ASSOCIATION BETWEEN STRESS AND SOCIAL SUPPORT AMONG YOUNG ADULT PACIFIC ISLANDER SMOKERS
Patchareeya P. Kwan PhD, MPH; James Russell Pike MBA; Danielle Erika Co MPH; Shenazar Esmundo MPH; Dorothy Etimani S. Vaivao; Vanessa Tu’one May; Jane Ka’ala Pang; Melanie Sabado-Liwag PhD, MPH; Nasya S. Tan MPH; Sora Park Tanjasiri DrPH; Bin Xie PhD; Paula H. Palmer PhD

LIMITED ENGLISH PROFICIENCY, POSTOPERATIVE COMPLICATIONS, AND INTERPRETER USE IN VASCULAR SURGERY PATIENTS IN HAWAI‘I
Uliana Kostareva PhD, RN; Katie Pe’a (Varik) RHIT, CPHRM; Chathura Siriwardhana PhD; Min Liu PhD; Kristine Qureshi PhD, RN, CEN, PHNA-BC, FAAN

MEDICAL SCHOOL HOTLINE
Mentoring as a Means to Achieving Workforce Diversification in Orthopaedic Surgery
Makoa Mau BS; Maria B.J. Chun PhD
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Association Between Stress and Social Support Among Young Adult Pacific Islander Smokers

Patchareeya P. Kwan PhD, MPH; James Russell Pike MBA; Danielle Erika Co MPH; Shenazar Esmundo MPH; Dorothy Etimani S. Vaivao; Vanessa Tui‘one May; Jane Ka‘ala Pang; Melanie Sabado-Liwag PhD, MPH; Nasya S. Tan MPH; Sora Park Tanjasiri DrPH; Bin Xie PhD; Paula H. Palmer PhD

Abstract

Recent studies have found high levels of stress among Americans, particularly amongst young adults and ethnic minority groups. The purpose of this secondary data analysis was to explore the association between stress and social support among a sample of 276 young adult smokers of Pacific Islander ancestry, specifically Samoans and Tongans with an average age of 25.3 years. Previous research had documented the protective role of social support on stress, and thus it is hypothesized that young adult Pacific Islander smokers who perceived higher levels of social support will have less perceived stress. Social support was assessed using a 12-item scale which measured participant's perceived social support from family, friends, and significant others. Perceived stress was measured using a 10-item scale with 2 subscales – self-efficacy and helplessness. Standardized parameter estimates from structural equation modeling indicated a statistically significant inverse relationship between perceived social support from family and perceived stress related to helplessness. More specifically, young adult Samoans and Tongans who report higher levels of social support from family do not feel as much stress stemming from being helpless. The results highlight the importance of family social support on stress management among this population. Most importantly, these findings add to the limited research around mental health within Pacific Islander (Samoan and Tongan) communities in the US.

Keywords

stress, social support, family, young adults, Pacific Islanders (PIs)

List of Abbreviations

CFI = Comparative Fit Index
CRCHD = Center to Reduce Cancer Health Disparities
MPACT = Motivating Pasifikas Against Cigarettes and Tobacco
MSPSS = Multidimensional Scale of Perceived Social Support
NCI = National Cancer Institute
PIs = Pacific Islanders
PSS = Perceived Stress Scale
RMSEA = Root Mean Square Error of Approximation
TLI = Ticker-Lewis Index

Introduction

According to the American Psychological Association’s annual Stress in America™ Survey, stress levels among Generation Z adults, those born between the mid-1990s to 2010s, have slightly increased over the past years, many reporting the highest level of stress compared to other adult generations. Stress levels among this age group can be extremely high and it sometimes interferes with their ability to make basic decisions, such as what to eat. Eighty-seven percent of Generation Z adults who attended college indicated that education was a significant cause of stress. The American College Health Association’s Spring 2020 National College Health Assessment found that almost half of students reported more than average levels of stress within the past year and 24.9% reported tremendous levels of stress. Between 2015 and 2020, there was an increase in stress levels from 43.1% to 49.6% among college students. Use and overuse of mobile devices and lack of good coping skills have all been linked to higher stress levels among young adults.

Previous research has shown that some ethnic minorities in the US typically experience more stress than their White counterparts. Reasons for higher stress levels found among ethnic minorities include social isolation and marginality, issues with ethnic identity, acculturation, sociocultural factors such as immigration status, racism, discrimination, and lower socioeconomic status. Left untreated, chronic stress can lead to poor health outcomes as it has been linked to heart disease, diabetes, and mental health disorders such as depression.

Stress is also associated with many unhealthy behaviors such as smoking. Studies focused on theories of addiction have linked stress to smoking initiation, maintenance, and relapse. Individuals with greater perceived stress are more likely to smoke compared to those with less perceived stress. Smoking is used as a coping mechanism for stress related to working environments, racial/ethnic discrimination, and financial and personal problems.

Stress and Social Support

Generally defined as a state of being cared for and assisted by others, social support has been a buffer against life’s many stressors. Social support acts at 2 different time points: first, during the stress appraisal process, which happens immediately after a potentially stressful event; and second, after the event has been appraised as stressful and now requires some form of behavioral and/or physiological response. Social support reduces or minimizes distress during and after disasters while...
being protective against poor mental health resulting from life stressors, such as financial stress and negative life events.\textsuperscript{38,42} Positive influences of social support on other aspects of mental health have also been documented, such as the buffering of anxiety, depression, and irritation,\textsuperscript{43,44} the improvement of psychological and existential quality of life, and the lessening of severe grief among young adults with cancer.\textsuperscript{45} Among smokers, the relationship between stress and social support is inversely related. A study conducted among low-income minorities found that increasing amounts of social support aid in stress reduction during quit attempts led to improved rates of smoking cessation.\textsuperscript{46} In times when coping skills and social support were high, stress did not have a significant effect on smoking behavior among a sample of university students.\textsuperscript{47}

**Pacific Islanders (PIs)**

Broadly speaking, PI culture is collectivist in nature with higher value placed on the family and community rather than the individual.\textsuperscript{48} Like other collectivist groups, PIs depend on their family and friends for social support.\textsuperscript{49} Mutual support is critical in PI communities and extends to both close and extended family members, friends, and others within the community. In the US, PI communities have a shared sense of culture and history with close-knit relationships. PI groups represent less than 1% of the total US population,\textsuperscript{50} estimated to be 1.6 million people from the 2019 US Census.\textsuperscript{51} Among the Polynesian groups, Samoans are the second largest in the US with a population of 204,000 followed by Tongans with approximately 67,000.\textsuperscript{52}

Despite their small population size, PIs have one of the highest gaps in health and mental health disparities with higher rates of smoking, alcohol consumption, and obesity when compared to other ethnic groups, and yet have lower access to health-related prevention and treatment programs.\textsuperscript{53} Data gathered from a random sample of 239 Samoan and Tongan households in California found that smoking rates among these groups were 3-4 times higher compared to the general population of Californians.\textsuperscript{54} Results from the Pacific Islander Health Study found that a higher proportion of Samoan and Tongan adult males smoked compared to the general US adult male population.\textsuperscript{55} A more recent study of PIs in California found that both Samoans and Tongans who are heavy smokers reported higher levels of stress and hostility than moderate and light smokers.\textsuperscript{56} The same study also found that Samoan men who are heavy smokers reported higher depression compared to moderate smokers. National data have shown that PI adolescents have higher occurrences of depressive moods than the general adolescent population, while rates of attempted suicide among PI adolescents were twice the rate of their White counterparts.\textsuperscript{57} Stigma around mental health illness is also high among PIs and it often hinders efforts to seek help,\textsuperscript{58,59} thus exacerbating the problem.

This paper describes the association between perceived stress and perceived social support among young Samoan and Tongan adult smokers living in Southern California. Using secondary data, the researchers examined whether the relationship between stress and social support among young adults is consistent with what is already known among other well-studied groups. Based on existing studies and literature, the authors hypothesized that perceived stress and social support among young adult Samoan and Tongan smokers are inversely related; high levels of perceived social support will be associated with less perceived stress.

