Hawai‘i Journal of Health & Social Welfare

A Journal of Pacific Health & Social Welfare

August 2026, Volume 85, No. 8, ISSN 2641-5216

Hawai‘i Journal of Health & Social Welfare

ISSN 2641-5216 (Print), ISSN 2641-5224 (Online)

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Yuji K, Yuji W. A Reexamination of Dr. Masanao Goto's Leprosy Treatment in Hawai'i: New Insights from Japanese and Hawaiian Sources. *Hawaii J Health Soc Welf*. 2026;85(8):203-209. doi:10.62547/CTHG4748

A Reexamination of Dr. Masanao Goto's Leprosy Treatment in Hawai'i: New Insights from Japanese and Hawaiian Sources

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Keywords: History of Medicine, Leprosy, Hawai'i, Masanao Goto, Japanese Medicine, Health and Social Welfare, Patient Empowerment, Person-Centered Care, Patient Experience

https://doi.org/10.62547/CTHG4748

Abstract

Leprosy (Hansen's disease) care in late 19th-century Hawai'i involved complex interactions between Western medicine, traditional practices, and diverse patient experiences. This study re-evaluates the contributions of Dr. Masanao Goto, a Japanese physician whose treatment gained significant patient popularity, by focusing on its health and social welfare implications. Utilizing previously under-examined Japanese sources—including family records and hospital documents—alongside Hawaiian and English archives, this historical research analyzes Goto's work in Hawai'i (1885–1895) and the dynamics of cross-cultural medical encounters. The analysis reveals a three-way dynamic between patients seeking relief, a non-Western practitioner offering a holistic paradigm, and a shifting medical establishment that increasingly prioritized bacteriological cures. Dr. Goto's holistic regimen, centered on chaulmoogra oil integrated with *Kampō* (a system of traditional Japanese medicine adapted from classical Chinese medicine) principles and medicated baths, provided tangible symptomatic relief and profound hope. While initially supported by the Kalākaua administration, his work later clashed with the "reformist" Board of Health following the political upheaval of 1887. Patient support, however, was a powerful force, culminating in an 1894 petition from 861 Kalaupapa residents to appoint him their permanent physician. Dr. Goto's work, embraced by patients, highlights the critical importance of patient-centered perspectives and the agency of non-Western practitioners. The organized patient movement for his care serves as a historical precedent for medical sovereignty, offering valuable insights into integrating diverse medical traditions pertinent to achieving health equity in contemporary Hawai'i.

Introduction

In late 19th-century Hawai'i, the management of Hansen's disease (leprosy) was deeply politicized, shaped by colonial authority and racial discourse. The policy of forced exile to settlements like Kalaupapa disproportionately marginalized Native Hawaiians (*Kānaka Maoli*) through what historian Pennie Moblo terms "defamation by disease."[1] Within this context, the work of Dr. Masanao Goto (1857-1908), a Japanese physician, remains under-examined. While historians like Gavan Daws[2] and Charles S. Judd Jr.[3] acknowledge him, their accounts primarily reflect the Western medical establishment's perspective. Although some scholarship frames Goto as a Meiji-era medical entrepreneur,[4] an analysis of his work from the patient-centered perspective found in Hawaiian sources is absent.

This article re-examines Dr. Goto's work by integrating Japanese primary sources with Hawaiian-language newspapers and official records. The conflict between Goto and the Board of Health represents a microcosm of a larger dynamic involving patients as active agents. Situating this story within the critical historiography of leprosy in Hawai'i,[1,5,6] frames the patients' embrace of Goto's methods not merely as a treatment preference, but as a demand for 'medical sovereignty'—an assertion of self-determination mirroring the broader *Kānaka Maoli* struggle for national sovereignty.[7]

Methods

This historical research employed a rigorous qualitative approach, triangulating diverse primary source materials in Japanese, Hawaiian, and English to reconstruct and interpret the significant yet overlooked work of Dr. Masanao Goto in Hawai'i. This multilingual approach was crucial for overcoming the biases of any single linguistic or cultural archive, aligning with historians like Anwei Skinsnes Law[6] and Noenoe K. Silva[7] who have demonstrated the necessity of non-English sources for a complete history of Hawai'i.

Primary sources were drawn from 3 languages. Japanese-language materials, including Goto family archives, records from his Kihai Hospital, and articles from the *Asahi Shimbun*, were central to understanding Dr. Goto's *Kampō* (a system of traditional Japanese medicine adapted from classical Chinese medicine) background and medical philosophy. Hawaiian-language newspapers, sourced from digital archives like nupepa.org and Chronicling America, provided an indispensable window into local reception and patient perspectives, offering a crucial counter-narrative to official records. English-language materials consisted primarily of official documents, such as the Reports of the Hawaiian Board of Health, and articles from newspapers like *The Hawaiian Star*, which offered insights into the views of the Western-dominated medical establishment.

The analytical process involved a meticulous and iterative cross-referencing of these diverse sources to build a comprehensive narrative, focusing on the period from Goto's initial contact with Hawaiian officials (c. 1878) to

the persistent efforts by patients to secure his return until his death in 1908. Translations of Japanese primary sources were conducted by the authors. For Hawaiian language materials, established scholarly translations were utilized and cross-referenced with contemporary English accounts. As this research is based solely on the analysis of publicly available historical records and involves no direct interaction with human subjects or personal data, it was determined to be exempt from Institutional Review Board (IRB) review.

Results

A Foundation in Japan: Kampō, Chaulmoogra Oil, and the Kihai Hospital

Masanao Goto (**Figure 1**) was born in 1857 into a family of physicians practicing *Kampō*. In a pioneering move, he and his father established the Kihai Hospital (literally "Resurrection Hospital") (**Figure 2**) in Tokyo, dedicated to treating leprosy, a significant social welfare initiative at a time when patients were typically ostracized.[4,8] The Gotos' regimen integrated chaulmoogra oil, a substance used for centuries in traditional Asian medicine and recognized, albeit problematically, in the West for its potential against leprosy. Western medicine struggled with the oil's severe side effects, including intense nausea when taken orally and painful abscesses from injections. The Kihai Hospital's holistic protocol was a sophisticated system designed to mitigate these issues. It included oral medication combining chaulmoogra with other herbs based on *Kampō* pharmacology, medicated baths using chaulmoogra pomace for direct topical application, physical therapy, and dietary guidance. This multi-pronged approach prioritized patient well-being and comfort.[4]

The Hawaiian Connection: Royal Invitation and Patient Advocacy

The Gotos' fame reached Hawai'i, offering hope where the local response to leprosy was forced exile and social death. The connection began as early as 1878, with Hawaiian newspapers reporting on a Dr. Goto in Japan with effective treatments.[8] A pivotal moment occurred during King Kalākaua's 1881 world tour, an ambitious diplomatic effort to secure the kingdom's sovereignty. While in Tokyo, the King met Dr. Masanao Goto and, impressed by his work, extended a personal invitation to visit the Kingdom.[9] This royal endorsement was powerfully reinforced by active political lobbying by patients. Gilbert Waller, a wealthy American businessman from Hawai'i who had sought treatment at the Kihai Hospital in 1883, was so impressed with his recovery that he urged Dr. Goto to come to Hawai'i.[10] After returning to the islands, Waller wrote to the government in 1885, strongly advocating for Goto's methods. This act of direct patient lobbying, combined with the King's prior invitation, resulted in the Hawaiian government officially inviting Dr. Goto to treat leprosy patients.[11] Waller's subsequent long life, with no reported recurrence of the disease, stands as compelling patient-perspective evidence of the treatment's efficacy.[12]

Figure 1. Dr. Masanao Goto.

This photograph is estimated to be from around the time of his work in Hawai'i; the date of the photograph is unknown.

