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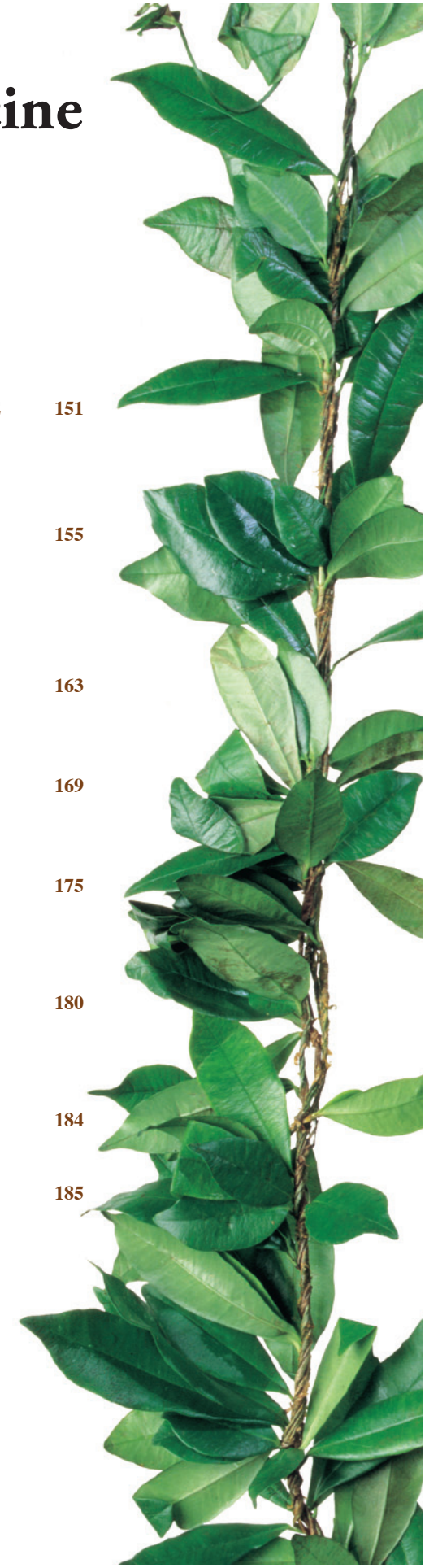

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Intranasal Corticosteroids and Central Serous Chorioretinopathy: A Report and Review of the Literature

Austin S. Nakatsuka MD; Hossein Nazari Khanamiri MD; Quy N. Lam BSc; and Jaafar El-Annan MD

Abstract

A 43-year-old male with a history of allergic rhinitis on chronic intranasal corticosteroids presented with complaints of a "black band" in his right eye visual field. On examination, he had subretinal fluid and lab tests and imaging studies including optical coherence tomography (OCT) and fluorescein angiography (FA) did not show any evidence of inflammatory, degenerative, or malignant process. He was diagnosed with central serous chorioretinopathy (CSCR). Symptoms improved and the subretinal fluid resolved after the discontinuation of intranasal corticosteroid medication. Intranasal corticosteroids are rarely associated with CSCR. Patients and providers should be aware of the potential risk of vision loss caused by intranasal corticosteroids.

Introduction

Central serous chorioretinopathy (CSCR) is a noninflammatory serous detachment of the neurosensory retina usually at the macula. The pathogenesis is not fully known but it is proposed to occur due to a combination of leakage from retinal pigment epithelium (RPE) and dysfunctional RPE ion-pump function. Strong evidence shows association with a high endogenous cortisol condition or exogenous corticosteroid use.[3-4] Local corticosteroid use in the form of topical creams has also been rarely implicated in the development of CSCR.[2,5-8] There are only a few reports of CSCR associated with using intranasal or inhaler corticosteroids. Intranasal steroid use is pervasive due to the widespread prevalence of allergic rhinitis and upper respiratory infections. Persistent allergic rhinitis is known to be associated with environments that are humid, such as Hawaii or other Pacific Islands, and the use of intranasal corticosteroid medications may be even more ubiquitous in these regions.[1] Of note, intranasal corticosteroid medications are now found over the counter which may contribute to their widespread use. Local side effects such as nasal irritation are generally well-known to patients and providers but the potential effects on vision are generally not known.[2] We report a case of central serous chorioretinopathy associated with intranasal corticosteroid use that resolved after corticosteroid discontinuation. We will also review the current literature for the association of intranasal corticosteroid use and CSCR to highlight the association of this rare ocular side effect to medical practitioners who may interact on a daily basis with individuals using intranasal or inhaler corticosteroids.

Report

A 43-year-old male with a past medical history of allergic rhinitis controlled with tiamcinolone acetonide (Nasacort™), an intranasal corticosteroid, presented with complaints of decreased vision in the right eye for 4 days. A review of systems was otherwise unremarkable. Best corrected visual acuity (BCVA) was 20/25 in the right eye and 20/25 in the left eye. Despite seemingly equal vision on examination, the patient was complaining of distorted vision and seeing a black "band-like" shadow located in the central visual field of the right eye. Intraocular pressure was within normal limits and visual fields were full in confrontation test. Slit lamp examination was unremarkable. Fundus exam revealed macular thickening due to clear subretinal fluid in the right eye. Optical coherence tomography (OCT), a non-invasive optical imaging modality, revealed subretinal fluid in the right eye and no fluid in the left eye (Figure 1). Fluorescein angiography, another imaging tool that utilizes fluorescence to highlight retinal vessels, revealed no delay in retinal perfusion (normal transit time), no macular or peripheral ischemia, and no signs of an inflammatory process such as vascular leakage in the macula (Figure 2). Blood pressure was within normal limits. Baseline laboratory studies including complete blood count (CBC) with differential, anti-nuclear antibody (ANA), and partial thromboplastin time with international normalized ratio (PT INR) were within normal limits. The patient was diagnosed as having central serous chorioretinopathy (CSCR). The only potential risk factor was identified as chronic use of over-the-counter intranasal corticosteroid. He also described himself as having type A personality. The patient was told to discontinue intranasal corticosteroid use. Subretinal fluid improved at 6 month follow-up examination and completely resolved at 12 months, when the patient reported resolution of his visual symptoms.

Discussion

We report a case of CSCR supposedly associated with chronic intranasal corticosteroid use. While there is no way to prove the causative connection between the development of serous retinal detachment and intranasal corticosteroid use, the resolution of subretinal fluid after discontinuation of corticosteroid is very suggestive, although subretinal fluid often resolves spontaneously even in non-corticosteroid associated CSCR. A Pubmed search of the English literature from 2000 to 2018 with the key words of "central serous chorioretinopathy", or "central serous retinopathy" AND "inhaled corticosteroids", or "intranasal corticosteroid" found reports of 11 cases of CSCR associated with inhaled corticosteroid use (Table 1). Four of these cases were due to oral inhaled corticosteroid and seven were due to intranasal inhaled corticosteroid.[5-8] In all cases, the subretinal fluid resolved after corticosteroid discontinuation.[8]

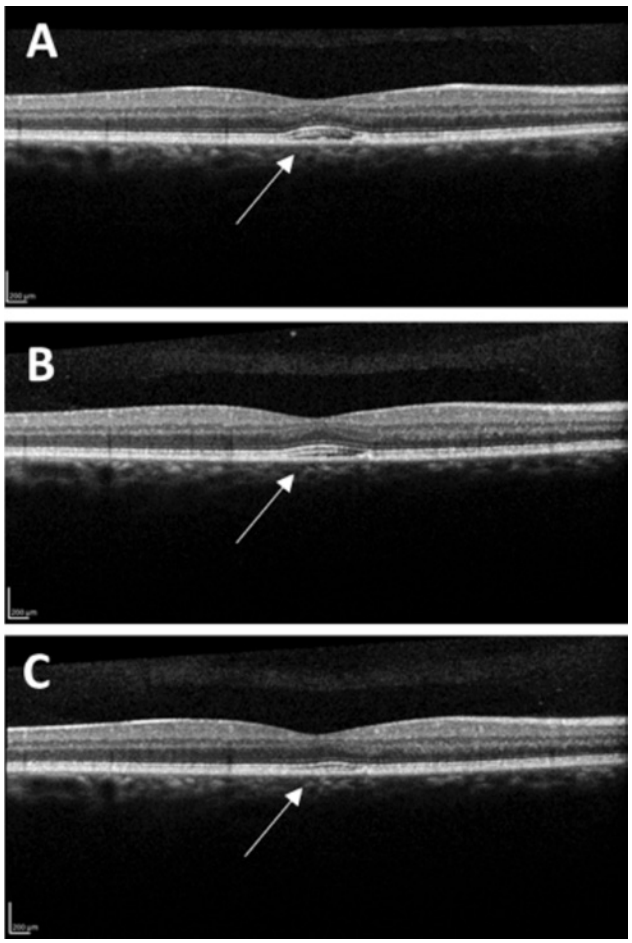

Figure 1. Optical coherence tomography image of the macula showing interval reduction of mild subretinal fluid (arrow) from presentation (A), to 6 month (B), and 12 month (C) follow-up examinations.

Figure 2. Intravenous Fluorescein Angiography shows normal transit time, no macular ischemia or peripheral ischemia, and no leakage.

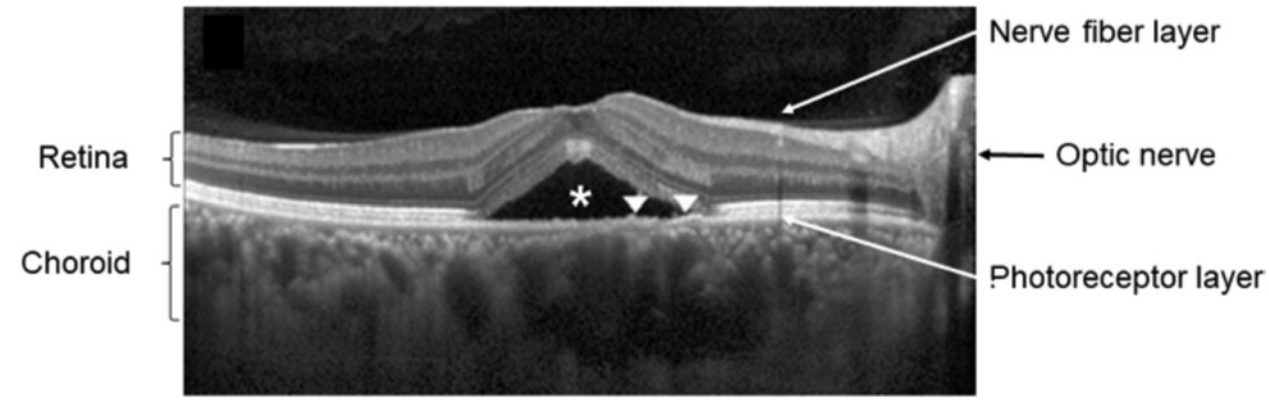

Figure 3. Optical coherence tomography of a patient with central serous chorioretinopathy showing thickened choroid and subretinal fluid. This is an OCT line scan through the fovea and shows subretinal fluid (asterisk) and abnormally thick choroid. Arrow heads indicate retinal pigment epithelium layer located between the retina and choroid. (Reproduced with permission and modifications under Creative Commons license from "Lee H, Bae K, Kang SW, Woo SJ, Ryoo NK, et al. Morphologic characteristics of choroid in the major choroidal thickening disease, studied by optical coherence tomography. PLOS ONE 2016;11(1):e0147139.)

Table 1. Case reports of CSCR associated with local steroid use (inhaled or topical)

CSCR and Steroids Case Report – Updated 09 Nov 2017											
Publishing Date	**Authors**	**Publishing Journal**	**Patient Age**	**Patient Sex**	**Affected Eye(s)**	**Initial visual acuity**	**Type of Treatment**	**Final Visual Acuity**	**CSCR Persistence**	**Type of Steroid**	**Steroid Administration**
Oct 2016	B Fardin, D J Weissgold	The British Journal of Ophthalmology	40	F	L	20/15 right, 20/20-2 left	steroid discontinuation, observation	20/15 right, 20/20 left	N	Fluticasone (glucocorticoid)	Oral inhaler
Oct-Dec 2013	Gunjan Prakash, Jain Shephali, Nath Tirupati, Pandey D Ji	Middle East African Journal of Ophthalmology	35	M	R	6/18	0.5% carboxymethylcellulose eye drops TID, observation	6/6	N	Dexamethasone (glucocorticoid)	Intranasal spray
Sep 2011	Andrew J. Kleinberger, MD, Chirag Patel, MD, Ronni M. Lieberman, MD, Benjamin D. Malkin, MD	The Laryngoscope	48	F	Both	no data	steroid discontinuation, observation	no data	N	Fluticasone (glucocorticoid)	Intranasal spray
Sep 2002	Lauren Y. Chan, Robert S. Adam, David N. Adam	The Journal of Dermatological Treatment	64	F	R	no data	steroid discontinuation, observation	no data	N	Betamethasone diproprionate (glucocorticoid)	Topical ointment
		The Journal of Dermatological Treatment	56	F	Both	no data	steroid discontinuation, observation	no data	N	Betamethasone diproprionate (glucocorticoid), Clobetasol diproprionate (glucocorticoid), Betamethasone valerate (glucocorticoid)	Topical ointment
Oct 1997	Robert Haimovici, MD, Evangelos S. Gragoudas, MD, Z]ay S. Duker, MD, Raymond N. Sjaarda, MD, Dean Eliott, MD	Ophthalmology	43	M	R	20/40 right, 20/25 left	steroid discontinuation, observation	20/40 right, 20/25 left	N	Betamethasone diproprionate (glucocorticoid)	Oral inhaler
			31	M	L	20/20 right, 20/25 left	steroid discontinuation, observation	20/15 right, 20/25 left	N	Triamcinolone acetonide (glucocorticoid)	Oral inhaler
			45	F	L	20/15 right, 20/40 left (corrected)	steroid discontinuation, observation	20/15 right, 20/30- left (corrected)	N	Fluticasone proprionate (glucocorticoid)	Intranasal spray
			47	F	Both	20/20 right, 20/20 left	continued use of steroids, observation	20/20 right, 20/20 left	Y	Beclomethasone diproprionate (glucocorticoid)	Oral inhaler
			24	M	R	20/60 right, 20/20 left	steroid discontinuation, observation	20/25+2 right, 20/20 left	N	Beclomethasone diproprionate (glucocorticoid)	Intranasal spray
			41	M	Both	20/20 right, 20/20 left	continued use of steroids, observation	20/20 right, 20/70 left	Y	Beclomethasone diproprionate (glucocorticoid)	Intranasal spray

CSCR is hypothesized to be caused by a defective retinal pigment epithelium (RPE) ion-pump function or increased vascular permeability of a thick and hypervascular choroid (pachychoroid) (Figure 3), the vascular layer located between the retina and outer coating of the eye, the sclera. The innermost layer of the choroid is called choriocapillaris which is composed of a network of capillary vessels. One of the many physiologic functions of the choriocapillaris is to supply oxygen and nutrients to the outer retina and to remove waste products. It has been postulated that corticosteroids enhance fibroblastic growth, leading to capillary fragility in the choroidal vessels and causing suboptimal choriocapillaris function. Another theory is that corticosteroids may also interfere with ion transport across the RPE.[9]

Although no direct causes of CSCR have been found, a strong association between CSCR and increased exogenous or endogenous corticosteroids as well as a stressful lifestyle and type A personality has been established.[10-11] The association between systemic corticosteroid use is documented frequently. However, even local corticosteroid use administered intranasally, orally inhaled, or placed topically may be linked to CSCR, as evidenced with our literature search. Like other similar cases, macular subretinal fluid in our patient resolved after cessation of intranasal corticosteroid, possibly indicating a diagnosis of CSCR related to intranasal corticosteroids. This patient had a self-described type A personality (a behavior pattern that was described in 1959 by two cardiologists as a complex in a person involved in a constant struggle to achieve success and has been linked to stress and coronary artery disease),[12] which may have predisposed him to development of CSCR, as well. The major components of type A personality are described as (1) a competitive drive (2) a sense of urgency (3) an aggressive nature 4) a hostile temperament.[13] It is hypothesized that constant and higher catecholamine drive in individuals with type A personality contributes to the multifactorial etiology of CSCR.

Our patient's symptoms improved and subretinal fluid resolved upon discontinuation of corticosteroid. Although CSCR is generally considered a benign condition with spontaneous resolution within 3-4 months in almost 80% of the cases, the subretinal fluid resorption is not universal and about one in five patient experience persistent subretinal fluid and vision loss lasting beyond 6 months.[8,11,14] Patients and primary providers should be aware of the potential visual consequences of what may be considered "benign low-dose" corticosteroid, especially in patients who may be otherwise prone for the development of CSCR. This has broad implications in Hawaii and other tropical regions where intranasal corticosteroid use is widespread due to greater incidence of exacerbated atopic conditions.[1]

Conflict of Interest

None of the authors identify a conflict of interest.

