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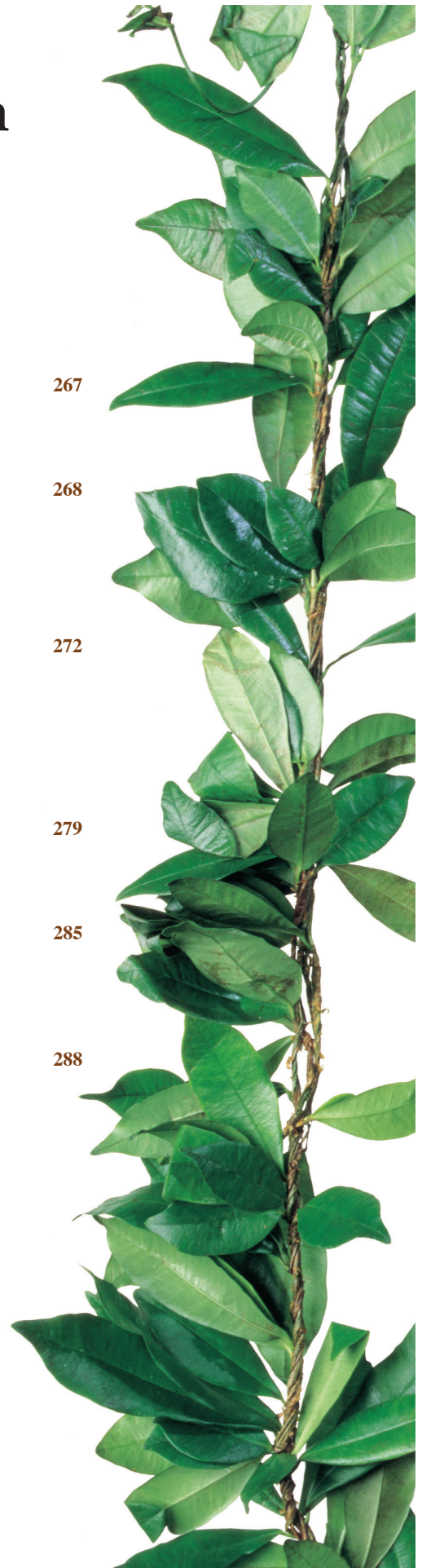
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HAWAI'I JOURNAL WATCH

KAREN ROWAN MS

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

CULTURALLY INFORMED RESEARCH METHODS ARE NEEDED IN RESEARCH ON NATIVE HAWAIIAN MENTAL HEALTH

Researchers led by Rachel L. Burrage MSW, PhD, of the Myron B. Thompson School of Social Work, conducted a scoping review of the literature on Native Hawaiian mental health and psychological well-being. The review included 21 empirical studies of Native Hawaiians in the US that linked psychological well-being to relational, physical, spiritual, or cultural constructs. The analysis revealed the importance of utilizing research methods that incorporate Native Hawaiian cultural values and concepts. For example, in studies of overcoming adversity, research demonstrated the importance of assessing the support of 'ohana (family). Studies also showed the value of using a decolonization framework in research design, the importance of connection to place for Native Hawaiian wellbeing and considering cultural identity in mental health research, and the significance of incorporating Hawaiian culture into health interventions. The researchers concluded future studies should include such methods.

- Burrage R, Antone M, Kaniaupio K, Rapozo K. A culturally informed scoping review of Native Hawaiian mental health and emotional well-being literature. *Journal of Ethnic & Cultural Diversity in Social Work*, 2020:1–13. <https://doi.org/10.1080/15313204.2020.1770656>

PRENATAL EXPOSURE TO METHAMPHETAMINE LINKED TO EPIGENETIC CHANGES IN CHILDREN

Children exposed to methamphetamine prenatally show epigenetic alterations in a gene involved in the body's stress response. Researchers including Charles Neal, MD, PhD, of the John A. Burns School of Medicine, analyzed DNA from saliva samples, and levels of the stress hormone cortisol from hair samples from 90 children ages 10 to 11 in Hawai'i and California. The children's mothers had participated in the Infant Development Environment and Lifestyle study, which collected data on methamphetamine use during pregnancy. Regression analysis showed that prenatal methamphetamine exposure, as well as children's scores on the postnatal early adversity index, were associated with greater methylation of a gene called HSD11B2. The associations held when the researchers controlled for mothers' tobacco, alcohol, and marijuana use. HSD11B2 encodes an enzyme that converts cortisol to an inert form, reducing circulating cortisol levels; the methylation of HSD11B2 reduces the enzyme's activity, increasing cortisol levels. The findings show that early experiences can become biologically embedded and have long-term health implications.

- Oni-Orisan OO, Dansereau LM, Marsit CJ, et al. DNA methylation in children with prenatal methamphetamine exposure and environmental adversity. *Pediatr Res*. 2020;[published online ahead of print]. doi:10.1038/s41390-020-1058-4

MORE THAN 300 ANTIMICROBIAL COMPOUNDS CATALOGED IN NEW REVIEW

Bacteria belonging to a group called marine actinomycetes have been a predominant source of recently identified natural compounds that show activity against microbes that infect humans. In a review

article, researchers including Shugeng Cao PhD, of the Daniel K. Inouye College of Pharmacy, list the sources, chemical structures, and antimicrobial activities of 313 actinomycetes compounds reported in the literature between 1976 and 2019. The review found that 272 compounds had antibacterial properties, including compounds with activity against the bacteria that cause staph/strep infections, and tuberculosis. There were 70 compounds that showed antifungal activity, including compounds that can stop the growth of the yeast *Candida albicans*, which also infects people. Most of the actinomycetes bacteria were isolated from marine sediments, but some were isolated from animals such as sponges and corals. The researchers concluded that more useful compounds will likely be found with new screening approaches.

- Wang C, Lu Y, Cao S. Antimicrobial compounds from marine actinomycetes. *Arch Pharm Res*. 2020;10.1007/s12272-020-01251-0. doi:10.1007/s12272-020-01251-0

YOUNG PEOPLE IN HAWAI'I HAVE HIGH RATES OF CHRONIC DISEASE

Chronic diseases such as asthma, diabetes, and chronic kidney disease are prevalent among children and young adults needing hospital care in Hawai'i. Researchers led by Tetine L. Sentell PhD, of the Office of Public Health Studies, gathered data on all 31 400 inpatient and 261 890 emergency department (ED) visits for children and young adults ages 5 to 29 during 2015 and 2016. Results showed 28.1% of hospitalized patients and 12.8% of ED patients had at least 1 chronic disease. Native Hawaiians in the hospital and ED settings, and Filipinos and Other Pacific Islanders in the hospital setting had higher rates of chronic conditions than other racial/ethnic groups. Rates of chronic conditions in young people in Hawai'i have been understudied; the new findings may help support intervention programs aimed at preventing or managing chronic diseases in young people.

- Sentell T, Choi SY, Ching L, et al. Prevalence of selected chronic conditions among children, adolescents, and young adults in acute care settings in Hawai'i. *Prev Chronic Dis*. 2020;17:E67. doi:10.5888/pcd17.190448

OVARIAN CANCER RISK FACTORS VARY ACROSS RACIAL/ETHNIC GROUPS

There are differences in the risk factors for epithelial ovarian cancer (EOC) across racial/ethnic groups. Researchers including Danja Sarink PhD, of the UH Cancer Center, analyzed data from the Multiethnic Cohort (MEC) Study, which includes African Americans, Native Hawaiians, Japanese Americans, whites, and Latinas. The study included 91 625 women at baseline. Over a median follow-up of 21 years, 607 women developed EOC. Results showed that parity and oral contraceptive use were inversely associated with EOC risk in the overall study population, but the associations were strongest among Japanese Americans. Having an older age at natural menopause and the use of postmenopausal hormones were associated with EOC risk only in Latinas. The researchers concluded that more research is needed to better understand the factors that contribute to differences in EOC risk, especially for Native Hawaiian, Asian American, and Latina women.

- Sarink D, Wu AH, Le Marchand L, et al. Racial/ethnic differences in ovarian cancer risk: Results from the Multiethnic Cohort Study. *Cancer Epidemiol Biomarkers Prev*. 2020;cebp.0569.2020. doi:10.1158/1055-9965.EPI-20-0569

Public Compliance with Face Mask Use in Honolulu and Regional Variation

Kasey A. Tamamoto BS; Nikki D. Rousslang BS; Hyeong Jun Ahn PhD; Heidi E. Better PharmD; and Robert A. Hong MD

Abstract

Infections with the SARS-CoV-2 virus are increasing in Hawai'i at alarming rates. In the absence of a SARS-CoV-2 virus vaccine, the options for control include social distancing, improved hygiene, and face mask use. There is evidence that mask use may decrease the rates of viral transmission. The rate of effective face mask use has not yet been established in Hawai'i. The authors performed an observational study at 2 locations in Honolulu and evaluated outdoor face mask use compliance in 200 people. Simultaneous observations were performed in a downtown Honolulu business area and in Waikiki, an area focusing on tourism. Overall, 77% of all subjects used face masks in an appropriate fashion, covering their nose and mouth, while 23% were either incorrectly masked or not masked. The rate of compliance with correct public mask use in downtown Honolulu (88%) was significantly higher than in Waikiki (66%) ($P=.0003$, Odds Ratio [95% Confidence Interval]=3.78 [1.82, 7.85]) These findings suggest that there are opportunities for improvement in rates of public face mask use and a potential decrease in the spread of COVID-19 in our population. Four proposed actions are suggested, including a reassessment of the face mask exemption requirements, enhanced mask compliance education, non-threatening communication for non-compliance, and centralization of information of the public compliance with face mask use.

Keywords

COVID-19, SARS-CoV-2, Face Mask Compliance, Face Mask Exemptions, Public Compliance

Abbreviations and Acronyms

COVID-19 = Coronavirus Disease 2019
SARS-CoV-2 = Severe Acute Respiratory Syndrome Coronavirus 2
OR [95% CI] = Odds Ratio [95% Confidence Interval]
 R_t = Effective Reproduction Number

Introduction

Cases of COVID-19 are increasing rapidly in the United States with more than 5 million SARS-CoV-2 infected individuals identified.¹ While Hawai'i has one of the lowest COVID-19 rates in the nation, the state's case numbers are increasing quickly. Three-hundred fifty-five new cases were reported on August 13, 2020.² It has been suggested that the use of face masks can prevent the spread of the SARS-CoV-2.^{3,4} Most studies supporting the concept of increased face mask use resulting in decreasing rates of COVID-19 cases and deaths have relied on online surveys.^{5,6} Direct, observational documentation of face mask use in the current COVID-19 pandemic has been limited. A review of the PubMed data bank using the terms "face mask use and infection" was performed on July 28, 2020, and 890

references were identified. A single citation was found describing in-person observation of public outdoor compliance with mask use and COVID-19 rates.⁷ Cheng et al assessed public mask use in Hong Kong using observations from 67 staff members of the Queen Mary Hospital who recorded public face mask use on their morning commute to work. These observers recorded face mask use among the first 50 subjects encountered on a morning commute between April 6-8, 2020. They noted a 96.6% public compliance rate with face mask use and attributed the lower rates of COVID-19 observed in Hong Kong compared to several Western countries to near-universal face mask use. Cheng reported 11 COVID-19 clusters in recreational "mask off" settings compared to 3 in workplace "mask on" settings. In a similar fashion, one of the authors of our manuscript noted that compliance with face mask use appeared to be lower in Waikiki, a recreational and tourism-based region than in downtown Honolulu, a primary business-based location. The authors elected to investigate this further.