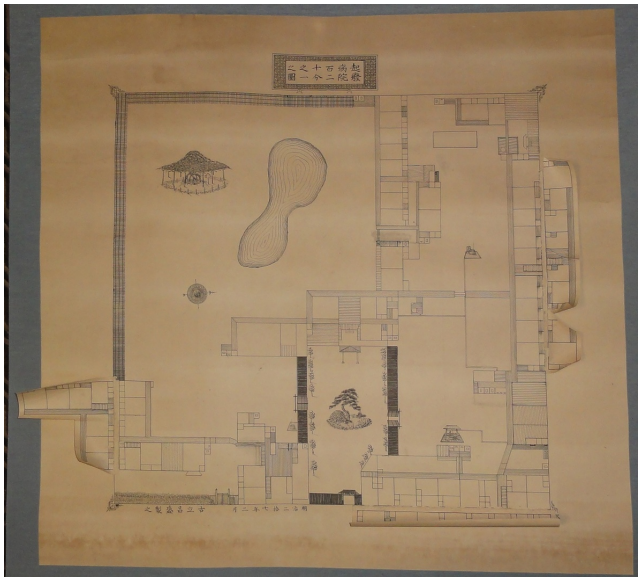

Figure 2. Map of the Kihai Hospital, Tokyo, Japan, created in February 1894.

This patient trust was so profound that it transcended national borders. In 1888, David Keaweamahi, a Native Hawaiian pastor from O'ahu diagnosed with leprosy, rejected the Board of Health's mandate for exile to Moloka'i and instead traveled all the way to Japan to seek treatment at the Goto's Kihai Hospital. Keaweamahi documented his journey and treatment in a series of letters titled *"He Leta*

Mai Iapana Mai" (A Letter from Japan) published in Hawaiian newspapers, serving as a vital link between the two nations.[12,13] He remained in Japan for 12 years to avoid the strict quarantine policy in Hawai'i. He died in Tokyo in July 1900; a contemporary report noted his cause of death as consumption and that "no sign of the disease was visible on his face," powerfully reinforcing community trust in the long-term efficacy of Goto's methods.[13,14] His experience, alongside Waller's, reinforced the deep community trust in Goto's treatment, demonstrating that patients sought not only a cure but also an alternative to forced exile.

First Sojourn in Hawai'i (1885-1887): A Clash of Therapeutic Paradigms

Upon his arrival in Honolulu in October 1885, Dr. Goto began work under contract with the Board of Health, establishing a clinic and treating patients at the Kaka'ako Branch Hospital.[15] This contract, initiated under the administration of Walter Murray Gibson, reflected the Hawaiian Kingdom's openness to alternative medical perspectives prior to the political shifts of 1887. His method, involving medicated hot baths and oral pills, was seen as a significant advance. In an official report to the Board of Health dated March 30, 1886, Dr. Goto provided a detailed description of these treatments for leprosy patients; this document was subsequently included in the legislature's official records.[12] One of his most prominent patients was Father Damien, who sought Goto's care in July 1886.[16] Enthusiastic about the initial results, Damien returned to Kalaupapa and championed the treatment, securing supplies and collaborating with Brother Joseph Dutton to construct a bathhouse for the community.[17] The treatment, particularly the baths, became immensely popular among patients, creating a "mania" for the therapy, as they actively sought a treatment that provided not only symptomatic relief but also a sense of comfort and control.

Significantly, Mother Marianne Cope, who oversaw patient care at the Branch Hospital, observed tangible improvements. In a letter dated August 28, 1886, she wrote to her superior that under Dr. Goto's treatment, "Almost all [patients] have improved significantly... The Doctor has even thoughts of discharging them soon," noting that such progress was "quite unheard of in the history of Leprosy."[18,19] This testimony from a Western observer corroborates the patient perspective that the treatment offered genuine physical relief. However, this period also marked the beginning of tensions with the Western medical establishment. Dr. Arthur Mouritz, the resident physician at the settlement, observed Father Damien's eventual physical decline under the intense regimen of hot baths and concluded the treatment was ineffective. As historian Kerri Inglis notes, Western physicians were increasingly focused on the "microbe medicine" of the newly identified *Mycobacterium leprae*. For them, if a treatment did not halt the bacteria, it was deemed of no value, even if it gave temporary relief.[20] This medical skepticism was compounded by political upheaval. The imposition of the "Bayonet Constitution" in 1887 and the subsequent removal of Walter Murray Gibson shifted the Board of Health's leadership to a "reformist" cabinet that prioritized fiscal austerity and Western scientific authority.[21] Consequently, despite patient petitions, Goto's contract was not renewed, and he returned to Japan in 1887. His service to the kingdom was nonetheless recognized with a royal decoration from King Kalākaua.[22]

*Second Invitation and "*Haukapila o Goto*" (1893-1895)*

Patient demand for Dr. Goto's return remained strong, leading to a second official invitation. He arrived in March 1893, just weeks after the overthrow of the monarchy, a timing that underscores the immense political pressure patients exerted to secure his invitation from the new, skeptical Provisional Government.[23] This time, he focused his efforts squarely on the Kalaupapa settlement.[24,25] American leprologist Albert S. Ashmead recognized Goto as a leading authority, describing him as "the most eminent leprologist in Japan."[26] At Dr. Goto's request, a dedicated facility was established at Kalawao on May 29, 1893, with an initial 30 patients.[12,24] This complex, which became known among patients as "*Haukapila o Goto*" (Goto's Hospital), included a hospital building, dormitories, a kitchen, and a bathhouse, allowing him to oversee the care of approximately 140 patients.[17] He implemented a structured schedule, spending most of his time on Moloka'i providing direct care. While explicit records of their daily interactions in this later period are scarce, earlier correspondence suggests a partnership where Goto provided medical direction while Mother Marianne Cope and her sisters executed the labor-intensive nursing care.[17,19]

This trust was not merely political; it was deeply personal. The children in Goto's hospital, experiencing "respite and true strength," even composed a song in his honor, celebrating the "healing medicine of Dr. Goto" that brought them such joy.[27] This sentiment was shared by the wider patient community, whose overwhelming support was demonstrated in April 1894, when a remarkable 861 out of approximately 1100 residents[25] signed a petition formally requesting that Dr. Goto be appointed as their permanent physician.[12,27,28] This petition represents a highly organized collective action by the patients to assert their choice in medical care. The Board of Health rejected the petition, citing a lack of proof of permanent cures and budgetary constraints—a decision that prioritized institutional metrics over the expressed needs of the patient community. Dr. Goto left Hawai'i again in April 1895.[29]

Anticipating Modern Science: Parallel Innovations in Chaulmoogra Oil Treatment

Decades before Western science developed a viable injectable form of chaulmoogra oil, Dr. Goto's *Kampō*-based regimen offered a patient-centered solution to the same fundamental problem. The challenge with chaulmoogra oil was not its potential efficacy but its severe side effects, which made it intolerable for many patients. Dr. Goto's innovation was a holistic and systemic one: he combined the oil with other herbs in a complex pharmacological formula to buffer its negative effects, and he developed medicated

baths to deliver it topically, bypassing the gastrointestinal issues altogether.[25] This was a sophisticated, complete protocol designed for patient tolerability and relief.

Interestingly, this patient-centered approach to chaulmoogra oil found a parallel in the work of another innovator in Hawai'i, Alice Ball. In 1915, Ball, a young African American chemist at the University of Hawai'i, developed a method to make chaulmoogra oil injectable and absorbable by the body, solving the same problem of side effects that Goto had addressed through *Kampō* formulations and baths.[30] Both practitioners listened to the physiological needs of the patients—one through the lens of traditional East Asian medicine, the other through Western chemistry—and both provided relief where standard Western methods had failed. The key difference was that Ball's success was biochemical and bacteriological, leading to patients testing negative for the bacillus and the first medical releases from isolation, whereas Goto's success was clinical and symptomatic, improving quality of life without eliminating the pathogen.

The Enduring Hope for Goto's Return

Even after his second departure, patients on Moloka'i held onto the hope of his return. In 1903, a representative from the Japanese-language newspaper *Hawaii Shimpo* visited Kalaupapa and reported that belief in the efficacy of Goto's treatment remained widespread.[31] Patients interviewed claimed significant improvements and earnestly desired his return. In response to this persistent patient demand, the Hawai'i legislature, in a significant victory for patient advocacy, appropriated $3000 specifically for Dr. Goto's salary and an additional $3000 for his medicines to return and treat the patients.[32] However, the initiative was once again thwarted by the Board of Health, which, despite resuming the use of his medicines due to patient clamor, decided not to send for Dr. Goto, citing a shortage of funds.[33] The Board maintained its rigid position that the treatment was only of temporary benefit and not a permanent cure. Dr. Goto continued his work in Japan until his death in 1908, but his influence on the patients in Hawai'i endured as a powerful symbol of hope and compassionate care.[34]

Discussion

The Changing Political Landscape

The Kingdom's openness to Dr. Goto's approach was not an anomaly but reflected a sustained commitment to public welfare. This is evidenced by earlier initiatives such as the establishment of Queen's Hospital in 1859 by King Kamehameha IV and Queen Emma, which provided health care at no cost to the Indigenous population. Such policies demonstrate that the Hawaiian government actively sought to protect its citizens through sovereign institutions long before the imposition of Western biomedical hegemony.