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Hawai‘i Concussion Awareness & Management Program (HCAMP): Impact

Nathan M. Murata PhD; Ross S. Oshiro MS, ATC; Troy Furutani MS, ATC;
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Abstract

Concussion, also referred to as mild traumatic brain injury (mTBI), is caused by a direct or indirect blow to the head or body causing the brain to move rapidly within the skull, resulting in immediate, but temporary, brain dysfunction. Developing awareness and promoting concussion education can reduce the number of short and long-term injuries associated with sports and non-sports related concussions in Hawai‘i. The purpose of this study was two-fold: (1) to describe the number of concussions in 67 Hawai‘i high school athletic programs using the ImPACT database; and (2) to describe which contact and collision sports had the highest rate of concussions in 67 Hawai‘i high schools. This was a retrospective study that described the number of concussions generated across school years 2010-2016, concussion data across 14 contact sports, and athletic exposure rating for the 14 contact sports. Data were analyzed and aggregated from a data-bank associated with the Hawai‘i Concussion Awareness and Management program. Findings suggest that for Hawai‘i high school student athletes' concussions increased from 2010-2013 with a gradual decrease from 2014-2016, specific sports had higher number of concussions (eg, football), and when evaluating concussion rate per 1000 exposures, girls' judo was the highest. These findings stress the need for continued data collection, monitoring, education/awareness and research that will reduce the number of concussions among student athletes.

Abbreviations

AE - Athlete Exposure
AHCTP - Athletic Health Care Trainers Program
AT - Certified Athletic Trainer
CMP - Concussion Management Program
HCAMP - Hawai‘i Concussion Awareness and Management Program
HIDOE - Hawai‘i Department of Education
ImPACT - Immediate Post-Concussion Assessment and Cognitive Test
KRS - Department of Kinesiology and Rehabilitation Science, College of Education, University of Hawai‘i at Manoa
mTBI - mild traumatic brain injury
SY - School Year

Introduction

Concussion, also referred to as mild traumatic brain injury (mTBI), is caused by a direct or indirect blow to the head causing the brain to move rapidly within the skull, resulting in immediate, but temporary, brain dysfunction. This damage to the brain can result in a variety of physical, neurocognitive, and behavioral symptoms such as alteration of consciousness, headache, blurry or double vision, irritability, slowed reaction times, and insomnia.[1] Repeated concussions without proper intervention tend to result in further damage and long-term brain dysfunction. For example, second impact syndrome, can lead to increased cerebral swelling and intracranial pressure, which may be fatal.[2] In the United States, it is estimated that there are 3.8 million sports-related concussions annually.[3] Despite the potential threat that concussions pose, many go unreported. Studies have shown that student-athletes have a negative bias and attitude toward reporting injuries out of fear of being taken out of play.[4] Other studies suggest that student-athletes are unaware of signs and symptoms indicative of a concussion and therefore do not report.[5]

Background

Hawai‘i has one public school system for the entire state with at least one Certified Athletic Trainer (AT) assigned to each public high school. The Hawai‘i Department of Education (HIDOE) has been tracking injuries for student athletes since the inception of the athletic health care trainer program in 1993. Since the 2007-2008 school year (SY 2008), HIDOE started monitoring and tracking concussions from high school student athletes statewide. Tracking included concussion management protocols and assessment tools like Grading Systems,[6,7] Standard Assessment of Concussion,[8] and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT).[9]

In SY 2010, after the publications of the 2004 National Athletic Trainers Association (NATA) position statement, 2004 and 2008 Concussion Consensus Statements, and with the myriad of concussion protocols and assessment tools utilized by Hawai‘i high schools, a standardized concussion management program (CMP) was established through the collaboration of the Department of Health's Neurotrauma Supports, University of Hawai‘i, College of Education, Kinesiology & Rehabilitation Science Department and HIDOE Athletic Health Care Trainers Program. This collaboration resulted in the Hawai‘i Concussion Awareness & Management Program (HCAMP) which was established in SY 2011 with the mission of providing Hawai‘i high school athletic programs, physically active community and medical community with evidence-based research education, support and resources to manage concussions, and to standardize concussion management in Hawai‘i high schools. The goals for HCAMP include: (1) utilize ImPACT for baseline and post injury neurocognitive testing, (2) provide a neuropsychologist to review all post injury tests, (3) coordinate the management of the CMP, and (4) provide concussion education and awareness to athletic trainers, coaches, health care professionals, parents, school personnel and students.

In order for HCAMP to fulfill its goal of coordinating a CMP, the ImPACT database for tracking the number of baseline and post injury 1 tests administered by each high school was implemented. With ImPACT being used as one part of the CMP, HCAMP utilized the Balance Error Score System (BESS) to assess postural stability, the Sideline Assessment of

Concussion (SAC) for field/court mental status assessments, and a stepwise gradual return to play plan. A standardized protocol was established for baseline, follow up assessments and the stepwise return to play. Annual concussion monitoring is important to quantify the number of student athletes with a concussion each year and to identify sports with a highest rate of concussions. When sports with the highest concussion rate are identified, administrators, officials, and other stakeholders can use the information to support competition rule changes and practice guidelines directed at lowering the rate of concussions. The purpose of this study was: (1) To describe the number of concussions in 67 Hawai'i high school athletic programs using the ImPACT database; and (2) to describe which contact and collision sports had the highest rate of concussions in 67 Hawai'i high schools.

Methods

To conduct this study, approval from the University of Hawai'i at Manoa Institutional Review Board and the HIDOE Data Governance and Analysis branch was obtained. Signed assent and consent forms were distributed and obtained prior to the student athletes starting their season.

This retrospective study described the number of concussions by sport and concussion injury rate per 1000 athlete exposures for school years from 2010 to 2016 in 14 contact/collision sports. ImPACT (ImPACT Applications, Inc., San Diego, CA., Version 2.0 to 3.2) is a computerized testing battery tool that provides healthcare professionals with objective measures of neurocognitive function that are useful in assessing and managing concussions in individuals 12-59 years.[10-12] ImPACT baseline assessments were administered prior to the start of each of the 14 collision and contact sports (boys baseball, girls softball, boys basketball, girls basketball, boys judo, girls judo, boys soccer, girls soccer, boys volleyball, girls volleyball, boys wrestling, girls wrestling, co-ed cheerleading, and co-ed football) for ninth and eleventh grade student athletes. A proprietary formula using data from the battery of tests produces four composite scores that measure visual design memory, word memory, processing speed and reaction time. When an individual is diagnosed with a concussion, the composite scores are compared to preseason baseline or norms established by ImPACT.

When a student athlete was suspected of a concussion, the athletic trainer would conduct a series of tests on the sideline and in the clinic/training room. When the diagnosis of a concussion was made by the athletic trainer, the concussed student athlete was referred to a licensed health care provider for follow up care. Within a recommended timeframe of 0-72 hours an ImPACT post-test 1 was administered to the concussed student athlete by an athletic trainer and the results were interpreted by a neuropsychologist. If applicable, further testing and treatments were administered throughout recovery. For the purpose of this study, HCAMP identified the number of concussed student athletes when the individual was administered an ImPACT post-test 1.

To measure concussion injury rate, athlete exposure (AE) was calculated by multiplying the number of players participating by the estimated number of practice days and number of games played for each sport.[13] One AE is equal to one student athlete participating in a practice or game. Player participation data were obtained from HIDOE player eligibility database. Number of practices and games was estimated using the Hawai'i High School Athletic Association start date calendar and high school leagues games schedules. Concussion injury rate is defined as the total concussions per sport divided by total athlete exposure for the season multiplied by 1000.[14] Concussion totals were obtained using the ImPACT database with an administered post-test 1 counted as one concussion. Moreover, the percent difference in concussion injury rate across selected years was also reported. This percent difference in concussion injury provided insight into the how much the injury rate varied between and across years.

Results

The number of concussions per year in 14 contact and collision sports were reported for 67 Hawai'i high schools in Figure 1. During 2010-2011 there were 424 concussions and the number of concussions increased in 2011-2012 through 2013-2014 to reach a total of 1262. A decrease in number of concussions was noted during 2014-2015 (947) and 2015-2016 (911). The average number of concussions across all 14 contact and collision sports during the 2010-2016 is reported in Figure 2. Football continues to be the sport with the highest number of concussions, followed by girls' soccer, boys' wrestling, girls' basketball, and cheerleading. Further analysis of contact and collision sports across sex was also reported (Table 1). A closer examination of concussion data by sex found increases in number of concussions across both sex and sports in all 14 sports during the 2010-2011, 2011-2012 and 2012-2013 school years. A decreasing trend in number of concussions is noted starting in 2013-2014. Athlete exposure (AE) per sport can be found in Table 2. Data show a range of AE from 20,430 (Girls Judo) to 243,052 (Football). These exposure rates provide an indication to the number of AEs as experienced from student athletes across selected sports. The concussion injury rate per 1,000 AE across the same 14 sports from 2010-2016 was analyzed in Figure 3. The purpose of reporting this data was to normalize the number of concussions by sport and to identify the sports with the greatest rate of sustaining a concussion. Specifically, highlighted was girls' judo (2.18/1000AE) as having the highest concussion rate followed by football (1.67/1000AE). Perhaps even more interesting was the decrease in concussion rate reported between 2013-2014 in all sports, except for volleyball (Table 3). More specifically, Table 4 demonstrated the percent difference in concussion injury rate in which a decrease was noted during the 2013-2016 in 13 out of 14 reported sports.

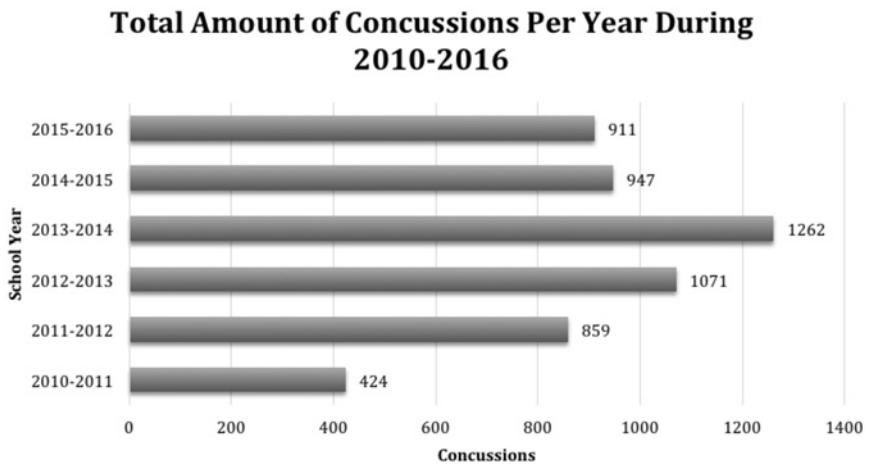

Figure 1. Total Number of Concussions Reported by 67 Hawai'i High School Athletic Programs from SY 2010 to 2016.

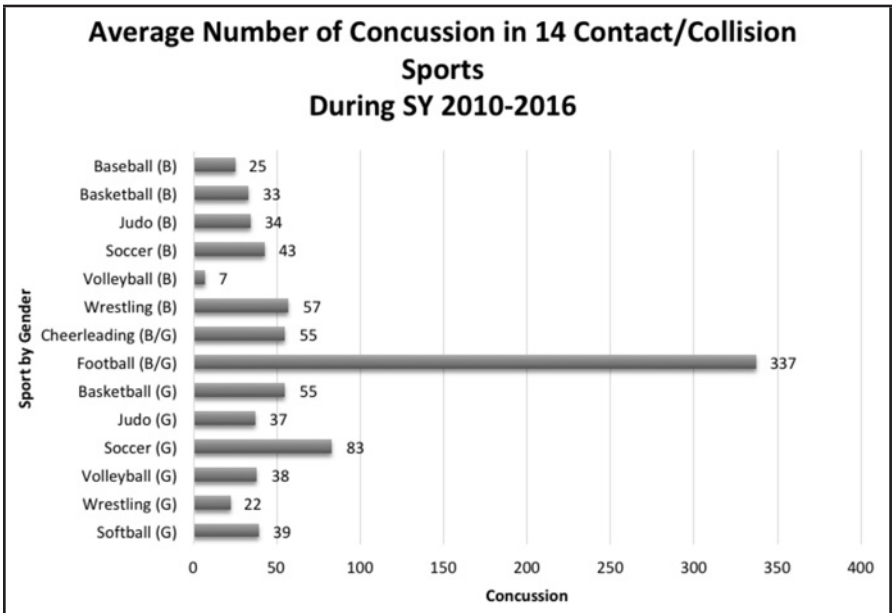

Figure 2. Average Number of Concussions for Hawai'i High School Students per Sport by Sex from SY 2010 – 2016.

Table 1. Number of Concussions per Year by Sport among Hawai'i High School Students During SY 2010 – 2016						
	2010-2011	**2011-2012**	**2012-2013**	**2013-2014**	**2014-2015**	**2015-2016**
Baseball (B)	4	10	38	37	31	32
Basketball (B)	9	10	39	72	44	26
Judo (B)	9	21	38	48	49	40
Soccer (B)	19	24	50	59	53	55
Volleyball (B)	1	1	8	6	11	13
Wrestling (B)	33	33	78	79	56	65
Cheerleading (B/G)	27	45	66	86	53	50
Football (B/G)	198	282	441	436	357	309
Basketball (G)	22	24	58	100	54	70
Judo (G)	17	28	40	57	39	40
Soccer (G)	50	42	106	130	78	89
Volleyball (G)	16	14	44	56	51	45
Wrestling (G)	9	11	23	33	17	36
Softball (G)	14	17	42	63	54	41

Table 2. Athlete Exposure* by Year and Sport							
	2010-2011	**2011-2012**	**2012-2013**	**2013-2014**	**2014-2015**	**2015-2016**	**Average/**
Sport							
Baseball (B)	**	82745	87750	89440	84435	85995	86073
Basketball (B)	72345	73385	73255	75725	71435	69810	72659
Judo (B)	35580	33000	34020	26880	31320	29820	31770
Soccer (B)	67080	64545	66820	69940	69030	81055	69745
Volleyball (B)	42965	51610	50830	53170	61165	64285	54004
Wrestling (B)	65910	62465	59540	61360	58565	52260	60017
Cheerleading (B/G)	70920	80730	84780	73260	58860	51390	69990
Football (B/G)	247590	248150	245140	248150	235480	233800	243052
Basketball (G)	62855	60710	60385	62140	55315	59670	60179
Judo (G)	21300	20580	19980	19080	19500	22140	20430
Soccer (G)	87880	87165	91455	96590	86775	84175	89007
Volleyball (G)	85085	82355	89180	91780	81835	86320	86093
Wrestling (G)	26325	27170	25090	24765	26065	29250	26444
Softball (G)	80275	79625	83330	83330	74165	77480	79701
Average/Year	74316	75303	76540	76829	72425	73389	

*Athlete Exposure was calculated by player participation number multiplied by the estimated number of practice days and number of games played.[13] Player participation data was obtained from HIDOE player eligibility database. Number of practices and games were estimated using practice start dates, estimated practice days, game schedules, and playoff schedules for each sport. One AE is equal to one athlete participating in a practice or game. ** Total Participation not reported.

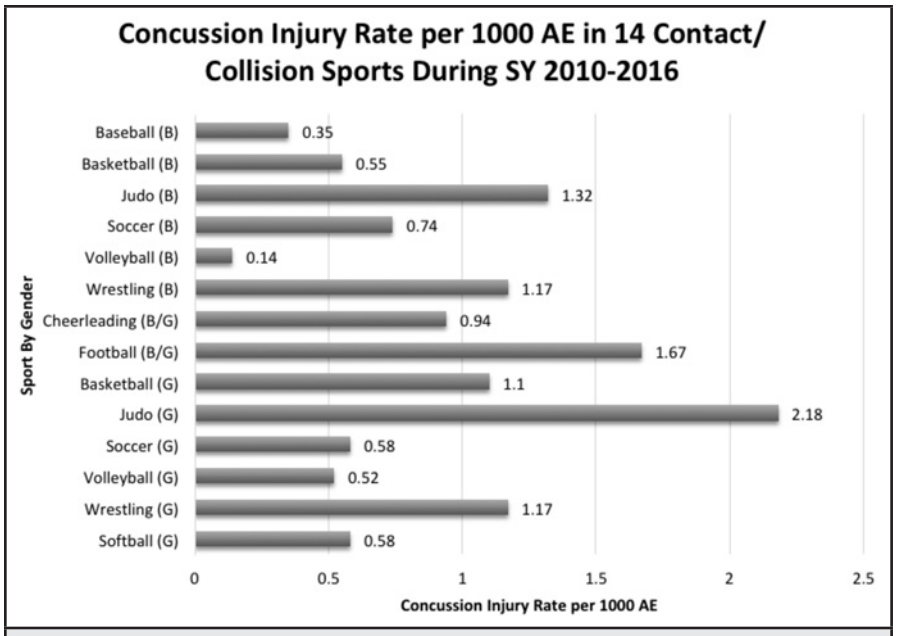

Figure 3. Concussion Injury Rate per 1000 AE for 14 Contact and Collision Sports Using Aggregate Totals for SY 2010 - 2016.

B=boys, G=girls, B/G=co-ed. Football (B/G) recorded 13 girl post test 1 during this period. Cheerleading (B/G) recorded 11 boys post test 1 during this period.

Table 3. Concussion Injury Rate per 1000 AE for 14 Contact and Collision Sports During Each SY 2010 – 2016.