Currently, the City and County of Honolulu present a unique situation for assessing face mask use compliance. On July 2, 2020, the Mayor of Honolulu and the Governor of Hawai'i mandated the use of face masks on the island of O'ahu when social distancing among members from different households would not be possible. Exceptions to this mandate were made for individuals engaging in physical activity where physical distancing of 6 feet could be maintained, children under the age of 5, persons involved in banking or financial transactions where face recognition was required, individuals with medical conditions in whom the use of a mask would potentiate a health or safety risk, and first responders for whom face coverings could impair their ability to respond appropriately.⁸ The authors elected to examine the overall compliance rates with face mask use and contrast use in Waikiki and downtown Honolulu.

Methods

On July 30, 2020, at 12:30 p.m., the authors performed a small, visual, point-in-time survey of mask use at 2 outdoor locations in Honolulu, 4 miles apart. One was in an open area in downtown Honolulu adjacent to major financial institutions. The second was on a main street in Waikiki outside a shopping area across from Waikiki Beach. These locations were chosen to ensure high rates of pedestrian traffic, which minimized the time observers spent near subjects. To avoid confounding factors created by weather or time of day, simultaneous observations of mask

use were performed. Mask use was assessed at each location for the first 100 individuals observed at these locations, and observations were completed within 15-20 minutes at each site. Observations were based upon subjects who walked or moved using a wheelchair past the observers. Runners, bicyclists, individuals who were in the process of eating or smoking, on-site workers, and children appearing under the age of 5 were excluded from analysis due to existing exemptions for these populations. Direct contact with the study population was not made, and the observers maintained a distance greater than 6 feet from subjects to avoid potential infectious risks.

Data were collected using a preprinted sheet divided into cohorts of 10 people per line and 10 total lines. Hash marking was performed to collect data rapidly. The elements recorded were no mask use, mask use, appropriate mask use covering both the nose and mouth, apparent type of masks (cloth-appearing vs. medical-styled masks), and subjects who appeared less than 5 years old. Observations were stopped after counting 100 subjects to minimize the time observers spent near subjects.

As observed individuals were not interviewed, it was not possible to assess if individuals that did not meet the aforementioned exemption criteria had other conditions (eg, medical) that would exempt them from mask use. Accordingly, categorization was based upon observation, and additional exclusions were not considered. To ensure the safety of the observers, both observers used KN-95 masks.

Survey records were summarized by frequency and percentage, and Chi-square or Fisher's exact tests were performed to investigate any significant rate difference between downtown Honolulu and Waikiki with respect to mask use status, appropriate mask use or not, and type of masks. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to measure the strength of the association. All the analyses were conducted using SAS version 9.4 (SAS Institute, Cary North Carolina), and *P*-value of less than .05 was considered statistically significant.

Results

One hundred people were evaluated at both sites, for a total of 200 individual evaluations.

Correct face mask use was defined as a face mask that covers both the mouth and nose of an individual, as per Centers for Disease Control and Prevention (CDC) guidelines.⁹ Of the 200 observed subjects, 154 (77%) correctly used face masks, and 46 (23%) either incorrectly used or did not use face masks. The downtown Honolulu area had 3.78 times higher odds of having correct use of face masks than the Waikiki area (OR [95% CI]=3.78 [1.82, 7.85], *P*=.0003). In the downtown area, 88% of the observed population correctly used face coverings, while 8% were not masked. In Waikiki, only 66% of subjects correctly used face masks, while 28% were not masked (Table 1). There were

	All Observations (%), N=200	Waikiki (%), n=100	Downtown Honolulu (%), n=100	<i>P</i> -value (chi-square)
Masked Correctly	77	66	88	--
Masked Incorrectly	5	6	4	.29
Not Masked	18	28	8	.0002
Not Masked or Masked Incorrectly	23	34	12	.0003
Cloth Mask	70 (n=164)	69 (n=72)	70 (n=92)	--
Medical Mask	30 (n=164)	31 (n=72)	30 (n=92)	--

significantly higher odds of not wearing a mask at the Waikiki site than at the downtown Honolulu site (OR [95% CI]=4.47 [1.92, 10.40], *P*=.0002). Although the exact material of each mask could not be determined, cloth-based masks appeared to be used more frequently than medical masks (70% vs 30%, respectively), and there was no significant difference between the 2 areas (*P*=.99).

Discussion

Cases of COVID-19 are increasing in the United States and Hawai'i at alarming rates. A SARS-CoV-2 virus vaccine is not currently available, and at the current time, the only options for decreasing the spread of this virus are social distancing, improved hygiene, and face mask use. Although there is evidence that the use of face masks is a reasonable strategy for decreasing the spread of this viral illness,^{10,11} there have been questions about the use of face masks in preventing the spread of COVID-19.¹² Despite these questions, face mask use is likely one of the few tools we can use to combat the spread of the SARS-CoV-2 virus.

The results demonstrate that outdoor public face mask use is not universal in Honolulu. Overall, only 77% used them correctly by covering both the nose and mouth. This rate could be improved. A significant difference was noted in the rates of mask use between downtown Honolulu and Waikiki. The reasons for the geographic differences are not certain. The lower public mask use in Waikiki may be related to the exemption from face mask use during exercise of swimming, as the Waikiki site of data collection is across the street from a beach and a few blocks from a large public park. The downtown Honolulu site, on the other hand, has fewer venues where exemptions are likely to occur. Alternatively, differing compliance between populations may be related to differences in the composition of the populations. According to the Hawai'i Tourism Authority, Honolulu had 3150 visitors in March 2020, and this number has increased to 12395 in May 2020.¹³ The Waikiki site of data collection likely had a higher proportion of tourism, as Waikiki is a popular tourist destination. Although tourist rates are substantially lower than they were at this time last year and tourists are required to self-quarantine for the first 2 weeks of their visit, the current

tourist rates are not insignificant, and once out of quarantine, tourists may contribute to the spread of COVID-19 like any member of the community. Alternatively, there may be relatively more residents of Honolulu in Waikiki now that there are fewer tourists. Other factors that may account for the difference in face mask compliance rates between Waikiki and downtown Honolulu include age differences, employment backgrounds, and planned immediate activities. Regardless of these factors, the difference in public outdoor face mask compliance between the 2 sites suggests that a wide scope of educational efforts will be needed to improve compliance. In order to educate such a diverse population, many techniques will be needed.

Based on the findings of this study, 4 proposals are suggested.

First, the exemption from face mask use with exercise should be re-evaluated. Whether or not people intend to exercise or swim, they may still contribute to the spread of COVID-19 when out in public. It may be difficult to distinguish exercise from other outdoor activities that are not exempt, so a simpler mandate in which swimming is the only exempt form of exercise may be easier to follow. Furthermore, even if the non-masked subjects in the study were exempt from face mask use because they were exercising, they still comprised a sizeable portion of the population, and the general public may receive conflicting viewpoints: is mask wearing important, or not? By implementing fewer or more stringent mask exemptions, the general public may better appreciate the importance of mask compliance.

Second, widespread public education on mask compliance is proposed. With tourism levels in Hawai'i significantly decreased from previous years due to the virus, it is likely that many of the individuals observed in the study were Honolulu natives. As noted earlier, education on face mask use needs to be given to many different populations. The younger population may respond more favorably to information delivered through social media platforms. For example, using familiar and recognized local athletes and social media influencers may provide a means for widespread, helpful education. An older population may benefit from television advertisements targeting news shows, while trans-Pacific visitors may be educated using public service announcements provided during airline flights to Hawai'i.

The third proposal encourages face mask compliance through a friendly approach. Other, more punitive efforts to enforce mask compliance have been suggested,¹⁴ but the authors feel that these efforts would be counterproductive. Instead, the authors propose that individuals perform a recognizable but non-confrontational gesture to encourage face mask compliance. For example, the authors suggest that properly masked individuals, upon identifying an improperly or non-masked individual, point their index fingers towards their mask and move their index finger up and down without touching the mask. This gesture could then be followed by a 'shaka' to help convey that this is merely a friendly reminder and is not meant to be confrontational. As

a culturally relevant action, the 'shaka' could encourage locals to use the gesture and remind visitors to respect and protect the health of the people of Hawai'i. The use of this signal could also be explained in the educational video shown to tourists about mask compliance in Hawai'i.

Fourth and lastly, the approach to compliance with social distancing and mask use should be centralized. Objective assessment of mask use should be considered with the centralization of efforts and data processing. A standard database housed at the Department of Health should be developed so that decisions to focus efforts can be directed at areas with lower face mask compliance.

Some have criticized the requirement for face mask use as not based upon hard evidence. It is clear that there are differing views on face mask use, and face mask use is likely not completely effective in preventing the spread of the SARS-CoV-2 virus.¹⁰ It should be noted that face mask use not only creates a physical barrier for infectious spread but also promotes appropriate social distancing, and effective hygiene. This change in the mental model may be one of our most effective tools in combating the dramatic increase in SARS-CoV-2 infections. Face mask compliance not only helps protect the individual but also shows the sacrifice a society is willing to make to protect its most vulnerable members.

In addition, although the full extent to which face masks prevent SARS-CoV-2 transmission is unknown, studies have found that face masks lower rates of infection.^{3,4} While it is likely that face mask use does not completely prevent SARS-CoV-2 transmission, complete prevention is not necessary to justify face mask compliance. At the time of publication, the most current data shows the effective reproduction number (R_t) of Hawai'i hovering around 1.4.¹⁵ As the R_t represents the virus's actual transmission rate at any given time, t , this means that on average, each patient infected with the SARS-CoV-2 virus infects 1 or 2 others. Face mask use is one of the few tools we have to lower the R_t for this contagious virus. In order to stop the spread of COVID-19, the R_t value must fall below 1, which would mean that an infected individual would, on average, infect less than 1 other person. Increased rates of correct face mask use may help lower the spread of COVID-19 in Hawai'i.

Overall, wearing a face mask is a simple act that can limit the community's exposure to the virus.

Limitations of the study include its small sample size and limited observation time. Because data collection took place in only 2 locations, the results are not necessarily representative of the entire population of Honolulu. As of July 31, 2020, the Mayor of Honolulu ordered all residents to stay at their place of residence, except to perform essential business as outlined by the order.¹⁴ As a result, the downtown Honolulu site was likely composed of employees of operations that were deemed

essential by city officials. Because data collection took place at 12:30 p.m., observers did not see if face mask use changed by the end of the workday. The limited observation time meant that observers often had to quickly assess whether the subjects were greater than 5 years of age and properly masked. In addition, data collection was limited to only July 30, 2020, which may not have been representative of face mask use over time. Further investigation of face mask use over a longer period of time, including different times of day, at different locations should be conducted to confirm our findings.