Dr. Goto's trajectory must be contextualized within the Kingdom's shifting politics (1885–1895). The initial embrace of Goto under King Kalākaua and Premier Walter Murray Gibson reflected a sovereign nation exercising agency to seek solutions beyond Western orthodoxy. However, the 1887 "Bayonet Constitution" marked a turning point. The subsequent "reformist" cabinet, aligned with White commercial interests, altered Board policies.[5,21,35] Western physicians' dismissal of Goto's treatment coincided with this regime change, which increasingly prioritized Western scientific authority and fiscal austerity over previous inclusive approaches.

Furthermore, the Board's insistence on segregation reflected the prevailing global medical standard following Gerhard Hansen's identification of *M. leprae* in 1873.[36] However, in Hawai'i, this global scientific standard became entangled with colonial politics. Under the post-1887 oligarchy, the rigorous enforcement of isolation and the rejection of "Native" or "Asian" therapeutics became markers of the new regime's claims to "modernity," often at the expense of the Indigenous population.

Restoring Agency: The Power of Non-Western Sources

Finally, Goto's story must be understood within the transnational flow of medical knowledge. His practice was not a static application of Japanese tradition but a dynamic interplay between *Kampō*,[4] his own studies of Western medicine, and the specific needs of his patients in Hawai'i. By re-examining this history with a focus on Japanese and Hawaiian-language sources, this paper challenges the dominant narrative that has privileged the perspective of the Western medical establishment. This approach, advocated by scholars like Noenoe K. Silva[7] and Anwei Skinsnes Law,[6] restores the voices and agency of the *Kānaka Maoli* patients and caregivers who found solace in Goto's methods and illuminates the vital role of non-Western practitioners in the history of Hawai'i. The organized movement to secure Goto's return in 1894 was not merely a request for medication; it was an assertion of medical sovereignty—a community demanding the right to define its own terms of healing against an imposed institutional authority.

Conclusion

While Dr. Masanao Goto did not provide the definitive cure the Hawaiian Board of Health sought, his establishment of *Haukapila o Goto*, his dedication to patient welfare, and the profound trust he earned from the community solidify his historical significance. His legacy is not one of a failed cure, but of a pioneering model of Person-Centered Care that was decades ahead of its time. Crucially, the patient-led movement to secure his services represents a powerful historical precedent for medical sovereignty, demonstrating a community's determination to define its own terms of health and well-being against an imposed institutional authority. The narrative of his work in Hawai'i is ultimately driven by the powerful agency of his patients, whose organized political advocacy brought him to the islands. His story, brought to light through a tri-lingual methodology, serves as a model for uncovering more just histories of cross-cul-

tural medical encounters. For contemporary health systems in Hawai‘i, this history serves as a powerful reminder that patient-defined success and the integration of diverse healing traditions are not peripheral concerns, but central to achieving true health equity.

Acknowledgements

The authors wish to thank the Hamilton Library at the University of Hawai‘i at Mānoa for their assistance with research materials, and Kristin Barrett-Anderson, Director of the Saint Marianne Cope Shrine & Museum, for her valuable support. We are especially grateful to Dr. George Goto, Professor Emeritus at Nagasaki University and grandson of Dr. Masanao Goto, for graciously providing the crucial historical photographs and maps from the family archives that were essential to this study. Finally, we extend our special thanks to Yayoi Ashikaga.

Conflict of Interest and Disclosures

KY reported institutional support from Tokyu Land Corporation outside the submitted work. WY declares no competing interests. Co-author Wakako Yuji is a great-granddaughter of Dr. Masanao Goto; this relationship provided access to the unpublished Goto Family Archives used in this study.

Submitted: July 20, 2025 PDT. Accepted: May 30, 2026 PDT.
Published: August 03, 2026 PDT.

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Jain A, Jain A, Jain D, Jain S, Pagano I. Impact of an Artificial Intelligence-Based Computer Aided Detection System (CADe) on Colonoscopies Performed in Hawai'i. *Hawaii J Health Soc Welf*. 2026;85(8):210-217. doi:10.62547/WOJD7191

Impact of an Artificial Intelligence-Based Computer Aided Detection System (CADe) on Colonoscopies Performed in Hawai'i

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Keywords: adenoma detection rate, artificial intelligence, colon polyps, colorectal cancer, computer aided detection system

https://doi.org/10.62547/WOJD7191

Abstract

The demand for colonoscopies has increased over the last few years due to an aging population combined with a post COVID-19 backlog as well as an ongoing rise in younger patients with colorectal cancer (CRC). Quality indicators ensure that high quality colonoscopies are being performed by endoscopists, thus decreasing the risk of post-colonoscopy CRC arising from lesions missed on the index exam. One common outcome measure is known as the adenoma detection rate (ADR), which is the likelihood that an endoscopist will detect a pre-cancerous polyp during colonoscopy. The Artificial Intelligence (AI) program known as computer-aided detection system (CADe) was designed to improve the ADR of endoscopists by helping them identify colon polyps. Previous studies have evaluated the clinical outcomes of CADe but none were conducted in Hawai'i. This study was designed to determine the impact of GI Genius (Medtronic), the first CADe introduced in Hawai'i. Data was collected on aggregate ADR for both male and female patients before and after implementation of GI Genius in several ambulatory surgery centers in Hawai'i and then a cost-estimate analysis was performed. The GI Genius software program resulted in a statistically significant increase in ADR for both male and female patients. Furthermore, the addition of this program was found to be cost-effective when compared with standard colonoscopy alone due to an anticipated decrease in CRC related health care costs. CADe is a promising new tool for endoscopists, but further studies are needed to determine the long-term benefits on CRC incidence and mortality.

Abbreviations and acronyms

ADR = adenoma detection rate
AGA = American Gastroenterological Association
AI = artificial intelligence
ASC = ambulatory surgery center
CADe/CADx = computer aided detection system
CRC = colorectal cancer
EOCRC = early onset colon cancer
LYG = life years gained
QALY = quality-adjusted life year
SSLDR = sessile serrated lesion detection rate
USPSTF = United States Preventive Services Task Force

Introduction

Since its introduction into health care in the mid-1950s, Artificial intelligence (AI) has revolutionized the field of medicine.[1] From AI-assisted mammogram reading which can detect breast cancer at earlier intervals to robotic surgeries which have improved surgical outcomes, AI has directly impacted patient care by helping health care providers make more precise decisions for their patients.[1] More recently, an AI software program known as a computer-aided detection system (CADe) has been helping gastroenterologists detect pre-cancerous colon polyps called adenoma during colonoscopy.[1]

Polyps are growths in the colon that can develop into colorectal cancer (CRC).[2] CRC is the 3rd most common cancer and 2nd leading cause of cancer-related deaths among both men and women.[3] Due to the ongoing rise of early-onset colorectal cancer (EOCRC), CRC is predicted to be the leading cause of cancer-related deaths in people younger than 50 over the next decade.[4,5] The United States Preventive Services Task Force (USPSTF) recommends that all patients at average risk for CRC begin screening at age 45.[6]

There are various forms of CRC screening, but colonoscopy remains the gold standard because it is the only screening modality which can both detect CRC and prevent it through the removal of adenoma.[2] Specialized training is required to perform colonoscopies and various quality measures have been identified that ensure high quality colonoscopies are being performed by endoscopists. These include: cecal intubation rate, average withdrawal time, bowel preparation adequacy rate, sessile serrated lesion detection rate (SSLDR), as well as adenoma detection rate (ADR).[7]

ADR is the percentage of first-time colonoscopies performed by an endoscopist in which at least one adenoma is detected.[7] An endoscopist's ADR is directly correlated with his or her ability to detect and remove adenoma and thus prevent CRC. Specifically, each 1% increase in ADR is associated with a 3% decrease in subsequent CRC.[8] Recent guidelines recommend that physicians maintain an average ADR of at least 35% (20-30% for female patients and 30-40% for male patients), although the actual rates vary widely from provider to provider.[7]

GI Genius (Medtronic, Minneapolis, MN) was the first commercially available CADe.[9] This software program was approved for marketing by the United States Food and Drug Administration on April 9, 2021 and introduced in Hawai'i in 2022.[10] Citing the results of previous studies, the manufacturer reports an increase in ADR for endoscopists who use GI Genius through improved detection of polyps during

colonoscopy.[11-13] Some previous studies on the efficacy of CADe in clinical practice have shown negative results, however.[14,15]

The authors of this study examined the clinical impact of GI Genius on ADR by colonoscopies performed across several ambulatory surgery centers (ASC) in Hawai'i. ADR rates before and after implementation of CADe were reviewed and a cost-effectiveness analysis was then performed.