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Baseball (B)	*	0.18	0.43	0.41	0.37	0.37
Basketball (B)	0.12	0.42	0.53	0.95	0.62	0.37
Judo (B)	0.25	0.82	1.12	1.79	1.56	1.34
Soccer (B)	0.28	0.64	0.75	0.84	0.77	0.68
Volleyball (B)	0.02	0.17	0.16	0.11	0.62	0.20
Wrestling (B)	0.50	0.96	1.312	1.29	0.96	1.24
Cheerleading (B/G)	0.38	0.58	0.78	1.17	0.90	0.97
Football (B/G)	0.80	1.59	1.80	1.76	1.52	1.32
Basketball (G)	0.35	0.51	0.96	1.61	0.98	1.17
Judo (G)	0.80	2.04	2.00	2.99	2.00	1.81
Soccer (G)	0.57	0.93	1.16	1.35	0.90	1.06
Volleyball (G)	0.19	0.29	0.49	0.61	0.18	0.52
Wrestling (G)	0.34	0.99	0.92	1.33	0.65	1.23
Softball (G)	0.17	0.38	0.50	0.76	0.73	0.53

Concussion injury rate is defined as the total concussions per sport divided by total athlete exposure for the season multiplied by 1000. *Total number of participants not reported.

Table 4. Percent Difference in Concussion Injury Rate During SY 2013-2016.					
	Peak Year 2013-2014	2014-2015	Percent Change from 2013-2014	2015-2016	Percent Change from 2013-2014
Baseball (B)	0.41	0.37	-11%	0.37	-10%
Basketball (B)	0.95	0.62	-35%	0.37	-61%
Judo (B)	1.79	1.56	-12%	1.34	-25%
Soccer (B)	0.84	0.77	-9%	0.68	-20%
Volleyball (B)	0.11	0.62	452%	0.20	79%
Wrestling (B)	1.29	0.96	-26%	1.24	-3%
Cheerleading (B/G)	1.17	0.90	-23%	0.97	-17%
Football (B/G)	1.76	1.52	-14%	1.32	-25%
Basketball (G)	1.61	0.98	-39%	1.17	-27%
Judo (G)	2.99	2.00	-33%	1.81	-40%
Soccer (G)	1.35	0.90	-33%	1.06	-21%
Volleyball (G)	0.61	0.18	-71%	0.52	-15%
Wrestling (G)	1.33	0.65	-51%	1.23	-8%
Softball (G)	0.76	0.73	-4%	0.53	-30%
Average Concussion rate/year	1.21	0.91	-25%	0.92	-24%
Adverage Number of Concussion/year	1262	947	-25%	911	-28%

Discussion

HCAMP data suggest that over the span of six school years, the number of concussed student-athletes rose across all sports. A closer examination of data showed a dramatic increase in concussions during SY 2012, SY 2013 and SY 2014. Part of this increase may stem from improved reporting and increased awareness of the severity of concussion and its potential long-term negative effects. During this time period, the State of Hawai'i passed Act 197, which required annual concussion training for coaches, administrators, faculty, staff, sports officials, AT, parents, and athletes. This law provided the catalyst for long term concussion awareness, education, and training. Act 197 also required all Hawai'i high schools to implement a mandatory removal from participation if a concussion is suspected, and medical clearance from a licensed health care provider prior to return to participation. In 2016, Act 197 was amended to Act 262. The amendment included support for neurocognitive testing in high school athletics and also implemented concussion education and awareness programs for youth athletics.

Also of note, since 2010, HCAMP has provided concussion education and awareness training to high school coaches, youth sports groups, and community organizations. Post-attendance surveys indicated that attendees had a better understanding of concussions and could identify signs and symptoms of a concussion, knew what to do, and who to contact if someone sustained a concussion. Other methods of providing concussion education and awareness included concussion awareness videos, PowerPoint presentations, and literature specifically designed to address the needs of and management protocol for concussed high school student athletes in Hawai'i. These tools were used during faculty meetings as well as parent and team pre-season meetings. Therefore, the advent of Act 197 and HCAMP's efforts to raise awareness through education programs, may have led to an increase in recognizing concussions.

As noted, concussions across all 14 sports increased since 2010, gradually leveling off in SY 2014. Concussion numbers decreased by 25% in SY 2015 and 38% in SY 2016. A potential explanation for this may be a change in concussion reporting behavior in student athletes. It has been reported that student athletes do not want to report concussions because of fear of losing participation time, receiving pressure to not report from parents, coaches, and fans, and not wanting to disappoint teammates.[4,15,16] The student athlete's education and awareness curriculum is complex because there needs to be less emphasis placed on policy and more emphasis on the potential consequences of playing with a concussion and encouraging a supportive environment for players and teammates to report suspected concussions.[17] HCAMP continues to educate coaches and parents on creating a safe reporting environment, asking student athletes to take care of themselves, to be aware of the ramifications of not reporting their concussion, and finally asking teammates to take care of each other and to report a teammate who may appear to have a concussion.

At HCAMP Concussion Education and Awareness Clinics a commonly asked question by parents is "which sport is the most dangerous for having concussions?" When investigating this question, HCAMP data demonstrated some unique results. A national study demonstrated that football had the highest rate of concussions.[14] In Hawai'i high schools, girl's judo had the highest rate of concussion out of the 14 contact and collision sports that HCAMP reported. This is unique data in that Hawai'i is the only state where judo is a sanctioned interscholastic

sport. It also makes an argument that concussions are not just a football issue as the media portrays.

During SY 2014 the highest concussion rate was reported and the subsequent years SY 2015 and SY 2016 the concussion injury rate decreased (Table 4). Thirteen out of 14 sports reported a decrease in concussion rates during the 2014-2016 period. The cause for the decrease in concussion rate remains unclear. One plausible explanation maybe the unwillingness for student athletes to report their concussion. A second explanation may be the implementation of contact limitation in practice and the introduction of game rule changes designed to reduce the risk of head injuries. For instance, decrease in football concussion injury rate may be due to the introduction of several game rule changes such as making it illegal to have a player's head the initial point of contact during a tackle. In 2014, football also introduced practice guidelines that limit the minutes of contact time to 30 minutes a practice and no more than 90 minutes per week.[19] Another example of rule changes designed to reduce concussion rate was seen in the SY 2017 judo season. A rule change was implemented where the double knee throw maneuver was made illegal in matches. This maneuver is considered a high-risk maneuver potentially placing the participant's head as the initial point of contact with the mat. This rule change was initiated by school athletic directors, Judo coaches and ATs after viewing the concussion injury data. These specific rules and policy changes require more research to determine their effect on concussion rates.

This monitoring of concussions serves to enhance HCAMP's ability to provide the most effective and current information available to ATs, coaches, school administrators, educators, parents, and students. Moreover, HCAMP ATs, administrators and coaches need to continue to monitor concussion data to possibly incorporate methods to reduce the rate of concussions in sports. It is therefore imperative that HCAMP and related entities continue to pursue education, research and evidence-based practices in order to reduce and minimize the number of concussions received by student athletes.

Limitations

HCAMP has identified three limitations to this study. First is the possibility that concussions may be overestimated when using concussion post-test 1. When the ImPACT software was implemented, there were reported cases where student athletes with symptoms that resembled a concussion were administered the ImPACT test even if those symptoms may have been caused by another condition such as dehydration or heat illness. Similarly, some high schools were using ImPACT as a diagnostic tool when it is not. Consequently, with continuing education on the appropriate use of ImPACT and additional concussion assessment tools, the percent of cases where ImPACT was used as a differential diagnostic tool is minimum. The second limitation is that with AE, player participation was estimated due to the unrealistic nature of obtaining daily attendance of practice and exact number of players participating during competition. More specifically, HCAMP does not know how many days a student athlete missed per sport. To obtain accurate AE, athletic teams could record daily practice attendance and player participation during games as part of a season report. The third limitation is the unwillingness or lack of intent of student athletes in reporting concussions, that may decrease the number of concussions being self-reported to AT. Because of the potential time loss from participation and pressure from coaches, parents, peers; an athlete may hide concussion symptoms from AT and health care professionals.

Conclusion

In 2003, the CDC reported to congress that mTBI is a public health problem.[20] In reaction to this statement every state in the United States has a concussion law. HCAMP education and awareness efforts and the advent of Hawai'i concussion law, Act 197, helped raise awareness of concussions, increase the number of concussions assessed, and helped shape a uniform concussion management protocol adopted in Hawai'i high schools. Moreover, a collaborative-partnership between HCAMP, AHCTP, HIDOE, local hospitals, and stakeholders has helped address the health and safety of our student-athletes involved in interscholastic, community, and recreational sports.

Percent differences in concussion injury rates noted a decrease since SY 2013 to SY2016. Rule changes, less contact time during practice, and improved recognition of concussion signs and symptoms are possible reasons for the decrease in concussion injury rate. However, despite these promising data in concussion decreases, caution is necessary when interpreting the data.

Because of the nature of contact and collision sports, concussions cannot be entirely prevented in sports; however, the rate of concussions may be reduced through policy changes, education and awareness, as well as concussion monitoring. HCAMP concussion monitoring has identified sports with the highest number of concussions and the highest concussion rates. This is valuable information for the athletic community and stakeholders in making informed decisions on the safety of sports. Concussion rate information could also help in deciding and investigating possibilities in making a particular sport safer. Through public and athletic policy changes aimed at reducing concussion rates, education, and raising awareness in concussion, HCAMP has a role in continuing to providing evidence based information and resources to coaches, parents, school administrators, and educators.

Conflict of Interest

None of the authors identify a conflict of interest.

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Staphylococcus aureus Antibiotic Susceptibilities in Infections in an Outpatient Dermatology Office on O'ahu

Kimberly R. Theos DO, MS; Kory M. Johnson BA; and Douglas W. Johnson MD

Abstract

Staphylococcus aureus *is a pathogen that causes skin and soft tissue infections (SSTIs) in dermatology patients. There is an increasing rate of methicillin-resistant* S aureus *(MRSA) reported in the dermatology literature since 1987. This report profiles the antibiotic susceptibilities of methicillin-sensitive* S aureus *(MSSA) and MRSA in an outpatient office in Hawai'i. This is a retrospective study done by chart review from 2012 to 2014. Demographics, anatomical site of infection, clinical diagnoses and antimicrobial susceptibility patterns were analyzed and compared. Of the 66 samples, 57% were males and 43% were females.* S aureus *was more commonly found in impetigo, folliculitis, furuncles and secondarily infected psoriasis and more commonly located on the extremities. MSSA accounted for 73% (48) of the cases and MRSA accounted for 27% (18) of the cases. The antibiotics most effective against all* S aureus *cultures for outpatients were linezolid (100%), trimethoprim sulfamethoxazole (95%) and tetracyclines (94%). Linezolid (100%), trimethoprim sulfamethoxazole (100%) were most effective against MRSA isolates. Our* S aureus *and MRSA antimicrobial susceptibility results are similar to the local Hawai'i outpatient antibiogram collected from a large private laboratory in Hawai'i in 2014 and the current Infectious Disease Society of America guidelines. This study may be helpful in guiding empiric treatment of SSTIs suspected to be caused by* S aureus.

Keywords

Staphylococcus aureus, *methicillin-sensitive* S aureus, *methicillin-resistant* S aureus, *antimicrobial susceptibility, dermatology, outpatient, Hawai'i*

Abbreviations

CDC = Centers for Disease Control and Prevention
DLS = Diagnostic Laboratory Services, Inc
IDSA = Infectious Disease Society of America
MRSA = methicillin-resistant S aureus
MSSA = methicillin-sensitive S aureus
OD QMC = Outpatient Dermatology Office from Queen's Medical Center
SSTIs = skin and soft tissue infections

Introduction

Staphylococcus aureus is a common pathogen implicated in a variety of skin and soft tissue infections (SSTIs) seen in the dermatology setting. The most common STTIs seen are impetigo, cutaneous abscess, cellulitis, furuncle, carbuncle, folliculitis, secondary infections in psoriasis and various secondarily infected dermatoses. Infections can be caused by methicillin-sensitive *S aureus* (MSSA) and methicillin-resistant *S aureus* (MRSA). MRSA can be further classified as community associated (CA-MRSA) or health care associated (HA-MRSA). CA-MRSA and HA-MRSA are genetically, epidemiologically and phenotypically different. The Centers for Disease Control and Prevention (CDC) distinguishes the two strains as follows:

CA-MRSA infection is classified as community associated if it develops in an individual without a history of MRSA isolation or if a positive culture is obtained in the outpatient setting or within 48 hours of hospitalization.[1]

HA-MRSA infection is identified when MRSA is isolated from a patient within 48 hours of hospitalization with risk factors for resistant infection including; dialysis, previous colonization, surgery during the past year; a permanent medical device or catheter; or hospital, hospice or nursing home admission.[1]

Prior to the 1990s, MRSA was uncommon outside of the health care environment.[2] Over the past 15 years, there has been a worldwide epidemic of CA-MRSA SSTIs.[2] A comprehensive literature review and clinical update published in 2017 showed that during the 2000s' there have been increasing rates of CA-MRSA widely reported in the United States and Canada.[3] The same review reported increasing rates of CA-MRSA while HA-MRSA is generally declining.[3]

MRSA was first isolated from dermatology outpatients in 1987.[4] From 1988 to 1996 the rates of MRSA in two dermatology clinics in Texas from all patients rose from 1.5% to 11.9%.[5] More recently, there have been several other reports of MRSA in the outpatient dermatology setting with higher rates ranging from 21%-35.7%.[6-9] In one of the larger retrospective cases series done in the dermatology setting, the rate of MRSA significantly increased by 17% during 2008-2010 from the previous 3 years reviewed.[8]

S aureus typically causes cutaneous abscesses involving the lower extremities but can involve the upper extremities, abdominal wall and face.[8] CA-MRSA skin lesions commonly present as an erythematous abscess or furuncle with or without surrounding cellulitis.[10] Purulent cellulitis is more likely to be caused by CA-MRSA.[3] Predominant sites of infections caused by HA-MRSA involve the respiratory tract, urinary tract, bloodstream and postsurgical sites.[3]

Before the emergence of MRSA, antibiotic selection was less challenging, as cephalosporins were an appropriate choice for most presumed *S aureus* infections. One way MRSA differs from MSSA is its resistance to penicillin, which is termed methicillin or oxacillin resistant.[3] Susceptibility to clindamycin, trimethoprim sulfamethoxazole and tetracyclines are usually retained in CA-MRSA.[3] In contrast, HA-MRSA is highly resistant to most oral antibiotics. Most hospitals now utilize a monthly-updated antibiogram that lists all of the culture results for the community in an effort to guide empiric treatment for both outpatient and inpatient infections. This is a helpful resource for clinics although cultures are routinely used to guide therapy in SSTIs given changing antimicrobial resistance patterns.

Given these findings, it is imperative that dermatologists

and other health care practitioners are aware of the current antimicrobial susceptibility profile to effectively treat patients with *S aureus* infections. To our knowledge there are no current studies reporting rates of *S aureus* antibiotic susceptibilities in the Hawai'i dermatology clinic setting. The purpose of this study is to investigate the antibiotic susceptibility profiles of *S aureus* isolates in Hawai'i from a dermatology office to better guide empiric antibiotic therapy in the outpatient setting in Hawai'i.

Methods

This was a retrospective observational study analyzing *S aureus* isolates collected from patients seen at the dermatology clinic located on the campus of Queen's Medical Center in Honolulu, Hawai'i. The Queen's Medical Center Research and Institutional Review Committee (RA-2018-035) approved this study. Chart review was done to identify patients with positive *S aureus* cultures. The first *S aureus* positive culture was identified on March 29, 2012 and the last one recorded was October 7, 2014. Antibiotic susceptibility reports for the cultures were retrieved from the established laboratory account for this clinic called Diagnostic Laboratory Services, Inc (DLS) located on the campus of Queen's Medical Center in Honolulu, Hawai'i. DLS is a large private laboratory that serves all of Hawai'i, Guam and Saipan and provides local antibiograms. Antibiotic susceptibility testing was done using the DLS protocol using the Vitek 2 system and for MRSA using the agglutination with penicillin binding protein. Clindamycin resistant testing is also done with the Vitek 2 system or the D-zone test using the Kirby Bauer method. Per the DLS protocol, the Kirby Bauer disk diffusion test is a secondary test used if the organism does not grow. Demographic data collected for this study included patient age, gender, anatomical site of infection and clinical diagnosis by chart review. MRSA susceptibility patterns from our outpatient dermatology clinic were compared with the DLS outpatient antibiogram for Hawai'i in 2014[11] and Hawai'i outpatient data collected from the State of Hawai'i Antimicrobial Resistance Project (SHARP) during 2000-2002.[12] The SHARP study collected data from two large private clinical laboratories that serve over 85% of the population of Hawai'i.

Results

We analyzed 66 *S aureus* cultures from 63 patients. One patient had four cultures obtained at different office visits. There were 36 males and 27 females (Figure 1). Age distributions of all *S aureus* cultures are represented in Figure 2. Thirteen percent of cultures were obtained from children age 17 and under, and 87% were obtained from adults 18 years and older.

Of the 66 *S aureus* samples, 73% (48) were MSSA and 27% (18) were MRSA. There were only three MRSA cultures in the pediatric age group and the remaining 15 were in the adult age group.