However, although small, the study sheds light on an important issue on which there is sparse literature. At the time of publication, there has been only 1 other published study examining face mask compliance via direct observation. However, this study was conducted in Hong Kong, and no study involving direct observation has been conducted in Hawai'i or other states. The study provides insight into how closely people in Hawai'i are following mandates, which can help inform policymakers on how to best modify similar mandates in the future. The authors hope that this manuscript will encourage efforts to improve face mask use in Hawai'i and help initiate positive efforts.

Conflict of Interest

None of the authors identify any conflicts of interest.

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Survival Analysis of Patient Contraceptive Choice Method at Time of Abortion — Honolulu, Hawai‘i, May 2010–December 2016

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Abstract

The relationship between contraceptive method choice at the time of abortion and risk for subsequent abortions is not well understood. This article uses an existing data set from the University of Hawai‘i Women’s Options Center between May 2010 and December 2016 to examine if such a relationship exists. A multivariate Cox proportional hazards regression survival analysis was used to evaluate contraceptive method prescribed or provided at index abortion encounters and likelihood of additional abortions. Patients who received a prescription of oral contraceptive pills, patches or rings at their index abortion were 61% more likely to have an additional abortion than those who had no contraceptive method recorded (hazard ratio [HR], 1.61; 95% confidence interval [CI], 1.14–2.28). Patients who received a long-acting reversible contraceptive method at their index abortion were 59% less likely to have an additional abortion when compared with a patient receiving no method (HR, 0.41; 95% CI, 0.20–0.86). The findings show that patients who were prescribed oral contraceptives pills, patches, or rings were more likely than patients who had no contraceptive method prescribed or provided to have more than one abortion during the data collection period. Contraceptive method choice at time of abortion is complex and providers should be thorough in their counseling about failure rates, while also remaining vigilant in supporting patient autonomy and avoiding coercive or stigmatizing language.

Keywords

abortion; contraception; survival analysis; reproductive autonomy

Abbreviations

CI = confidence interval

DMPA = Depot medroxyprogesterone acetate

HR = hazard ratio

LARC = long-acting reversible contraceptive

PPR = oral contraceptive pills, patches, or rings

REDCap = Research Electronic Data Capture

SD = standard deviation

Introduction

Unwanted pregnancies that result in abortion can be personally disruptive and costly, and pregnancy is associated with medical risks. Multiple abortions are not inherently problematic as abortion is a safe procedure and has lower associated morbidity and mortality than pregnancy or childbirth. However, procedures can be a burdensome experience, particularly if the patient must overcome financial, legal, or geographic barriers to access care.¹ Using contraception to avoid additional unwanted pregnancies that result in abortion may reduce these impacts on patients and their families. According to a 2008 study by

the Guttmacher Institute, 50% of patients having an abortion have already had a prior abortion.²

Contraceptive counseling is a preventive health measure endorsed by the World Health Organization and the United States Preventive Services Task Force; nevertheless, the evidence demonstrating the efficacy of such practices in conjunction with abortion is limited.^{3,4} The Contraceptive CHOICE Project, which provided structured counseling and no-cost access to all methods of contraception to all participants, demonstrated increased uptake of highly effective methods of contraception, but the conditions of this intervention (highly structured counseling and no-cost contraception) are not reflective of most clinical settings.⁵ Other studies have demonstrated that contraceptive counseling alone, even using a highly structured approach, did not improve uptake and continuation of contraceptive methods after abortion.^{4,6} A focused contraceptive counseling intervention in England resulted in more patients leaving their abortion visit with a contraceptive method, but no difference in the number of patients returning for an additional abortion within 2 years.⁷

Patients may not want to discuss contraception at the time of their abortion, or they may find the conversation to be stigmatizing or coercive.^{8–11} Provider promotion of long-acting reversible contraception (LARC) as a low maintenance, highly effective method may be interpreted by patients as a judgmental message about the importance of avoiding additional pregnancies.^{9,11}

Access to contraception and its relationship to subsequent pregnancy has also been explored. Immediate provision of LARC and contraceptive injections after abortion increases uptake of these methods and has been shown to reduce rates of pregnancy in subsequent years when offered within the context of a research study.^{12,13} These experimental settings may not reflect real-world conditions in which a variety of factors, including cost, method availability, the influence of a partner or guardian, and time constraints for the patient or clinic may impact contraceptive decision-making.

The University of Hawai‘i Women’s Options Center (referred to hereafter as the Women’s Options Center) in Honolulu, Hawai‘i has a detailed database of all abortion patients seen between May 2010 and December 2016. This database includes information about patients’ contraceptive method prescribed or provided during the abortion encounter and data on subsequent abortions during the data collection period. The Women’s Op-

tions Center is not the sole abortion provider in the state, but it is the only provider for pregnancies greater than 18 weeks and is the largest referral-based center with a catchment area that includes all islands. The goal of this study was to examine the relationship between a patient's post-abortion contraceptive method choice, including those who chose not to initiate a method, and the likelihood for more than 1 abortion over the 6-year period.

Methods

Data Collection

Data from the Women's Options Center Abortion Database was used for this survival analysis. Patients who had an abortion with the Women's Options Center during May 2010 and December 2016 (the data collection period) were identified using *International Classification of Diseases, Ninth Revision (ICD-9)* and Current Procedural Terminology (CPT) codes in the electronic health record. Immediately following the abortion or at a follow-up visit, the provider would document the contraceptive method(s) the patient had selected. Patient records were excluded from this analysis if the record had missing data for post-abortion contraceptive method, age, race, or insurance type. Patients who had abortions for fetal or maternal indications were also excluded, and encounters for the third or higher-order abortion for a patient were not included in this analysis.

Data Abstraction

Trained data abstractors reviewed each abortion encounter in the electronic health record and entered data into the Women's Options Center Abortion Database using Research Electronic Data Capture (REDCap), an online database system for tracking and storing research data.¹⁴ Data entered for each encounter included demographic information such as age, race, and insurance type. Patients provided information on race and could select more than 1 racial group. Race categories included Alaskan Native/Native American, Asian, Native Hawaiian/Pacific Islander, African American, white, and no answer. Patients who identified more than 1 racial group were categorized as multiracial for the analysis.

Abstractors documented clinical encounter details such as gestational age, procedure type, complications, and contraceptive methods prescribed or provided during the abortion encounter or the abortion follow-up visit. Contraceptive method was confirmed with prescription records for oral, pill, patch, or ring contraceptives or procedure notes for LARC, injection, and sterilization methods. Patients were also categorized as having one or greater than 1 abortion in the database by a dichotomous variable ("Patient in the database more than once? Yes/No") and the encounter was numbered accordingly (first, second, third encounter, etc) in the database for reference. The primary investigator audited the data entries at regular intervals to ensure accuracy of data abstraction.

Statistical Analysis and Primary Outcome

The patient's first (or only) abortion encounter with the Women's Options Center (referred to hereafter as the "index" abortion) was analyzed. Insurance type was categorized as private (eg, Hawai'i Medical Services Association, United Health Association, etc), public (eg, Medicare, Medicaid), or uninsured (patients who reported no insurance or who self-paid). Contraceptive methods prescribed or provided were categorized into 7 different groups: no contraception; non-hormonal, less effective birth control methods (abstinence, withdrawal, natural family planning, condoms, diaphragm/cervical cap/sponge); depot medroxyprogesterone acetate (DMPA), more commonly known as Depo-Provera; oral contraceptive pills, patches, or rings (PPR); LARC; and plans for sterilization. A patient was categorized as a LARC recipient only if there was documentation of a device (implant or intrauterine device) being placed. Patients whose clinician reported plans for patient sterilization or partner's sterilization were documented without confirmation of the sterilization procedure. It is standard practice in this clinical setting to provide or prescribe contraception after any abortion encounter. The primary outcome was the risk for more than 1 abortion based on contraceptive method prescribed or provided at the index abortion visit.

A multivariate Cox proportional hazards regression, or survival analysis, was used to assess the association between contraceptive method prescribed or provided after the index abortion and the time to presenting for an additional abortion. Survival analyses are helpful when patients have unequal periods of follow up during the study period and allow for calculation of conditional probability of an event (in this case, a second abortion) based on time to event or no event occurring during the study period.¹⁵ Patients who did not have an additional abortion during the data collection period were censored, whereas patients who had an additional abortion during the data collection period were analyzed in days between their index abortion and additional abortion. The primary independent variable was contraceptive method prescribed or provided at the index abortion encounter. The multivariate model also included 3 variables anticipated to cause confounding: age, race, and insurance type. The primary outcome was the likelihood of an additional abortion during the 67 months of data reflected in the database, reported as a hazard ratio (HR) with 95% confidence intervals (CI), both adjusted and unadjusted. Significance level was set at $P < .05$. Analysis was performed using SAS University Edition 3.6 (SAS Institute, Cary, North Carolina).

Results

Characteristics of Subjects

Of the 2544 records in the database, 292 encounters that were a patient's third or higher-order abortion, 179 encounters that were for maternal or fetal medical indications and 5 encounters for missing data were excluded. The remaining 2068 encounters

were included in the analysis (Figure 1). Of these, 158 (7.6%) patients were seen for more than 1 abortion at the Women's Options Center during the period of data collection.

The demographics of patients, grouped by single abortion or more than 1 abortion, are summarized in Table 1. The racial distribution reflects the racial and ethnic makeup of Hawai'i, and the 94% of patients had health insurance. The majority of the patients were either Asian or Native Hawaiian/Pacific Islander (74%). The average age of participants was 26.57 years (standard deviation [SD], 6.85), with a range of 12-49 years. Patients aged 19-25 represented the largest percent of the population (n = 790, 38.2%), with 65 (8.2%) patients having an additional abortion at the Women's Options Center.

Statistical Analyses

Frequency of more than 1 abortion by contraceptive method are shown in Table 2. The average time from index abortion to second abortion was 583 days. Patients who were prescribed PPR had a higher frequency of more than one abortion than patients in the other 6 contraceptive categories. Patients who received a LARC method immediately post-abortion, at their follow-up visit or who reported plans for personal or partner sterilization had the lowest rate of more than 1 abortion.

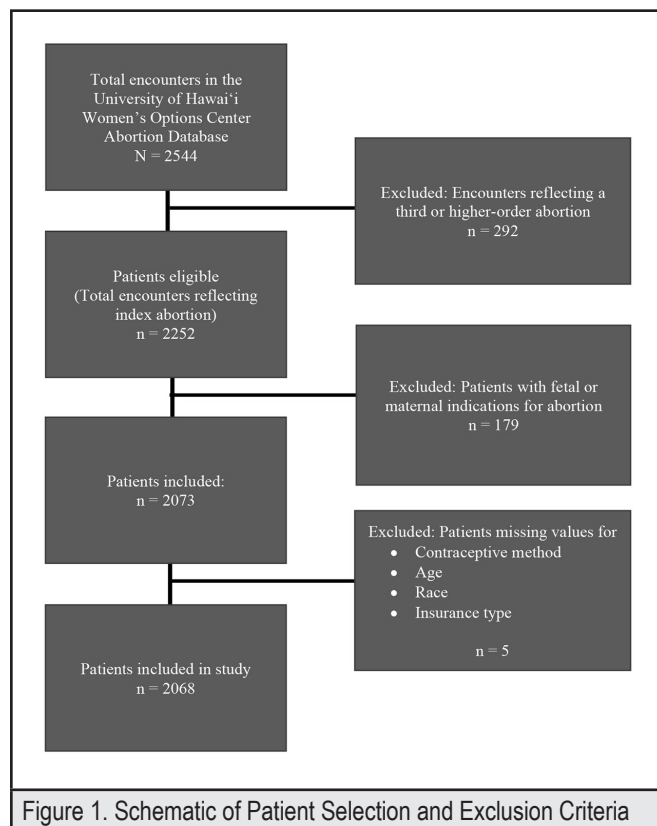


Figure 1. Schematic of Patient Selection and Exclusion Criteria

Figure 2 shows the difference between all contraceptive type groups is statistically significant using a Kaplan Meier Plot, with a $P = .0006$. The survival function depicts the probability a patient will only have 1 abortion given the contraceptive method.