**Methods**

**Sample**

This study utilized data from the baseline assessment of 278 PIs enrolled in a randomized controlled trial that tested the effectiveness of a culturally tailored smoking cessation intervention titled Motivating Pasifikas Against Cigarettes and Tobacco or MPACT,\textsuperscript{60} that took place between 2013-2015. Designed specifically for young adult PIs who are ready to quit smoking, MPACT was developed by the Weaving an Islander Network for Cancer Awareness, Research, and Training (WINCART Center), a Community Network Program funded by the National Cancer Institute’s Center to Reduce Cancer Health Disparities (CRCHD). A product of partnerships between community leaders representing Chamorros, Marshallese, Native Hawaiians, Samoans, Tongans, other PIs, and academic researchers in Southern California, MPACT is comprised of an online smoking cessation curriculum, text messaging, web-based social support, and telephone coaching sessions. Recruited mainly from Los Angeles, Orange, and San Diego counties through flyers, word-of-mouth, social media, and face-to-face recruitment at PI festivals and gatherings, individuals were eligible for this trial if they: (1) self-identified as Native Hawaiian or Pacific Islander, (2) were between the ages of 18 and 30 years, (3) lived in Southern California at the time of the study and would be living there for the next year, (4) owned a cell phone with a text messaging plan, (5) had access to a computer with internet for at least 2 hours per week, (6) smoked daily or most days of the week (>3 days), and (7) smoked at least 100 cigarettes in their lifetime. Since the trial focused on young adult current smokers and required routine check-ins by local PI community-based research staff, anyone over the age of 30 who lived outside Southern California was excluded. Assessments of trial participants took place at baseline pre-test, immediate post-test, and follow-up at 3, 6, and 12 months. Trained community-based research staff were on stand-by in case help was needed. Data used for the current study are drawn solely from the baseline pre-test assessments (both control and intervention arms) where participants completed a one-hour web-based survey and were compensated for their time. The research conducted was approved by the Institutional Review Board at the academic partners’ institutions (ClinicalTrials.gov Identifier: NCT03238456; CGU IRB Protocol #: 2030). The trial was voluntary and all participants provided written consent.
Measures

Multidimensional Scale of Perceived Social Support (MSPSS). A 12-item social support scale\(^6,7\) shown to be psychometrically valid in research involving youths\(^6,7\) and South Asian populations\(^9,70\) was employed to assess participants’ perceptions of the social support they receive from friends, family, and significant others. Support was measured by presenting a statement about friends (“My friends really try to help me.”), family (“My family is willing to help me make decisions.”), or a significant other (“There is a special person who is around when I am in need.”) and asking the participant to select a response option ranging from 1 (Strongly Disagree) to 6 (Strongly Agree).

Perceived Stress Scale (PSS). The Perceived Stress Scale is a 10-item scale\(^71,72\) that measures how often someone feels their life is stressful, uncontrollable, or overwhelming. The PSS has been found to be correlated with higher cortisol levels\(^73-75\) and has been used to assess a variety of populations including youths\(^76\) and youth smokers.\(^77\) Additionally, a translated Thai version demonstrated validity and reliability in estimating stress levels on a Thai population.\(^78\) Comprised of 2 subscales,\(^71,76\) the first PSS subscale consists of 6 questions that inquire about perceived self-efficacy (eg, “In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?”). The second subscale asks 4 questions about perceived helplessness (eg, “In the last month, how often have you felt confident about your ability to handle your personal problems?”). The response options for each question range from 0 (Never) to 4 (Very Often).

Analysis

Descriptive analysis was conducted in SAS version 9.4\(^79\) (SAS Institute Inc, Cary, North Carolina). An examination of skew and kurtosis revealed that all item in the MSPSS and the PSS was within recommended guidelines (skew < 3, kurtosis < 10).\(^80\) However, since several items from the MSPSS exhibited some degree of skew (> 2) and kurtosis (> 6), a Huber-White sandwich estimator was employed when calculating standard errors.\(^81\) Based on a priori models described in prior research, a confirmatory factor analysis was performed in Mplus version 8.5\(^82\) to test the psychometric properties of a three-factor measurement model of the MSPSS and a two-factor measurement model of the PSS. Factors within each measurement model were permitted to co-vary. Analysis of the MSPSS subscales of friends (α = .86), family (α = .86), and significant others (α = .83) exhibited good internal consistency. The subscales of perceived self-efficacy (α = .87) and perceived helplessness (α = .81) also demonstrated good internal consistency. Full-information maximum likelihood was employed to account for missing responses,\(^83\) although no item had more than 11.3% of the responses missing. The absolute fit of each measurement model was evaluated using the chi-square goodness of fit statistic and the root mean square error of approximation (RMSEA)\(^84\) with a cut-off for acceptable fit at .06.\(^85\) The relative fit of each model was evaluated using the Tucker-Lewis index (TLI)\(^86\) and the comparative fit index (CFI).\(^87\) After evaluating the measurement models, a structural model was estimated in which the 2 factors from the PSS were regressed on the 3 factors from the MSPSS. Standardized parameter estimates were calculated to examine the relationship between perceived social support and perceived stress among young adult PIs. The initial structural model calculated unadjusted parameter estimates while a subsequent structural model adjusted for ethnicity (0 = Tongan vs 1 = Samoan), sex (0 = male vs 1 = female), and age in years.

Results

A total of 278 participants enrolled in the trial but 2 did not identify as either Samoan or Tongan and were excluded from analysis. The final study sample included 276 participants with approximately two-thirds (65.6%) of whom were Samoan and one-third (34.4%) were Tongan (Table 1). Half of the participants were female. The mean age of the sample was 25.3 (SD = 3.6) years old. The distributions of perceived social support for friends (M = 5.0, SD = 1.0), family (M = 5.1, SD = 1.0), and significant others (M = 5.4, SD = 0.8) had a negative skew. The mean and distribution of perceived stress self-efficacy (M = 1.7, SD = 0.8) and helplessness (M = 1.9, SD = 0.8) are also reported in Table 1.

The fit of the 3-factor MSPSS (ie, perceived social support from friends, family, and significant other) was adequate, \(\chi^2\) (df = 51) = 95.813, \(P < .001\), TLI = .911, CFI = .931, RMSEA = .058, 90% CI [.040-.076]. The standardized factor loadings ranged from .68 to .86 (all \(P < .001\)) (Figure 1). The covariance between the 3 factors ranged from .49 to .51 (all \(P < .001\)). The fit of the 2-factor PSS (ie, perceived stress related to self-efficacy and helplessness) was also acceptable, \(\chi^2\) (df = 34) = 67.042, \(P < .001\), TLI = .935, CFI = .951, RMSEA = .061, 90% CI [.039-.083]. Standardized factor loadings varied from .61 to .79 (all \(P < .001\)) (Figure 2). The covariance between perceived self-efficacy and perceived helplessness was not statistically significant.

The fit of the structural model was acceptable, \(\chi^2\) (df = 199) = 314.168, \(P < .001\), TLI = .923, CFI = .933, RMSEA = .047, 90% CI [.037-.057]. Standardized parameter estimates (Table 2) indicated a statistically significant inverse relationship between perceived social support from family and perceived stress related to helplessness in unadjusted (\(\beta = -.38\), SE = .08, \(P < .001\)) and adjusted (\(\beta = -.37\), SE = .08, \(P < .001\)) models. All other regression paths in the structural models were not statistically significant, including the covariates of ethnicity, gender, and age.
Table 1. Demographic Characteristics of Young Tongan and Samoan Adult Smokers (n=276) Enrolled in Motivating Pasifikas Against Cigarettes and Tobacco (MPACT)

<table>
<thead>
<tr>
<th>Ethnicity, n (%)</th>
<th></th>
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<tbody>
<tr>
<td>Samoan</td>
<td>181 (65.6%)</td>
</tr>
<tr>
<td>Tongan</td>
<td>95  (34.4%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender, n (%)</th>
<th></th>
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<tbody>
<tr>
<td>Female</td>
<td>138 (50.0%)</td>
</tr>
<tr>
<td>Male</td>
<td>138 (50.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age, years mean (SD)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.3 (3.6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived Social Support Scale, mean (SD)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends</td>
<td>5.0 (1.0)</td>
</tr>
<tr>
<td>Family</td>
<td>5.1 (1.0)</td>
</tr>
<tr>
<td>Significant Other</td>
<td>5.4 (0.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived Stress Scale, mean (SD)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>1.7 (0.8)</td>
</tr>
<tr>
<td>Helplessness</td>
<td>1.9 (0.8)</td>
</tr>
</tbody>
</table>

* The Multidimensional Scale of Perceived Social Support


Table 2. Unadjusted and Adjusted Estimates for Perceived Social Support by Perceived Stress Among Young Tongan and Samoan Adult Smokers (n=276) Enrolled in Motivating Pasifikas Against Cigarettes and Tobacco (MPACT)