Methods

This is a retrospective study of aggregate ADR for male and female patients at 3 of United Surgical Partners International's (USPI's) Hawai'i based outpatient ASCs: Endoscopy Institute of Hawai'i (EIH), Pacific Endoscopy Center (PEC), and The Endoscopy Institute of Hilo (TEH) from 1st quarter of 2021 to 1st quarter of 2025. The GI Genius software was implemented at each of these 3centers in the 1st quarter of 2023.

After receiving approval from USPI's Market President, Tenet Health care's National Research Budget Office, and the MetroWest Institutional Review Board, de-identified information on ADR at the endoscopy centers was provided by USPI's Pathology Department. No patient details, which can identify individuals, were accessible to the researchers at any time during data acquisition, storage, and comparison.

To test for year-over-year (2021-2025) differences in ADR, a generalized linear mixed model (GLMM) was used to analyze ADR by year, stratified by sex. The model assumed a Poisson (count data) distribution with a log link function, incorporating the natural logarithm of colonoscopy counts as an offset to adjust for varying procedure volumes. The year of colonoscopy served as a fixed effect, with 2021 as the reference category; and a random intercept at the physician level accounted for clustering within physicians. The quadrature method facilitated parameter estimation, calculating least squares means with confidence limits for the year effect. The SAS software, version 9.4 (SAS Institute Inc., Cary, NC) GLIMMIX procedure was used for the analyses.

A Markov cohort analysis was then conducted via the SAS IML procedure to evaluate the cost-effectiveness of CADe compared to standard colonoscopy in hypothetical cohorts of 1000 patients undergoing colorectal screening starting at age 45. Over a 50-year horizon (50 annual cycles), the model simulated lifetime outcomes, including total costs (with a 3% annual discount rate applied to reflect the time value of money and preference for earlier benefits), quality-adjusted life years (QALYs), life years gained (LYG), and new CRC cases.

The model incorporated 9 mutually exclusive health states with the initial state distribution taken from previous studies: (1) Healthy (66.8%), (2) Small Adenoma (≤5 mm; 16.8%), (3) Medium Adenoma (6-9 mm; 14.2%), (4) Large Adenoma (≥10 mm; 2.0%), (5) CRC Stage I (0.07%), (6) CRC Stage II (0.09%), (7) CRC Stage III (0.06%), (8) CRC Stage IV (0.04%), and (9) Death (0%).[5,16-18] Transitions between states were governed by a 9x9 transition probability matrix, identical for both strategies to reflect the same natural history of disease progression. Key transition probabilities included annual progression rates from healthy to small adenoma (0.012), small to medium adenoma (0.035), medium to large adenoma (0.022), and large adenoma to CRC Stage I (0.050), with background mortality (0.008-0.574 depending on state) and CRC stage-specific progression.[16,19]

Also included in the model were CRC disease stages. According to the Centers for Disease Control and Prevention (CDC) the distribution on presentation in the US is 31.9% for Stage 1, 38.4% for Stage 2-3, 22.4% for Stage 4, and the remaining 6.2% have an unknown stage.[3] For cost of disease, the following state-specific annual values in US dollars were assigned after a literature search of approximate costs for varying stages of CRC: $0 for non-CRC states (1-4 and 9); $50 100 for CRC I; $144 275 for CRC II; $161 279 for CRC III; and $207 540 for CRC IV.[20,21] Procedure-specific costs included colonoscopy ($1105.00), polypectomy ($451.32), histopathology ($514.45), and CADe/CADx add-on ($12.26).[16,22] Sidecar Health provides a publicly available Care calculator (Sidecar Health, El Segundo, CA) which includes the average total cash price of colonoscopy performed at an ambulatory surgery center in Hawai'i, regardless of insurance status.[22]

At model initiation (cycle 1), adenoma were detected and removed during the screening colonoscopy, with detected cases transitioned back to the healthy state. Histopathology was applied to all detected adenomas in the standard arm but only to those >5 mm in the CADe/CADx arm according to a "resect and discard protocol" advocated by Bustamante-Balen, Taghiakbari, and others for CADe assisted cases.[16,23] CADx is an additional software program that can provide real-time identification of the histology of a polyp.

To estimate cumulative QALYs utility values from previous studies were included to represent the health-related quality of life associated with each health state, ranging from 0 (death) to 1 (perfect health). Values were 0.88 for non-CRC adenoma states, 0.74 for CRC I-II, 0.59 for CRC III, 0.25 for CRC IV, and 0 for death.[16] Adenoma miss rates were set at 32% for standard colonoscopy and 16% for CADe/CADx, also based on previous data, reflecting improved detection sensitivity in the intervention arm.[16,24]

Results

Effectiveness

Between Quarter 1 2021 and Quarter 1 2025, a total of 20 777 colonoscopies were performed and 9248 adenoma were detected across all 3 USPI centers (**Table 1**).

Using 2021 as a baseline, there was a statistically significant increase in ADR for male patients in 2023 (44.4% versus 50.3%, 95% CI 45.3% to 55.9%, *P*=.006) and 2024 (44.4% versus 53.7%, 95% CI 48.4% to 59.5%, *P* <.001) **(Figure 1)**. For female patients there was a statistically significant increase in ADR in 2023 (29.2% versus 40.2%, 95% CI 35% to 46.1%, *P* <.001) which persisted through 2024 (29.2% versus 38.5%, 95% CI 33.5% to 44.2%, *P* <.001) and the first quar-

Table 1. Number of Colonoscopies Performed and Adenoma Detected across all Centers[a] between Quarter 1 of 2021 and Quarter 1 of 2025

Year	Sum of Total Screening Colonoscopies	Sum of Adenoma Detected
2021	4255	1682
2022	5017	2030
2023	5327	2529
2024	5080	2471
2025/Q1	1098	536
TOTAL	20777	9248

[a]Centers include the Endoscopy Institute of Hawai'i, Pacific Endoscopy Center, and Endoscopy Center of Hilo.

ter of 2025 (29.2% versus 42.1%, 95% CI 35.5% to 50.1%, *P* <.001) (**Figure 1**).

The implementation of GI Genius in the first quarter of 2023 resulted in a statistically significant increase in ADR for both male and female patients throughout the duration of this study with the exception of male patients in the first quarter of 2025. The average increase in ADR was 6.97% per year for males and 11.07% per year for females.

Cost-Effectiveness

Between the beginning of Quarter 1 2023 and the end of Quarter 1 2025, a total of 11 507 colonoscopies were performed across all 3 USPI centers (**Table 1**).

According to Sidecar Health, the average global cost of a colonoscopy done at an ASC in Hawai'i is $1105 per colonoscopy.[22] GI Genius is leased to the 3 centers at a cost of $1 000 + tax/room/month, or $5225/month across all 3 centers, for a total cost of approximately $141 075 or $12.26 per colonoscopy performed during this period. Therefore, the addition of GI Genius increased the total cost from $1105 to $1117.26 per colonoscopy during the study period.