Table 3 shows the crude and adjusted hazard ratios from the survival analysis. Patients who did not initiate a contraceptive method at the time of index abortion were the reference group. Those who were given PPR, LARC, or reported plans for sterilization were significantly associated with risk for more than 1 abortion after adjusting for age, race, and insurance type. Patients who received a prescription for PPR at their index abortion were 61% more likely to have more than 1 abortion than those who did not initiate a method for PPR (HR, 1.61; 95% CI: 1.14-2.28). In contrast, the participants who received a LARC method at their index abortion were 59% less likely to have more than one abortion when compared with patients receiving no method (HR, 0.41; 95% CI: 0.20-0.86). Patients receiving a prescription PPR were 293% more likely to have more than one abortion than those receiving a LARC at their index abortion (HR, 3.93; 95% CI: 1.88-8.21).

Table 1. Characteristics of Patients Seen at the University of Hawai'i Women's Options Center for 1 or More Abortion, May 2010–December 2016

Characteristic	Abortion visits	
	Patients seen for 2 abortions (N = 158)	Total patients (N = 2068)
	n (%)	n (%)
Race		
Alaskan Native/Native American	2 (25.0)	8 (0.4)
Asian	56 (7.0)	795 (38.4)
Native Hawaiian/Pacific Islander	60 (8.3)	725 (35.1)
African American	2 (6.1)	33 (1.6)
White	21 (7.1)	297 (14.4)
No answer	9 (8.3)	109 (5.3)
Multiracial ^a	8 (7.9)	101 (4.9)
Age (years)		
12-18	11 (4.9)	225 (10.9)
19-25	65 (8.2)	790 (38.2)
26-30	47 (9.7)	487 (23.6)
31-35	24 (7.5)	318 (15.4)
36 and older	11 (4.4)	248 (12.0)
Insurance type		
Private ^b	66 (6.8)	967 (46.8)
Public ^c	89 (9.1)	980 (47.4)
Uninsured	3 (2.5)	121 (5.9)

^a Multiracial means that more than 1 race was selected.

^b Private: Hawai'i Medical Service Association (HMSA), Hawai'i Mainland Administrators (HMA), University Health Alliance (UHA), Hawai'i Medical Assurance Association (HMAA), Aetna.

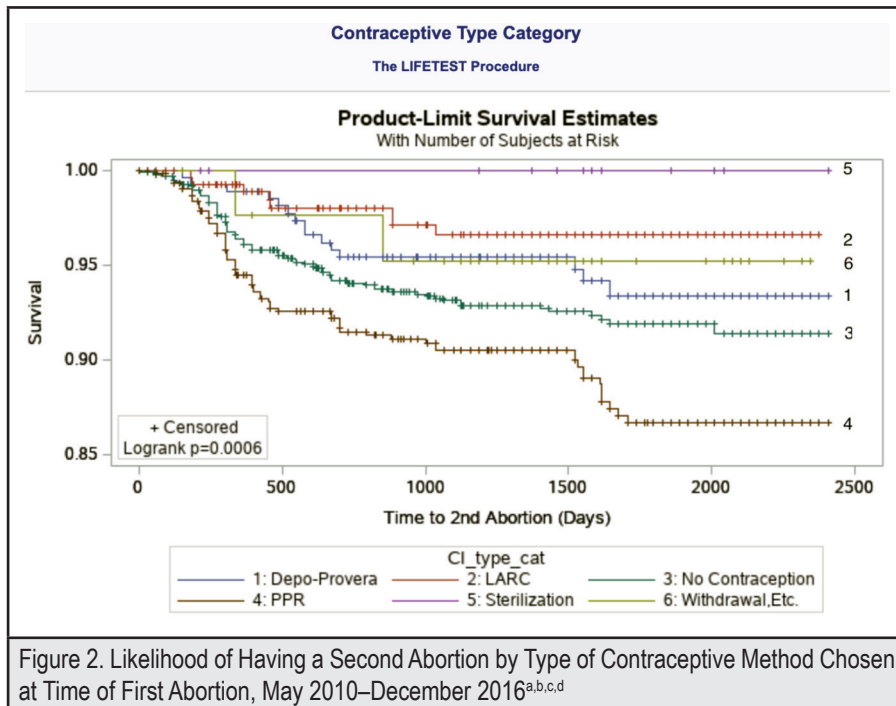
^c Public: Medicaid, Medicare.

Table 2. Type of Contraceptive Method Prescribed or Provided at the Time of Index

Variable	Abortion visits	
	Patients seen for 2 abortions (N = 158)	Total patients (N = 2068)
Contraceptive type	n (%)	n (%)
No contraception	69 (7.4)	937 (45.3)
Less effective methods ^a	2 (4.9)	41 (2.0)
Depot medroxyprogesterone acetate injection ^b	14 (5.7)	246 (11.9)
Oral contraceptive pill, patch, or ring	65 (11.1)	569 (27.5)
Long-acting reversible contraception ^b	8 (3.0)	263 (12.7)
Sterilization	0 (0.0)	12 (0.6)

^a Includes abstinence, withdrawal, natural family planning, condoms, diaphragm, cervical cap, sponge

^b Commonly known as Depo-Provera and LARC, respectively



^a Contraceptive type categories (CI_type_cat): Depo-Provera (depot medroxyprogesterone acetate injection), LARC (long-acting reversible contraceptive); no contraception; PPR (oral contraceptive pills, patches, or rings); sterilization (male or female); withdrawal, etc (abstinence, withdrawal, natural family planning, condoms, diaphragm/cervical cap/sponge).

^b Second abortion represented by tick on the graph.

^c Survival estimates represent the probability of patients only having 1 abortion given contraceptive type.

^d $P=0.0006$ represents the difference between contraceptive type categories and is considered statistically significant ($P<.01$).

Table 3. Crude and Adjusted Hazard Ratios of Type of Contraceptive Method and Additional Abortion, May 2010–December 2016		
	Crude HR (95% CI)	Adjusted HR ^a (95% CI)
Contraception method		
No contraception	Reference	Reference
Less effective methods ^b	0.64 (0.16-2.67)	0.73 (0.18-3.01)
Depot medroxyprogesterone acetate injection ^c	0.73 (0.41-1.29)	0.69 (0.39-1.23)
Oral contraceptive pill, patch, ring	1.58 (1.13-2.62)**	1.61 (1.14-2.28)**
Long-acting reversible contraception ^c	0.43 (0.21-0.89)*	0.41 (0.20-0.86)*
Sterilization	0.00**	0.00**
Race		
Alaskan Native/Native American	4.73 (1.15-19.37)*	4.85 (1.17-20.11)*
Asian	Reference	Reference
Native Hawaiian/Pacific Islander	1.20 (0.83-1.72)	1.15 (0.80-1.65)
African American	0.85 (0.21-3.48)	0.89 (0.22-3.68)
White	0.99 (0.60-1.64)	0.94 (0.57-1.55)
No answer	1.24 (0.61-2.50)	1.16 (0.57-2.35)
Multiracial ^d	1.15 (0.55-2.42)	1.07 (0.51-2.24)
Age (years)		
12-18	0.58 (0.31-1.10)	0.58 (0.31-1.11)
19-25	Reference	Reference
26-30	1.20 (0.83-1.75)	1.21 (0.83-1.77)
31-35	0.95 (0.60-1.52)	1.03 (0.64-1.64)
36 and older	0.52 (0.27-0.98)*	0.61 (0.32-1.16)
Insurance type		
Private ^e	0.77 (0.50-1.05)	0.71 (0.50-0.99)*
Public ^f	Reference	Reference
Uninsured	0.29 (0.09-0.91)*	0.26 (0.08-0.82)*

Abbreviations: HR, hazards ratio; CI, confidence interval

^a Adjusted for race, age, and insurance type

^b Includes abstinence, withdrawal, natural family planning, condoms, diaphragm, cervical cap, sponge

^c Commonly known as Depo-Provera and LARC, respectively

^d Multiracial means more than 1 race was selected

^e Private: Hawai'i Medical Service Association (HMSA), Hawai'i Mainland Administrators (HMA), University Health Alliance (UHA), Hawai'i Medical Assurance Association (HMAA), Aetna

^f Public: Medicaid, Medicare

* $P < .05$

** $P < .01$

Discussion

This study found that the type of contraceptive method prescribed or provided at the time of index abortion was significantly associated with likelihood of having an additional abortion. The risk was highest among patients who received a prescription for PPR. This was higher than for patients who elected to use a method known to be less effective or no method at all.

This analysis reflects the real-world conditions in which patients make decisions about contraception use after an abortion, which includes the values and circumstances surrounding the patient and the contraceptive counseling and provision practices of the clinical setting. Contraceptive counseling is routine during abor-

tion visits in these offices and the vast majority of patients have insurance coverage for contraception. Despite this, almost half (45.4%) of patients in the database had no method prescribed or provided at the end of their index visit.

This study was not able to determine why patients who selected PPR methods had a higher rate of more than 1 abortion. Previous literature found that patients who had more than 1 abortion were likely to have been using some form of contraception at the time of conception, implying that patients who experience an additional abortion are attempting to avoid pregnancy but may have experienced method failure caused by improper use, access issues, or other challenges reflecting a user-method mismatch.¹⁶

It is possible that in the clinical setting some patients who would have preferred to leave the visit with no method felt pressured to pick a method to satisfy their clinician and chose a method they were familiar with but had little or no intention to use, as has been demonstrated in other studies.^{9,11} Recent data suggests that many patients would prefer not to discuss their contraceptive options with their abortion providers.⁸ Because PPR are among the most well-known contraceptive method types in the United States, it is possible that these patients chose a method because it was familiar and they felt pressured to choose something, even if it did not meet their needs or plans.

Some patients certainly chose the PPR with the intention of using the method. Contraceptive failure contributes to 48% of unintended pregnancies in the United States.¹⁷ The typical-use failure rate for PPR is known to be approximately 9%, while LARCs have a failure rate ranging from 0.05% to 0.8%.⁴ Patients who were prescribed these PPR methods at their index visit may have experienced this typical-use failure, resulting in an additional unwanted pregnancy and abortion. Additionally, because the average time to a second abortion was greater than 1 year (538 days) it is also possible that patients who elected to start PPR at the time of their index abortion had run out of their initial prescription after 12 months, putting them at risk for another unwanted pregnancy.