<table>
<thead>
<tr>
<th>Perceived Stress: Helplessness</th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>P</td>
<td>β</td>
</tr>
<tr>
<td>Perceived Social Support from Friends</td>
<td>-0.15</td>
<td>0.10</td>
<td>.12</td>
<td>-0.12</td>
</tr>
<tr>
<td>Perceived Social Support from Family</td>
<td>-0.38</td>
<td>0.08</td>
<td>&lt;.001</td>
<td>-0.37</td>
</tr>
<tr>
<td>Perceived Social Support from a Significant Other</td>
<td>0.10</td>
<td>0.07</td>
<td>.21</td>
<td>0.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived Stress: Self-Efficacy</th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>P</td>
<td>β</td>
</tr>
<tr>
<td>Perceived Social Support from Friends</td>
<td>0.01</td>
<td>0.11</td>
<td>.91</td>
<td>0.02</td>
</tr>
<tr>
<td>Perceived Social Support from Family</td>
<td>-0.06</td>
<td>0.09</td>
<td>.54</td>
<td>-0.03</td>
</tr>
<tr>
<td>Perceived Social Support from a Significant Other</td>
<td>-0.14</td>
<td>0.10</td>
<td>.16</td>
<td>-0.16</td>
</tr>
</tbody>
</table>

* Adjusted for ethnicity, gender, and age. P-values calculated from univariate z-tests.
Figure 1. Three Factor Analysis Measurement Model for Perceived Social Support (MSPSS) Among Young Tongan and Samoan Adult Smokers (n=276) Enrolled in Motivating Pasifikas Against Cigarettes and Tobacco (MPACT)


*P < .05  **P < .01  ***P < .001

Figure 2. Two Factor Analysis Measurement Model for Perceived Stress (PSS) Among Young Tongan and Samoan Adult Smokers (n=276) Enrolled in Motivating Pasifikas Against Cigarettes and Tobacco (MPACT)


*P < .05  **P < .01  ***P < .001
**Discussion**

This study found that feeling supported by family members was associated with lower stress levels among young adult Samoan or Tongan smokers, particularly for stress related to feeling helpless. The results suggest that young adult Samoan or Tongan smokers who perceive greater levels of social support from their family do not feel as stressed or as helpless when tackling unexpected challenges or managing the stress they experience in everyday life. The finding is consistent with existing literature, which has identified social support as a defense against stress.38,39 Many studies have documented the critical role of family social support in diverse areas such as aging,88,89 job satisfaction,90 cancer care and treatment,91,92 and emotional and behavioral problems among adolescents.93 Adolescents who reported low family social support had an increased likelihood of psychological distress compared to those who reported higher family social support.94 Depressive symptoms were also seen among adolescents reporting lower levels of social support from family and friends.94 Most relevant to the current study is the role of family social support among smokers. As previously described, the relationship between stress and social support among smokers is inversely related.46,47,95 Social support not only reduces stress among smokers, but it has been documented to aid quit attempts and successful smoking cessation,96,97 a key point particularly among young adult smokers.

These findings highlight the importance of family support in mental health management, particularly among Samoan or Tongans. Their cultural collectivism emphasizes connections to others, and places high value on social context and the preservation of relationships.98 Hence, stress and coping in cultural collectivists’ view are strongly tied to family and family-based social support.99,100 Family is a critical component of stress management among young adults as it functions to support the individual and buffers the various forms of stress. PIs are likely to utilize support from family and religion/spirituality to cope with distressing events in their lives.98 Most importantly, this study’s findings add to the limited research on mental health and PI population. Although large mental health disparity gaps have been identified among this ethnic group, PIs are still understudied and their mental health needs often go undocumented due to reasons such as underutilization, lack of access to mental health services, and general mental health stigma within the community hindering documentation of needs.59 Although recent research has established mental health as an important priority area among PIs,58,59 more work needs to be done in this area.

**Limitations**

There are several limitations to the findings presented. First, this study’s sample of current smokers may have higher levels of stress than their non-smoking counterparts and thus results are only generalizable to young adult Samoan or Tongan smokers from California. Second, the measurement models of social support and perceived stress and the structural model examining the relationship between these constructs had adequate but not exceptional model fit, suggesting that there may be aspects of each construct that were not captured by the current models. Still, prior validation papers that examined these constructs reported similar levels of model fit95,78 and, while the fit indices are less than ideal, they are comparable to the unmodified models reported in previous studies. Third, because the assessments were conducted through web-based surveys, selection bias could be a limitation because only participants who had access to a computer or were computer literate could join the study. The research team provided participants with access to laptop computers at the community partners’ offices so they can complete the survey if needed but not all potential participants wanted to complete the surveys at the community partners’ sites due to lack of transportation, time, and overall inconvenience. Lastly, the sample in this study were inclusive to Samoans and Tongans living in Southern California whom may not be representative of Samoans and Tongans living elsewhere nor are they representative of the multiple ethnic groups that comprised the larger PI community. Although PI groups have similar cultures and experiences, they do differ greatly and one group may not be representative of another.

**Implications**

Findings from this study help to inform mental health professionals, researchers, and others working with PIs about the relationship between stress and social support. The significance of family social support on stress among PIs is important to highlight as it may be a key factor in stress prevention and management among this population. Existing evidence suggests that mindfulness-based stress reduction101-103 and meditation104 strategies have been effective at managing stress among healthy individuals, thus integration of a strong family component to these strategies may further enhance their effects.

**Conflict of Interest**

None of the authors identify a conflict of interest.
Acknowledgement

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Limited English Proficiency, Postoperative Complications, and Interpreter Use in Vascular Surgery Patients in Hawai‘i

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Abstract

A retrospective cohort analysis of inpatient and outpatient vascular surgery cases from 2014 to 2018 was conducted to analyze the relationship between limited English proficiency (LEP) and undesirable postoperative outcomes, and to evaluate interpreter use as part of culturally and linguistically appropriate services (CLAS). Propensity score matching and logistic regression models were used to examine the association of English proficiency with postoperative outcomes and chart review was done to examine CLAS provision. Of the 959 cases, 57 (6%) were LEP and had noticeably worse health status before surgery than non-LEP. The 57 cases include 51 patients who had a single vascular surgery and 3 patients who had 2 vascular surgeries (different medical encounter/visit). There was no statistically significant difference in postoperative outcomes between patients with LEP and without LEP. Males with LEP were significantly less likely than females to receive CLAS (P = .008). On the day of vascular surgery and/or the day informed surgical consent was obtained, 16% of patients with LEP received access to interpreters; 25% had no documentation about interpreter provision, and 59% had mixed language access (family, staff, or interpreter). The provision of interpreters might be influenced by providers’ perceived ability to communicate with patients with LEP without an interpreter, ease of obtaining an interpreter, availability of family or ad-hoc interpreters, and patients’ preferences. Future research should examine reasons for frequent use of untrained individuals and inform strategies to implement language services in line with national standards.

Keywords

health literacy, health disparities, language barrier, surgery, health communication, quality of care, interpreters, cultural competency

Abbreviations

CLAS = culturally and linguistically appropriate services
CPR = cardiopulmonary resuscitation
CVA = Cerebrovascular Accident
DHHS = US Department of Health and Human Services
EMR = electronic medical record
GI = gastrointestinal
LEP = limited English proficiency
NSQIP = National Surgical Quality Improvement Program
SIRS = systemic inflammatory response syndrome
SSI = surgical site infection
UTI = urinary tract infection

Introduction

The state of Hawai‘i has the fourth-highest share of residents with limited English proficiency (LEP) in the nation. In 2019, almost a quarter of Hawai‘i’s population was foreign-born, primarily from Asia (77%) and Oceania (12%), and 12% self-reported speaking English less than “very well.” As a result, health care providers in Hawai‘i care for diverse populations speaking more than 20 languages, and frequently encounter patients with LEP.

LEP is associated with lower personal health literacy. Personal health literacy is defined as the “ability to find, understand, and use information and services to inform health-related decisions and actions.” It is influenced by organizational health literacy which is the degree to which health organizations enable personal health literacy. Researchers have found associations between lower personal health literacy and worse health among Native Hawaiians, Pacific Islanders, and Asians as well as persons with LEP and worse health status among Pacific Islanders and Asians. Low health literacy and LEP are co-occurring barriers to effective care, contribute to lower medical comprehension, and can influence health outcomes.

Per the US Department of Health and Human Services (DHHS), culturally and linguistically appropriate services (CLAS) are necessary to advance health equity, improve health care quality and patient satisfaction, respond to demographic changes, meet accreditation standards, and decrease liability. Provision of CLAS through language assistance via qualified interpreters is critical to patient safety and effective communication between clinicians and individuals with LEP. While DHHS requires that a covered entity take the necessary steps to ensure effective communication through the use of qualified interpreters, many patients with LEP do not receive interpreter services, receive them inconsistently, or are assisted by ad-hoc interpreters (staff whose linguistic skills have not been assessed) and family members, including minors. Prior research shows the use of qualified interpreters, rather than family members, is associated with more effective communication, increased patient satisfaction, improved quality of care, and better health outcomes. Compared to ad-hoc or no interpreters, professional and trained medical interpreters provide better quality interpretation with a similar length of dialogue but fewer interpretation errors of potential clinical consequence. Qualified interpreters also help to establish a clear line of communication, rapport, and trust between patient and provider.