Antibiotic susceptibilities were available in all 66 cases. Susceptibility patterns for all *S aureus* (MSSA and MRSA) cultures are represented in Table 1. The antibiotic susceptibility patterns

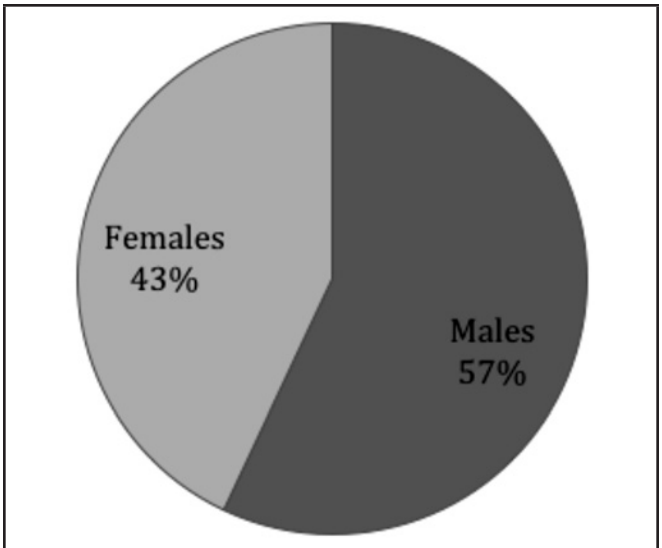

Figure 1. *S aureus* Cultures by Patient Sex.

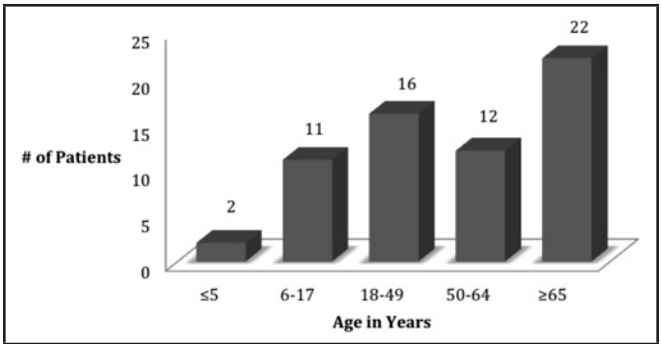

Figure 1. *S aureus* Cultures by Patient Age Groups.

Table 1. Antibiotic Susceptibility Pprofile of All *S aureus* Isolates (MSSA and MRSA) Collected from OD QMC.

Antibiotic	Percentage (n)
Erythromycin	65 (43)
Oxacillin	73 (48)
Cefazolin	73 (48)
Ciprofloxacin	83 (55)
Moxifloxacin	85 (56)
Clindamycin	86 (57)
Tetracycline	94 (62)
Trimethoprim sulfamethoxazole	95 (63)
Vancomycin	100 (66)
Linezolid	100 (66)
Nitrofurantoin	100 (66)
Rifampin	100 (66)
Gentamicin	100 (66)

n = number
OD QMC = Outpatient Dermatology Office at Queen's Medical Center, Honolulu, HI

are as follows: erythromycin (65%), oxacillin (73%), cefazolin (73%), ciprofloxacin (83%), moxifloxacin (85%), clindamycin (86%), tetracycline (94%), trimethoprim sulfamethoxazole (TMP-SMX) (95%), vancomycin (100%), Linezolid (100%), nitrofurantoin (100%), rifampin (100%) and gentamicin (100%).

The susceptibility profiles in Table 1 show that the most effective antibiotics for all *S aureus* (MSSA and MRSA) SSTIs is linezolid followed by trimethoprim sulfamethoxazole and tetracyclines. Of the total *S aureus* isolates tested from our clinic, clindamycin had a susceptibility of 86%.

MRSA susceptibility profile for the 18 cases is demonstrated in Table 2. The antibiotic susceptibility patterns are as follows: erythromycin (22%), ciprofloxacin (56%), moxifloxacin (61%), clindamycin (78%), tetracycline (78%), trimethoprim sulfamethoxazole (TMP-SMX) (100%), vancomycin (100%), linezolid (100%), nitrofurantoin (100%), rifampin (100%) and gentamicin (100%).

Linezolid and trimethoprim are 100% susceptible against MRSA and could be used as first-line treatment (Table 2). The susceptibility of MRSA to clindamycin and tetracycline's was less at 78% each supporting its potential use as a therapeutic second-line agent. Although all *S aureus* and MRSA cultures were susceptible to vancomycin and gentamicin, their use is mainly for inpatients and not discussed here. Refer to the discussion section regarding the current antibiotic recommendations per IDSA guidelines.

Clinical diagnoses were determined by a board certified dermatologist and were available for only 54 of our patients by chart review. Twelve of the 66 *S aureus* cultures had no confirmed diagnoses and were not included. The term "infected" has been used for some of the clinical diagnoses since these were secondarily infected and therefore warranted a culture. Impetigo represented 13% of the *S aureus* infections. Folliculitis, furuncles and secondarily infected psoriasis each represented 7% of the cases. Abscesses and secondarily infected nummular eczema each represented 6% of the cases. Infected ulcers, cellulitis, paronychia, infected actinic keratosis, infected cutaneous horn, infected trauma site, infected squamous cell carcinoma, infected lichen simplex chronicus and conjunctivitis each represented less than 4% as shown in Table 3.

MRSA was implicated in 22% of secondary infections in psoriasis, 17% of folliculitis, 11% of furuncles, 11% of unknown diagnoses and 6% each for infected ulcers, cellulitis, abscesses with cellulitis, impetigo, infected cutaneous horn and secondary infections in atopic dermatitis and dermatitis (Table 3).

Table 2. MRSA Susceptibility Patterns in Hawai'i Settings.

Susceptibility %	OD QMC 2012-2014 n = 18	DLS Outpatient Data for Hawaii in 2014 n = 1641	Hawai'i Outpatient Data 2000-2002* n = 5135
Erythromycin	22	17.5	52
Ciprofloxacin	56	NR	NR
Moxifloxacin	61	71	NR
Tetracycline	78	95	84
Clindamycin	78	74	69
Trimethoprim Sulfamethoxazole	100	92	96
Vancomycin	100	100	100
Linezolid	100	100	NR
Nitrofurantoin	100	100	NR
Rifampin	100	100	97
Gentamicin	100	NR	NR

NR = Not Reported. n = number. OD QMC = Outpatient Dermatology Office at Queen's Medical Center. DLS = Diagnostic Laboratory Services. *SHARP study during 2000-2002.

Table 3. Clinical Diagnoses of *S aureus* linfections from OD QMC, (N=54).

	Percentage (n)	MRSA % (n)*
Impetigo	13 (7)	6 (1)
Post-surgical	11 (6)	0
Atopic dermatitis	11 (6)	6 (1)
Dermatitis	11 (6)	6 (1)
Folliculitis	7 (4)	17 (3)
Furuncle	7 (4)	11 (2)
Psoriasis	7 (4)	22 (4)
Abscess	6 (3)	6 (1)
Nummular eczema	6 (3)	0
Cellulitis	4 (2)	6 (1)
Ulcer	4 (2)	6 (1)
Actinic keratosis	2 (1)	0
Paronychia	2 (1)	0
Cutaneous horn	2 (1)	6 (1)
Trauma	2 (1)	0
Conjunctivitis	2 (1)	0
Lichen simplex chronicus	2 (1)	0
Squamous cell carcinoma	2 (1)	0

n = number. *2 MRSA cultures with unknown diagnoses.
OD QMC= Outpatient Dermatology Office at Queen's Medical Center.

Table 4. Distribution of culture sites from OD QMC, a total of 65 samples.

	Percentage (n)
Extremities	49 (32)
Face	17 (11)
Head and Scalp	12 (8)
Back	5 (3)
Abdomen	3 (2)
Axilla	3 (2)
Other	11 (7)

n = number. OD QMC = Outpatient Dermatology Office at Queen's Medical Center.

Comparisons of the anatomical distribution of culture sites were available in 65 of the cases (Table 4). Among the cultures 32 (49%) were obtained from the extremities, 11 (17%) from the face, 8 (12%) from the scalp and 7 (11%) from a site not listed (other). Back, axilla and abdomen collectively accounted for less than 11% of the culture sites.

Discussion

S aureus causes a variety of uncomplicated and complicated SSTIs that are frequently encountered in the practices of dermatologists. Uncomplicated *S aureus* SSTIs include impetigo and abscesses. Impetigo can be treated with topical antibiotics.[2,13] Uncomplicated cutaneous abscesses can be treated with incision and drainage alone based on several randomized control trials comparing incision and drainage with or without antibiotic therapy.[2,13] Per IDSA guidelines, antibiotic therapy is recommended for abscesses associated with severe or extensive disease, rapid progression in the presence of associated cellulitis, signs and symptoms of systemic illness, associated comorbidities or immunosuppression, extreme age, abscess in an area difficult to drain, associated septic phlebitis, and lack of response to incision and drainage alone.[13] Pretreatment bacterial cultures are crucial to confirm exact pathogen but do not deliver a useful result in time for the initiation of therapy. Therefore, empiric antibiotic treatment should be guided by antimicrobial resistance patterns in the community and then tailored to its antibiotic susceptibility testing results.

IDSA's recommended empiric oral antibiotic therapy for CA-MRSA in outpatients with SSTI include clindamycin, trimethoprim sulfamethoxazole, linezolid or a tetracycline (doxycycline or minocycline).[13] Based on our data, the best empiric outpatient antibiotics for presumed *S aureus* SSTIs are linezolid, trimethoprim sulfamethoxazole or tetracyclines. Clindamycin could be used as an alternative agent if there were contraindications to the first line agents. Our data supports IDSA's guidelines for empiric treatment of CA-MRSA in outpatients with SSTIs. It is important to mention that the recommended oral antibiotic therapy for outpatients with non-purulent cellulitis is generally a beta-lactam oral antibiotic directed against beta-hemolytic streptococci.[13] The specific management of SSTIs caused by MSSA versus MRSA is beyond the scope of this article. Our goal is to help guide empiric antibiotic therapy within our community of Hawai'i and therefore includes combined antimicrobial susceptibilities for all *S aureus* cultures. The purpose of analyzing MRSA susceptibilities alone was to show efficacy of antibiotics given the increasing rates of CA-MRSA.

More than half of the *S aureus* cultures were in males and from patients older than 18 years of age (Figures1 and 2). The most common culture site was from the extremities; followed by the face and scalp. A similar distribution pattern was observed in another review done by Dimantis in 2011[14] and consistent with data from a comprehensive review.[2]

Of the 66 samples analyzed in our study, 73% were MSSA and 27% were MRSA. Similar rates of MRSA were observed in two other studies. One study was conducted from a private pediatric dermatology office from 2005-2007 and showed a MRSA rate of 27.3%.[7] The other study was done in six US dermatology centers from five states in 2010-2012 and revealed a MRSA rate of 29.7%.[9] However, these differ from two other published outpatient dermatology case reviews that reported their rate of MRSA at 21% in 2007 and 35.7 % in 2005-2011, each from a private dermatology office in the US.[6,8] It is evident that MRSA rates have increased over time in dermatology patients since the first study in 1988 that showed a MRSA rate of 1.5% and then rose to 11.9% by 1996.[5] In a large epidemiologic study done in Hawai'i from 2000-2002, the prevalence of MRSA from 5,135 outpatient cultures was 22%,[12] lower than our reported rate but consistent with the rising rates of MRSA overtime. It is difficult to draw conclusions given the small number of studies analyzing *S aureus* infections in the dermatology setting and the variation in CA-MRSA prevalence based on geographic in the United States.

When comparing our data locally, our MRSA susceptibility data is similar to the Hawai'i DLS outpatient antibiogram from 2014 shown in Table 2. MRSA was 100% susceptible to linezolid, 95% to tetracycline, 92% to trimethoprim sulfamethoxazole, and 74% to clindamycin. The efficacy of trimethoprim sulfamethoxazole against MRSA in the outpatient setting appears to have lessened in Hawai'i since 2000-2002. There also appears to be more resistance to tetracycline and less resistance to clindamycin over the years when comparing our data to Hawai'i.

A similar retrospective study was performed from 2005 to 2011 in a dermatology clinic at the University of Miami.[8] Of the 387 isolates in that study, 64.3% were MSSA and 35.7% were MRSA. The antibiotic susceptibility data from 2011 were chosen for comparison purposes due to closer temporal correlation. MSSA data are as follow: linezolid (100%), vancomycin (100%), trimethoprim-sulfamethhoxazole (100%), gentamicin (100%), tetracyclines (90%), levofloxacin (95%), clindamycin (90%) and erythromycin (65%). Similar findings were observed when comparing these data with our data and showed that linezolid, trimethoprim-sulfamethoxazole and tetracyclines are most effective against *S aureus* for outpatients. The Miami MRSA susceptibility data showed linezolid (100% susceptibility), vancomycin (100%), trimethoprim-sulfamethhoxazole (90%), gentamycin (100%), tetracyclines (90%), levofloxacin (40%), clindamycin (70%) and erythromycin (30%). A similar trend was observed when comparing their MRSA data to ours. However, all *S aureus* and MRSA in our study had slightly higher susceptibility to trimethoprim-sulfamethoxazole at 95% and 100%, respectively. Data support the use of these particular outpatient antibiotics in the dermatology clinics. Our clindamycin data showed more resistance for all *S aureus* and MRSA at 86% and 78%, respectively. This demonstrates that certain geographical locations have differing susceptibilities patterns and again supports the use of local antibiograms.

Furthermore, antibiotic therapies should also be guided by their side effective profile, cost and availability. Linezolid is FDA approved for treatment of MRSA SSTIs but is limited

by hematologic toxicity, peripheral and optic neuropathy and lactic acidosis.[13] Trimethoprim sulfamethoxazole is not FDA approved for staphylococcal infections, however 95-100% of CA-MRSA strains are susceptible in vitro and is a good option for outpatient treatment of SSTIs.[12] Trimethoprim sulfamethoxazole has not been evaluated for the treatment of CA-MRSA in children and it should be used with caution in the elderly taking renin-angiotensin inhibitor and those with chronic kidney disease due to the risk of hyperkalemia.[13] Doxycycline is FDA approved for *S aureus* SSTIs and not specifically for MRSA and more invasive infections given limited data.[13] Clindamycin is FDA approved for the treatment of serious infections due to *S aureus* but not MRSA infections; however, it is widely used for SSTIs. Clindamycin use is limited by diarrhea and in up to 20% of patients *Clostridium difficile* associated diarrhea can occur.[13] Of note, the actual risks and perceived risks can vary between medical specialties. For example, there is strong concern about the risk of toxic epidermal necrolysis with sulfa drugs such as trimethoprim sulfamethoxazole among dermatologists.

One major concern with the use of clindamycin in CA-MRSA infections is the possibility of inducible resistance to clindamycin seen in erythromycin resistant/clindamycin susceptible strain.[13] This type of resistance is not readily detected by standard in vitro testing methods unless measures that induce clindamycin resistance are included.[15] A disk induction testing call the "D-zone test" can be used to test inducible clindamycin resistance.[15] In our study, we had 14 (21%) of *S aureus* isolates that exhibited the erythromycin resistant/clindamycin susceptible phenotype.

Our data shows that rifampin was 100% effective against *S aureus* MRSA; however, it is not recommended as monotherapy against *S aureus* or MRSA due to rapid development of resistance.[13] Nitrofurantoin also demonstrated 100% efficacy against *S aureus* in vitro in our study; however, it is used primarily for urinary tract infections. Pregnant patients should confer with their physicians, as their recommendations are different.

The clinical manifestations seen were generally associated with purulence or abscesses, which is typical for *S aureus* infections.[2] The most common clinical diagnoses were impetigo, folliculitis, furuncles, abscesses and secondary infections in atopic dermatitis, dermatitis and psoriasis (Table 3). We also observed *S aureus* implicated in post-surgical infections. This is consistent with *S aureus* as the causative pathogen for post-surgical SSTIs.[3] MRSA infections were more commonly cultured from folliculitis, furuncles and secondary infections seen in psoriasis (Table 3). Since this was a retrospective study done by chart review, it is inferred that these particular diagnoses were infected and warranted a culture. Knowledge of the anatomic locations and morphology of *S aureus* infections is of relevance to guide clinicians in accurate diagnosis and appropriate treatment.

Limitations

There are limitations to our study. This study addressed a select population of dermatology patients in Hawai'i and may not be generalizable to different clinical settings or regions. Since this was a retrospective study recommending empiric antibiotic treatment, we did not include specific antibiotics used in each case and their clinical outcomes. A future study in the same setting analyzing directed antibiotic therapy and their outcomes would be of relevance. One variable that may have affected the results is that some patients could have been colonized with *S aureus* rather than infected. This study should be repeated to compare rates of *S aureus* and observe if our data is the same or changing.

Conclusion

Most uncomplicated SSTIs can be treated with topical agents and local incision and drainage. All complicated SSTIs concerning for *S aureus* should be treated with empiric antibiotics guided by local antibiotic susceptibility patterns. SSTIs should have cultures obtained to determine the exact pathogen to guide therapy. Our study shows the best empiric treatment for presumed *S aureus* infections in Hawai'i outpatients is with linezolid, trimethoprim sulfamethoxazole or tetracycline. Clindamycin could be used as a second line therapy but there are risks of inducible resistance. Certain side effects and limitations are important to consider when choosing antibiotic therapy. This study may be helpful in guiding empiric treatment of SSTIs suspected to be caused by *S aureus*.