While the typical-use failure rate of PPR may explain some of the additional abortions in this cohort, it does not explain how the risk for an additional abortion was higher than that seen among patients who left the visit with no method prescribed or provided. The risk for pregnancy among patients who use no method is estimated at 85%, almost 10 times the risk for patients using a PPR.⁶ While these patients were not prescribed or provided with a method at their abortion visit, they may have received contraceptive counseling and initiated a method with a different provider. A recent survey of abortion patients noted that almost 20% of respondents indicated that they had already received counseling about a method from another provider; and therefore, they were uninterested in further counseling during their abortion visit.⁸ While prescription records and follow-up notes from referring providers were used whenever possible to reflect patient's contraceptive uptake after the index visit it is possible that some patients in the "no method" group received contraception from another provider subsequent to their index abortion. It is also true that some patients decline contraception because they know that they have a low risk of pregnancy due to planned abstinence or a medical diagnosis of reduced fertility.

Limitations

This cohort study relies on data abstracted from patients' electronic health records. Although data abstractors were extensively trained, and data entry was regularly audited for accuracy, some data may have been incorrectly recorded. Abstractors were trained to review the electronic health record comprehensively,

including prescriptions, follow-up visits, and referring providers' documentation to identify all data points, but some data may not have been available. Very few patients in this cohort reported plans for sterilization or use of the least effective contraceptive methods so data for these contraceptive types should be interpreted cautiously.

Changes in contraceptive method types or changes in insurance status are also not accounted for after the index abortion. However, it is known to be standard practice in this office to prescribe patients a 12-month supply of their preferred contraceptive method, and the state of Hawai'i allows patients to fill up to 12 months of a prescription contraceptive at once. Both of these practices should support uninterrupted continuation of a method if a patient chooses to use it.

This data only reflects abortions at the Women's Options Center during the 67 months of data collection. Patients who had an abortion at the Women's Options Center may have visited another provider for a subsequent abortion which would not have been captured in the database. The same limitation applies to contraceptives prescribed, as it is only possible to capture contraceptive methods given at the Women's Options Center or prescriptions documented by another provider in the patient's electronic medical record.

Conclusion

Having more than 1 abortion is not inherently problematic; however, some patients may prefer to avoid having more than 1 abortion, due to emotional, financial, legal, or geographic burdens these procedures can present. Prescription for PPR after an abortion significantly increased the likelihood of more than 1 abortion compared to a patient who did not have a method prescribed or provided after their index abortion in this study. Patients who were provided with a LARC method or who reported plans for sterilization were significantly less likely to be seen for more than 1 abortion. These differences persisted after adjusting for age, race, and insurance type. To some extent, these increased hazard ratios are explained by typical-use failure rates. However, it is also possible that patients who are uninterested in contraceptive counseling at the time of abortion will elect to be prescribed a familiar method, with no intention of using the method, in order to end the counseling session. Abortion providers should be vigilant in supporting their patient's reproductive autonomy and be conscientious to avoid counseling approaches or language that implies a patient must choose a contraceptive method. Providers should inquire about and be respectful of a patient's desire to discuss contraception at the time of abortion and counsel patients who do elect to use PPRs about the typical-use failure rate of these methods.

Conflict of Interest

None of the authors identify any conflict of interest.

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Assessing the Quality of the Systems of Care for Children with Congenital Zika Virus Infection and Other Neurodevelopmental Disabilities in the United States Pacific Island Territories

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Abstract

Congenital Zika virus (ZIKV) infection can cause lifelong medical and developmental conditions and management needs. There is limited information on the strengths and weaknesses of the systems of care for addressing ZIKV and other neurodevelopmental disabilities (NRD) in the United States (US) Affiliated Pacific Island Territories. Therefore, the purpose of the study was to assess the quality of the chronic illness systems of care for children with congenital ZIKV and other NRD in the US Pacific Island Territories. A cross-sectional study was conducted among health professionals from American Samoa, Guam, and Commonwealth of the Northern Mariana Islands. Participants completed an adapted version of the Assessment of Chronic Illness Care 3.5 (ACIC), which is based on the Chronic Care Model. The median Total Program Score was calculated, which ranged from limited support (0–2), basic support (3–5), reasonably good support (6–8), to fully developed support for care (9–11). Among the 17 health professionals who completed the survey, 47% were Guamanian/Chamorro, 24% were Samoan, 12% were Filipino, and 6% were Other Pacific Islanders. The median (25th percentile, 75th percentile [interquartile range]) Total Program Score was 5 (3, 6 [3]), indicating basic support for ZIKV and other NRD care for children. As more is learned about the full spectrum of clinical findings related to ZIKV, it is critical to continue to build an interdisciplinary maternal and child health workforce with the capacity and preparation to adequately address the special needs of children with ZIKV and other NRD.

Keywords

congenital Zika virus infection, neurodevelopmental disabilities, US Pacific Island Territories, chronic care model, interdisciplinary

Abbreviations

ACIC = Assessment of Chronic Illness Care
CCM = Chronic Care Model
CNMI = Commonwealth of Northern Mariana Islands
ECHO = Extension for Community Healthcare Outcomes
IQR = interquartile range
NRD = neurodevelopmental disabilities
ZIKV = Zika virus

Introduction

During pregnancy, Zika virus (ZIKV) infection can cause birth defects, as a pregnant woman can transmit the virus to her fetus.¹ Congenital ZIKV infection is associated with adverse birth outcomes in children, such as microcephaly and other neurodevelopmental disabilities.¹ Mosquito-borne and sexual transmission puts many women at high risk for ZIKV,

especially in low- and middle-income areas.² In 2016, during an outbreak in American Samoa, there was an incidence of confirmed ZIKV of 0.92 per 1,000 persons.³ The first case of microcephaly associated with non-endemic congenital ZIKV in Hawai'i was reported in 2016, prompting proactive ZIKV surveillance measures.⁴ As the number of mosquitos increases with the rising temperatures, there is a possibility for increased spread of ZIKV infection.^{5,6}

Children with congenital ZIKV and other neurodevelopmental disabilities (NRD) need chronic illness care due to associated lifelong medical and developmental conditions and management needs. Understanding the care for NRD can help inform health care workers on the necessary care for managing ZIKV. American Samoa previously had a higher risk of ZIKV than other United States (US) Pacific Island Territories. Although no cases of ZIKV have been reported in Guam and the Commonwealth of the Mariana Islands (CNMI), their similar sub-tropical climate puts them at risk for ZIKV infection, increasing the need of being prepared for ZIKV management. Assessing the systems of chronic illness care for NRD in addition to ZIKV in the Pacific Island Territories can help to build the capacity of maternal and child health professionals to care for children with ZIKV and other NRD.

American Samoa, Guam, and CNMI are rural, which promotes social isolation among Pacific Islanders; resources may be at distant locations, which may affect access to care. Transportation may also be difficult, especially outside of urban areas. Often, visits to obtain health care require long bus or boat rides.⁷ Population sizes in some areas are small, and many of the regions have low per capita gross national product, resulting in a low proportion of people with wage-based jobs. Most health care services, however, are provided by the government, and complex cases frequently require the need to seek treatment off-island.⁷ These factors may create significant challenges and barriers for children and their families to receive services.

Although interdisciplinary chronic illness care is crucial, access to certain health professionals is often restricted in low resource areas. There is limited knowledge of how these systems of chronic illness care are serving individuals with ZIKV and other NRD. The purpose of this study was to evaluate the quality of the chronic illness systems of care for children with congenital ZIKV and other NRD in the US Pacific Island Territories. Children with

congenital ZIKV and other NRD need chronic illness care due to associated lifelong medical and developmental conditions and management needs. The Chronic Care Model (CCM), which has been used to assess the systems of chronic illness care, was used as the framework for this study. The CCM measures strengths and weaknesses in the delivery of chronic illness care and consists of 3 core areas: (1) Organization of the health care system, (2) Community linkages, and (3) Practice level. The Practice level core area is further broken down into 4 sub-components: Self-management support, Decision support, Delivery system design, and Clinical information systems. In this model, high-quality care is comprised of 6 elements: Organization of health care system, Community linkages, Self-management support, Decision support, Delivery system design, and Clinical information systems.^{8,9} To the best of our knowledge, the CCM has not been used previously to address congenital ZIKV virus infection and has not been used with health professionals from the US Pacific Island Territories. However, the model has been shown to be effective in improving chronic illness, such as Type 2 diabetes care in a rural setting in the United States.¹⁰ Maternal and child health professionals can potentially use this information to communicate, coordinate, and improve services for children with congenital ZIKV and other NRD.

Methods

Study Design

A cross-sectional study was conducted among maternal and child health professionals from the US Affiliated Pacific Island Territories. Institutional Review Board approval was obtained from a children's hospital in Southern California.

Participants and Setting

Maternal and child health professionals, such as pediatricians, nurses, child psychologists, and audiologists, were eligible to participate if they were over the age of 18 years and currently working in American Samoa, Guam, or the CNMI. A convenience sample of health professionals working in the fields of chronic illness care from local hospitals, public health departments, and university centers for excellence in developmental disabilities received an electronic survey link via email. A snowball approach was used for additional recruitment, as some participants forwarded the link to other health professionals who were eligible to participate based on their current positions in the field of maternal and child health.

Variables

Demographics. The demographic characteristics of age, gender, race/ethnicity, education, health discipline, and location were collected.

Chronic illness care related to ZIKV and NRD. The Assessment of Chronic Illness Care (ACIC) survey is a tool to measure quality improvement efforts and is based on the CCM constructs.⁸ The ACIC has demonstrated effectiveness in measuring the care for chronic conditions and has demonstrated reliability and validity in a Southeast Asian population.^{7,9,11} An adapted version of the ACIC 3.5 was used, as each component was modified to specifically ask about the study outcome: the quality of chronic illness care related to congenital ZIKV and other NRD. To adapt the ACIC, the following phrase was added at the end of each item or component: "Zika or other NRD Chronic Illness Care."¹² The ACIC corresponds to the 3 core areas of the CCM by measuring a total of 6 scores: 1) Organization of the health care system, (2) Community linkages, (3) Self-management support, (4) Decision support, (5) Delivery system design, and (6) Clinical information systems. Each ACIC subscale and Total Program Score can be measured on a scale of 0 (not implemented) to 11 (most implemented) on statements about the respective section. The scoring was interpreted and assigned the following categories: (1) 0–2: limited support for chronic illness care; (2) 3–5: basic support for chronic illness care; (3) 6–8: reasonably good support for chronic illness care; and (4) 9–11: fully developed chronic illness care.

Statistical Analyses

Descriptive statistics were used to describe the population demographics. Total scores for each ACIC subscale were created, and the median, 25th, 75th percentile interquartile range [IQR] program scores were calculated based on the number of components in each subscale. The same process was used to calculate the median Total Program Score, along with the 25th, 75th percentile interquartile range [IQR]. A Kruskal-Wallis test was conducted to examine whether there were differences between locations. IBM SPSS Statistics, Version 17.0 was used for all analyses.