National and international studies on care for patients with LEP have been documented in the literature. Multiple studies
identified performance gaps in language assistance programs and focused on the impact of interpreters in primary care rather than a hospital setting. A review by Al Shamsi and colleagues focused on articles that examined implications of language barrier on access to care, communication, and satisfaction found that while interpreter services can improve satisfaction with care, they can also increase costs and length of interactions. The authors suggested translation applications as a potential cost and time-saving measure. Several investigators explored the relationship between qualified interpreter use and surgical outcomes. Four recent studies examined the provision of interpreter services for patients with LEP who received surgical care; 3 were from the US and 1 from Australia. Three of these studies focused on orthopedic surgery and 1 was an assessment of the process surgeons use for obtaining informed consent from patients with LEP and considered CLAS standards. Semere et al looked at caregivers of Chinese- and Spanish-speaking patients and found that caregivers often had LEP themselves and experienced notable caregiving-related stress. Greene et al examined access to qualified interpreters at orthopedic surgeons’ offices for Spanish speakers and found that 80% were asked to bring a friend or a family member to interpret for them. Xue et al examined post-discharge surveillance of surgical outcomes among LEP patients in Australia and found the use of ad-hoc interpreters to be an acceptable alternative to qualified interpreters, but this was specifically for completing self-reported follow-up post-arthroplasty surveys. Patel et al surveyed surgeons about consenting LEP patients and found multiple suboptimal practices such as the use of ad-hoc (untrained staff) interpreters, family (including minors), and the surgeons’ own non-fluent language skills when obtaining informed consent.

Understanding communication dynamics between vascular surgery patients with LEP and their clinical providers is of utmost importance for identifying potential disparities in health care and informing CLAS, including the role of family members. To address the paucity of research on the relationship between LEP and postoperative vascular surgery outcomes and evaluate the provision of CLAS, this study investigated 3 questions: (1) Is there a significant difference in postoperative vascular surgery outcomes between patients with LEP and those without LEP? (2) Do vascular surgery patients with LEP receive interpreter services per policy during vascular encounters, specifically to obtain informed consent? (3) Who interprets during these visits?

Methods

This study examined the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) inpatient and outpatient vascular surgery cases performed between 2014 and 2018 (n=959) at a large medical facility on O’ahu, Hawai’i. The retrospective cohort analysis included a chart review of data from electronic medical records (EMR) in EPIC, version 2020 (Epic Systems Corporation, Verona, WI). Each EPIC record was matched with each NSQIP vascular surgery case and included demographic (eg, race/ethnicity, sex, age, primary language) and clinical characteristics (eg, operative procedure, occurrence of undesirable surgical events). The study was approved by the Institutional Review Board at the University of Hawai’i at Mānoa CHS number 24348 that ceded to the facility’s Institutional Review Board study number 2018-134.

Statistical Analyses

There were 26 possible undesirable NSQIP postoperative outcomes within 30 days after vascular surgery procedure (Appendix, Table 1). These were condensed into 11 categories: surgical site infection (SSI) minor, SSI serious, embolic, pulmonary, renal, cardiovascular, urinary tract infection (UTI), gastrointestinal (GI), transfusion, serious medical, and very serious medical outcomes. Health status modifiers present at the time of surgery were removed from the analysis. For the statistical analysis, each event of interest was used as a binary variable per each patient, such as “1 – event observed”, and “0 – not observed.” Propensity score matching was performed based on multiple health-related confounders to obtain matched sets for minimizing confounder effects on the marginal group comparison (Appendix, Figure 1).

Patient variables were descriptively summarized using means and standard deviations for continuous variables and proportions for categorical variables. Two-sample t tests and Fisher’s exact tests were applied for examining associations among patient characteristics and the LEP category (ie, patients with LEP vs. patients without LEP) on continuous and categorical outcomes, respectively. The association of the LEP category on the binary outcomes of interest was initially examined using logistic regression. To balance covariate distributions between the 2 groups, the 1:1 nearest propensity score matched LEP and non-LEP patients was used for the primary analysis of the study. For the propensity score matched pairs, the LEP grouping association with outcomes was examined using the Generalized Estimating Equations based logistic regression, utilizing a compound symmetric correlation structure to account for the paring effect. A 2-sided P value < .05 was considered as the criteria for statistical significance for all hypothesis tests. Contingency tables were used to examine differences between LEP cases. Analyses were performed using R software, version 3.51 (R Foundation for Statistical Computing, Vienna, Austria), SPSS, version 26 (IBM Corp, Armonk, NY), and Excel, version 16 (Microsoft Corporation, Redmond, VA).

Interpreter Use

The facility’s policy refers to requirements by DHHS for reasonable accommodation via language access services to ensure effective means of communication for patients, family members, and visitors who have LEP. The policy defines effective communication as the successful joint establishment of
meaning wherein patients and health care providers exchange information enabling patients to participate actively in their care (eg, interpreters, translators). The policy also recognizes that patients with LEP maintain the right to request a friend or family to interpret; however, the EMR record should include documentation that a qualified interpreter was offered and the patient declined interpreter services. In such instances, the facility’s policy recommends the use of “shadow interpreters” also referred to as “stand-by interpreters.” In stand-by interpreting, an interpreter silently observes, listening in to the conversation to verify that the information is accurately and completely interpreted and communicated. If an omission or inaccuracy is identified in the interpretation, the qualified interpreter would intervene to correct the inaccuracy, then step out of the interpretation encounter and continue to observe.

The interpreters at the facility are provided free of charge to the patient as follows: (1) professional medical interpreters available in-person, via phone, or online video conferencing through third-party vendors for all languages; (2) 2 dedicated employed (in-house) professional medical interpreters (Mon-Fri 8 AM – 5 PM) for the Japanese language; and, (3) bilingual staff whose primary job is not to interpret, but whose linguistic and comprehension skills have been assessed via an independent medical interpreter exam and reassessed every 2 years. In this study, both professional medical interpreters and staff who passed the medical interpreter exam were considered qualified interpreters.

The LEP status of vascular patients was confirmed by 2 steps. First, the EMR was reviewed for answers to standardized questions asked in the clinical setting: “What language do you speak at home?” (asked by non-clinical staff; eg, registrar or nurse). Patients who answered either question with a language other than English were classified as LEP. Second, a retrospective EMR chart review of each LEP case was conducted. Two authors discussed each case for LEP status and the provision of CLAS until concordance was reached. An additional reviewer was available for consultation when a disagreement could not be resolved.

To determine the type of interpreter, notes from the date(s) of the vascular procedure(s) and/or the date(s) when the vascular procedure consent form(s) were obtained. Although notes related to interpretation were reviewed across several touchpoints of the vascular encounter (eg, consultation, procedure preparation, post-surgical recovery), the focus of the study was around informed consent interaction(s) because it is considered a critical care conversation and the EMR should include note(s) about the use of qualified interpreter or documented declination of interpreter services. Interpreter use was categorized in alignment with the National Language Access Plan and CLAS Standards as follows: (1) No interpreter, meaning that no EMR notes indicated that an interpreter was provided; (2) Mixed interpreters, meaning that interpretation was provided by more than 1 person, such as family, staff, and/or a qualified interpreter; and (3) CLAS-provided, meaning that the visit was either attended only by a qualified interpreter, or attendance by a qualified interpreter was offered to the patient and the patient’s declination was documented per the facility’s policy requirements. Notes pertaining to the use of family members as interpreters were also reviewed.

### Results

Of the 959 total patients, 57 (6%) were confirmed to have LEP via 2-step EMR review (Table 1). Patients with LEP and those without LEP were of similar age and had similar proportions of females to males (Table 2). However, patients with LEP were significantly more likely to have insulin-dependent diabetes, hypertension, sepsis, an open wound, be on dialysis, and be partially or totally dependent in their functional health status.

![Table 1. Limited English Proficiency (LEP) Case Identification](image)

<table>
<thead>
<tr>
<th>Language Identification Method</th>
<th>Identified By</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>What language do you speak at home? (patient demographics)</td>
<td>Non-clinical staff and asked only once when EMR is first created</td>
<td>73 LEP (72 in the system and 1 case identified though random screen)</td>
</tr>
<tr>
<td>In what language would you like to receive health care information? (patient intake flowsheet)</td>
<td>Clinical staff and asked at every encounter (ie, emergency department, same day surgery, hospital admission)</td>
<td>41 LEP</td>
</tr>
<tr>
<td>Manual chart review of patient notes relevant to English language proficiency</td>
<td>Research team</td>
<td>57 confirmed LEP</td>
</tr>
</tbody>
</table>

Initial analysis without propensity score matching indicated that patients with LEP faced significantly increased risks for embolic (OR = 3.45, 95% CI 1.13-10.49) and cardiovascular (OR = 3.64, 95% CI 1.19-11.15) event categories (Table 3). However, analysis with propensity score matching showed no significant difference in postoperative vascular outcomes between patients with LEP and those without LEP for any adverse outcome.