Conflict of Interest

None of the authors identify any conflicts of interest.

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Testing a Talkstory Intervention to create Supportive and Safe Violence-Free Communities for Women

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Abstract

The purpose of this paper is to report on a community-designed and led talkstory intervention to increase awareness of intimate partner violence (IPV), decrease acceptability of IPV, and increase community leadership to address IPV. In collaboration with women engaged in prior IPV outreach and education in Hawai'i, a talkstory intervention for IPV was developed, and a single-group, pre-post-test design was used to test it. The intervention included five talkstory sessions over seven months with community groups interested in violence prevention. Pre- and post-testing were conducted to determine changes in group means on three measures. Ninety-two individuals participated in the intervention, 77 (84%) of these completed the 1-month follow-up measure, and 59 (64%) of these also completed the 6-month follow-up measure. The findings included: (1) participants in the talkstory intervention groups decreased their acceptability of violence and increased their awareness, knowledge, and confidence to address IPV; (2) the community leaders in the intervention groups gained skills in facilitation; and (3) intervention groups continued to sponsor other IPV awareness-raising activities in their communities following completion of the study. Working with community leaders to design and facilitate the intervention not only provided IPV education within the context of the community, but also led to sustainable efforts to enhance the safety and wellbeing of women experiencing violence.

Keywords

Intimate Partner Violence, Intervention, Community-Based Research, "Talkstory"

Acronyms

CBPR = Community-Based Participatory Research
CHSS = Consortium for Health Safety and Support
CST = Critical Social Theory
DVAC = Domestic Violence Action Center
HP 2020 = Healthy People 2020
IRB = Institutional Review Board
IPV = Intimate Partner Violence
OWH = Office of Womens' Health

Introduction

The purpose of this article is to report the results of a community-designed intervention conducted in Hawai'i to determine if it would increase awareness of intimate partner violence (IPV), decrease acceptability of IPV, and develop community leadership to prevent and address IPV. IPV is a complex issue affecting individuals around the world.[1,2] Experiencing IPV has been linked to negative acute and long-term physical, psychological, social, and economic outcomes.[3] In the United States (US), nearly 1 in 4 adult women (23%) and approximately 1 in 7 men (14%) report having experienced severe physical violence (eg, being kicked, beaten, choked, or burned on purpose, having a weapon used against them, etc) from an intimate partner in their lifetime.[4] Over 40% of female homicide victims in the US are killed by an intimate partner.[4]

Adverse health effects of IPV can include cardiovascular, gastrointestinal, reproductive, musculoskeletal, and nervous system conditions, as well as depression, posttraumatic stress disorder (PTSD), and engagement in risky health behaviors, such as substance abuse.[4] In 2000, costs associated with non-fatal injuries and deaths due to IPV exceeded $70 billion.[5,6] Traditionally, interventions have been sponsored by the justice system and by psychological counseling providers; however, many women experiencing IPV are reluctant or unable to access these services.[7]

In Hawai'i, at least 20% of women aged 19-64 years have been victims of IPV in their lifetime.[8] The Hawai'i State Department of Human Services contracts with seven non-profit entities to provide emergency support to IPV victims. In 2015, there were 9,081 IPV victims served, 16,900 hotline calls, and 3,473 victims and survivors provided IPV advocacy.[9] Although this information does not describe specific cultural groups, previous studies have investigated ethnic variation in reports of IPV. In an earlier retrospective review of medical records at four community health centers on O'ahu, 337 medical records from over a 5-year period were examined to identify documented cases of IPV. Native Hawaiians represented 32% of 31 documented IPV cases, despite the fact that Native Hawaiians comprised only 19% of the study sample.[10] In qualitative research with Pilipino* women, 16% of participants reported IPV and noted that this was an important concern for their community.[11] Between 2000 and 2012, 67 women in Hawai'i were murdered as a result of IPV, and more than 70% of those murdered were Pilipino or Native Hawaiian women.[12]

Findings from research in Hawai'i suggest that many individuals do not use conventional IPV resources due to language or cultural barriers and fear of discrimination from the legal, child-protection, and immigration systems.[12] Advocacy interventions, defined as interventions in which IPV victims receive help with safety planning and social services beyond the clinic, are gaining popularity and appear to yield more benefits than standard care.[13] Interventions focused on developing individual capacity to access information on IPV have primarily focused on leaving

* The official Filipino language recognizes both Filipino (Filipina) and Pilipino (Pilipina) as terms for the citizens of the country. Participants in this study chose to use the terms Pilipino (Pilipina). Retrieved from: www. pilipino-express. com/history-a-culture/in-other-words.

the relationship, but significant service gaps exist for women who require support after leaving an abusive relationship.[14] A review by Ellsberg et al. concluded that the most effective IPV interventions are participatory, engage multiple stakeholders, support critical discussion about gender relationships and the acceptability of violence, and support greater communication and shared decision making among family members, as well as non-violent behavior.[15]

Consideration of culture is important in intervention development in Hawai'i because of the ethnic diversity of the population, estimated at 21.3% Native Hawaiian, 22.7% Caucasian, 16.3% Japanese, 17.2% Pilipino, 6.8% Chinese, and 15.7% others.[16] Traditional cultural beliefs, practices, and norms regarding gender roles and decision-making patterns can function as protective or contributing factors to IPV and may be influenced or disrupted over time.[17]

Methods

Developing the Intervention

The intervention was developed by three authors, (LM, JS, CS) and other members of the Consortium for Health Safety and Support (CHSS), a group of community members, professionals from the Hawai'i Domestic Violence Action Center (DVAC) and other legal, health and social services providers, and faculty from the University of Hawai'i at Manoa (UHM). The Office of Womens' Health (OWH) initially funded 16 sites nationwide to assess community needs and develop research proposals that addressed the specific needs of women. During the first year of funding, the CHSS conducted a community needs assessment of the Leeward communities on O'ahu (Ewa Beach, Kapolei, Makaha, Nanakuli, Waianae, and Waipahu) with high percentages of Native Hawaiian and Pilipino residents. "Talkstory" was identified by community members as an important strategy to address IPV. The members of the community believed that talkstory would increase community engagement and ownership and create safe spaces for discussions about IPV. Continued funding from OWH was received to implement and test the intervention in these communities.

Talkstory refers to an informal, laid-back conversation involving a "reciprocal exchange of thoughts, ideas, feelings about self, and other issues,"[18] and is important to Hawai'i residents across multiple ethnic groups. The use of talkstory demonstrates respect of the local culture and customs by generating dialogue that is not targeted to a single perspective or endpoint. Talkstory discussion groups have been used in previous studies to address primary care and prevention issues on the Leeward Coast (southwest side of the Island of O'ahu.)[19] It has been used as an approach to address disharmony between family and community members and to reach accepted solutions to remedy the discord and restore harmony to relationships.[18,19]

Theoretical Orientation

Although IPV is a multi-faceted phenomenon and no single theoretical approach provides a complete explanation,[20] critical social theory (CST) was chosen by the CHSS to guide the intervention. The intent of CST is to "challenge conventional assumptions and social arrangements and to move beyond the "what is" to the "what could be."[21] The context for IPV is a belief system about the relationships between power, societal structures (primarily related to race, gender, and class), and resulting conditions of society. Dominant voices hold power over marginalized voices, creating both privilege and marginalization. Gender roles within culture can increase the tolerance of abuse and decrease the reporting of abuse.[20]

To complement CST, a community-based participatory research (CBPR) approach was adopted. The purpose of CBPR is to increase shared leadership, community capacity, and intervention relevancy for community members.[22] These strategies, while recognizing the power of community participants, also place an obligation on the community partners to take action that is consistent with the participants' voices. Thus, the intervention was designed to use a talkstory approach to help participants reflect critically on the traditional rules, practices, structures, and assumptions that have guided the perceptions of IPV and the resulting programs in communities.

The CHSS developed and pilot tested an initial curriculum with Native Hawaiian and Pilipino community groups, and refined it based on the pilot groups' suggestions to become the talkstory intervention.[22] The intervention consisted of five sessions, each lasting approximately two hours. Three sessions were facilitated during the first month, followed by one session three months later and a final session six months later. Conceptually, the sessions were designed to encourage community members to discuss five topics: 1) their perceptions of IPV; (2) actions they took individually to prevent, interrupt, or stop IPV; (3) suggested actions that community groups (eg, churches, schools, canoe clubs) could take together; (4) resources to prevent, intervene, or interrupt IPV; and (5) resources still needed. Woven through the talkstory sessions was information on (1) understanding IPV; (2) gender role expectations/healthy relationships; (3) effects of IPV on the family and community; (4) support and safety within the community; (5) strategies and skills to create safe environments to address IPV; and (6) creating a community-owned network of safe support groups. This information was compiled into a document entitled, "Talkstory Toolkit." In preparation for the implementation of the study, 20 facilitators were trained to become group leaders. They attended at least two, 2-hour sessions that included: (1) instruction in safety measures and methods of conducting groups; and (2) human subjects' protection. Trained community leaders usually co-facilitated with someone from DVAC and/or UHM. Table 1 describes the topics, research instruments, and schedule.

Ethical Considerations

The Institutional Review Board (IRB) from UHM granted approval (CHS #20030) for this study. All participants were informed about the implications of participating in the study and were required to provide their informed consent prior to participating. In addition, a Certificate of Confidentiality was requested from the National Institutes of Health and all par-

Table 1. Talkstory Topics and Data Collection Schedule					
	Week 1	Week 2	1Month	3 Months	6 Months
Talkstory Topics	Understanding Intimate Partner Violence (IPV)	Gender role expectations and healthy relationships	Effects of IPV on the family and community	Support and safety within the community	Strategies and skills to create safe environments to address IPV in communities
Demographic Questionnaire	x[a]				
Resource Utilization Survey	x				x
Acceptability of Violence	x		x		x
Awareness, Knowledge and Confidence	x		x		x
Community Capacity	x		x		x

[a]x= Data collected at these points

ticipants were required to sign a Confidentiality Agreement to maintain ethical integrity. Safety procedures to be taken in the event of unforeseen interruptions of the session were also developed. With these procedures in place, no breaches in safety were experienced.

Study Participants and Setting

A single-group, pre-post-test design was used to test the talkstory intervention. To recruit women into interventions groups, community leaders who represented the partnering agencies on the Leeward Coast purposively identified and invited community residents 18 years of age or older willing to discuss IPV from among friends, neighbors, and respected informal leaders. Participants' IPV status was disclosed on the demographic form. One of the purposes of the study was to change attitudes and perceptions regarding IPV, and both those who had experienced violence and those who had not were included in the study. No participants were known to community leaders as perpetrators.

Although the selection of talkstory emerged from the community, retention of intervention participants throughout the seven-month intervention initially proved challenging. After discussion with group leaders and OWH, and with the approval of the IRB, a progressive increase in the incentives was offered to participants. The original incentive schedule of $20 per session was increased to $25 for the first session, $30 for the second, $35 for the third, $40 for the fourth, and $50 for the fifth session attended. An assistant was also hired to maintain contact with the participants between sessions.

Data Collection

All participants were asked to complete a demographic questionnaire and three paper assessment instruments: (1) Perceptions of the Acceptability of Violence; (2) Awareness, Knowledge, and Confidence regarding IPV; and (3) Perception of Community Capacity to Address IPV. The completion of the assessment instruments occurred at three points: baseline, 1 month, and 6 months.

In the "Perceptions of the Acceptability of Violence Tool" (three items), respondents marked their level of perceived acceptability of IPV on a 3-point scale (1=never, 2=sometimes, 3=always). This tool was developed by Torres, et al.[23] In her previous research, women marked their level of perceived acceptability of IPV in their communities, their families, and themselves on a 10-point scale, and item scores were categorized into tertiles—low, mid, and high. Following pretesting in our communities, we used a 3-point scale instead of a 10-point scale.

The "Awareness, Knowledge, and Confidence Tool" (nine items) solicited self-assessment of individual capacity to address IPV (1 for beginning capacity; 2 for developing; 3 for accomplished). Examples of items included "I'm aware of community needs for prevention of IPV" and "I'm confident in my ability to work with community agencies for the prevention of IPV". The authors have used this tool with students and found that their self-rated competence increased along the 3-point scale after engaging in interdisciplinary team work on IPV.

The "Perception of the Capacity of the Community Tool" (six items) asked participants to assess the competence of the community, eg, percentage of the community aware of IPV (0=<25%, 1=25-49%, 2=50-74%, 3=≥75%). This tool has not been used in research and was tested for language clarity and understanding during the pilot study and refined accordingly. We expected this to allow us to see a difference from baseline to post-intervention measures.

Data Analysis

Demographic variables were analyzed using frequencies. Because of the large number of items in the outcome measures, we created "total scores" for the three outcome measures. The "Violence Acceptability" score was created by summing the three items from that scale (range 3=violence is not acceptable to 9=violence is acceptable). The "Awareness, Knowledge, Confidence" score was created by summing the nine items in this scale (range 9=very low awareness-knowledge-confidence to 27=high awareness-knowledge-confidence as perceived by the respondent). The "Community Capacity" score was created by summing the six items in this scale (range 6=perceived low community awareness about and resources to reduce IPV to 18=perceived high community awareness about and resources to reduce IPV). For each scale, a Cronbach's alpha was estimated.

Values were .76, .85, and .86, respectively, suggesting that these measures had good internal reliability. Because responses were not normally distributed, we used the Wilcoxon signed-rank test, a non-parametric test, to compare measures at baseline with those at 1 and 6 months. SPSS v21 (IBM Corp, Armonk, NY) was used for data management and analysis.

At the final evaluation conference with participating group leaders, each group was asked to identify the number of individuals who expressed or documented that they had been abused and were given assistance because of the project.

Results

Participants included 92 Leeward Coast residents in ten intervention groups. As hoped, about 36% of the sample was Native Hawaiian, 33% Pilipino, and 2% Other Pacific Islander. Other participants were predominantly Asian (9%) or Caucasian (13%). The participants included 28 men and 64 women, and the mean age of participants was 39 years. About 18.5% had a high school degree only, 4% attended college but did not earn a degree, and 39% reported having a bachelors, masters, or higher degree. About 75% of participants reported being employed, and 86% of participants reported having health insurance. Almost all participants reported income (n=89); about 41% of the sample reported annual income of <$39,999, and 55% reported annual income of $40,000 or more (Table 2).

Although 92 participants provided baseline data on the outcome measures, only 77 (84%) completed the 1-month post-test, and only 59 (64%) also completed the 6-month post-test. As shown in Table 2, larger proportions of women participated in the 1- and 6-month assessments compared to baseline; however, this difference was not statistically significant. Nor did the baseline and follow-up samples differ significantly on any other demographic measure, suggesting no systematic bias in attrition.

Over time, there was significant improvement on each of the three scales (Table 3). Specifically, post-test scores were lower for Violence Acceptability (from 4.03 to 3.74; P=.048 at 1 month, to 3.50; P<.001 at 6 months), higher for Awareness, Knowledge, Confidence (from 18.11 to 22.19; P<.001 at 1 month, to 25.38 P<.001 at 6 months), and higher for Community Capacity (from 10.66 to 11.68; P =.024 at 1 month, to 13.10; P<.001 at 6 months).

Community leaders reported that many of the intervention group members did not realize that what women experienced in their homes was actually abuse from their partners. In previous research conducted by this group, community participants indicated they felt it was normal for women to be emotionally and physically beaten up.[24] Leaders reported that participants gained a better understanding of the dynamics of abuse. Based on intervention group discussion and self-report either on the

Table 2. Characteristics of Intervention Participants Over Time[a]

	Baseline n=92 n (%)	1-month follow-up n=77 n (%)	6-month follow-up n=59 n (%)
Ethnicity			
Native Hawaiian	33 (36)	27 (35)	15 (26)
Pilipino	30 (33)	24 (32)	23 (39)
Other Pacific Islander[b]	2 (2)	2 (3)	0
Other Asian[c]	8 (9)	8 (10)	6 (10)
Caucasian	12 (13)	10 (12)	10 (17)
Other[d]	7 (8)	5 (7)	4 (7)
Mean age (years)	38.3	39.7	37.6
Gender			
Female	64 (67)	54 (70)	46 (78)
Male	28 (31)	23 (30)	13 (22)
Education			
High school or GED[e]	17 (19)	13 (17)	7 (12)
Some college	39 (42)	32 (42)	28 (48)
Bachelor's degree	20 (22)	18 (23)	12 (20)
Masters or higher	16 (17)	14 (18)	12 (20)
Employed (yes)	69 (75)	58 (75)	46 (78)
Insurance (yes)	79 (86)	67 (87)	50 (85)
Income			
< $20,000	17 (19)	11 (14)	10 (17)
$20,000-$39,999	21 (23)	18 (23)	15 (26)
$40,000-$59,999	28 (30)	24 (31)	19 (32)
> $60,000	23 (25)	21 (27)	14 (24)
Missing	3 (3)	3 (4)	1 (2)

[a]Percentages may not total 100% due to rounding. [b]Including Micronesian, Marshallese, Guamanian, Samoan. [c]Including Cambodian, Chinese, Japanese, Korean, Thai, Vietnamese. [d]Including African American, Hispanic, Native American. [e]General Educational Development Test

Table 3. Comparison of Scores at Baseline and After 1 and 6 Months					
	Baseline (n=92)	**1-month follow-up (n=77)**	**Significance from baseline[a]**	**6-month follow-up (n=59)**	**Significance from baseline[a]**
Total "Violence Acceptability" Score[b]					
Mean (Standard Deviation)	4.03 (1.47)	3.74 (1.03)	0.048	3.50 (0.88)	<.001
Range	3-9	3-7		3-6	
Skewness	1.22	1.36		1.48	
Total "Awareness/Knowledge/Confidence" Score					
Mean (Standard Deviation)	18.12 (4.29)	22.19 (4.09)	<.001	25.38 (2.32)	<.001
Range	9-27	14-38		18-27	
Skewness	0.23	0.50		1.40	
Total "Community Capacity" Score					
Mean (Standard Deviation)	10.66 (3.12)	11.68 (2.91)	0.024	13.10 (3.15)	<.001
Range	6-21	6-18		8-21	
Skewness	1.12	0.66		0.51	

[a]Significance by Wilcoxon Signed Rank Test. [b]A lower score is better.

demographic form or verbally in the talkstory group, community leaders estimated that 25-30 members of the 92 intervention participants, about one-third of total participants, were experiencing or at risk of IPV during the talkstory intervention. At least five women sought help during the period of the intervention, most often leaving the unsafe situation.