Results

The survey was distributed to 29 maternal and child health professionals, in which 17 responded, resulting in a response rate of 59% (Table 1). The majority of participants ranged in age from 30–49 years and all were female. Overall, 47 % of participants were Guamanian or Chamorro, 24% Samoan, 12% Filipino, and 6% Other Pacific Islander. In terms of current location in the US Pacific Island Territories, 41% of participants were from American Samoa, 41% were from Guam, and 18% were from the CNMI.

Overall, the median (25th percentile, 75th percentile [IQR]) Total Program Score on the adapted ACIC was 5 (3, 6 [3]), indicating that there was basic support for ZIKV and NRD care in American Samoa, Guam, and the CNMI (Table 2). The

Characteristics	n	Percent (%)
Age Group (years)		
18–29	3	18
30–49	12	71
50–64	2	12
Sex		
Female	17	100
Race/Ethnicity		
Guamanian or Chamorro	8	47
Samoan	4	24
Filipino	2	12
Korean	1	6
White	1	6
Other Pacific Islander	1	6
Education		
College/university degree	7	41
Graduate degree or above	10	59
Discipline		
Child Development	1	6
Communication	1	6
Developmental Disabilities	1	6
Occupational Therapy	1	6
Pediatrics/Medicine	1	6
Physical Therapy	2	12
Public Administration	2	12
Public Health	3	18
Social Work	3	18
Special Education	2	12
Location		
American Samoa	7	41
Guam	7	41
Commonwealth of the Northern Mariana Islands	3	18

All the survey participants were female and most identified as Pacific Islander. Since the sample size was <200, decimal points were not used, and rounding was used for 0.5 and above. As a result, some percentages are over 100%.

ACIC subscale scores also indicated that there was primarily basic support for ZIKV and NRD care. Subscale scores suggested that there was reasonably good support for Community linkages, with 6 (4, 8 [4]), and Self-management support, with 6 (2, 8 [6]); however, there was basic support for Organization of health care system, Decision support, Delivery system design, and Clinical information systems, which were 5 (5, 9 [4]), 5 (2, 7 [5]), 5 (3, 6 [3]), and 5 (2, 7 [5]) respectively. Results from the Kruskal-Wallis test indicated that there were no statistically significant differences in the median Total Program Score by location, $X^2(2) = 0.13, P = .94$.

Component (N=15)	Median	25th, 75th percentile [IQR]
Organization of health care system	5	5, 9 [4]
Community linkages	6	4, 8[4]
Practice level		
Self-management support	6	2, 8 [6]
Decision support	5	2, 7 [5]
Delivery system design	5	3, 6 [3]
Clinical information systems	5	2, 7 [5]
Total Program Score	5	3, 6 [3]

The median Total Program Score of 5, indicated basic support for chronic illness care. Since the sample size was <200, decimal points were not used, and rounding was used for 0.5 and above.

Discussion

This study is the first known to assess which systems of chronic illness care need improvement in the US Affiliated Pacific Island Territories related to the management of children with ZIKV and other NRD. Although some studies have used the ACIC, no other studies found in literature searches used an adapted version to measure the quality of chronic illness systems of care for children with congenital ZIKV and other neurodevelopmental disabilities.^{9-11,13-16} There are unique challenges to pediatric chronic care, such as having fewer resources for high-quality, evidence-based clinical practices, and the complex interaction that chronic illness has on child development.¹³ Using the CCM may help assess and redesign systems for pediatric chronic illness care, especially for ZIKV and other NRD in low resource areas promoting movement beyond a basic level of support. Suggestions to improve each CCM component are described below.

Organization of Health Care Systems

American Samoa, Guam, and the CNMI continue to have capacity building as one of their main priorities to prepare for a possible ZIKV outbreak. Strengthening the organization of health care systems is critical. Given the low level of support for organization of health care, a possible intervention might include involving leaders across practice sites to better plan quality improvement efforts.¹⁴ CCM resources that have been successful in smaller health care settings could be shared with larger health care organizations to build the capacity of health care systems when treating complex cases, which may include ZIKV and other NRD. Research demonstrated that implementing components of the CCM improved prevention and strengthened services provided for chronic conditions in rural areas.¹⁵ When planning health strategies, partnerships between administration, finance, and information systems may be necessary to facilitate system-wide changes.¹⁶

Table 3. Feedback on Adapted ACIC for Congenital ZIKV Infection and Other Neurodevelopmental Disabilities	
Organization in Health Care Delivery System	"American Samoa "is a resource-limited health care system that other specialty services are not available and rely on off-island referral system once deemed urgent or appropriately needed." "I think more collaboration among agencies need(s) to happen to optimize resources and prevent duplication of services. Also, I think leaders and personnel must be held accountable for their services."
Community Linkages	"...a more active collaboration between agencies is still needed. And perhaps more effort to improve patient/client awareness in terms of what services are available to them." "manpower, funds and sustainability of enforcement of such programs has always been a challenge."
Self-Management Support	There is "very limited opportunity for this on island."
Decision Support	"...access to" [evidence-based practice]"(EBP), opportunities for professional development, and improving service provider accountability."
Delivery System Design	"I think improving the system guidelines to include a more defined roles/responsibilities, expectations, and a regular teaming."

Feedback from health professionals indicated limited resources and a high need to improve the system of care for chronic illness.

Community Linkages

There have been limited opportunities for active coordination between the health system, community agencies, and patients in the US Pacific Island Territories. Hiring staff to coordinate and promote the use of resources may help to build capacity and improve community linkages. The Pacific Islander community has a collectivist culture, which includes family involvement in making decisions about health.^{7,17} Pacific Island parents of children with special needs were interviewed in Hawai'i about how they maintained emotional strength; results indicated that they derived strength from family, community, and faith-based support.¹⁸ Self-care and respite, as well as faith-based practices, may offer a "whole family approach" and help relieve the burden families often feel.¹⁹

Practice Level

Self-management support. Within the practice level, self-management support had the highest amount of support for chronic illness care, suggesting that some families in American Samoa, Guam, and the CNMI may be more open to receiving additional support and services. Early intervention providers working with children with ZIKV and other NRD should provide care that is family-centered and culturally competent.²⁰ Challenges for Pacific Islander parents of children who are medically fragile include the financial burden, burden of providing care, role conflicts with other responsibilities, and limited parent independence.¹⁸ Counseling is recommended for mothers of children with ZIKV-associated microcephaly to better support families.²¹ The Department of Health in American Samoa has a ZIKV roadmap for parents to keep track of the visits and screenings throughout the first 36 months.²² As knowledge of the clinical findings of ZIKV continues to increase, families can improve self-management of care.

Decision support. In order to characterize and provide the appropriate care for the full spectrum of congenital ZIKV in the US Pacific Island Territories and throughout the United States,

providers should follow the recommended evaluation and management procedures established.²³ The Centers for Disease Control and Prevention has provided detailed guidelines and an algorithm for both clinical findings, such as the presence of microcephaly, and testing results of infants with possible ZIKV.²⁴ These guidelines recommend interdisciplinary care from the start, such as from developmental-behavioral pediatricians, neurologists, and clinical geneticists. Continued monitoring and follow-up are also important as the child grows.²⁴ Other specialists, such as early intervention providers, occupational therapists, physical therapists, and speech and language pathologists may be needed to help a child with developmental and educational growth beyond infancy.²³ These specialty consultations could be conducted in the hospital setting before discharge or in an outpatient setting. Providing access to interdisciplinary teams and cross-training may help to prevent the need to transfer patients to other off-island facilities for subspecialty care.²⁴

Telehealth, which is the provision of health services from a distance using electronic information and communication, could increase access to specialists and may provide the necessary interdisciplinary care.²⁵ Rehabilitation through telehealth has been shown to increase access to subspecialty services and provide effective care for neurologic cases.²⁵ Increasing the role of telehealth in low resource areas, such as through the use of the Extension for Community Healthcare Outcomes, better known as ECHO, model,²⁶ could help to train health care providers and provide access to interdisciplinary care. This may help to build the capacity of health care professionals in American Samoa, Guam, and the CNMI.

Delivery system design. A lack of health care professionals in the US Pacific Island Territories contributes to the limited access to health care services and lack of interdisciplinary care for children with chronic conditions, such as ZIKV and other NRD.²⁷ There is a need to expand the maternal and child health workforce, especially in program areas such as birth defects, genetic counseling, newborn hearing screening, and early intervention services. The delivery system design could

be improved by increasing provider time and training, and by ensuring follow-up care is provided to better support children. Examples in the clinic setting include optimizing clinic flow, planning sessions, scheduling follow-up sessions, and having maternal and child health professionals perform routine screenings and other preventative tests.¹³ In the home setting, care managers could apply subspecialist expertise to address the needs of these children, and community health workers could perform routine assessments and provide health education.¹³ These access strategies may help minimize transportation barriers and off-island referrals.^{28,29}

Clinical information systems. Geographic barriers, a lack of resources, and a lack of proper training limit the quality of health information systems in the US Pacific Island Territories.³⁰ Many of the health records are incomplete, unreliable, and with minimal productive analyses to inform clinical practice.³⁰ Improving patient tracking, follow-up, and feedback collection can strengthen clinical information systems. For example, an option is to create and maintain registries of children with ZIKV and other NRD, which could be simple spreadsheets to fully developed electronic health records. Registries used to monitor screening, manage follow-up visits, and track health outcomes may help to promote consistent communication with families.¹³ With appropriate training on data management and usage, health providers can serve as partners in maintaining current and accurate health information systems.³⁰

Research on Chronic Illness Care

A research agenda is needed in the US Pacific Island Territories that addresses health inequities and long-term needs. Studies using the US Zika Pregnancy Registry may better inform research priorities, as it is not yet clear which parts of the CCM are the most effective and feasible to implement.³¹ Researchers interested in measuring specific delivery processes and systems could use the CCM in conjunction with additional tools, such as the Team Functioning Assessment Tool and other quality improvement instruments.^{32,33,34} Studies are needed that examine the benefits of using interdisciplinary teams to provide care. Longitudinal studies are also needed on how team culture and performance impact quality of care and services.^{35,36} Further research could explore how collectivist cultural beliefs in the US Pacific Island Territories influence the implementation of the CCM in areas such as health care decision making.³⁷ Embedding cultural competence into a health care model requires building on the current knowledge of the local population and developing methods that will be accepted.³⁸ Understanding caregiver attitudes about children with ZIKV and other NRD in the US Pacific Island Territories may help to provide systemic changes to address needs better.³⁹

Policy Related to Chronic Illness Care

Policy implications include maintaining best practices, health care coverage, and continuity of care.¹⁹ To protect pregnant women and infants, more prevention strategies such as increased education on ZIKV and minimizing unplanned pregnancies are important.^{39,40} Effective vector control is needed to understand the screening and magnitude risk of ZIKV.^{20,40} Using the US Zika Pregnancy Registry could also aid in developing clinical guidelines and strategies to build the capacity of health systems to care for affected infants and children throughout their lives, including transition planning to adult care.^{20,40}

Limitations

Although the CCM has been used to improve care in many systems, it may not have provided precise identification of areas of need for certain health systems, especially health systems that were under-resourced and had weaker organizational infrastructures.^{16,41} While this study utilized a relatively small convenience sample, there was consensus across all sites that there was a basic level of support for ZIKV and other NRD care. As a cross-sectional study, it is unknown how changes in systems of care were monitored over time, and results may not be generalizable to other low resource areas with different health systems and cultures.⁴² Given the small sample size, there was limited statistical power to detect potential differences in Total Program Scores between American Samoa, Guam, and the CNMI. However, past research on the health of the populations in these three locations has been limited. This study provides baseline information on which systems of chronic illness care for children with ZIKV and other NRD may need improvement, such as delivery system design and clinical information systems.