During the retrospective EMR chart review to examine CLAS, the sample size changed from 57 to 56 because in 1 case the patient with LEP became incapacitated during the encounter. A sub-analysis was performed with contingency tables of patients with LEP between those who received and did not receive CLAS.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-LEP (n = 887)</th>
<th>LEP (n = 57)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean (Standard Deviation)</td>
<td>67.5 (13.6)</td>
<td>70.1 (11.8)</td>
<td>.11</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40.1</td>
<td>45.6</td>
<td>.41</td>
</tr>
<tr>
<td>Male</td>
<td>59.9</td>
<td>54.4</td>
<td></td>
</tr>
<tr>
<td>Patient status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>64.8</td>
<td>77.2</td>
<td>.06</td>
</tr>
<tr>
<td>Outpatient</td>
<td>35.2</td>
<td>22.8</td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>69.2</td>
<td>42.1</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Yes: Non-Insulin</td>
<td>15</td>
<td>28.1</td>
<td></td>
</tr>
<tr>
<td>Yes: Insulin</td>
<td>15.8</td>
<td>29.8</td>
<td></td>
</tr>
<tr>
<td>Current smoker (within the past 1 year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18.7</td>
<td>10.5</td>
<td>0.15</td>
</tr>
<tr>
<td>Dyspnea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>94.8</td>
<td>96.5</td>
<td>&gt; .99</td>
</tr>
<tr>
<td>Independent</td>
<td>4.4</td>
<td>3.5</td>
<td>&gt; .99</td>
</tr>
<tr>
<td>Moderate Exertion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>94.8</td>
<td>96.5</td>
<td>&gt; .99</td>
</tr>
<tr>
<td>Independent</td>
<td>4.4</td>
<td>3.5</td>
<td>&gt; .99</td>
</tr>
<tr>
<td>Functional health status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partially Dependent</td>
<td>11.5</td>
<td>22.8</td>
<td>.003</td>
</tr>
<tr>
<td>Totally Dependent</td>
<td>0.8</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>0.5</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Ventilator dependent</td>
<td>Yes</td>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>History of severe Chronic Obstructive Pulmonary Disease</td>
<td>Yes</td>
<td>6.7</td>
<td>5.3</td>
</tr>
<tr>
<td>Ascites within 30 days prior to surgery</td>
<td>Yes</td>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>Congestive heart failure within 30 days prior to surgery</td>
<td>Yes</td>
<td>2.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Hypertension requiring medication</td>
<td>Yes</td>
<td>67.8</td>
<td>87.7</td>
</tr>
<tr>
<td>Acute renal failure</td>
<td>Yes</td>
<td>2.3</td>
<td>7</td>
</tr>
<tr>
<td>Currently requiring or on dialysis</td>
<td>Yes</td>
<td>8.9</td>
<td>24.6</td>
</tr>
<tr>
<td>Disseminated cancer</td>
<td>Yes</td>
<td>0.3</td>
<td>0</td>
</tr>
<tr>
<td>Steroid immunosuppressant use for chronic condition</td>
<td>Yes</td>
<td>3.6</td>
<td>1.8</td>
</tr>
<tr>
<td>Loss of body weight in the 6 months prior to surgery</td>
<td>Yes</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Bleeding disorder</td>
<td>Yes</td>
<td>24.5</td>
<td>28.1</td>
</tr>
<tr>
<td>Preoperative Red Blood Cells transfusion within 72 hours prior to surgery start time</td>
<td>Yes</td>
<td>2.3</td>
<td>7</td>
</tr>
<tr>
<td>Sepsis in 48 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>93.1</td>
<td>82.5</td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>2.1</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Septic shock</td>
<td>0.7</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>SIRS</td>
<td>4.1</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Emergency case</td>
<td>Yes</td>
<td>7.3</td>
<td>10.5</td>
</tr>
<tr>
<td>Open wound with or without infection</td>
<td>Yes</td>
<td>21.8</td>
<td>38.6</td>
</tr>
<tr>
<td>Wound classification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean</td>
<td>89.8</td>
<td>77.2</td>
<td>.02</td>
</tr>
<tr>
<td>Clean/Contaminated</td>
<td>1.2</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Contaminated</td>
<td>0.7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Dirty/Infected</td>
<td>8.2</td>
<td>21.1</td>
<td></td>
</tr>
</tbody>
</table>

Variables are summarized using percentages (%), unless specified. Total percent may not add up to 100% exactly due to rounding. P values reported correspond to the group differences. LEP (limited English proficiency). SIRS (Systemic Inflammatory Response Syndrome).
Males were significantly less likely than females to receive CLAS (χ² = 7.11, df = 1, P = .008) (Table 4). There was no significant difference between surgical outcomes among patients who received CLAS compliant standard of service and those who did not (χ² = 1.01, df = 1, P = .32).

The top 3 languages spoken by patients with LEP were Ilocano (26%), Marshallese (16%), and Chuukese (12%) (Table 5). A quarter (25%) of patients with LEP had no notes in the EMR that documented interpreter support, 59% received mixed support, which included family, non-qualified staff, and/or qualified interpreters, and 16% received CLAS, meaning either a qualified interpreter attended the visit or there was documentation that a qualified interpreter was offered and declined. Among 9 patients with LEP who received CLAS, 2 (1 Chuukese, 1 Marshallese) were offered interpreters multiple times but declined interpreter services and in most cases chose to use family member(s) instead. During the entire vascular episode, including touchpoints outside of informed consent, two-thirds (68%) of vascular patients had family involved with interpreting. Japanese was the most frequent language spoken among patients with LEP who received CLAS (44%), followed by Marshallese (22%), Chuukese (22%), and Ilocano (11%). The majority of surgical and associated anesthesia consents were complete, but a few (4%) did not have consent form scanned into the EMR (consent missing) or were incomplete (9%) due to missing dates and/or signatures. Notably, 11% of consents were signed by a surrogate (family member) when not indicated (the patient with LEP had decisional capacity and did not require a surrogate).

<table>
<thead>
<tr>
<th>Table 3. Estimated Odds-Ratios for Observing Postoperative Complications and Patients with and without Limited English Proficiency (LEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Postoperative Events Categories</strong></td>
</tr>
<tr>
<td><strong>Unmatched Comparisons</strong></td>
</tr>
<tr>
<td>SSI Minor (Superficial incisional SSI)</td>
</tr>
<tr>
<td>SSI Serious (Deep incisional, organ space, wound disruption)</td>
</tr>
<tr>
<td>Embolic (Postoperative pulmonary embolism, vein thrombosis requiring therapy, cerebrovascular accident)</td>
</tr>
<tr>
<td>Pulmonary (Pneumonia, unplanned intubation)</td>
</tr>
<tr>
<td>Renal (Progressive renal insufficiency, acute renal failure)</td>
</tr>
<tr>
<td>Cardiovascular (Cardiac arrest requiring CPR, myocardial infarction)</td>
</tr>
<tr>
<td>UTI*</td>
</tr>
<tr>
<td>GI Category (Clostridioides difficile)</td>
</tr>
<tr>
<td>Transfusion (Transfusion intraoperative, postoperative, 72 hours of surgery start time)</td>
</tr>
<tr>
<td>Serious Medical (Septic shock)</td>
</tr>
<tr>
<td>Very Serious Medical (Postoperative death within 30 days of procedure)</td>
</tr>
</tbody>
</table>

Log-Odds-Ratio > 0 shows that LEP had higher odds of observing the event, compared to non-LEP. SSI (Surgical Site Infection). CPR (Cardiopulmonary Resuscitation). UTI (Urinary Tract Infection). * Postoperative UTI category was removed because it did not have sufficient events to make a reliable estimation.

