

SPOTLIGHT ON NURSING

An Asthma Plan for Hawai'i: It's Time to Trial Technology-based Interventions

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The Spotlight on Nursing is a recurring column from the University of Hawai'i at Mānoa Nancy Atmospera-Walch School of Nursing (NAWSON). It is edited by Holly B. Fontenot PhD, APRN, WHNP-BC, FAAN, Associate Dean for Research, Frances A. Matsuda Chair in Women's Health, and Professor for NAWSON, and HJH&SW Contributing Editor; and Joanne R. Loos PhD, Science Writer for NAWSON.

Asthma, a chronic respiratory illness, can be triggered by allergens such as dust mites, pet dander, and mold, irritants such as secondhand smoke or volcanic smog (vog), and respiratory infections such as the flu or common colds.¹ Asthma has been associated with increases in morbidity and mortality.² While asthma symptoms can be treated, environmental factors can contribute to flare-ups.

In the Hawaiian Islands, the weather contributes to asthmatic triggers. The islands are situated just below the Tropic of Cancer, and mild weather conditions are experienced year-round. The unique natural environment includes lush rain forests, snowcapped mountains, arid deserts, and active volcanoes. Due to high mountain peaks and ranges and natural trade wind flow, the islands are divided into a windward side, which is wet and lush, and a leeward side, which is dry and sparse. The contrasting landscapes, wet/dry climates, and active volcanoes contribute to environmental triggers that increase the risk for asthma episodes. These environmental triggers include allergens (mold dust mites, animal dander) and irritants (smoke from wildfires and vog).¹

The continuous eruption at Kīlauea (1981-2018) and the September 2023 eruption at Halema'uma'u crater contributed to higher emission of vog. Vog is volcanic smog with a hazy appearance caused by the mixing of sulfur dioxide with the atmosphere.³ The release of these irritants places those with asthma at increased risk of having an asthma episode.^{4,5} Vog can contribute to an increased prevalence of asthma. However, prior to the onset of Kīlauea Volcano's eruption in 1983, the Hawai'i State Department of Health did not collect asthma prevalence data. Nor was there known historical data on asthma prevalence prior to the start of the volcanic eruption. Therefore, comparative data on asthma prevalence before the start of the volcanic eruption and in the years immediately following is unavailable (J. Chosy, personal communication, July 25, 2013).

In August 2023, devastating wildfires on Maui wreaked havoc on residents and visitors. The fires also placed those with asthma and respiratory conditions at greater risk of having an asthma episode. The current state of the affected land may displace other irritants and cause asthma episodes to those living downwind of the area. However, the impact of wildfires on those with asthma is currently unknown.⁶

The unique environment in Hawai'i exacerbates triggers and contributes to the prevalence of asthma in Hawai'i, especially among Native Hawaiians. Among Hawai'i adult, 13.8% who have ever been diagnosed with asthma.⁷ Among Native Hawaiian adults, 19.5% have ever been diagnosed with asthma.⁸ Adults who did not graduate from high school, those with an income of below \$50,000, who are current smokers, are obese, or are Native Hawaiian are at an increased risk for developing asthma.⁹

Current Asthma Plan Care Plan in Hawai'i

The key to asthma care is through prevention and control of asthma symptoms. Asthma care plans include proper medical assessment, patient education, control of environmental triggers, medication adherence and monitoring,¹⁰ and the use of an asthma action plan. Asthma action plans typically entail a written worksheet that provides a step-by-step strategy to keep asthma symptoms from getting worse. The plan begins with asthma education which includes information about asthma, triggers, and treatment modalities, including how to properly utilize emergency medications. This education is provided by health educators such as nurses or community health workers, and certified asthma educators, who also provide written educational materials (eg, flyers or brochures) to the patient and/or caregiver. An agreement is made between the patient and provider with follow-up as needed. Furthermore, the plan includes information about how to access primary care providers

and specialists, along with health educators to seek additional information as needed.¹ For youth, the asthma action plan heavily relies on caregivers to implement the plan and manage the asthma appropriately.¹⁰ Paper-based asthma education and medication information along with a written plan can be lost or misplaced and may not be culturally tailored.

At the state level, the Hawai'i Asthma Plan 2030¹ is an initiative to address asthma. The plan is linked to the larger Healthy Hawai'i Strategic Plan.¹¹ The state has identified 2 priority populations, youth and Native Hawaiians, who are at greater risk for asthma, along with 4 sector areas to address. These sectors include community design and access, education, health care, and worksite.¹

Building Research to Inform Future Integration of Technology-Based Strategies into the Asthma Plan

Past research on asthma among Native Hawaiians includes exploring an understanding of barriers and facilitators of care and the role and influence culture has on asthma care. Cultural practices, such as *lomilomi*, sitting seaside, and living *apono* life, were among the strategies used by Native Hawaiian caregivers of children with asthma.¹² Providers who embraced the collectivistic nature of Native Hawaiians capitalized on this strength to problem solve asthma care.¹³ While work in this area shows promise, more research is needed, especially among the Native Hawaiian population. A recent statewide qualitative asthma study was conducted to understand the impact COVID-19 had among Native Hawaiian adults with asthma.¹⁴ Findings from this study highlighted 3 major themes: social support, lifestyle strategies to manage asthma, and worry over COVID-19; additionally, for the first-time, participants were interested in technology-based solutions to improve asthma education.

Research in Australia among Aboriginal and Torres Strait Islander population has shown that the use of an evidence-based mobile Health (mHealth) tool (mobile phone application 'app') was successful in increasing short term knowledge on asthma and asthma care.¹⁵ The Australian mHealth tool was culturally informed by Aboriginal and Torres Strait Islander communities in Northern Queensland and Northern Territory. This asthma mHealth tool had culturally relevant terms and images, and verbiage is spoken in the native languages specific for the peoples of those areas of Australia.

In the United States, asthma related mHealth tools are also being tested as an option for asthma management. These mHealth tools have been developed for medication management and collect information on asthma symptoms and inhaler use.¹⁶ As the technology continues to develop, other asthma technology tools available include eHealth which provides remote delivery of care and timely access to a care provider, and web-based asthma self-management sites.¹⁷

Building on the formative work out of Australia and the United States, a Hawai'i-based nurse-led team has secured funds to develop and test an asthma mHealth tool for Native Hawaiians. This tool will be designed for use by adults who provide care for youth diagnosed with asthma. The nurse-led team (which includes Hawai'i-based technology and design partners) is working with key stakeholders in the Native Hawaiian community to ensure the technology is culturally informed. The mHealth tool as it is designed will include core Native Hawaiian health concepts and the integration of written and spoken verbiage in the Hawaiian language. Once the mHealth tool is designed it will be pilot tested and further evaluated to ensure it meets the community's needs. The overall goal is to reduce asthma health disparities for Native Hawaiians and integrate technology-based solutions to improve culturally informed asthma education, improve access to care (especially among those in rural areas), and improve health outcomes. The project aligns with and is responsive to the Hawai'i Asthma Plan 2030¹ and the larger Healthy Hawai'i Strategic Plan.¹¹

Conclusion

Novel and culturally informed approaches are needed to reduce asthma health disparities in Hawai'i, especially among Native Hawaiians. The state's unique environment and cultures must be considered when building technology-based health interventions. Interventions must consider social and cultural determinants of health, the unique geographic and environmental influences on asthma, rurality and other access to care barriers, and other influences that facilitate or are barrier to effective asthma care plans including providers, educators, educational materials, and effective policies to reduce asthma prevalence. The development and testing of a culturally informed mHealth tool is an important next step to address the state's needs to improve asthma care plans for Native Hawaiians.

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