Adenoma detection at the initial colonoscopy was higher with CADe/CADx (277.2 total detections per 1000 patients) than standard (224.4). Sensitivity was improved across all sizes: small (141.4 vs. 114.4), medium (119.2 vs. 96.5), and large (16.6 vs. 13.5). Subsequent cycle analysis simulated natural progression without further interventions.

For a hypothetical cohort of 1000 patients eligible for a single colonoscopy, the addition of GI Genius was associated with 277 polypectomies, 136 histopathologies, and detection of 45 CRC cases (**Table 2**). In comparison, standard clinical practice was associated with 224 polypectomies, 224 histopathologies, and detection of 59 CRC cases (**Table 2**). Therefore, the use of GI Genius during colonoscopy resulted in 53 excess polypectomies but avoided 88 histopathology analyses and had 14 fewer cases of CRC (45 vs. 59) due to early-stage detection and removal of pre-cancerous lesions (**Table 2**). This was a 24% decrease in expected CRC rate.

Per-patient lifetime costs were lower with CADe/CADx ($16 512) compared to standard colonoscopy ($23 400), representing a cost savings of $6888. Effectiveness outcomes slightly favored CADe/CADx, with gains of 0.071 QALYs (20.184 vs. 20.113) and 0.065 LYG (22.975 vs. 22.910) per patient. The ICUR (incremental cost-utility ratio) was -$96 880/QALY, and the ICER (incremental cost-effectiveness ratio) was -$106 369/LYG, indicating that CADe/CADx not only reduced costs but also improved health outcomes (**Table 3**).

Discussion

Effectiveness

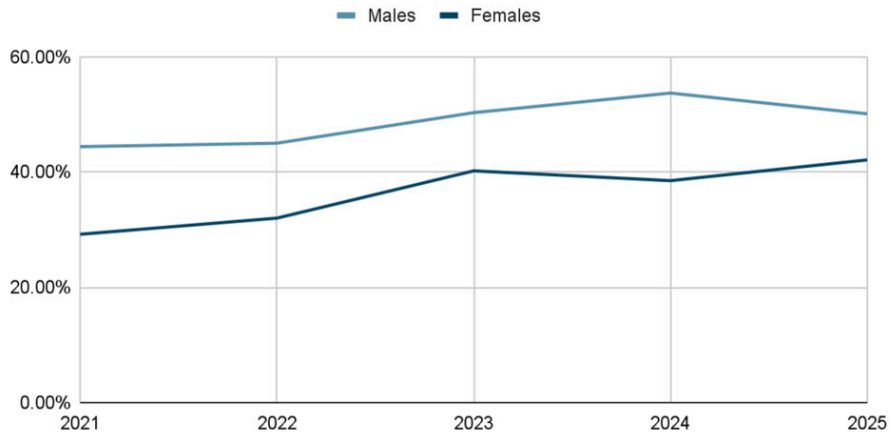
The addition of CADe to colonoscopies performed at several ambulatory surgery centers in Hawai'i resulted in an average increase in ADR of approximately 7% per year for male patients and 11% per year for female patients. This correlates with a decrease in interval CRC rates of 21% for male patients and 33% for female patients.[8] The increase was statistically significant throughout the course of the study with the exception of male ADR in the final quarter, possibly due to a smaller sample size. One study cited by the manufacturer reported increases in ADR of up to 14.4% with the use of CADe.[9,11] However, a recent clinical practice guideline on CADe-assisted colonoscopy the American Gastroenterology Association (AGA) determined that CADe increases ADR by 8% which is similar to the results of this study.[25] The adenoma miss rate was found to be lower with CADe by 19% with an 11% increase in non-neoplastic polyps (higher false positives).[25]

Interestingly, the authors of the AGA summary found that many patients were excited about the possibility of CADe reducing CRC mortality while some providers were apprehensive about the potential increase in procedure time and cost.[26] Therefore, even if CADe is feasible to implement across different facilities, not all providers would be willing to incorporate it into their practices.

Cost-Effectiveness

Previous cost-savings models have shown that reducing CRC incidence in the United States by 15% per year could potentially save up to 150 000 life years and $624 million in health care costs.[26] Cost-analysis studies from Spain, Canada, and Japan, all with nationalized health care systems, have determined that CADe is financially beneficial due to enhanced detection of adenoma and subsequent CRC prevention.[16,27,28] Using a modeling system of health care associated costs in the United States, this study found that in a hypothetical cohort of 1000 patients across the US undergoing colorectal screening the lifetime savings was approximately $7000 per patient when comparing CADe-assisted colonoscopy with colonoscopy alone, largely due to a predicted 24% decrease in CRC rate after the addition of CADe. These findings suggest that integrating CADe/CADx into routine screening at age 45 within the United States could also yield substantial economic as well as clinical benefits nationwide.

The enhancements in ADR and corresponding reductions in interval CRC rates are projected to yield individual gains in life years and QALYs, with modeling studies es-



Sex	Year	Aggregate ADR (95% CI)	Absolute difference	*P*[a,b]
Males	2021	44.4% (39.8%-49.5%)	-	-
	2022	45.0% (40.4%-50.0%)	+0.6%	.79
	2023	50.3% (45.3%-55.9%)	+5.9%	**.006**
	2024	53.7% (48.4%-59.5%)	+9.3%	**<.001**
	2025/Q1	50.1% (43.1%-58.3%)	+5.7%	.10
Females	2021	29.2% (25.3%-33.8%)	-	-
	2022	32.0% (27.8%-36.9%)	+2.8%	.07
	2023	40.2% (35.0%-46.1%)	+11.0%	**<.001**
	2024	38.5% (33.5%-44.2%)	+9.3%	**<.001**
	2025/Q1	42.1% (35.5%-50.1%)	+12.9%	**<.001**

Figure 1. Aggregate Adenoma Detection Rates (ADR) for Male and Female Patients by Year between Quarter 1 of 2021 and Quarter 1 of 2025

[a]Based on a *t*-test
[b]*P*-values in bold indicate statistical significance

Table 2. Disease Progression in a Hypothetical Cohort of 1000 Patients Undergoing Colonoscopy Alone (Standard Practice) versus Colonoscopy with Computer Aided Dection (CADe/CADx)

	Standard Practice	CADe/CADx	Difference
Colonoscopies	1000	1000	-
Polypectomies	224	277	53
Histopathologies	224	136	-88
New Colorectal Cancer Cases	59	45	-14

timating incremental benefits of approximately 0.07 life years and 0.07 QALYs per patient screened. While the individual gains (equivalent to about 26 days for each) may appear modest, they become more meaningful when aggregated across large populations. When applied to 1000 screened individuals, it translates to 70 additional years overall, representing significantly enhanced health, reduced morbidity, and potential cost savings in colorectal cancer management at the societal level.

Downsides of AI

As with any other AI program, there are some concerns about the use of CADe in colonoscopy including higher costs, overreliance on technology, and job displacement. Currently less than half of facilities in the United States, most commonly academic centers, use this software program.[29] The additional monthly costs associated with CADe may be too high for some facilities to absorb. The authors of the cost-effectiveness study from Spain felt that the short-term increase in health care costs associated with CADe

Table 3. Cost-effective Analysis in a Hypothetical Cohort of 1000 Patients Undergoing Colonoscopy Alone (Standard Practice) Versus Colonoscopy with CADe/CADx Using Markov Model

	Standard Practice	CADe/CADx	Difference
Total LYG/QALY	22.91/20.11	22.98/20.18	0.07/0.07
Total costs	$23399.67	$16511.78	-$6887.89
Diagnostic cost	$1105.00	$1117.26	$12.26
Disease management cost	$22294.67	$15394.52	-6900.15
ICER ($/LYG)	-$106369.39/LYG		
ICUR ($/QALY)	-$96879.91/QALY		

LYG=Life Years Gained
QALY=Quality Adjusted Life Years
ICER=Incremental Cost-Effectiveness Ratio
ICUR=Incremental Cost-Utility ratio

would be balanced in the long term by CRC management savings.[16] If cost-effectiveness is demonstrated in additional studies, it is possible that more facilities or insurance companies themselves may be willing to invest in this program.