<table>
<thead>
<tr>
<th>Table 4. Crosstabulation of CLAS Provision by Surgical Complications and Sex among patients with Limited English Proficiency (LEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surgical Complications</strong></td>
</tr>
<tr>
<td><strong>Provided</strong></td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
</tr>
<tr>
<td><strong>Provided</strong></td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
</tr>
</tbody>
</table>

CLAS (Culturally and Linguistically Appropriate Services). * In the analysis of interpreter use (CLAS), the sample size was changed from 57 to 56 because in one case the patient became incapacitated during the encounter. ** Asymptotic Significance (2-sided).
Table 5. Summary of Languages, Interpreter Use (CLAS), and Consent Documentation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percent (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language (n = 57)</strong></td>
<td></td>
</tr>
<tr>
<td>Ilocano (Filipino language)</td>
<td>26 (15)</td>
</tr>
<tr>
<td>Marshallese (Micronesian language)</td>
<td>16 (9)</td>
</tr>
<tr>
<td>Chuukese/Trukese (Micronesian language)</td>
<td>12 (7)</td>
</tr>
<tr>
<td>Japanese</td>
<td>11 (6)</td>
</tr>
<tr>
<td>Korean</td>
<td>7.0 (4)</td>
</tr>
<tr>
<td>Cantonese (Chinese language)</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Mandarin (Chinese language)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Chamorro (Guam and Mariana Islands in Micronesia)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Samoan (Polynesian language)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Tagalog (Filipino language)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Spanish</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Ulithian (Micronesian language)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Visayan (Filipino language)</td>
<td>2 (1)</td>
</tr>
<tr>
<td><strong>Type of Interpreter Used on the Day of Procedure and/or During Informed Consent (n = 56)</strong></td>
<td></td>
</tr>
<tr>
<td>No interpreter</td>
<td>25 (14)</td>
</tr>
<tr>
<td>Mixed (one family member (n = 10), several family members (n = 14), staff &amp; family (n = 3), interpreter &amp; family (n = 5), interpreter &amp; non-qualified staff (n = 1))</td>
<td>59 (33)</td>
</tr>
<tr>
<td>Qualified interpreter used/offered &amp; policy requirements met = CLAS-provided</td>
<td>16 (9)</td>
</tr>
<tr>
<td><strong>Family Involvement with Interpreting During Vascular Encounter (n = 56)</strong></td>
<td></td>
</tr>
<tr>
<td>Family not involved in interpreting</td>
<td>32 (18)</td>
</tr>
<tr>
<td>Family involved in interpreting</td>
<td>68 (38)</td>
</tr>
<tr>
<td><strong>CLAS-provided by Language (n = 9)</strong></td>
<td></td>
</tr>
<tr>
<td>Japanese</td>
<td>44 (4)</td>
</tr>
<tr>
<td>Marshallese</td>
<td>22 (2)</td>
</tr>
<tr>
<td>Chuukese</td>
<td>22 (2)</td>
</tr>
<tr>
<td>Ilocano</td>
<td>11 (1)</td>
</tr>
<tr>
<td><strong>Vascular-related Consent Documentation (n = 57)</strong></td>
<td></td>
</tr>
<tr>
<td>Complete</td>
<td>68 (39)</td>
</tr>
<tr>
<td>Signed not by a patient while patient had decisional capacity</td>
<td>19 (11)</td>
</tr>
<tr>
<td>Missing dates and/or signatures</td>
<td>9 (5)</td>
</tr>
<tr>
<td>Not on file</td>
<td>4 (2)</td>
</tr>
</tbody>
</table>

Total percent may not add up to 100% exactly due to rounding. CLAS (Culturally and Linguistically Appropriate Services).

* In the analysis of interpreter use (CLAS), the sample size was changed from 57 to 56 because in one case the patient became incapacitated during the encounter.
Discussion

This exploratory study analyzed the relationship between LEP and undesirable postoperative vascular surgery outcomes and evaluated the provision of CLAS at a large medical facility in Hawai‘i. The initial analysis indicated significantly increased risks for embolic and cardiovascular event categories for patients with LEP. The follow-up analysis addressed the high heterogeneity of vascular cases via propensity score matching and found no significant differences in postoperative outcomes. Within the LEP group, there was a significant difference by sex with males being less likely to receive CLAS than females.

The retrospective EMR chart review enabled identification of patients’ language needs and examination of various types of interpreters that were used. Ilocano was the most prevalent language among patients with LEP but only 1 out of 15 had documented CLAS provision. This finding should be viewed in light of Hawai‘i’s nursing workforce which includes a substantial number of people of Filipino background, some of whom speak Ilocano and/or Tagalog. In comparison, 2 out of 4 patients with LEP who spoke Japanese received CLAS, a language for which there were in-house interpreters available.

A concerning finding was that a quarter of patients with LEP had no notes in the EMR that documented interpreter support on the day of surgery and/or for informed consent, and that only 16% received CLAS. Inconsistent EMR documentation of language barriers and language needs could have contributed to suboptimal CLAS provision. Although regulatory obligations discourage the use of family and friends (especially minors, or those whose English proficiency has not been assessed) as medical interpreters, almost two-thirds of patients in this study with LEP had EMR note(s) indicating that family member(s) were involved with interpretation during a vascular encounter. Furthermore, several consents were signed by a surrogate instead of a patient with LEP when not indicated. Notes indicating that the English language proficiency of family or ad-hoc interpreters was assessed prior to using them as interpreters were not found.

Frequent involvement of family members as interpreters might be partially explained by Hawai‘i demographics. Hawai‘i residents speak many languages, some of which are rare and for which it may be difficult to obtain qualified interpreters, and represent cultures that place more emphasis on the involvement of family in their medical care. A local study that explored perspectives of Chuukese patients and their health providers found that both preferred the in-person mode of interpretation and most often used family members as interpreters; thus, challenging national standards that promote professional medical interpreters. Research shows that in addition to cultural factors, an interpreters’ sex, the majority of whom are female, may contribute to less CLAS provision among male patients. Overall, the use of interpreters was highly variable and not in alignment with the national CLAS standards.

This study illuminated the difficult balance between family involvement in medical decision-making, cultural preferences and beliefs of patients, and policy. As reported in prior research, this study also found that it was not the facility’s policy but rather the circumstances of the encounter and clinicians’ perceived ability to communicate with LEP patients that appeared to guide their choice to request an interpreter. There could have been a lack of awareness or understanding of the facility’s policy and national guidelines among staff leading to the selection of more convenient or patient preferred sources for interpretation. It is possible that some patients may not have been aware of their right to request a qualified interpreter. Additionally, providers may not have been aware of the stand-by interpreter option, which could have been employed to verify the accuracy and completeness of communicated information in case patient with LEP insisted to use a family member as an interpreter.

Based on the findings, EMRs should have clear documentation of language needs, and the language access services policy should be strengthened. There is a need for sustained clinician training and support with interpreter services, especially for such critical conversations as obtaining consent for procedures. The health literacy of all patients, including those with LEP, should be considered in all medical encounters to facilitate effective communication since providers tend to overestimate patients’ health literacy. Clinicians should also consider the complexity of the US health care system and the difficulties Hawai‘i’s foreign-born and people with LEP may experience while trying to make health-related decisions and navigate the health care system. Hawai‘i’s health care facilities may benefit from encouraging training and assessing the linguistic and comprehension skills of their diverse multilingual staff via an independent medical interpreter exam to ensure they are qualified to interpret. It is also important to meet regulatory obligations to provide language services without disrupting or delaying care, and to consider potential issues associated with care quality as well as autonomy, accuracy, and confidentiality of communication when a friend or family member is used for interpreting.

The findings of this study should be interpreted considering their limitations. The vascular surgery population was heterogeneous and generally complex. The sample size for LEP patients was small, which reduced the statistical power of detecting small-scale effects between the LEP and non-LEP groups and limited the conclusions that could be drawn. Propensity score matching method strictly assumes the validity of the propensity score methodology. There could have been other imbalanced covariates that were not identified. The EMR may have included erroneous entries and may not have captured all patient data. Patients’ overall burden from multiple chronic conditions and social determinants of health were not accounted for. The length of stay, survival of cases, patient satisfaction (availability was limited and the survey was only in English), or 30-day readmission rates were not included in this analysis of postoperative outcomes.
Finally, the interpreter-use categorization was based on the available EMR documentation and definition articulated in the National Language Access Plan and CLAS Standards to assure health equity by promoting effective communication via linguistic services. 17,18 These define CLAS compliance in 2 ways: (1) patient with LEP received interpreter services or (2) interpretation services were offered but declined. 19 Thus, both patients with LEP who received interpreters and those who declined them were included in the CLAS-provided category. The EMR documentation of language barriers and language needs appeared to depend on the staff’s perception and circumstances of interaction with a patient with LEP.

Future research should examine the health care experiences of patients, interpreters, and providers to understand reasons for the frequent use of untrained individuals and develop strategies to implement language services in line with national standards, potentially with the use of stand-by interpreters. Also, future research should consider a comparison between patients who received qualified interpreter support to those who declined it or had only family help with interpreting and the role of cultural factors. It could also include larger sample size and variables such as satisfaction with care and the cost of care (e.g., 30-day readmission rates, type of health insurance). The next steps should focus on ways to turn observations into interventions that can improve patient-provider communication with patients with LEP.