Other leaders described that their groups' concerns about IPV led them to make signs and engage in sign-waving events along the only major highway leading to the community, particularly during Mother's Day and Father's Day. One leader reported that 135 residents participated in sign-waving, with group leaders counting more than 2,000 "honks" of approval accompanied by the "shaka sign" from people driving past the participants. Community members also designed a T-shirt with the logo, "kNOw MORE," to emphasize their hope for changing the social acceptance of IPV to a culture of no tolerance for IPV. A "kNOw MORE" march was held by community residents and involved more than 200 people. Following completion of the research study, four of the original community groups continued to include prevention and activities to address IPV in their regular programs to create different social norms regarding IPV. One group, for example, continues to provide "Healthy and *Hapai*" baby showers for new mothers and fathers, providing baby supplies as well as support and an opportunity for pregnant young families to reach out for help if needed during this vulnerable period.

Discussion

Although legal and social policies are enacted to address IPV and provide remedies for those experiencing violence, they are not enough to stop the problem. Effective prevention and response require a coordinated effort across many sectors, and community activism plays an important role. Michau, et al, urged that prevention programs be designed to change "attitudes, norms, and behaviors."[25] They also maintain that community-based, rather than individually focused, programs are more likely to foster social change.

This talkstory intervention appears to have positively influenced attitudes in the community and begun to change behaviors regarding IPV. A particularly valuable outcome of the process was that it developed local leadership for IPV prevention. Natural leaders built their capacity regarding IPV through the training activities provided to them and through the process of facilitating their groups. At the end of the project, they described their plans to continue work in IPV-awareness raising and to engage the broader community in periodic sign waving and ongoing discussions.

The talkstory groups were conducted with mixed genders. This format was designed by members of the community because they believed that it would more fully engage the community. Michau, et al,[25] state that "evidence now shows that work with both women and men (in gender-specific and mixed groups, depending on the topic and the situation) is more likely to promote non-violent norms around masculinity and less passive norms around femininity than work that only engages men or women separately."[25]

One of the goals of Healthy People (HP) 2020 — a set of nationwide health promotion and disease prevention goals developed by the US Department of Health and Human Services — under educational and community-based programs (ECBP) is to increase the number of community-based organizations providing population-based primary prevention services against violence (ECBP-10.2).[26] Throughout the study, a myriad of activities developed by community partners has helped address this goal in Hawai'i. At the end of the intervention, participating community leaders were asked to report ways the intervention impacted perceptions of IPV on the Leeward Coast. Leaders estimated the number of participants in their groups experiencing and/or at risk of IPV, how the intervention helped these individuals, and activities the leader and/or group conducted to further raise awareness of IPV in their community. These activities help overcome silence around IPV on the Leeward Coast, where large percentages of Native Hawaiians and Pilipinos reside.

A second goal of HP 2020 under injury and violence prevention (IVP) is to reduce violence by current and former intimate partners (IVP-39).[27] This goal is highly desirable, and working towards a reduction in violence is undoubtedly important. Yet, success should not be measured in the short term. Lacayo[28] used Complexity Theory as a framework to analyze change fostered by a social program in Nicaragua. She describes societies as being composed of people who are "unpredictable and uncontrollable," and the process of social change as being "a nonlinear, contradictory, messy, emergent, self-organizing, and long-term process."[28] A study such as the talkstory intervention conducted at the community rather than the individual level promotes social awareness, which can lead to social change of attitudes and beliefs over time.

Conclusions

From this test of the talkstory intervention, it appears there was a positive impact. Working with community leaders to design and facilitate the intervention provided IPV education within the context of the culture of the Leeward Coast. It also led to sustainable efforts to enhance the safety and wellbeing of women of the community, and in ways that were safe and did not judge or isolate women experiencing violence. Participants in the talkstory interventions decreased their acceptability of violence and increased their awareness, knowledge, and confidence to address IPV, the community leaders gained skills in facilitation, and groups went on to sponsor other IPV-awareness-raising activities.

IPV is a complex issue involving families and communities and is best addressed with their full participation. Social change is dynamic and complex and is gradual rather than dramatic in most instances. The community members involved in this project have provided testimony regarding the changes in their neighborhoods. Since the project, they have gained a better understanding of the dynamics of abuse, are aware of ways to decrease it, and have greater capacity to address IPV in their communities.

Conflict of Interest

None of the authors identify any conflict of interest.

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The University of Hawai'i West O'ahu Undergraduate Health Science Program: Training the Workforce of the Future

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Abstract

Hawai'i faces a significant healthcare workforce shortage, not only with physicians, but also with health science workers. "Health science" is a hands-on field that combines biomedical and psychosocial aspects of health, disease, and health care. Many of the fastest-growing jobs are in the health sciences, including home health aides, physical therapists, school counselors, and social workers. In Hawai'i, an aging population and the retirement of current health professionals increases the demand for health science workers. Innovative approaches and new care models are essential to meet Hawaii's needs. One promising solution involves creating four-year undergraduate degree concentrations that train students in marketable skills that are projected to be in demand in Hawai'i, such as in long-term care, community health, and health information management. These bachelor-level graduates could serve critical roles in relieving nurses and physicians of administrative, managerial, care coordination, and clinical data analysis duties that hamper their abilities to practice at the top of their licenses and training. The undergraduate health sciences program at the University of Hawai'i West O'ahu supports students who want to enter these career paths. The program's primary goal is to establish multiple pathways that provide opportunities for underserved youth in West O'ahu communities to choose marketable healthcare careers that pay a sustainable and living wage. Support for this innovative initiative will create a stronger, more well-rounded and sustainable health care workforce that meets Hawaii's increasing demand for affordable, accessible and high-quality care. The final measure of success will be the quality and number of our graduates from our communities, serving our communities.

Keywords

Health Science, health science program, workforce shortage, doctor shortage, fastest growing occupations, University of Hawai'i West O'ahu, health careers, bachelor of applied science, UHWO-UHSP (University of Hawai'i West O'ahu – Undergraduate Health Science Program)

Introduction

Healthcare is now the largest and fastest-growing industry in the United States.[1,2] Employment in healthcare is projected to grow 18% from 2016 to 2026, with the industry adding about 2.4 million jobs.[3] Driven by an aging population and improvements in medical technology, the demand for healthcare already outpaces the supply.[4,5] This demand has created a well-documented physician shortage.[6] It has also created a looming imbalance in the health science workforce.[7] Over half of the 30 fastest-growing jobs in the United States are health science occupations. This includes home health aides, personal care aides, physical therapist aides and assistants, medical assistants, genetic counselors, occupational therapy aides and assistants, massage therapists, and phlebotomists.[8] In order to address the tremendous demand, an innovative, mobile, and versatile health science workforce is needed.[9]

Presently, Hawai'i has a shortage of more than 700 physicians.[10] There is a need for more than 300 primary care physicians. The shortage also extends to various specialties including general surgery, orthopedic surgery, infectious disease, critical care, and pulmonology. The neighbor islands of Hawai'i and Kaua'i and underserved rural communities throughout the state suffer the most from the doctor shortage as access to primary and specialty care are limited.[11] Ironically, Hawaii's growing aging population will not only increase the demand for healthcare, but it will also amplify the healthcare workforce shortage with an impending surge of physician, nurse, and health science worker retirements. Similar to national trends, nine of the 20 fastest-growing occupations in Hawai'i from 2008 to 2018 were in health sciences.[12]

West O'ahu communities, which include Waianae, Nanakuli, Kapolei, Ewa, Waipahu, Wahiawa, and Waialua, have critical health care needs. Comprised of five Native Hawaiian Homesteads, the Wai'anae and Nanakuli area has the highest percentage of Native Hawaiians residents on O'ahu.[13] Unfortunately, Native Hawaiians have poor outcomes on many health metrics compared to the other major racial/ethnic groups in Hawai'i.[14] This includes the highest incidence of obesity, diabetes, cancer, and cardiovascular disease.[15] People with these chronic conditions will require an increased number of patient clinic visits and hospitalizations. Notwithstanding, Native Hawaiians also have many strengths that can be leveraged in the health professions. This includes culturally-based values such as *lokahi* (balance), *'ohana* (family), *aloha* (love and compassion), and *malama* (to care for).[16]

The West Side of O‘ahu

Kapolei, Oahu’s second city, has undergone rapid expansion with the construction of 25,000 homes over the last 25 years. Community challenges include an inadequate highway infrastructure that causes major daily traffic delays.[17] Illustrating the growing the problem of overcrowding, in early 2017, the first release of almost 12,000 single-family homes in one development, called the Hoopili project, sold out in one day.[18] Preparing adequate educational, healthcare, and employment resources to match this increase in population is important. It has been postulated that health care may be Kapolei’s fastest growing industry.[19]

A comparison of the communities in East O‘ahu (such as Kahala, Wai‘alae, and Hawai‘i Kai) and West O‘ahu (such as Wai‘anae, Nanakuli, and Kapolei) illustrates the economic, educational, and health disparities between the two areas (Table 1). West O‘ahu households suffer from a lower per capita income, more poverty, and lower home values. A greater percentage of the population under 65 years old are disabled in West O‘ahu (8.4% versus 3.7%). Most striking is the percentage of the population with bachelor’s degrees, with East O‘ahu at 56% and West O‘ahu at 8%.

Table 1. East vs West O‘ahu Demographics

Category	East O‘ahu	West O‘ahu
Per Capita Income	$50,000	$18,000
Poverty	4%	18%
Native Hawaiian/ Pacific Islander Alone	5%	46%
White Alone	25%	5%
Asian Alone	49%	7%
Home Value	$903,300 (Hawai‘i Kai)	$478,000 (Wai‘anae)
% Disability Under 65 y/o	3.7%	8.4%
Bachelor’s Degree	56%	8%

Source: United States Census Bureau, 2012-2016. Home Values: Zillow 2019.

Today, the University of Hawai‘i West O‘ahu has more than 3,000 students. Projected enrollment is 8,000 students by 2028. Although the college is more than 40 years old, the UH West O‘ahu campus at Kapolei is only five years old. It is near two upcoming stops of Honolulu High-Capacity Transit Corridor Project, and the current buildings occupy less than 100 acres of its 500-acre parcel, indicating significant room for growth. There is additional room to grow with another 1,000-acre parcel nearby, across the H-1 Freeway on the slopes of the Waianae Mountains. The campus is easily accessible from the freeway, has affordable tuition, and provides free and plentiful parking. In 2017, it gained the distinction of being the fastest-growing US public institution offering four-year degrees, with a 214% increase in enrollment from 2005 to 2015.[20]

Hawai‘i is entering a period where demand for healthcare workers will significantly outpace supply.[11] Advancing the health sciences to a more prominent role in healthcare is needed. Now is the time to address the problem and implement innovative, viable, and sustainable solutions. One goal of the UH West O‘ahu Undergraduate Health Science Program is to “Grow Our Own” professional workforce by creating multiple pathways to provide West O‘ahu youth opportunities to choose stable healthcare careers that pay a sustainable and living wage.[21] The second goal is to serve as a bridge to seamlessly advance students from high school and community college to a bachelor’s degree and on to graduate degrees. And the last goal is to strive for academic, community, and research innovation, and excellence. The vision is that this will help repair the major educational and economic disparities while also improving health outcomes.

Presently, the vast majority of health science occupations require certification and/or an associate degree. These include laboratory technicians, medical assistants, personal trainers, surgical technologists, and medical billing specialists. Unfortunately, there is little room for workers to earn salary increases or career advancement with only an associate degree. Another level of health science training is emerging, which includes an additional two years of education to attain a bachelor’s degree. This phenomenon, sometimes called “degree creep,”[22] is occurring in respiratory care and occupational therapy, where the requirements for taking the certifying or licensure exams will soon include a baccalaureate degree instead of an associate degree.

Adding two more years of education at the undergraduate level allows for a wider range of skills to be taught, and in many cases, additional skills are sorely needed. For example, instead of caring for patients, nurses are now often being pulled off of clinical floors to perform administrative or managerial duties, such as care coordination, discharge planning, specialty referral, case management, and patient navigation. And at the same time, physicians are spending large amounts of time documenting clinical encounters, and yet are not receiving useful analysis of patient data and demographics that could increase the quality of care provided.[23]

With the premise that skills such as care coordination and documentation do not necessarily need clinical training, the expansion of the health science worker role to coordinate, manage, document, and evaluate the patient’s overall care will free up more nurses and doctors to attend to their patients. In addition, the ability of health science workers to perform at this higher level of skill and responsibility will justify increases in salaries to a living and sustainable wage. Moreover, this will also allow physicians, nurses, and other health professionals to practice at the top of their licenses and training.

It is important to note that many of these bachelor level health science positions are considered totally new occupations. Specific learning and training objectives need to be delineated in partnership with front-line staff, providers, and administrators. In the same way, there needs to be a collaborative effort between Hawaii’s health industry, academic institutions, and government to design these degrees and occupations for maximum effectiveness. Determining evidence-based standards of practice and accreditation will be critical to advance this initiative.

The Undergraduate Health Science Program at UH West O‘ahu

Presently, the UH West O‘ahu Undergraduate Health Science Program offers three established health career degree concentrations. The first is a Bachelor of Arts in Public Administration with a concentration in Health Administration. Established in 2008, it is the oldest health concentration offered at the school and has the highest enrollment. This program is designed for students who want a professional health career that requires a high level of critical thinking, business and financial knowledge, and policy development. It prepares students with a broad range of administrative, management, legal, and behavioral skills. For those already employed in a health care field, earning this degree can increase knowledge, skills and abilities, as well as provide greater career mobility. It is available via both traditional and distance education modalities.

The second is a Bachelor of Applied Science with a concentration in Respiratory Care. Established in 2017, this program is a “2+2” degree based a memorandum of agreement between UH West O‘ahu and Kapi‘olani Community College (KCC). It is designed for students who have completed a two-year Associate of Science degree in Respiratory Care at KCC and are interested in working for two more years to further their career. It provides training in the use of special equipment, administering medical gases, using positive pressure breathing machines, performing pulmonary drainage and clearance procedures, managing patient airways, and performing pulmonary rehabilitation and home care. Coursework includes a foundation in health administration and also focuses on case and disease management.

Established in 2018, the Bachelor of Arts in Public Administration (PUBA) with a concentration in Community Health is the newest degree concentration offered. The Community Health concentration is designed for students interested in an interdisciplinary approach to health. This program, which is available via both traditional and distance education modalities, provides students with an understanding of community health systems and ways to develop and implement strategies to improve the health of individuals and communities. These students develop a strong foundation in community-based participatory research.

In addition to the above programs, there are four health science degree concentrations that are proposed to be established by Fall 2019. Within the last three years, faculty have been hired to support and design the following degree concentrations:

- Bachelor of Applied Science (BAS) with a concentration in Health Professions
- Bachelor of Applied Science with a concentration in Hawaiian & Indigenous Health & Healing
- Bachelor of Arts in Public Administration with a concentration in Long-Term Care
- Bachelor of Applied Science with a concentration in Health Information Management

The Health Professions BAS is for students interested in pre-medical, pre-dental, pre-pharmacy, pre-PA, pre-OT, and pre-PT studies. Comprehensive coursework in the Natural Sciences (chemistry, biology, and physics) is supplemented with components of health career options, professionalism, and problem-based clinical cases. Students will learn laboratory techniques, CPR/AED/First Aid, and correct handling of blood borne pathogens (via OSHA certification) and health information (HIPAA).

The Hawaiian & Indigenous Health & Healing (HIHH) BAS is for students interested in traditional healing. Students work towards a better understanding of Hawaiian culture and values through the transfer of knowledge and skill in the traditional healing arts of *Ho‘oponopono*, *La‘au Lapa‘au*, and *Lomi Lomi*. The integration of practitioners of these arts into larger healthcare teams is critical in the preservation of these traditional healing arts. As noted above, this has high relevance for our community in West O‘ahu.