An additional concern is the higher pathology costs due to detection and removal of non-clinically significant polyps. In an abstract presented at the American College of Gastroenterology Annual Conference in 2024, Herman and her colleagues reported a higher percentage of benign lesions detected by CADe (30.9%) versus standard colonoscopy alone (22.7%), without removal of any precancerous adenoma.[30] To counteract this, some experts have suggested a "resect and discard" or even "leave in situ" strategy for polyps less than 5mm in size detected by CADe, particularly in the rectosigmoid area.[16,24,31,32] This method was used in the hypothetical model, but not in the actual patient cohort.

New fellows in gastroenterology must be able to demonstrate adequate polyp detection and removal before successfully completing a training program. With the advent of CADe, experienced endoscopists may lose their polyp detection skills. This concept is known as "deskilling" and has been seen in recent studies.[33,34] Instead, it may be most beneficial to target those endoscopists with low ADR rates when implementing CADe. In fact, a very recent observational study found that only endoscopists with a baseline ADR of less than 26% will have a lower interval CRC risk when their ADR improves.[35] The authors of this present study chose to blind the individual endoscopists to protect physician privacy.

Finally, some physicians are concerned that advancing AI technology may take away jobs in the health care sector. Both of the CADe scenarios "resect and discard" and "leave in-situ" require fewer specimens to be removed and sent for histopathologic analysis, thus potentially decreasing staffing in ambulatory surgery centers and pathology departments.

Study limitations

Limitations of this study include retrospective analysis of ADR rates, lack of data on adenoma size and histology, estimated values and "resect and discard" strategy used for modeling study, and the need for long-term effects on mortality.

Due to the retrospective design of this study, the ADR rates of endoscopists performing CADe-assisted colonoscopy could not be compared in a head-to-head fashion with those performing colonoscopy without CADe. The same endoscopists performed colonoscopies throughout the 5-year study period, however, which allowed a direct comparison of their ADR rates before and after implementation of GI Genius. In addition, the 2-year follow-up period helped increase the power of the study.

SSLDR, or the percentage of first-time colonoscopies performed by an endoscopist in which at least one sessile serrated adenoma is detected, is another important quality measure.[6] Serrated adenoma are flatter polyps that are usually located in the proximal colon and are often more difficult to identify.[2] A recent study by Seager and others found that the addition of CADe increased the SSLDR by 3.3% with an odds ratio of 1.49.[36] In the summary by AGA, an increase in SSLDR of 1% was reported.[25] The AGA also noted a 2% increase in detection of advanced adenoma for CADe-assisted colonoscopies .[25] Advanced adenoma include polyps >1cm, adenoma with tubulovillous/villous histology, and adenoma with high-grade dysplasia and carry a higher malignant potential.[2]

The modeling study is based only on estimated values including adenoma missed rates and cancer related costs. Furthermore, the "resect and discard" protocol avoided the known costs associated with CADe-assisted detection and analysis of small, non-clinically significant polyps. Future studies are needed to determine if CADe is indeed a cost-savings tool which can help combat the ongoing rise in national health care costs. Finally, the immediate increase in ADR will need to be followed out for a longer period to determine the true impact on CRC rates and subsequent patient mortality.

Conclusion

The implementation of GI Genius in several ambulatory surgery centers in Hawai'i resulted in a statistically significant increase in ADR. Furthermore, the addition of this

software was found to be cost-effective when compared with standard colonoscopy alone. Additional long-term studies are needed to determine if CADe will help decrease CRC associated mortality.

Acknowledgments

The authors would like to thank Jessie Gunter (Quality Manager, USPI Pathology Services), Eric Boon (Market President, USPI), Jeanette Hollander (Research Financial Analyst, Tenet Health care), AnnaLyn Ogata (Regional Vice President, USPI, Hawai'i region), Kammi Jacang (Center Manager, EIH)

Conflict of interest

None of the authors identify any conflict of interest.

Submitted: September 25, 2025 PDT. Accepted: May 25, 2026 PDT. Published: August 03, 2026 PDT.

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Lau S, Novak L. Strengths-Based Approaches in Peer-Led Parenting Groups. *Hawaii J Health Soc Welf*. 2026;85(8):218-220. doi:10.62547/QWEO2278

Strengths-Based Approaches in Peer-Led Parenting Groups

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Keywords: peer-led parenting groups, strengths-based

https://doi.org/10.62547/QWEO2278

Abstract

Social Work in Action is a solicited column from the social work community in Hawai'i. It is edited by HJHSW Contributing Editor Sophia Lau PhD, of the Thompson School of Social Work and Public Health at the University of Hawai'i at Mānoa.

Abbreviations

ACEs = adverse childhood experiences
HOPE = Healthy Outcomes from Positive Experiences framework
PCEs = positive childhood experiences
SF PFF = Strengthening Families Protective Factors Framework

Introduction

Parenting support groups can enhance parents' knowledge base, support active engagement in positive parenting practices, and link families to services and resources that are needed. Some parenting groups are led by a peer. These groups are thus facilitated by a non-professional, in a manner that emphasizes the facilitator is not a parenting expert but rather a peer who maintains shared characteristics or experiences with the group members. Empirical findings have shown the value of peer support including its unique role in promoting health and functioning for children and families. Moreover, when strengths-based frameworks inform programs that aim to improve family functioning and dynamics to prevent child abuse and neglect, an empowering narrative can be attached to the family which can result in more meaningful and effective partnership and outcomes. Peer facilitators are essential in supporting families through their process of change in the real-world context.[1] Although empirical investigations have been undertaken to understand peer facilitators' unique perspectives and experiences, an area that is also worthy of attention is the impact of parenting groups on peer facilitators. Peer-led parenting groups have the potential to impact the peer facilitators in ways that transcend their parent role and influence other social roles they maintain, hence, shaping their interactions in their social environment. An exploratory qualitative study will be conducted in partnership with Family Hui Hawaii, a non-profit organization in Honolulu, Hawai'i to examine the experiences of parent leaders and learn how have they been impacted by parenting groups. At Family Hui Hawai'i, peer-facilitators of parenting groups are referred to as Parent Leaders, and every program and service offered through Family Hui Hawaii is informed by the Strengthening Families Protective Factors Framework (SF PFF) and the Healthy Outcomes from Positive Experiences (HOPE) framework.

Peer-Led Parenting Groups

Parents and other caregivers who provide direct care to children (*parents* hereon) play a powerful role in shaping childhood experiences. They support children's ability to flourish across health dimensions including their physical, psychological, social, and spiritual health.[2] In order for parents to optimize their role, they require support and resources.[2] It is also expected that peer facilitators of parenting groups receive training prior to leading a group, especially if the group is curriculum-informed. The peer facilitator's primary role is to create a safe space where diverse experiences can be shared and help facilitate focused dialogue, information-sharing, and support among group members. Although parenting groups vary in size, interventions focusing on parenting generally have 2 goals: (1) Directly improve the lives and wellbeing of parents; and (2) Indirectly improve the lives, wellbeing, and development of these parents' children.[1] In turn, these benefits can not only improve the wellbeing and functioning within the family system, but also transcend and impact the health of the community as a whole.[2]

Centering Strengths-Based Approaches in Parenting Groups

Hope and resiliency can be revived when strengths-based frameworks inform parenting groups. Strengths-based frameworks underscore the protective qualities of the caretakers and the social environment they help create; as well as emphasize the positive experiences and outcomes among children.[3] This means peer facilitators should be intentional and employ a positive lens when engaging with families, to help identify and strengthen the protective factors that can elevate the family's dynamics and overall wellbeing. When parents feel supported and are able to activate their protective factors, they maintain great capacity in providing their children with positive childhood experiences (PCEs). The SF PFF and HOPE frameworks are research-informed approaches that emphasize the importance of promoting positive childhood experiences and development, which then implies that there must be a focus on parents' experiences.[4]

The Strengthening Families Protective Factors Framework (SF PFF)

The aim of the SF PFF is to increase family strengths to prevent and reduce the likelihood for child abuse and neglect. The 5 research-informed protective factors are: (1) Parental resilience: parent's stress response and ability to manage distress; (2) Social connection: positive relationships within the family as well as in the social environment that offers emotional, informational, tangible, and spiritual support; (3) Knowledge of parenting and child development: understanding child development and parenting strategies that support child development across the physical, cognitive, emotional, and social health domains; (4) Concrete support in times of need; and (5) Social and emotional competence of children: family and children's interaction styles that support children's ability to regulate emotions, communicate effectively, and maintain healthy relationships.[5]