Conclusion

Effective communication is essential for safe, high quality, and equitable health care. Considering many people with LEP live in Hawai‘i and represent diverse cultures and unique languages, CLAS is needed to advance health equity, respond to demographic changes and health literacy needs of individuals, and to provide better care. This exploratory study found a need for more accurate EMR documentation of language barriers and language needs and more consistent provision of CLAS via language services for patients with LEP. Given the high variability in interpreter use, the study highlighted the need to further explore the application of national standards and interpreter guidelines as they are being challenged by patients’ preference to use family members instead of professional medical interpreters. One potential solution could include the use of shadow interpreters or stand-by interpreters. More efforts should be taken to provide trainings for health providers about language services and meaningful communication with patients with LEP. Given the high variability in interpreter use, the study highlighted the need to further explore the application of national standards and interpreter guidelines as they are being challenged by patients’ preference to use family members instead of professional medical interpreters. One potential solution could include the use of shadow interpreters or stand-by interpreters. More efforts should be taken to provide trainings for health providers about language services and meaningful communication with patients with LEP. Furthermore, all staff who may have impact on patient communications could benefit from language access and cultural competency trainings. Bilingual community health workers knowledgeable about Hawai‘i’s immigrant/migrant diasporas could also disseminate health knowledge. The findings of this study would be useful for health care providers, those who study immigrant health, and stakeholders involved in CLAS policy development and implementation.

To help increase awareness of the importance of the provision of interpreters, when to provide them, and required EMR documentation, a one-page decision-tree flowsheet was created by the authors to use as a visual aid for clinicians and other allied health care workers (Appendix, Figure 2).

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Appendix

Table 1. Undesirable National Surgical Quality Improvement Program (NSQIP) Postoperative Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial Incisional SSI</td>
<td>Superficial Incisional SSI is an infection that involves only skin or subcutaneous tissue of the surgical incision.</td>
</tr>
<tr>
<td>Deep Incisional SSI</td>
<td>Deep Incisional SSI is an infection, which involves deep soft tissues. Deep soft tissues are typically any tissue beneath skin and immediate subcutaneous fat, for example fascial and muscle layers.</td>
</tr>
<tr>
<td>Organ/Space SSI</td>
<td>Organ/Space SSI is an infection that involves any part of the anatomy (eg, organs or spaces), other than the incision, which was opened or manipulated during the primary procedure.</td>
</tr>
<tr>
<td>Wound Disruption</td>
<td>The spontaneous reopening of a previously surgically closed wound.</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Pneumonia is an infection of one or both lungs caused by bacteria, viruses, fungi, or aspiration of gastric content or saliva.</td>
</tr>
<tr>
<td>Unplanned Intubation</td>
<td>The placement of an endotracheal tube or other similar breathing tube [Laryngeal Mask Airway (LMA), nasotracheal tube, etc.] and ventilator support.</td>
</tr>
<tr>
<td>Pulmonary Embolism</td>
<td>Lodging of a blood clot in the pulmonary artery with subsequent obstruction of blood supply to the lung tissue.</td>
</tr>
<tr>
<td>On Ventilator &gt; 48 Hours</td>
<td>Total cumulative time of ventilator-assisted respirations exceeding 48 hours.</td>
</tr>
<tr>
<td>Progressive Renal Insufficiency/Acute Renal Failure</td>
<td>Progressive Renal Insufficiency: the reduced capacity of the kidney(s) to perform its function in comparison to the preoperative state. Acute Renal Failure Requiring Dialysis: A clinical condition associated with significant decline of kidney function in comparison to the preoperative state.</td>
</tr>
<tr>
<td>Urinary Tract Infection</td>
<td>An infection in the urinary tract (kidneys, ureters, bladder, and urethra).</td>
</tr>
<tr>
<td>Stroke/ (CVA)</td>
<td>An interruption or severe reduction of blood supply to the brain resulting in severe dysfunction.</td>
</tr>
<tr>
<td>Cardiac Arrest Requiring CPR</td>
<td>The absence of cardiac rhythm or presence of a cardiac rhythm requiring the initiation of cardiopulmonary resuscitation.</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>Reduction of blood flow to the heart causing damage or death to part of the heart muscle.</td>
</tr>
<tr>
<td>Blood Transfusion</td>
<td>Transfusion of red blood cells, whole blood, autologous blood, and cell-saver products.</td>
</tr>
<tr>
<td>Vein Thrombosis Requiring Therapy</td>
<td>New diagnosis of blood clot or thrombus within the venous system (superficial or deep), which may be coupled with inflammation and requires treatment.</td>
</tr>
<tr>
<td>Clostridium Difficile (C. diff)</td>
<td>C. diff. colitis is diarrhea of varying severity, from mild to fulminant and life-threatening.</td>
</tr>
<tr>
<td>Sepsis</td>
<td>Sepsis takes a variety of forms and spans from relatively mild physiologic abnormalities to septic shock.</td>
</tr>
<tr>
<td>Septic Shock</td>
<td>Septic shock is more severe than sepsis as it is associated with organ and/or circulatory dysfunction.</td>
</tr>
</tbody>
</table>

SSI (Surgical Site Infection). CVA (Cerebrovascular Accident).

Appendix, Figure 1. A Boxplot of Propensity Scores Distributed Between 2 Groups (limited English proficient (LEP) vs non-LEP)
Appendix, Figure 2. Flowsheet Describing Interpreter Use and Complex/Interactive Medical Communications
**Medical School Hotline**

**Mentoring as a Means to Achieving Workforce Diversification in Orthopaedic Surgery**

Makoa Mau BS; Maria B.J. Chun PhD

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.

**Abstract**

Orthopaedic surgery is no stranger to health care disparities and the American Academy of Orthopaedic Surgeons (AAOS) has expressed a commitment to a culturally competent and diverse workforce. Addressing workforce diversification is critical to recruiting a more diverse orthopaedic workforce and engaging the community to improve patient care and ensure equitable care for all. Unfortunately, these concerns were acknowledged by the AAOS almost 2 decades ago, without much significant progress. This article discusses mentoring as a means to address workforce diversification in orthopaedics and provides recommendations on how orthopaedics can enhance its efforts.

**Keywords**

mentoring, workforce diversity, orthopaedic surgery

Health care disparities in orthopaedic surgery are well-documented. Racial and ethnic minority groups demonstrate lower rates of total joint arthroplasty, greater complications after joint replacement, higher rates of readmission after surgery, and increased morbidity and mortality following hip fracture as compared to Whites. Reasons for these disparities are multifactorial, making the path toward eliminating them difficult. In addition to the cultural contexts of the patients they care for, orthopaedic surgeons themselves are not diverse; in the United States (US) approximately 92% of orthopaedists are males and 85% are White. Studies indicate that patients are more likely to be satisfied with their care if they are cared for by a physician of the same race/ethnicity. This creates a difficult scenario, as health care disparities in orthopaedic surgery may increase if action is not taken to encourage more culturally-tailored care, and to increase the diversity of the orthopaedic workforce. The specialty has acknowledged these concerns almost 2 decades ago, but not much progress has been made since. The purpose of this article is to provide a personal perspective from a Native Hawaiian third year medical student at the John A. Burns School of Medicine (JABSOM) on possible actions that can be taken to enhance diversity in orthopaedics through mentoring. Previous attempts at improving cultural competency and diversification within orthopaedics is also described.

Early attempts at addressing orthopaedic health care disparities focused on providing culturally competent communication methods and responses to various scenarios. In 2001, the American Academy of Orthopaedic Surgeons (AAOS) Communication Skills Mentoring Program began providing communication skills workshops and cultural competency resources developed by the AAOS Diversity Board, such as the Cultural Competency Challenge CD-ROM and Culturally Competent Care Guidebook. In 2004, at the AAOS Annual Meeting, the Diversity Advisory Board challenged participants to assess their ability to provide culturally competent care with hypothetical case scenarios. As a result, the Cultural Competency Challenge CD-ROM was developed in 2005, and includes 18 hypothetical interactions and questions with Latino/Hispanic, Asian, Arab, Muslim, African American, Native American, and female patients. Shortly after, the Culturally Competent Care Guidebook was developed in 2007 as a resource that provided tips on handling culturally sensitive scenarios with Hispanic/Latino, African American, Asian American, and Native American patients, and sex- and faith-based issues.