Conclusion

Study findings may help raise awareness among health professionals, researchers, and policymakers that additional support is needed to address chronic illness care for children with ZIKV and other NRD. Prioritizing quality indicators in health care systems and team performance measures may help to identify areas for improvement better.^{43,35} Interdisciplinary training, primarily through telehealth, may enhance team performance and provide more comprehensive management of complex cases.^{44,45} It is critical to continue to build an interdisciplinary maternal and child health workforce with the capacity and preparation to adequately serve children with ZIKV and other NRD who need chronic illness care management in the US Affiliated Pacific Islands.

Conflicts of Interest

None of the authors identify any conflict of interest.

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The Challenges of Hepatitis B Treatment in the US-Associated Pacific Islands

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

The Challenges of Hepatitis B Treatment in the US-Associated Pacific Islands

Instituting hepatitis B therapy in a low-resource Pacific Island setting is challenging. During 2018, members of the University of Hawai'i Department of Family Medicine and Community Health (DFMCH) participated in the "Tuberculosis (TB) and Leprosy Free Majuro" campaign in the Republic of the Marshall Islands (RMI) to identify and treat people with TB and Hansen's disease (formerly called leprosy).¹ The question of how to institute a vertical hepatitis B elimination program that dovetails with strengthening the primary health care system was highlighted. In this discussion, parallels are drawn with how treatment became available for HIV/AIDS and hepatitis C, two other viral diseases for which there was at one time no political will to treat in resource-poor settings.

Hepatitis B in the Marshall Islands

A 2009 study estimated that Marshallese women who are older than 30 years have a very high hepatitis B surface antigen (HBsAg, indicative of chronic infection with the virus) prevalence of 9.5%.² Since hepatitis B is mostly transmitted by vertical, mother-to-child transmission or early in childhood, boys and girls are equally likely to contract hepatitis B (and therefore develop chronic hepatitis B), thus the prevalence in men is likely similar. Because newborn vaccination against hepatitis B started in the late 1980s, the prevalence is lower in those under 30 years old. Although alcohol is used by a minority of the population (19.3%), there is a greater frequency of drinking among men and those younger than 44. Additionally, those who drink often engage in heavy, episodic drinking even at early ages.³ In Micronesia, chronic liver disease, including cirrhosis, liver failure, and hepatocellular carcinoma,^{4,5} are primarily driven by hepatitis B.

TB and Leprosy Free Majuro

The intent of the TB and Leprosy Free Majuro campaign was to attempt to reach the entire population of Majuro, the capital

atoll of the Republic of the Marshall Islands. The initial screening sites, located in the population center, were two elementary schools, which were not in session during the summer. A mobile screening site was later set up for more distant populations. For those about to receive treatment for latent TB infection (LTBI), a screening algorithm for individuals at risk of underlying undiagnosed hepatitis B was instituted with blood testing for transaminases on patients 40 years or older and those with significant alcohol consumption (the definition of "significant" being up to the prescriber). Elevated transaminases, aspartate aminotransferase (AST) and alanine aminotransferase (ALT), indicate ongoing hepatocellular damage from liver diseases such as alcohol and hepatitis B. Patients who met campaign criteria for a diagnosis of LTBI were started on LTBI medications the same day and instructed to go to Majuro Hospital for venipuncture. Those with AST or ALT greater than 80 units per liter, approximately twice the upper limit of normal, would have further testing for hepatitis B surface antigen (the only hepatitis B serology available at Majuro Hospital).

Although Hepatitis B was not a focus of the TB and Leprosy Free Majuro campaign, there were concerns that the isoniazid and rifapentene that were planned to be dispensed to about 7000 individuals with LTBI would precipitate liver toxicity and contribute to liver failure in vulnerable individuals with underlying undiagnosed chronic hepatitis B infection. Such an adverse outcome would violate the ethical precept *primum non nocere* (first, do no harm) and tarnish the image of an overburdened public health system. Additionally, given the history of exploitation and unethical medical testing by American physicians in the Marshall Islands in the years after World War II,^{6,7} it was imperative to protect all screening participants from unintended, iatrogenic harm.

During the 6-month campaign, no known cases of severe hepatotoxicity, requiring intensive care admission and support, occurred.

Hepatitis B Care in the Marshall Islands

The RMI Ministry of Health (RMI MOH) continues to make an effort to universally vaccinate infants against hepatitis B (the primary measure to prevent mother-to-child transmission) despite logistical challenges. Health care workers must periodically travel by boat to remote atolls to reach patients. As a secondary preventive measure, hepatitis B immune globulin (HBIG) is administered to infants born to mothers with hepatitis B to bind to any circulating virus.

There is no systematic screening of adults for hepatitis B in the Marshall Islands, despite the high prevalence of chronic hepatitis B infection. Antiviral medications for hepatitis B remain prohibitively expensive, thereby limiting access for the developing small island nation. The formal government off-island referral system sends most patients to the Philippines. Because of the high costs of such referrals, policy limits these referrals to only those patients with a predicted >50% survival after 5 years. Thus, patients who develop complications such as liver failure or hepatoma generally do not receive referral under the formal system. For those who need antiviral treatment, the only alternative for many patients is to migrate to the US. However, health insurance coverage is difficult to obtain for such migrants.⁸

Global Health Equity – Who Qualifies? Which Diseases Qualify?

To draw lessons for expanding hepatitis B treatment, the history of how treatment became available for HIV/AIDS and hepatitis C is reviewed. These are two viral diseases, which at one time were not being treated in resource-poor settings. Hepatitis B is in the phase of neglect that these other diseases were once in prior to the more widespread availability of treatment.

HIV/AIDS

While Highly Active Antiretroviral Therapy (HAART) for HIV/AIDS became available in 1996, it was initially deemed too complicated and too expensive to treat individuals in low-resource settings. In the early 2000s, Médecins Sans Frontières (MSF) and Partners in Health (PIH) demonstrated that therapy could indeed be delivered. Paul Farmer's address at the 14th International AIDS Conference in Barcelona in 2002 was pivotal.⁹ This was followed by the President's Emergency Plan for AIDS Relief (PEPFAR), which was announced in January 2003, with \$15 billion pledged to fight HIV/AIDS over 5 years; and the Global Fund to Fight AIDS, TB, and Malaria, with pledges of \$4.8 billion by 2004.

Political pressure from mobilized people and activists, notably people living with HIV/AIDS (PLWHA), and deaths among some prominent individuals, led to these funding decisions by the governments of developed countries. In addition, pharmaceutical

corporations were pressured to allow generic HIV medications to be manufactured and distributed. Thus, even today, people with HIV/AIDS continue to be relatively well-supported. The RMI, with a vanishingly small number of people living with HIV, has a stock of antiretroviral medications supplied by the United Nations Development Programme (UNDP), and receives regular continuing education from the AIDS Education & Training Center.

Hepatitis C

Although a long political struggle was necessary to pressure pharmaceutical corporations on intellectual property rights in order to allow access to antiretroviral drugs for HIV, the recent treatment program implemented in Egypt is an example of access to modern hepatitis C antivirals progressing rather rapidly.

While hepatitis C therapy was spectacularly expensive in the US, in 2015, the Egyptian government made a deal with a pharmaceutical corporation to offer a treatment course that costs the government \$900, and comes at no cost to the patient. Gilead Sciences provides sofosbuvir (used in combination with other antivirals) to the Egyptian government at prices that make it affordable for Egyptians to be treated for hepatitis C. At this time (2015) a treatment course in the US cost \$84,000;¹⁰ a newer therapy currently cost \$27,580.¹¹ Of note, the effective treatment of hepatitis C leads to cure of the infection.

Implications for hepatitis B

Over the past two decades, the treatment of hepatitis B has progressed such that effective oral medications are now available. As with HIV, the treatment must be ongoing, with most patients needing lifelong therapy. In fact, one of the hepatitis B medications (tenofovir) is also an HIV medication. Ironically, in the Marshall Islands, it is available for HIV, but not for hepatitis B. Thus, when market mechanisms fail, public policy must ensure the delivery of life-saving medications to those who need them. The history of advocacy for HIV treatment serves as a reminder that advocacy for hepatitis B treatment is needed.

Comprehensive or Selective Primary Health Care?

In 1987, at the Joint WHO/UNICEF Conference in Alma-Ata, USSR (now Almaty, Kazakhstan), the Declaration on Primary Health Care (PHC) called for health systems to strive to be practical, scientifically sound, socially acceptable, universally accessible, and affordable. This vision of comprehensive PHC was viewed by some quarters of the international development community as too expensive and disruptive to the established world order. PHC was thus undermined by calls for "Selective Primary Health Care" (SPHC),¹² a rubric emphasizing directing resources toward specific diseases with high prevalence, morbidity, and mortality, and established means of control. SPHC thus

emphasized vertical programs and technical solutions. Among such programs were infant vaccinations, breast-feeding, malaria treatment, and oral rehydration packets.

SPHC is alive and well today in the RMI. Within public health, departments are organized along funding lines from the US Centers for Disease Control and Prevention. Meanwhile, the hospitals (Majuro Hospital and Lerioj Kitlang Hospital in Ebeye, the second population center) and their staffs are supported by the Department of the Interior. Thus, at the national level, TB services are separate from Non-Communicable Disease (NCD) services. NCD is part of public health and is separate from the Outpatient Department. The “TB and Leprosy Free Majuro” campaign, while a temporary project, was a vertical program that drew upon the resources, human and material, of the formal health services of the RMI.

Human Resources for Health

One problem with the proliferation of vertical programs is the scarcity of human resources for health in a setting like the Marshall Islands. The RMI is unable to produce enough health care workers to serve its population. The majority of physicians practicing in the RMI are international medical graduates, mostly from the Philippines.

With each vertical program introduced into the RMI, a number of physicians and administrators are drawn away from caring for the general medical needs of the populace. Each program has its own reporting mechanisms and requirements, sometimes requiring off-island travel. What is needed is a hepatitis B program that does not negatively affect and further burden the already strained primary care system.

The “TB and Leprosy Free” campaigns of 2017-2018 in the RMI tried to minimize the number of health care personnel drawn from other programs by bringing in expatriate workers. Nonetheless, the sizable cost of providing travel, food, and lodging to rotating teams of American volunteers to support the campaigns was primarily borne by the RMI government. Despite early signs of success in screening the majority of the urban Marshallese population for TB, large-scale, short-term, capital-intensive interventions like this would not be appropriate to address hepatitis B in the RMI. With a HBsAg prevalence of 9 to 10% in those over age 30, a program of hepatitis B screening and treatment at the next clinic or hospital encounter makes more sense.