Healthy Outcomes from Positive Experiences Framework (HOPE)

When families' protective factors are strengthened and activated, PCEs can be enriched. When considering the childhood experiences continuum, adverse childhood experiences (ACEs) have been examined extensively and are well-established as detrimental factors that can have long-standing impacts including disease risk factors and reduced quality of life.[6,7] However, solely focusing on ACEs may result in an inaccurate representation of child's experiences; resulting in misinterpretation of child's strengths and opportunities. Researchers have also directed attention to positive childhood experiences which have also been shown to influence brain development and health outcomes across the life span.[6,8] The following 4 research-informed PCEs are understood to be essential and interrelated experiences that highlight the parent and child relationship dynamic: (1) safe and supportive relationships within the family and social environment, (2) safe, equitable, and stable environments where children can live, learn, and play, (3) opportunities for social and civic engagement to develop connection and sense of belonging, and (4) opportunities for emotional growth that can equip them with skillsets to use when confronted with challenges.[4,9] PCEs have been linked to various health and social outcomes including better self-reported adult health and lower risk of mental and physical health conditions,[10,11] and various psychosocial outcomes like lower psychological distress, increased life satisfaction, and more social support.[11]

Next Steps: Community Partnership and Research Activity

The SF PFF and HOPE are research-informed approaches that overlap, and, when serving as the primary frameworks in parenting interventions, can empower families to promote positive outcomes that can enrich the entire family system. Empirical investigations on the experiences and impacts of peer-led parenting interventions have focused on group members' outcomes and less so on the peer facilitators. In general, there is limited understanding of peer facilitators' experiences in their dual roles as group leader and as parents. Parenting groups have potential to impact group members in ways that transcend their parent role and influence other social roles they maintain, hence, shaping their interactions in their social environment. These groups may also have the capacity to do the same for the peer facilitator but perhaps in different ways with respect to their dual role in the group. A study conceptualized by Dr. Sophia Lau and partners at Family Hui Hawai'i, a non-profit organization in Honolulu, Hawai'i will aim to explore the experiences and impacts of Parent Leaders in their role as peer facilitators of a strengths-based and curriculum-informed parenting group. We are humbled to learn from the Parent Leaders' perspectives and experiences which can help inform future practice, training, and research.

Submitted: March 04, 2026 PDT. Accepted: June 11, 2026 PDT.
Published: August 03, 2026 PDT.

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Young N, Matsumoto R. Novel Online Pharmacy Education Addresses Workforce Needs and Expands Access to Learners. *Hawaii J Health Soc Welf*. 2026;85(8):221-224. doi:10.62547/NADU5198

Scripts

Novel Online Pharmacy Education Addresses Workforce Needs and Expands Access to Learners

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Keywords: pharmacy workforce, pharmacist shortage, online education, higher education trends

https://doi.org/10.62547/NADU5198

Abstract

The Daniel K. Inouye College of Pharmacy Scripts is a column by the University of Hawai'i at Hilo Daniel K. Inouye College of Pharmacy (DKICP). It is edited by Nicole Young, PharmD, BCCCP, Associate Professor and Chair of the Department of Pharmacy Practice.

In January 2026, the Daniel K. Inouye College of Pharmacy (DKICP) launched an extended, online PharmD pathway (PharmD-XO) in addition to its existing on-campus program. PharmD-XO spans 5.5 years and is 1 of the 2 extended online Doctor of Pharmacy (PharmD) programs in the US.[1] The mostly asynchronous coursework with once a year in-person immersion weeks for labs and skills training during the first 4.5 years of the program allows more flexibility for students who need to work or have caregiving responsibilities and are not able to move to Hilo. The final year of the PharmD-XO comprises full-time clinical rotations. While there are biases when it comes to online professional education,[2] online programs are prevalent in other professional schools, such as nursing.[3] Additionally, there has been a steady increase in online PharmD programs since the pandemic,[1] and the concept of an extended online PharmD program is responsive to the evolving needs of the profession and trends in higher education.

Higher education trends

Recent trends in higher education include an increase in the proportion of non-traditional adult learners enrolled in college, and a growing preference for hybrid or online classes among students.[4,5] National data shows that over 40% of students are over the age of 22 and are considered time poor with increasing demographics of working adults, parents, and care givers.[4] The elimination of GradPlus loans[6] which have been a major source of financial aid for PharmD students is expected to increase the need for students to work while pursuing their degrees. Moreover, the number of high school graduates is projected to decline by 13% nationally over the next 15 years, with Hawai'i experiencing the largest decline in the nation at 33%.[7] With a current insufficient supply of applicants to fill available seats in pharmacy programs[8] including in Hawai'i, it is anticipated that the enrollment gap will be filled, at least in part, by increased recruitment of non-traditional learners. When taken together, these trends suggest that there are projected to be fewer applicants from the traditional high school graduate demographic, and an increase in the proportion of non-traditional adult learners who must work while pursuing higher education. Designed with adult learners with work and caregiving responsibilities in mind, the PharmD-XO pathway offers a proactive solution to the evolving landscape in higher education.

Pharmacy workforce needs

The demand for pharmacists is projected to increase in the coming years, with an insufficient supply of graduates to meet these needs. The pharmacist profession is projected to grow 5% in the next 10 years nationally, which is higher than the average for all professions, with over 14000 openings each year from 2024-2034.[9] The demand is driven by a combination of factors, including pharmacists leaving the workforce due to retirements and burn out[10] and the greater health care demands associated with the aging demographics in our country.[11]

In contrast to the projected need for pharmacists, the American Association of Colleges of Pharmacy has reported year-to-year decreases in PharmD degrees conferred since 2019, with less than 12 000 graduates in 2024 and about 8000 graduates expected in 2026.[12] The landscape regarding future pharmacist shortages in Hawai'i is particularly concerning because there has been a 71% decrease in applicants to pharmacy school in Hawai'i between 2012 and 2022 and a 44% decrease in PharmD graduates from UH Hilo between 2013-2014 and 2023-2024.[12] By providing a viable pathway to a pharmacy degree for prospective students who are unable to pursue full-time studies in Hilo, the PharmD-XO pathway is expected to expand the number of PharmD students and graduates from the DKICP.

In addition to proactively addressing future workforce needs, the PharmD-XO is also responsive to current workforce stresses. Up to 71% of DKICP students in a PharmD class have worked as pharmacy technicians. Pharmacy technicians work under the supervision of a pharmacist to ensure that essential pharmacy services are provided to patients. Employers, especially on the neighbor islands and other underserved locations, have expressed concerns that it can be difficult to replace these valued employees when they leave to pursue full-time PharmD studies and that they often do not return following graduation. By providing a path to a PharmD degree while continuing to live and work in their communities (often as pharmacy technicians), the likelihood of PharmD-XO students staying in their communities to work as a pharmacist upon graduation is higher by helping to retain and grow talent in communities where they are already embedded and needed.

Access to quality health care

With 90% of Americans living within 5 miles of a pharmacy, pharmacists are among the most accessible health care professionals.[13] Patients visit community pharmacies about 12 times as often as primary care physician offices,[13] with pharmacists strongly embedded as trusted resources in many remote communities, particularly across neighbor islands. With a doctoral level of expertise and clinical training, pharmacists are recognized as critical members of health care teams. With longstanding physician shortages in Hawai'i, especially on the neighbor islands,[14] pharmacists are positioned to help bridge health care access, especially with regard to preventative care (eg, administering immunizations), chronic disease state management (ie, helping patients manage diseases that once diagnosed are treated with medications), and medication therapy management (ie, optimizing the safe and effective use of medications that have been prescribed).

By 2035, it is projected that 1 in 4 people in Hawai'i will be 65 years or older.[15] This underscores the need for a robust pharmacist workforce because as people age, physiological changes can increase susceptibility to disease and the need for more medications.[16] These physiological changes can also modify the responsiveness to medications, making older patients more susceptible to side effects and interactions when multiple drugs are taken together.[16] Therefore, the role of pharmacists for safe and effective medication therapy management becomes particularly important.