In addition to cultural competency training, recent attempts at minimizing health care disparities have focused on the diversification of the orthopaedic workforce. The creation of the AAOS Diversity Advisory Board and the AAOS mentoring initiative “The Changing Face of Orthopedics” were made to enhance culturally competent care among practitioners and to provide information that guides those underrepresented in medicine (URM) to pursue an orthopaedic surgery residency. However, since the creation of these programs in the early 2000s, the diversity within orthopaedics has not changed, while the diversity within other specialties has increased. The orthopaedic workforce continues to be composed of only 6.7% Asian American, 2.2% Hispanic, 1.9% African American, and 0.4% Native American surgeons. Female orthopaedists have increased by 1.7% over a 10 year span, up to 5.8% in 2018, but are still clearly underrepresented. Furthermore, a recent study found that the number of URM orthopaedic residents has decreased over time from 9.3% (287 out of 3,074) in 2002 to
5.9% (215 out of 3,621) in 2016. In response, orthopaedists in collaboration with academic institutions and industry are creating intensive mentoring programs. The Nth Dimensions program, founded by a group of African American orthopaedic surgeons in 2004, is reportedly the most successful pipeline program in the US for women and minorities, producing 275 scholarly presentations and publications between 2017-2020, and boasting a 92% match rate into orthopaedics. The program, a 501(c)(3) nonprofit organization, seeks to address and eliminate healthcare inequities by providing a 3 phase research and mentorship opportunity for competitive rising second year medical students. The Phase 1 programs promote student growth through interactive workshops with orthopaedic surgeons who reflect the diversity of the students’ race/ethnicity and/or gender, learning about orthopaedic practices with actual orthopaedic equipment provided by industry. Phase 2 is comprised of a summer internship program, where students join mentors in clinic and in research, culminating with a presentation at the National Medical Association annual meeting. Students are chosen for the 8-week summer internship via the Association of American Medical Colleges’ Holistic Review Framework, which includes an interview with the entire leadership team and participants from other large orthopaedic organizations, such as the AAOS. Each candidate is evaluated on attributes, such as grit and resilience, academic metrics, and experiences such as socioeconomic status and cultural barriers overcome. When chosen, students are matched with a long-term mentor who oversees their research project and immerses them in clinical experiences. Lastly, the Phase 3 program focuses on continuing mentoring and professional development. This program is open to students who are interested in orthopaedics, but may not have completed the Phase 2 program. This allows Nth Dimensions to reach a wide array of scholars, and helps them with mentoring for personal statement reviews, subinternship selections, and interviewing skills. The impressive achievements of Nth Dimensions demonstrates that a successful mentoring program is possible and could greatly improve the diversity of the specialty.

Lack of mentorship is one of the greatest barriers for URM students. Many minority students miss out on the hidden curriculum (ie, norms and values of the medical profession not formally taught) needed to excel in medical school and match into residency. As a Native Hawaiian, first-generation medical student, much of my mentoring experiences have come from personal requests made towards willing surgeons, orthopaedic residents, and senior medical students. JABSOM, like many medical schools, does not have a formal orthopaedic mentoring program. Instead, students are provided with a list of possible research opportunities across all specialties. This resulted in frequent cold-calling with little response. This has been the only way a URM without previous ties to orthopaedics or medicine in general can gain experience. In my efforts to contact orthopaedic mentors, I have been fortunate to receive a few responses. Once they become third year students, JABSOM students are given the opportunity to contact career advisors in their specialty of choice. This career advisor helps navigate subinternships and residency applications in addition to mentoring. However, like many other surgical subspecialties, there is only 1 orthopaedic career advisor available at JABSOM. This can be improved by increasing availability to career advisors. Career advisors should be formally introduced to all students as early as possible, creating long-term relationships and exposure to the specialty. Hopefully, the long-term relationship stimulates positive affirmation and lowers the frequency of “imposter syndrome.” Furthermore, more career advisors should be recruited. Career advisors or mentors may be incentivized, as financial resources could be allocated to support and protect time for advisors/mentors to routinely meet with students. Furthermore, career advisors do not need to be based in Hawai‘i, as the use of virtual meetings has been shown to be an adequate form of communication. The “success” of these mentors should be documented and they should be publicly acknowledged for their efforts furthering the next generation of surgeons. Involvement with formal career advising or mentoring may be recognized by roles, titles, and credit. Alternatively, if more career advisors cannot be identified, increased opportunities for students to be exposed to orthopaedics should be available, such as invitations to Grand Rounds or academic conferences. Due to the lack of a formal mentoring program in orthopaedics, finding a mentorship experience in Hawai‘i is difficult and relies heavily on student efforts to make the connection.

Additional mentoring programs are needed for URM in orthopaedic surgery. Opportunities like the Nth Dimensions program are few, dispersed along the East Coast, and extremely competitive. This makes it difficult for most URM outside that area to find similar opportunities. In Hawai‘i there are a few mentorship programs specifically for Native Hawaiian students. For Native Hawaiian medical and pre-medical students, the ‘Ahahu o Nā Kauka, Association of Native Hawaiian Physicians created the Pū Pa‘akai Native Hawaiian Tiered Mentoring program to match Native Hawaiian medical and pre-medical students with a Native Hawaiian mentor in their desired career field. This program provided me with an opportunity to shadow a Native Hawaiian orthopaedic surgeon for the first time. Observing someone similar to my ethnic identity has further inspired me to continue pursuing orthopaedics. However, this program is not actively advertised and is limited to Native Hawaiian students, so it does not impact other URM. More programs are needed so that the workforce continues to diversify.

A targeted solution would be to promote intensive, highly successful orthopaedic internship opportunities for URM, such as Nth Dimensions, and encourage the creation of more programs nationwide, including in Hawai‘i. Recently, the Weill Cornell Medicine/New York Presbyterian Hospital Network, NY developed a 4-tier pipeline program for prospective surgeons. This cascading mentorship program increases surgical exposure to URM beginning in high school, and subsequently provides increasingly relevant resources and exposure to students pro-
gressing through undergraduate college and medical school. The program ends as residency members are inducted in a national society membership, ensuring that mentorship among all levels of medical training is accomplished. The aforementioned programs can provide a framework for mentorship and diversification of the orthopaedic field. JABSOM, a community-based medical school, has the seeds to enhance relationships with the community through existing efforts in the primary care specialties. This should be expanded to orthopaedic surgery, which would help address workforce diversity.

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   d. Ensure that all articles adhere to the guidelines set forth in journal’s Instructions to Authors page, especially the instructions for manuscript preparation and the statistical guidelines.
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   h. Communicate any issues or desired changes to the 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
   - Final date for submitting Word documents for layout
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7. Supplement issues are posted on the HJH&SW website (http://www.hawaiijournalhealth.org) as a full-text PDF (both of the whole supplement as well as each article). An announcement of its availability will be made via a press release and through the HJH&SW email distribution list. Full-text versions of the articles will also be available on PubMed Central.

8. It is the responsibility of the sponsor to manage all editorial, marketing, sales, and distribution functions. If you need assistance, please contact the journal production editor. We may be able to help for an additional fee.

9. The editorial board reserves the right of final review and approval of all supplement contents. The HJH&SW will maintain the copyright of all journal contents.

Sample Workflow and Timeline for a Supplement

1. The sponsor contacts the HJH&SW editors (hjhsw@hawaii.edu) to discuss the supplement topic, estimated timeline, length and cost. HJH&SW staff will review the journal requirements for articles and share our review process with the sponsor. **Time frame: 2 weeks**

2. The sponsor will complete the draft contract and pay a non-refundable deposit of $2500 or half the contract value. **Time frame: 3 days**

3. The sponsor will solicit articles for the supplement. **Time frame: 3-6 months**

   Articles must comply with:
   - **Instructions for Manuscript Preparation and Submission of Research Articles**
   - **Instructions for Manuscript Preparation and Submission of Columns**
   - **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](http://www.hawaiijournalhealth.org).

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.

   **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.

Revised 2/6/20
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HHM manages 9 health trackers to help your community monitor progress in specific topic areas.

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- **Cancer Plan 2030**
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- **Oral Health Tracker**
  Examines community and individual indicators of oral health across the lifespan.

- **Tobacco Prevention & Control 2030**
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HawaiiHealthMatters.org
Does it matter who owns my malpractice insurance company?

Yes.

As a reciprocal exchange, MIEC is entirely owned by the policyholders we protect. With no external shareholders to satisfy, this ownership model allows us to return profits to whom they rightfully belong—MIEC policyholders. We do not inflate our surplus or tie up profits in nonguaranteed deferred retirement plans, we give it back. Over the last 45 years we have put more than $446 million back in the pockets of our policyholders. To learn more about the benefits of being an MIEC policyholder, or to apply, visit miec.com or call 800.227.4527.