Given the increases in the number of elderly patients in Hawai‘i, the demands of caring for people with chronic disease, and the advances in health-focused technology, the last two degree concentrations to be established will possibly have the most impact in terms of growing employment and overall patient care. The long-term care bachelor’s degree is for students who want to focus on the long-term care (LTC) needs of Hawaii’s aging population. It prepares students with the conceptual, technical, and interpersonal skills and competence necessary to work in LTC facilities and community-based organizations. It also addresses Hawaii’s high demand for LTC providers, paraprofessionals, and skilled workers. This degree is available in both traditional and distance education modalities.

The Health Information Management BAS is designed to equip students with integrated knowledge of medicine, science, technology, and management. The coursework for this program will focus on ensuring that health data maintains its integrity, accuracy, accessibility, and security. Students will acquire vital leadership skills in health informatics, revenue cycle management, data analytics, and information governance.

These seven degree concentrations described lay the academic foundation of the UH West O‘ahu Undergraduate Health Science Program (UHWO-UHSP). The courses are designed to be student-centered, intradisciplinary, and transdisciplinary. In addition, each program includes required courses to infuse Native Hawaiian values and culture to support the UH West O‘ahu objective of being indigenous-serving. And, the three training tenets are:

1. Training must be based in the community
2. Training must be hands-on and realistic
3. Training must create interdisciplinary teams

Work in Progress

Three foundation-laying events have shaped the progress thus far to build the program. The first occurred in March 2018, when the Hawai'i State Legislature appropriated $550,000 to the UH West O'ahu Health Science Program to hire six new permanent faculty and student support staff. The faculty positions included assistant or associate professorships in chemistry and physics to strengthen the school's capacity in natural science, and in health information management and Indigenous health science to build the health science program. The health information management (HIM) faculty is especially needed because accreditation in HIM depends upon having at least two full time faculty. The Indigenous health science faculty will serve as the lead coordinator for the Hawaiian & Indigenous Health & Healing BAS degree concentration. It is the first and only position of its kind in the nation. While there is a Master of Public Health degree program with a specialization in Native Hawaiian and Indigenous Health at the University of Hawai'i at Manoa, there are no undergraduate degrees with this focus.[23] The other two positions are in student support. They include an advisor/counselor and a curriculum specialist, and both are dedicated to the health science program.

The second was the construction and grand opening of a new Administration/Health Science Building on campus on December 12, 2018. Costing over $32 million and encompassing over 44,000 square feet, the building includes 10 classrooms and three laboratories (equipped for classes in anatomy/physiology, cellular biology, and microbiology). At the ceremony, Ryan Domingo, a junior pre-medical student, summed up the sentiment of his fellow classmates: "As a student who will conduct research and have several classes here this coming January, I am filled with a strong sense of pride and promise. I have pride in becoming the first of my peers to walk these halls and classrooms, holding on to the promise of following the footsteps of many others who have graduated from this wonderful place of learning."[24]

The final and latest foundation laying event took place on February 28, 2019, when the University of Hawai'i Board of Regents approved the new degrees of a Bachelor of Science in Natural Science (BSNS). The BSNS is significant because it is the first STEM degree and bachelor of science degree offered at UH West O'ahu. This degree program will be housed in the newly created and approved Division of Math, Natural and Health Science. Future plans include designing a BSNS with a concentration in Health Science that will prepare students for graduate work towards a health professions master's or doctorate degree.

Our Students, Our Future

After laying a strong foundation, the next phase in the UHWO-UHSP development will be the recruitment of more faculty, staff, partners, and students. Presently, all six positions appropriated by the legislature are in their respective search committees with a projected hiring date of August 1, 2019. Seeking collaborative partners is critical. Partners within the University of Hawai'i System are needed to create articulation agreements across campuses. Seamless transitions for students can be made by building bridges between high school and early college programs, associate-level programs at community colleges, and professional degree programs (ie, MD, PharmD, PhD, MSN, MSW, and MPH). Partners in the health industry are necessary to guide program focus and provide sites for clinical and non-clinical internships. They will be critical in establishing marketable minimal and desirable qualifications and a salary scale that will hopefully pay a sustainable wage. Presently, The Queen's Medical Center West O'ahu, Waianae Coast Comprehensive Health Center, Hospice Hawai'i, and Heartsavers (CPR Certification) are partners of the UH West O'ahu.

Recruiting students into the program will be challenging. More than 20 new courses have recently been created. Some of these include:

HLTH 117: "Survey of Health Professions"
HLTH 123: "Introduction to Clinical Skills and Patient Care"
HLTH 204: "Introduction to Native Hawaiian & Indigenous Health & Healing"
HLTH 205: "Hawaiian Ways of Healing"
HLTH 315: "*Ho'oponopono* – Practical Applications"
BIOL 302: "The One Health Approach to Infectious Disease"

Insights into students' goals can be gained from surveys, and currently, in both HLTH 117 and HLTH 123, pre- and post-course evaluations are completed by students. A review of the responses from the first three HLTH 123 classes held over the last three semesters revealed that the vast majority of undergraduate students are not aware of the option to pursue health science as a career (Table 2). Among the students who completed the evaluation, 84% were women, 82% were from West O'ahu communities, and 98% attended public high school. West O'ahu public high schools (HS) that were attended included Waianae HS, Nanakuli HS, Kamaile Academy HS, Kapolei HS and Waipahu HS. Central O'ahu public high schools included James Campbell HS and Leilehua HS. Honolulu public high schools included Aiea HS and Radford HS. There were no students from Windward or East O'ahu public high schools.

Reviewing the students career goals, most concerning is that 24% want to be physicians, 31% want to be nurses, but only 5% wanted to go into health science (see Table 2). When analyzing specific occupation goals, the students show more knowledge and clear-cut selections within the doctorate-level clinical occupations versus bachelor-level health science occupations. But exposure to options can change a trajectory. These data suggest that wide spread marketing and recruitment of students will be required to increase awareness of the seven degree concentrations offered in the health science program.

Conclusions

Just because people are poor does not mean that they deserve poor healthcare, in poor facilities from poorly-trained doctors. And, just because people are poor does not mean that they deserve a poor education, in poor campus facilities, from

Table 2. Results of Course Evaluations Completed by University of Hawai'i West O'ahu Undergraduate Students in Introduction to Clinical Skills and Patient Care (HLTH 123)

Career Goal N = 94		
Career	**Number**	**Percentage**
Physician	22	24
Non-Physician Doctorate	5	5
Physician's Assistant	3	3
Nurse Practitioner	4	4
Registered Nurse	25	27
Health Care Administration	13	14
Health Science	**5**	**5**
Other / Undecided	17	18
Total	**94**	**100 %**

Specific Occupation Goals		
Health Science (n = 5) 5%	**Nursing (n = 29) 21%**	**Physician / Doctorate (n = 27) 29%**
Laboratory Technician = 2 Sonographer = 1 Dental Hygiene = 1 Medical Assistant = 1	Nurse Practitioner = 4 Neonatal Nurse = 3 Pediatric Nurse = 1 Registered Nurse, Unspecified = 21	Premedical Undecided = 4 Pediatrician = 5 Surgeon = 1 Neurosurgeon = 1 Neurologist = 1 Emergency Medicine = 2 Pathologist = 2 Obstetrics/Gynecology = 2 Radiologist = 2 Dermatologist = 1 Geriatrics = 1 Neonatology = 1 Clinical Psychology = 1 Pharmacist = 1 Biomedical Engineer = 2

poorly-trained professors. Healthcare is more than just giving out pills, it is also about providing education and employment. The UHWO-UHSP can help address health and economic disparities in underserved West O'ahu communities, as well as fight the growing healthcare workforce shortage. This endeavor will require the collaboration and cooperation of Hawaii's health industry sector, the University of Hawai'i system, state and federal government entities, and West O'ahu communities. Support for this innovative initiative will create a stronger, more well-rounded and sustainable health workforce that meets Hawaii's increasing demand for affordable, accessible and high-quality care. With growing our own as the goal, the final measure of success will be in the quality and number of our graduates from our communities, serving our communities.

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Improving the Accuracy of Patient Medication Lists: Performing Medication Reconciliation by Phone Prior to Appointments

Camlyn Masuda PharmD; Monica Cheung Katz MD; and Lovedhi Aggarwal MD

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Abstract

The purpose of this project was to utilize pharmacists and pharmacy students to perform comprehensive medication reconciliation by telephone prior to a patient's office visit with their primary care physician, to address any medication issues. The project's aims were to decrease polypharmacy, improve the accuracy of medication reconciliation, and to allow more time for the physician to meet with the patient. Patients were called prior to appointment and a thorough medication reconciliation was conducted including verification of current prescription medications, over-the-counter medications, and herbal supplements. A total of 21 patients were enrolled in the study, and in 36% of patients, the number of medications decreased after the intervention. However, overall, the average number of medications used by patients increased from an average of 8.9 to 9.5 medications (P = .39). All patients included in the study had at least one medication change in the electronic medical record system. Most of the changes were to add medications that were not on the medication list or to remove medications on the list that the patient was no longer taking. This study demonstrated improved accuracy with pharmacist/pharmacy student involvement in the medication reconciliation process.

Introduction

Approximately 41% of patients have at least one medication discrepancy in their medical record.[1] One of the Joint Commission's National Patient Safety Goals for both ambulatory care and hospital settings is providing medication reconciliation.[2] Pharmacist-guided medication reconciliation averts medication discrepancies and prevents adverse drug reactions.[1,3] Although medication reconciliation is important, it can be time consuming, especially with patients with several comorbid conditions and multiple medications.

The Physician Center at Mililani, a John A. Burns School of Medicine family practice medical residency staffed clinic, services those with low or fixed income. Physicians typically have 15- to 30-minute appointments with patients and within this window, the medical assistant takes the patient's vitals and performs a medication reconciliation prior to the physician performing the physical exam and office visit. This short encounter may not be the most opportune time to perform a comprehensive medication reconciliation.

The purpose of this project was to utilize pharmacists and pharmacy students to perform comprehensive medication reconciliation by telephone prior to a patient's office visit with their primary care physician. During these encounters, pharmacists/pharmacy students would address any medication refill requests and any medication issues prior to the appointment. The project's aims were to decrease polypharmacy, improve the accuracy of medication reconciliation, and to allow more time for the physician to meet with the patient. The project was created based on previous studies that showed pharmacists medication reconciliation improved accuracy and, from previous experience of the primary author, provided diabetes management over the phone.[1,3] The idea was that if diabetes management could be done over the phone, then so could medication reconciliation.

The study was initially intended as a prospective, randomized control trial as a quality improvement project to decrease polypharmacy. However, due to poor enrollment our project became a proof of concept that showed that having a pharmacist/pharmacy student performing medication reconciliation prior to a patient's appointment with a physician improves accuracy of medication lists and can help improve physician and patient satisfaction.

Methods

This project included adults 18 years or older who were prescribed four or more medications with a scheduled office visit appointment and gave consent. Patients were randomly selected based on availability of pharmacist or pharmacy student on the day of appointment. Forty patients per group were calculated to meet a power of 80%, $P < .05$, to show a reduction in the number of medications in 40% of patients in the treatment group versus 15% in the control group. The University of Hawai'i institutional review board approved the study.

Description of intervention (Figure 1): Pharmacist/pharmacy students performed chart reviews using the electronic medical records system (EPIC) and randomly selected patients who met the inclusion criteria. Patients were called prior to appointment and provided verbal consent for study participation. A thorough medication reconciliation was conducted including verification of current prescription medications, over-the-counter medications, and herbal supplements. In addition, patients were asked

if they had any questions or problems with their medications, and if they needed any refills. After the telephone encounter the pharmacist/pharmacy student performed a medication review which included assessing the appropriateness of medications (eg, drug-drug interactions, therapeutic appropriateness, duration of drug treatment). A telephone encounter note was documented in the electronic medical record which was forwarded to the physician. Completion of additional medication reconciliation and completion of written consent was done at the patient's appointment. Discrepancies, recommendations for medication changes, and refill requests were addressed on day of visit with physician, prior to the patient's appointment. Following the appointment, the patient and physician completed post-visit surveys.

Results

After a two-year recruitment period, only 21 patients with an average age of 62, consented to participate in the study and came in for their scheduled appointment (Figure 2). It was decided to end the study prior to meeting the 40 patients needed due to lack on enrollment. A control group was not pursued since the study did not meet the number of participants required. Female patients accounted for 53% of the study group, 86% of patients had hypertension, and 33% had diabetes mellitus. Table 1 includes the baseline characteristics of the patients.

The primary goal of this study was to decrease polypharmacy and in 36% of patients, the number of medications decreased after the intervention. However, overall, the average number of medications used by patients increased from an average of 8.9

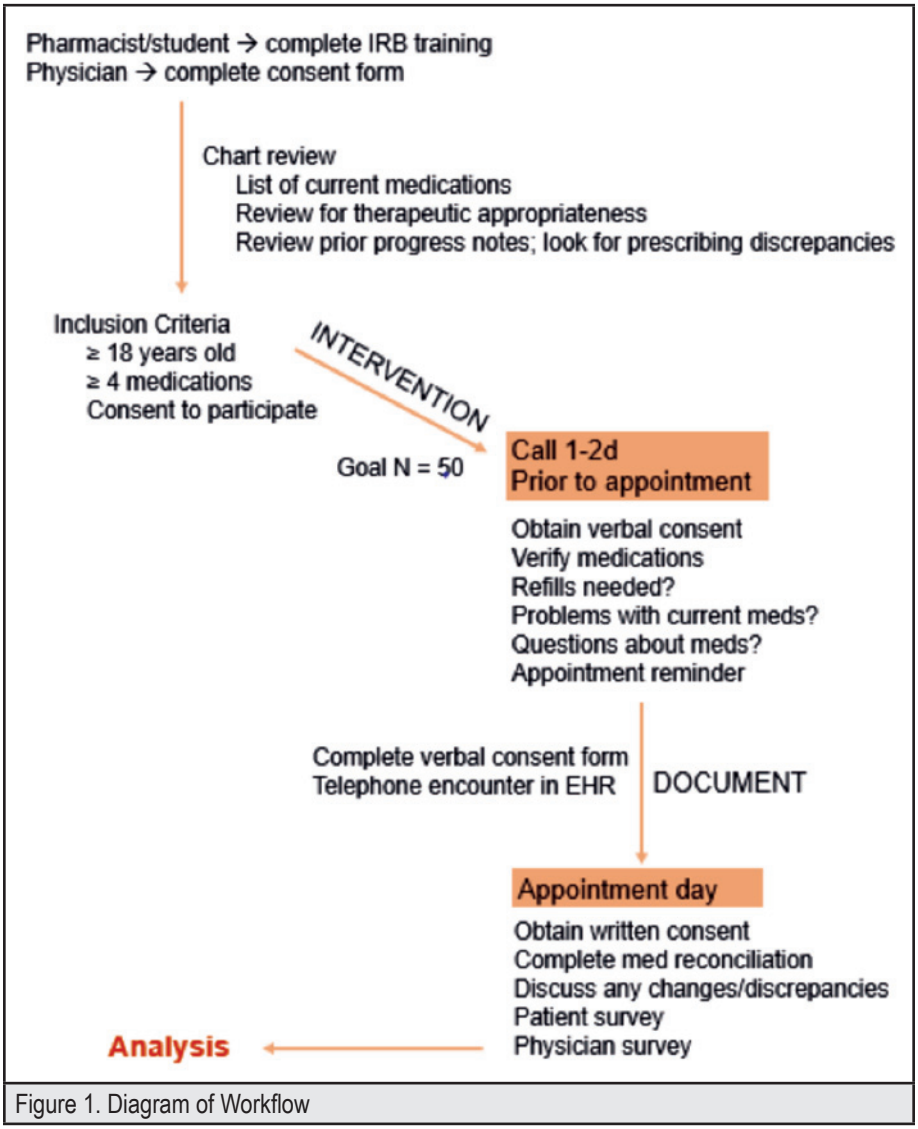

Figure 1. Diagram of Workflow

to 9.5 medications ($P = .39$). All patients included in the study had at least one medication change in the electronic medical record system. Most of the changes were to add medications that were not on the medication list or to remove medications on the list that the patient was no longer taking. In some instances, the medication dose had to be changed. There was a total of four medications that were discontinued after discussion with the physician after the pharmacist/pharmacy student medication reconciliation and review. Examples of medications discontinued were memantine in an elderly patient because of increased risk of fall and dizziness and lack of efficacy, and oxycodone in a patient who was not achieving pain relief with the medication and was experiencing side effects. Figure 3 includes the details of all medication changes made per patient.

Five physicians were included in the study. Of the five physicians, three completed the survey and all three agreed that they felt they had more time with patients because of the intervention, but one of the three physicians was not able to see their patient on time because of the intervention.

The patient survey was completed by 44% of the patients and 100% of the respondents felt the intervention was helpful (Table 2). Furthermore, 86% of the patients felt they had more time with the physician because of the intervention.