Discussion and conclusion

While the PharmD-XO addresses many unmet future needs, areas of concern remain in pursuing pharmacy education in Hawai'i, and the DKICP continues to work toward finding viable solutions for them. Some of these concerns relate to the cost of higher education, the high cost of living and affordable housing in the state, and the scope of pharmacy practice in Hawai'i.

Regarding the high cost of higher education, the PharmD degree at DKICP offers financial advantages over other options. First, the in-state tuition (currently $24 096/year) is lower than the national average (currently $34 000/year)[17] and the fees are much lower than most other schools.[18] This includes the PharmD-XO, which prorates the tuition to equal the cost of the full-time on-campus PharmD program.[19] DKICP's tuition is also under the new borrowing caps for federal financial aid for professional students ($50 000 per year and $200 000 total).[6] This helps the PharmD degree to remain a viable option for individuals interested in pursuing careers in the health professions.

In addition, admissions into the DKICP PharmD program does not require completion of a bachelor's degree. There are pre-requisite requirements for program eligibility,[19] and also an option to earn a bachelor's degree while completing PharmD degree requirements at UH Hilo.[20] This can reduce the time and expenses for completing a bachelor's degree and streamline the path into the PharmD program, especially if resources provided through the Pharmacy Learning and Experiences (PhLEx) program are utilized.[21]

For high achieving high school and undergraduate students, the DKICP has created the Pharmacy Admissions Success Track (PhAST) to guide learners to the pharmacy profession and decrease education costs. This glide path guarantees early admissions to the DKICP PharmD program as long as GPA and other requirements are met and maintained.[22] With the PhAST pathway, select students have the opportunity to obtain a PharmD degree in as little as 6 years after high school graduation.

The high cost of living can be a deterrent to practicing in Hawai'i. The average pharmacist salary in Hawai'i is competitive, but is the lowest in the country when adjusted for cost-of-living.[23] Related to this are concerns about affordable housing which is a documented barrier for meeting workforce needs for other health professions in the state.[24] As a result, many graduates of health professions program in Hawai'i, including pharmacy, choose to practice on the continent. To address this, the state has created incentive programs including loan repayment and preceptor tax credits[25,26] to offset part of the financial burden of practicing in the state. However, additional incentives, some of which may require private partnerships, such as favorable interest rates for home loans for health care professions, are options to consider for the future.

An additional consideration for the profession is the scope of pharmacy practice which varies across the nation, with Hawai'i historically having legislation that lags behind many of our competitor states for pharmacist jobs on the West Coast of the continent. The DKICP has thus been partnering with the Hawai'i Pharmacists Association and Hawai'i Board of Pharmacy to modernize laws in the state that are related to the profession to create a more impactful practice environment for pharmacists.

In summary, the DKICP is working to create solutions that will graduate and retain pharmacists in Hawai'i to meet the workforce needs of the state. The recently launched PharmD-XO pathway offers new opportunities for today's adult learners in a way that expands access by acknowledging their personal and professional responsibilities, providing a financially viable path forward, while also addressing current workforce stresses in the profession, especially on the neighbor islands and other medically underserved areas of the state.

Submitted: March 01, 2026 PDT. Accepted: June 22, 2026 PDT.
Published: August 03, 2026 PDT.

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

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The Hawai‘i Journal of Health & Social Welfare (HJH&SW) partners with organizations, university divisions, and other research units to produce topic-specific issues of the journal known as supplements. Supplements must have educational value, be useful to HJH&SW readers, and contain data not previously published elsewhere. Each supplement must have a sponsor(s) who will work with the HJH&SW staff to coordinate all steps of the process. Please contact the editors at hjhsw@hawaii.edu for more information if you would like to pursue creating a supplement. The following are general guidelines for publication of supplements:

1. Organizations, university divisions, and other research units considering publication of a sponsored supplement should consult with the HJH&SW editorial staff to make certain the educational objectives and value of the supplement are optimized during the planning process.

2. Supplements should treat broad topics in an impartial and unbiased manner. They must have educational value, be useful to HJH&SW readership, and contain data not previously published elsewhere.

3. Supplements must have a sponsor who will act as the guest editor of the supplement. The sponsor will be responsible for every step of the publication process including development of the theme/concept, peer review, editing, preliminary copy editing (ie, proof reading and first round of copy editing), and marketing of the publication. HJH&SW staff will only be involved in layout, final copy editing and reviewing final proofs. It is important that the sponsor is aware of all steps to publication. The sponsor will:

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   c. Establish and oversee a peer review process that ensures the accuracy and validity of the articles.
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   e. Obtain a signed Copyright Transfer Agreement for each article from all authors.
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   g. Work with the editorial staff to create and adhere to a timeline for the publication of the supplement.
   h. Communicate any issues or desired changes to the
   i. HJH&SW staff in a timely manner.

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   - Final date to submit a list of all articles, with working titles and authors
   - Final date for submitting Word documents for copy editing via Scholastica
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   - HJH&SW Style Guide for Native Hawaiian Words and Phrases
   - AMA Manual of Style
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   a. Ensure that each article includes Institutional Review Board (IRB) review and approval, and a statement disclosing any conflicts of interest.
   b. Obtain a Copyright Transfer Agreement signed by all authors for each article.
   c. *Optional*: During this time, the sponsor can solicit advertisements for the supplement to help defray costs forpublication and/or printing. Please reach out to the HJH&SW directly for assistance by emailing hjhsw@hawaii.edu.
5. 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
8. For each article, the sponsor will submit the final Word document and Copyright Transfer Agreement to the HJH&SW via Scholastica. The journal Publications Specialist will send the articles to the copy editor for journal style review. Copy editing 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: 1-2 months
9. The sponsor will review and approve the proofs for each article, which are formatted and sent by the Scholastica Typesetting team. IMPORTANT: Changes or corrections may 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.
   Time frame: 1 month
10. Acting in the role of guest editor, the sponsor will include a column introducing the supplement and send it to the journal Publications Specialist via email to hjhsw@hawaii.edu. The sponsor will also provide the journal Publications Specialist with the order in which the articles should be arranged in the issue in preparation for publication.
    Time Frame: 2 weeks
11. The journal Publications Specialist will provide a finished electronic copy of the supplement to the sponsoring editors, and the sponsor will review the issue and submit any final corrections.
    Time frame: 5 working days
12. The supplement will be published online. 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.

Revised 06/05/2026

Hawai'i Journal of Health & Social Welfare
General Recommendations on Data Presentation and Statistical Reporting (Biostatistical Guideline for HJH&SW)
[Adapted from Annals of Internal Medicine & American Journal of Public Health]

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

Percentages: Report percentages to one decimal place (eg, 26.7%) when sample size is >=200. For smaller samples (<200), do not use decimal places (eg, 27%, not 26.7%), to avoid the appearance of a level of precision that is not present.

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

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

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

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

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

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

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

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

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

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

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

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

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

Descriptive tables: In tables that simply describe characteristics of 2 or more groups (eg, Table 1 of a clinical trial), report averages with standard deviations, not standard errors, when data are nor mally distributed. Report median (minimum, maximum) or median (25th, 75th percentile [interquartile range, or IQR]) when data are not normally distributed.

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

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

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

Hawai‘i Journal of Health & Social Welfare (HJH&SW) Style Guide for the Use of Native Hawaiian Words and Diacritical Markings

The HJH&SW encourages authors to use the appropriate diacritical markings (the ‘okina and the kahakō) for all Hawaiian words. We recommend verifying words with the Hawaiian Language Dictionary (http://www.wehewehe.org/) or with the University of Hawai‘i Hawaiian Language Online (http://www.hawaii.edu/site/info/diacritics.php).

Authors should also note that Hawaiian refers to people of Native Hawaiian descent. People who live in Hawai‘i are referred to as Hawai‘i residents.

Hawaiian words that are not proper nouns (such as keiki and kūpuna) should be written in italics throughout the manuscript, and a definition should be provided in parentheses the first time the word is used in the manuscript.

Examples of Hawaiian words that may appear in the HJH&SW:

‘āina	**Māori**	**O‘ahu**
Hawai‘i	**Lāna‘i**	**‘ohana**
kūpuna	**Mānoa**	**Wai‘anae**

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