Conclusion

Hepatitis B does not have a specific home within the RMI health system and continues to be a neglected disease with

high burden. The DFMCH’s involvement in mass TB and leprosy screenings raised ethical and clinical concerns over the potential unintended negative consequences of the intervention. Additionally, large-scale interventions such as these are not appropriate solutions for all public health concerns — and they are no replacement for robust, integrative primary health care systems. The historical trend in global health since Alma Ata has been a consistent shift away from primary health care towards top-down, donor-driven, and market-based vertical programming. As a consequence, low-resource countries like the RMI have little support to develop integrated services necessary for effective primary health care. Instead, the RMI remains reliant on US donor priorities and expensive off-island referrals.

As strategies are formulated to improve hepatitis B services in places like the RMI, plans should be explicit on how to make hepatitis B screening and care an integral part of comprehensive primary care. People living with hepatitis B and their allies in medicine and public health need to advocate for public policy to lower cost and make hepatitis B medications more widely available. It should be ensured that hepatitis B care does not draw financial or human resources away from the primary care system. Doing so supports an on-going commitment towards greater health equity across the globe, including the far-flung atolls of the Marshall Islands.

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SPOTLIGHT ON NURSING

Navigating Uncharted Waters: Preparing COVID-19 Capable Nurses to Work in a Transformed Workplace

Mary G. Boland DrPH, RN, FAAN

The Spotlight on Nursing is a recurring column from the University of Hawai'i at Mānoa's School of Nursing and Dental Hygiene (UHM SONDH). It is edited by Mary G. Boland DrPH, RN, FAAN, Dean of UHM SONDH; Kristine Qureshi PhD, RN, CEN, PHNA-BC, FAAN, Associate Dean of Research for UHM SONDH and HJH&SW Contributing Editor; and Joanne R. Loos PhD, Science Writer for UHM SONDH.

The University of Hawai'i at Mānoa School of Nursing and Dental Hygiene is the major public educator of entry-level and advanced practice nurses for the state of Hawai'i, with an enrollment of 410 students and a mission and responsibility to serve our Hawai'i nei. In mid-March 2020, when COVID-19 cases were reported in Hawai'i, we pivoted from face-to-face to online learning; withdrew clinical students from a range of health care organizations; built non-traditional clinical experiences for students with agencies responding to the crisis; and restructured the school nursing partnership with the Department of Education (DOE) to launch a nurse hot line and telehealth visits with the Hawai'i Keiki Program school advanced practice registered nurses (APRNs).

A faculty member led the Hawai'i Emergency Management Agency (HI-EMA) Community Care Outreach Unit (CCO) team. Members came from UHMānoa medicine, nursing, public health, and social work faculties, UH graduate students, the CCO Unit Community Advisory Partners representing Native Hawaiian, Pacific Island, Filipino, elderly, and neighbor island and rural communities. The unit was tasked with identifying capacity, needs, and threats to the health of community members as a result of the COVID-19 disaster in Hawai'i and making recommendations to mitigate the situation. They began by assessing the current capacity, needs, and threats to agencies that provide health and social services support across the State and ascertain the agencies estimation of the impact of COVID-19 on the clients that they serve. The findings indicated that major issues for individuals that the 121 responding organizations serve revolve around securing basic needs such as food security, housing and access to services (job loss resulting in financial problems are a key root cause), mental health, COVID-19 concerns (including adequate personal protective equipment [PPE], cleaning supplies, quarantine, testing issues).¹

A New Era of Emergency Preparedness

COVID-19 has prompted calls for the country's disaster-

readiness workforce to scale up dramatically. In the United States, the health care infrastructure proved to be unprepared for the pandemic. Although stopping the spread of the virus was dependent on testing, supply shortages and bureaucratic and logistical barriers prevented adequate testing from taking place.^{1,2} Contact tracing, another essential component for containing the spread of the virus, fell short largely because the United States lacked the workforce required to carry it out.³

The coronavirus pandemic has placed immense pressure on emergency rooms and intensive care units, highlighting the critical role of interprofessional teamwork as nurses, nurse practitioners, physicians and physician assistants are finding that collegiality and communication are not sufficient to manage the intensity of care. Emotional support to address stress and fatigue is also essential. Nurses employed in long-term care, public health, home care and the range of community based settings may have limited support for crisis response. Many of these organizations are small and lack the education capacity of the larger health systems.

Frontline providers and students required immediate understanding of a new highly transmissible respiratory pathogen, response to pandemics and particularly, the proper use of personal protective equipment (PPE) to prevent, treat, and control the spread of SARS-COV2. The Mānoa Nursing faculty developed a free online modular course that focuses on COVID-19 as a case example of pandemics, public health response, emergency management models, nursing care, and the ethics and stress of caring. UH Outreach College managed registration and hosting of content and the Hawai'i State Center for Nursing provided continuing education credits. The course launched in early April 2020. As of June 30, 2020, 289 nurses, 89 other licensed health care professionals, and 321 individuals with an interest in learning about COVID-19 had completed the course. Participants came from Hawai'i (68%), other United States (24%), and international areas (10%), with 6% from locations that were unknown/not reported. As of August 1, the course has been

updated to provide the most current information. Data regarding the course will continue to be updated as more information about the virus, transmission, and treatment emerges.

The UH nursing community recognizes that COVID-19 will be a health concern for the foreseeable future. As the state moves to reopen the economy, the key to containment would be a comprehensive public health approach. The school partnered with the Department of Health (DOH) to train clinician contact tracers (nurses, physicians, physician assistants and pharmacists). A team of faculty, staff from the UH Translational Health Science Center and student actors from the UH Department of Theatre and Dance created an interactive online program with simulated case scenarios. By mid-July, the program has trained approximately 400 people from Hawai'i County, Honolulu County, Kaua'i County, and Maui County, who are now skilled in contact tracing.

Accelerated Adoption of Telemedicine

The COVID-19 pandemic and the school building closings have and will continue to disrupt the daily life and routine for children and families. Telehealth (TH), a term that is frequently used interchangeably with telemedicine, is the delivery and facilitation of health and health-related services including medical care, provider and patient education, health information services, and self-care using telecommunication technologies.⁴ Tools include phone, text, computers with video, and specialized HIPAA compliant software products. Today TH includes mobile health applications, video and audio technologies, digital photography, and remote patient monitoring (RPM).

Nurses, nurse practitioners, pharmacists, and physician assistants will play a more significant role in acute, ambulatory, long-term care, and home care. The delivery of care will rely increasingly on artificial intelligence advancements and TH. Health care providers in the United States have been inching toward making more services available via TH for years, but COVID-19 has pushed the inevitable telemedicine adoption that is accelerating the shift to decentralize health care toward preventive and home care. In nursing, population health coursework for entry and advanced practice students will include expanded content and experiences in technology supported applications, which include the use of smartphones with health-related mobile applications and telehealth.

Team-Based Interprofessional Care Delivery

The demand for effective teamwork and collaboration is growing rapidly. There is a sense of urgency, beyond national accreditation requirements, to prepare students for team-based practice to improve health care quality and value. Building capacity in teamwork and collaboration is key to transforming the delivery of health care and retaining the current workforce.

The Hawai'i Interprofessional Education Workgroup for Health Sciences & Social Welfare (HIPE) at the University of Hawai'i developed an interprofessional education curriculum grounded on the Interprofessional Collaboration Core Competency model.⁵ Established in 2009 by six organizations committed to advancing interprofessional learning experiences and promoting team-based care, the Interprofessional Education Collaborative includes 21 national organizations, such as the American Association of Colleges of Nursing (AACN), American Association of Medical Colleges (AAMC), American Association of Colleges of Pharmacy (AACP), and American Public Health Association (APHA). The 2016 update to the original version broadened the competencies to include a focus on culture and population health.⁵ These changes synergistically align with the UH's mission and serve to create a clear path for the involvement of public health, with the inclusion of social determinants of health and a focus on the overall improvement of health-related quality of life for the people of Hawai'i. The efforts of this group will accelerate change noting concerns related to the short and long term effects on all providers of working in high-volume, high-intensity settings where the number one stressor reported is loss of control.⁶

Navigating Forward

As the health care field has been forced to pivot in light of the COVID-19 pandemic, among other changes, nursing education curricula and practice are being reinvented. The foci are on preparing entry level and advance practice nurses for frontline practice in a delivery system that is changing daily and will continue to need nurses that are COVID-19 competent across all delivery settings. Today, nursing is preparing for the long haul by contributing to the state response in a manner that uses nursing expertise and ensures students are capable and competent to enter a transformed workplace.

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Hawai'i Journal of Health & Social Welfare (HJH&SW)

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- [HJH&SW Statistical Guidelines](#)
- [HJH&SW Style Guide for Native Hawaiian Words and Phrases](#) [AMA Manual of Style](#) A free summary can be found [here](#).

4. The sponsor will oversee the article selection, peer review, and editing process. We recommend that time be allowed for at least two rounds of reviews for each article. **Time frame: 3-6 months**

- Ensure that each article includes Institutional Review Board (IRB) review and approval, and a statement disclosing any conflicts of interest.
- Obtain a [Copyright Transfer Agreement](#) signed by all authors for each article.

5. *Optional:* During this time, the sponsor can solicit advertisements for the supplement to help defray costs for publication and/or printing. To initiate this process, the sponsor will work the HJH&SW advertising representative Michael Roth at 808-595-4124 or roth-comm@gmail.com.

6. The sponsor or their designee will conduct a final review of each article to ensure adherence to HJH&SW guidelines and AMA style. **Time frame: 2 weeks**

7. For each article, the sponsor will submit the final Word document and Copyright Transfer Agreement to the HJH&SW journal production editor. The journal production editor will send the articles to the copy editor for final journal style review. Copyediting will be 8 hours per edition plus 1 hour per article for additional articles purchased. Any additional hours will be billed at \$100 per hour. **Time frame: 2 weeks**

8. The sponsor will submit the final articles to the layout editor for formatting. **Time frame: 1 month**

Acting in the role of guest editor, the sponsor will include a column introducing the supplement.

IMPORTANT: All articles submitted for layout should be in their finalized form. Page proofs will be returned to the sponsor for their review and approval, but changes will only be made to fix any errors that were introduced during the layout process. Any editing or changes to the text or figures after the initial copy layout will incur a fee of \$50 per page.

9. The sponsor will review the electronic copy from the layout editor and submit any final corrections. **Time frame: 5 working days**

10. The layout editor will make the final corrections and provide a finished electronic copy of the supplement to the sponsoring editors to allow time for printing.

11. The managing editor will work with the sponsor to draft a press release. Sponsors should contact the managing editor at least 30 days prior to the date of publication to plan and script the press release. Sponsors are encouraged to submit 1-2 photos to accompany the press release. Note that obtaining signed photo releases is the responsibility of the sponsor.

12. The supplement will be published online along with the press release. An electronic copy will be sent to our subscribers and circulation lists, and the edition will be forwarded to the National Library of Medicine for indexing and made available for no cost access to the public.

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