Table 1. Characteristics of the Patient Population

Demographics (N=21)	
Average Age	62 y.o (range 36-39)
Patients ≥ 65 y.o	33%
Female	53%
Comorbidities	
Diabetes Mellitus (DM)	33%
Patients ≥ 65 y.o +DM	14%
Medications	
Average # medications prior to phone call	8.9
Average # medications after clinic visit	9.5 ($P = .39$)
Patients with ≥ 8 medications	52%

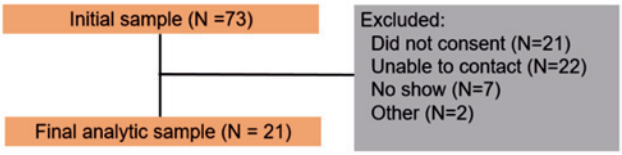

Figure 2. Analytic Sample at Enrollment

Commentary on the Project

The objective of this project was to conduct a prospective, randomized control trial as a quality improvement project to decrease polypharmacy. Due to limited enrollment after 2 years, it was decided to stop the research portion and instead continue the project as quality improvement project and proof of concept. This project showed that having a pharmacist/pharmacy student performing medication reconciliation prior to a patient's appointment with a physician improves accuracy of medication lists.

This project had problems with recruitment for several reasons and was therefore unable to meet power for the study. Many patients were willing to have the pharmacist/pharmacy student perform a medication reconciliation over the phone but did not consent to inclusion in the study and thus their data were not included. Patients seemed very reluctant to be part of a research study, even with assurances that we would conceal their identity. Other challenges for recruitment were that patients were not at home when the pharmacist called or they consented to the medication reconciliation but did not show up for their scheduled appointment. Performing the medication reconciliation by phone for all patients consistently and educating patients that the pharmacist would be calling prior to their appointment may have increased participation.

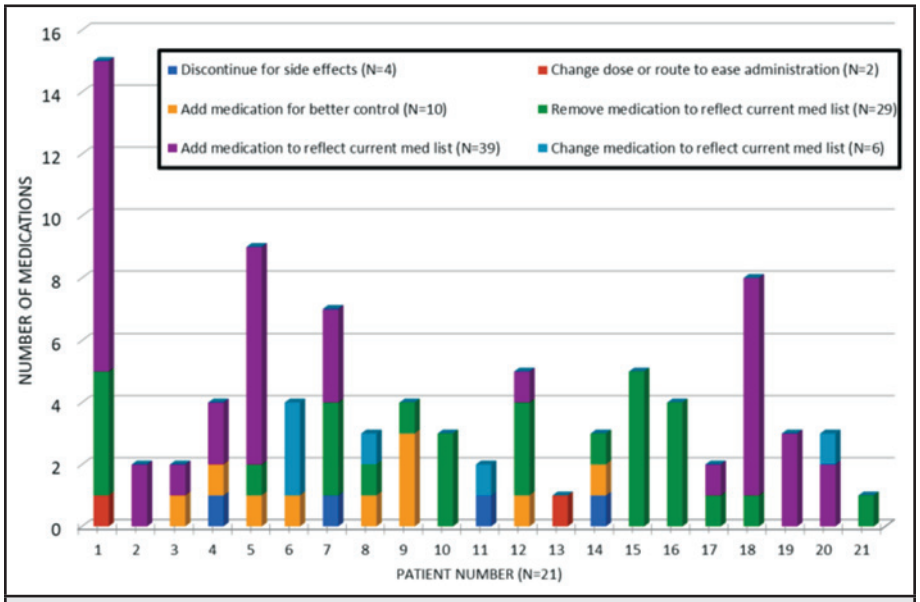

Figure 3. Number of Medication Changes per Patient

Table 2. Analysis of Outcomes

Primary Outcomes	
Reduction in # of medications	36%
Patients with medication changes: dose reduction, discontinuation, and/or addition of medications to reduce long-term complications	100%
Secondary Outcomes	
Potentially harmful medications eliminated, #	4
Patients perceived more time with physician at office visit following phone call	94%

The data from patients that were included in the study indicates that thorough medication reconciliation performed by a pharmacist or pharmacy student prior to office visits can help improve accuracy of medication lists. All patients in the intervention group had a change to their medications to accurately reflect current medication profiles.

Performing the medication reconciliation by phone prior to the appointment with the physician helped improve patient satisfaction based on increased perceived time with the physician during clinic visits. It also helped to improve physician satisfaction as the majority of physicians felt intervention helped increase the time spent with patient.

This intervention would work well in clinics that have at least three physicians and are able to partner with a full-time pharmacist or pharmacy students. Medication reconciliation by phone would work best on high-risk patients, such as those recently discharged from the hospital who are at high-risk for readmission or on four or more medications. Other patients who might benefit from this intervention are those who have been recently discharged from a hospital to decrease the number of visits to the clinic, which is helpful to patients with transportation issues or who are disabled.

Although this study demonstrated improved accuracy with pharmacist/pharmacy student involvement in the medication reconciliation process, contacting patients by telephone prior to their appointment is not a current workflow in this clinic. The limited time the pharmacist/pharmacy student are in clinic makes it challenging to offer this service to all doctors and all appropriate patients. Instead, the pharmacist/pharmacy student is available to do same-day medication reconciliation during times they do not have scheduled patients. Physicians and medical residents may also ask patients to schedule an appointment with the pharmacist/pharmacy student to do medication therapy management reviews. This workflow allows the service to focus on those who are high risk and also allows more efficient use of the pharmacist/pharmacy student's and patient's time.

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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

Foster Care Experiences and HIV-Risk Behaviors

Children and teens who have experienced homelessness and have also spent time in foster care may face heightened risk of engaging in HIV-risk behaviors. Lead author Amanda Yoshioka-Maxwell PhD, of the Myron B. Thompson School of Social Work, collected data from 184 youth at drop-in centers in Los Angeles to investigate the specific aspects of foster care that may impact HIV-risk behaviors. Results showed that long periods spent in care negatively impacts condom use. In addition, older age of exit from foster care appears to protect against engagement in injection drug use. Keeping foster youth from homelessness reduces risk, and foster youth need more education in condom use, the researchers concluded. The study, Exploring the Relationship Between Foster Care Experiences and HIV Risk Behaviors Among a Sample of Homeless Former Foster Youth, is published in *AIDS and Behavior*.

Improving Tests for Zika Virus

Accurate diagnosis of Zika virus infection requires blood tests that look for antibodies to the virus. However, these tests can potentially give a false-positive result if a person has previously been infected with dengue virus because the viruses are closely related. New research led by Wen-Yang Tsai, MS, of the John A. Burns School of Medicine, shows that washing the antibodies taken from patient blood samples with urea prior to testing them can distinguish between a Zika infection in a person who was previously infected with dengue and a second infection of dengue, with a sensitivity of 87.5% and a specificity 93.8%. This testing technique could be used to help diagnose Zika infections in dengue-endemic regions, the researchers wrote. The article, Use of Urea Wash ELISA to Distinguish Zika and Dengue Virus Infections, was published in *Emerging Infectious Diseases*.

A Tuberculosis-Free World Is Possible

The world could be free of tuberculosis (TB) by 2045 if world leaders invested sufficient resources today in treating and preventing the disease, according to a new report from experts including Victoria Fan, ScD, with UH Public Health. The new economic analysis showed that fighting TB offers a strong return on investment: For every dollar spent in the US on TB research and development, $16–$82 are returned to the US economy. TB currently kills 1.6 million people yearly worldwide and reducing deaths by 90% would require a global investment of about $5 billion a year initially. Preventing one TB death will result in savings at least three times that of the costs, the researchers found. Key strategies will include targeting drug-resistant TB and ensuring high-risk groups are identified and reached with medical care. The paper, Building a Tuberculosis-Free World: The Lancet Commission on Tuberculosis, is published in *Lancet*.

Liver Cancer Study Links Gene Signatures to PET Imaging Results

The heterogeneity of hepatocellular carcinoma (HCC) makes it difficult to study possible molecular therapeutic targets in clinical trials. Now, a new study links certain gene signatures of HCC with the rates of uptake of a marker called fluorine-18 fluorocholine (FCh) measured by PET scans. Sandi Kwee, MD, PhD, of the UH Cancer Center and colleagues compared validated gene signatures with the results of PET imaging using FCh in 41 patients in Hawai'i. The researchers found an association between high FCh uptake and multiple previously published gene signatures for HCC, including those associated with survival. They also found another signature linked with low FCh uptake and shorter survival. Few studies to date have reconciled molecular imaging with genomics in this manner. It is an under-utilized approach to studying tumor pathobiology, the researchers wrote. The article, Transcriptomics Associates Molecular Features with 18F-Fluorocholine PET/CT Imaging Phenotype and Its Potential Relationship to Survival in Hepatocellular Carcinoma, was published in *Cancer Research*.

A New Target for Treating *Clostridium difficile* Infections

Patients who develop gut infections with the bacteria *Clostridium difficile* (commonly called *C. diff*) are commonly treated with the broad-spectrum antibiotics, but these medications can cause further disruption of the gut flora. In a new paper, researchers including Dianqing Sun, PhD, with The Daniel K. Inouye College of Pharmacy, found that the enzyme FabK is essential for fatty acid synthesis in *C. diff*. The researchers used gene silencing and chemical inhibition of the enzyme to show that FabK is critical for both survival and spore production. Moreover, other major gut bacteria species do not depend solely on FabK for fatty acid synthesis, suggesting that FabK represents a target for new narrow-spectrum antibiotics to treat *C. diff* with less damage to other gut microbiota. The paper, The Fatty Acid Synthesis Protein Enoyl-ACP Reductase II (FabK) Is a Target for Narrow-Spectrum Antibacterials for *Clostridium difficile* Infection, is published in *ACS Infectious Diseases*.

Early Kidney Disease in Asian-Americans

Asian-Americans may face higher risk of early kidney damage compared to Whites. Researchers led by Merle Kataoka-Yahiro, DrPH, of the UH School of Nursing and Dental Hygiene, and James Davis, of the John A. Burns School of Medicine looked at data gathered from nearly 6,000 participants in the National Health and Nutrition Examination Survey 2011-2014. They found Asian-Americans were significantly more likely to have elevated urine albumin-to-creatinine ratios (ACR), compared to Whites, suggesting that Asian-Americans are at higher risk of early kidney damage. After adjustments were made for age, sex, education, and comorbidities, Asian-Americans were 2.77 times more likely than Whites to have ACR levels above 300 mg/g, indicating early-stage kidney damage. However, Asian-Americans were significantly less likely to have estimated glomerular filtration rates of less than 60 ml/min/1.73m^2, a marker of kidney dysfunction. More research on the relationships between ethnicity, diet, genetics, and environment is needed, the researchers wrote. The paper, Asian Americans & Chronic Kidney Disease in a Nationally Representative Cohort, is published in *BMC Nephrology*.

THE WEATHERVANE

RUSSELL T. STODD MD; CONTRIBUTING EDITOR

ONCE YOU GET IT PAST YOUR NOSE, IT'S STILL FUNKY.

Although it is well known that marijuana is classified as a schedule one narcotic, no one seriously considers that it should be thought of like heroin. Nor should it be included as a schedule two or three drug such as Demerol, hydrocodone, or amphetamine. Ignoring the federal statute, thirty-three states and the District of Columbia have enacted laws broadly legalizing pot in some form. A host of companies including the world's biggest brewers are struggling to make a drinkable cannabis. Problems are multiple. The oily THC extracts don't mix with water, and to get a proper blend with each sip requires frequent shaking. Moreover, the cannabis must pass through the liver, so it takes too long for the drinker to feel the effects, usually about one-half hour. One current approach is to prepare a sweetened drinkable cannabis, promising anxiety reduction, pain relief or better sleep. But one sense intervenes: marijuana-infused beverages produce hints of dirty socks. The taste has been compared to dish soap and urine. One advocate says, "It's very grassy and very funky." Despite the negatives, the major makers of intoxicating beverages Anheuser Busch, Molson Coors Brewing Co. and Corona maker Constellations Brands Inc. are forming partnerships with Canadian marijuana companies. All are throwing their muscle into the task of making cannabis drinks. One chief executive said the global marijuana market could eventually top today's $100 billion annual US market for beer. Perhaps, but right now don't get in line.

WHOA. WE ARE SUPPOSED TO BE THE MOST FERTILE LAND IN THE WORLD.

There has been a marked decline in US fertility rates in recent years. Some have asked if this is due to abortion frequency and the answer is no. Fertility is near record lows on two measures: around 3.85 million babies were born in 2017, the lowest number since 1987. And the total number of children women are expected to have in their lifetime is 1.8, approaching the 1976 low of 1.7. For the first time since 1975 the abortion total dropped below one million in 2013 when 958,700, were numbered, and has continued downward to 926,000 in 2014. These data are collected by the Guttmacher Insitute, a research organization started in 1968 that assembles data by contacting all known facilities where abortion is provided. In addition to tracking abortions, Guttmacher also counts the number of facilities where abortion is provided, something the CDC doesn't track. The number of clinics where abortion is provided has dropped 6% between 2011 and 2014 with the steepest decline in the Midwest (22%) and south (13%). Among the factors often overlooked contributing to the decline are the increased use of long-acting reversible birth control and a reduction in the number of unplanned pregnancies.

HEY DOC. MAYBE IT'S TIME TO PUT DOWN THAT KNIFE AND GO GOLFING.

According to the American Medical Colleges Physician Specialty Data Report, in 2017, 44% of 103,032 active surgeons in the United States are 55 years or older with a spread of 40.9% still doing vascular surgery to 58.1% doing thoracic surgery. Surgeons are not immune to the decline in cognitive function that accompanies aging. Also hearing, olfactory and visual functions deteriorate. In one study of nearly 900,000 Medicare patients who had operations performed by older surgeons (beyond 60 years) had lower mortality than patients who had operations performed by younger surgeons. In contrast, another study of the files of 461,000 Medicare patients operated for pancreatectomy and coronary artery bypass grafting found that younger surgeons (ages 41 to 50) had lower mortality rates than older surgeons (beyond 60 years). How about mandatory retirement age? No, in the United States that would be illegal, unfair and inappropriate. Russia and China retire male surgeons at 60 years and women age 55. However, Congress has mandated retirement for commercial airline pilots 65 years, FBI agents 57 years, National Park Rangers 57 years, air traffic controllers 56 years and lighthouse operators 55 years. So, there you are. Gathering it all up one is possibly safer with maturity or maybe not.

EXCITING DEVELOPMENT IN LASER FUNCTION AT MIT.

Using a laser tuned to interact with water vapor in the air, researchers created sounds in a localize spot just loud enough to be picked up by the human ear. This is the primary event using this technique safely around humans. Reporting in *Optics Letters,* scientists worked at the Massachusetts Institute of Technology (MIT). Using these wavelengths and power the laser will not burn the eyes or skin. The team tested the setup in the lab on themselves. Physicist Charles Wynn said, "You move your head around, and there's a couple-inch zone where you go, Oh, there it is. It's pretty cool." The task relies on the photoacoustic effect, where pulses of light are converted into sound when absorbed by water vapor. It is still a primitive mechanism, but the potential for extended use is huge.

ADDENDA

- How does an elephant get down from a ladder? He doesn't get down from a ladder. He gets down from a goose.
- The first computer was in the Garden of Eden. It was an Apple with very limited memory. One byte and everything crashed.
- Progress was alright once, but it has gone on far too long.
- I didn't know he was dead. I thought he was British.
- We may eventually come to realize that chastity is no more a virtue than malnutrition.

ALOHA AND KEEP THE FAITH rts

(Editorial comment is strictly that of the writer.)

General Recommendations on Data Presentation and Statistical Reporting (Biostatistical Guideline for HJM&PH)
[Adapted from Annals of Internal Medicine & American Journal of Public Health]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Guidelines for Publication of HJM&PH Supplements

The following are general guidelines for publication of supplements:

1. Organizations, university divisions, and other research units considering publication of a sponsored supplement should consult with the editorial staff of HJM&PH to make certain the educational objectives and value of the supplement are optimized during the planning process. It is important that the sponsoring editor is aware of all steps to its publication. Please contact Drs. Kalani Brady for further information.

2. Supplements must have educational value, be useful to HJM&PH readership, and contain data not previously published to be considered for publication.

3. Supplements must have a sponsoring editor who will be involved in every step of the development, editing, and marketing of the publication since HJM&PH staff will only be reviewing final proofs.

4. Supplements should treat broad topics in an impartial, unbiased manner. Please prefer specific classes of drugs, rather than products, unless there are compelling reasons or unique properties of the drug (product) that justifies its treatment.

5. The authors are solely responsible for the content of their manuscripts and the opinions expressed. They are also responsible for the replicability, precision, and integrity of the data and may be asked to sign a statement to that effect prior to publication. All authors are required to disclose any primary financial relationship with a company that has a direct fiscal or financial interest in the subject matter of products discussed in submitted manuscripts, or with a company that produces a competing product. The sponsoring editor must ensure that each article submitted incorporates a disclosure statement from the authors within the body of the text. For more information, please refer to the Disclosure Statement within "Instructions to Authors" on the journal website.

6. All supplement manuscripts should undergo editorial and peer review. It is the responsibility of the sponsoring editor to ensure the integrity of authorship and review process. In addition, sponsorship implies compliance with all federal, state and local laws, rules and regulations that may be applicable in connection with its publication.

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9. Supplement issues are posted online for full-text (PDF) retrieval on the HJM&PH website at www.hjmph.org. An announcement of its availability will be made through our normal email distribution list. Full-text will also be available on PubMed Central.

10. It is the responsibility of the supplement editor and contributing team members to manage all editorial, marketing, sales, and distribution functions. If you need assistance, please contact our production manager. We may be able to help for an additional fee.

11. Timing of a supplement issue publication will be formalized once all required materials have been submitted to the production manager and payment made.

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