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A LETTER FROM THE EXECUTIVE LEADERSHIP COMMITTEE

July 1, 2019

Dear Readers,

We are excited to inform you of the expanded mission of the Hawai‘i Journal of Medicine & Public Health, which is reflected in our new name, The Hawai‘i Journal of Health & Social Welfare. The journal continues to be indexed by MedLine/PubMed and is freely available online through our website: http://hawaiijournalhealth.org/.

Why this change? In 2018, the Hawai‘i State Department of Health and the University of Hawai‘i (UH) expanded the number of partners providing financial backing for the journal. The lead academic partners now include the six units of the UH College of Health Sciences and Social Welfare, including the John A. Burns School of Medicine, UH Public Health, the Myron B. Thompson School of Social Work, the School of Nursing and Dental Hygiene, the UH Cancer Center, and the Daniel K. Inouye College of Pharmacy. Other partners are the Hawai‘i State Department of Health, University Health Partners of Hawai‘i, and the UH Office of the Vice Chancellor for Research.

To reflect our newly-broadened support base, we are changing the name of the journal, as well as the scope of articles that we publish. With this, our July issue, we are proud to reveal our new name: The Hawai‘i Journal of Health & Social Welfare. Our aim is to advance knowledge about health and social welfare, with a focus on the diverse peoples and unique environments of Hawai‘i and the Pacific region. Regular features of the journal include peer-reviewed research articles, columns reporting on partner-engaged endeavors, and journal watch, which highlights articles from Hawai‘i-based researchers published in other journals.

The journal continues to be edited by Dr. Kalani Brady, managed by Karen Rowan, and produced by Drake Chinen. Associate editors, contributing editors, and column writers (all volunteers) come from the Hawai‘i State Department of Health and UH. We look forward to continuing to serve our readership by offering research articles, case reports, and editorial columns that give unique insights into the health and welfare of the people of Hawai‘i and the Pacific region.

Mahalo for your continued support of our journal,

Hawai‘i Journal of Health & Social Welfare Executive Leadership Committee

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Exploration of Patients’ Spiritual/Religious Beliefs and Resuscitation Decisions

Elizabeth Freitas PhD and Guangxiang Zhang PhD

Abstract

Artificial resuscitation has potential to reverse a premature death or to prolong the dying process. The resuscitation decision is one of life and death making it imperative that healthcare providers understand patients’ beliefs. Making the decision to resuscitate has been associated with patients’ spiritual/religious beliefs. Clinicians’ assumptions based upon a patients’ religion or spiritual beliefs may bias the resuscitation decision. The purpose of this study was to determine associations between hospitalized patients’ spiritual/religious beliefs and their resuscitation decisions. A single-site, correlational study was conducted with a convenience sample of hospitalized patients in Honolulu, HI. Patients were enrolled November 2015 to January 2016. Spiritual/religious beliefs were assessed using two validated metrics. Two questions were used to determine the resuscitation decision (chest compressions and intubation). The sample of 84 patients represented no ethnic majority among Caucasian, Asian, and Native Hawaiian/Pacific Islander. Seventy-nine percent of the participants identified theistic spiritual beliefs. No associations were found between resuscitation decisions with either spiritual/religious beliefs or demographic characteristics of this study sample. Interestingly, 20% of the participants answered yes to only one of the resuscitation decision questions. Thus, providers’ assumptions should not be made about an association between spiritual/religious beliefs and resuscitation decisions. It is imperative that patients are aware of the necessity for both medical interventions of chest compressions and intubation. Further research should address the complexity of the resuscitation decision, including patients understanding of medical interventions and anticipated prognosis, and other influencing factors.

Keywords

spiritual beliefs, religious beliefs, end of life, resuscitation

Abbreviations

BVS = Beliefs and Values Scale
DNAR = Do not attempt resuscitation
MoCA = Montreal Cognitive Assessment
SB&RDQ = Spiritual beliefs and resuscitation decision questionnaire
SIBS-R = Spiritual Involvement and Beliefs Scale-Revised
QMC = The Queen’s Medical Center-Punchbowl

Introduction

Individuals in their last year of life utilize approximately one-quarter of Medicare spending, a proportion that has remained virtually unchanged since the late 1970s. It is imperative to discuss and make difficult end-of-life decisions, particularly in cases where either the patient’s quality of life is compromised or the cost of care of aggressive life-supportive treatment is a financial burden. The end-of-life decision is complex as it involves patients, their families, the health care provider’s knowledge, and the medical treatment options available.

Patients’ end-of-life decisions are influenced by many factors including age, emotions, quality of life, medical diagnosis/co-morbidities and knowledge about and burden of treatment, religious beliefs, and cultural values and practices including collectivist decision making.

Today’s healthcare environment requires holistic care that incorporates patient spiritual/religious beliefs. Holistic care is critical in the context of assisting patients in making resuscitation decisions. The resuscitation decision is the desire for medical interventions in attempt to be retrieved from death or near death. Hospitalized patients are asked upon admission, if they would want artificial life support: an attempt to restart their heart or to provide breathing tube and a ventilator. Consequences of the resuscitation decision make it imperative that healthcare providers have an understanding of patients’ beliefs and how those beliefs are associated with resuscitation decisions. There is limited research regarding the relationship between spiritual/religious beliefs and resuscitation decisions. Literature demonstrates that spiritual/religious beliefs have numerous definitions. For this study, spirituality was defined as personal beliefs that may give meaning to life and bring faith, hope, peace, and empowerment. Spiritual/religious beliefs as defined by King and Koenig are “An assent or conviction about a domain or existence that goes beyond the material world. This includes all manner of religious or other beliefs that are not based upon materialism.” There is limited research regarding the relationship between spiritual/religious beliefs and resuscitation decisions. Without this information, healthcare professionals lack a guide as they endeavor to try to incorporate patients’ spiritual/religious beliefs into resuscitation decisions and may rely on their personal bias as how to approach this discussion. Further research is essential to explore and better understand the associations between patients’ spiritual/religious beliefs and resuscitation decisions. The purpose of this study was to examine the associations between spiritual/religious beliefs and resuscitation decisions in hospitalized patients.

Methods

A correlational study was conducted with a convenience sample of hospitalized patients at The Queen’s Medical Center-Punchbowl (QMC), Honolulu, Hawai‘i. The institution is a private, nonprofit, acute tertiary care facility with 505 acute and 28 sub-acute licensed beds.
Measures. Spiritual Beliefs and Resuscitation Decision Questionnaire (SB&RDQ).25

This questionnaire was comprised of three sections. The first section was the demographics and current health status, which were self-reported (Table 1). The second section was the spiritual/religious beliefs assessment consisting of two assessment scales: the Spiritual Involvement and Beliefs Scale-Revised (SIBS-R) and the Beliefs and Values Scale (BVS). SIBS-R26 is a second generation, 22-item, seven-point Likert-type scale assessment with a Cronbach’s α of .92, that was developed to measure spiritual actions and beliefs across religious traditions. SIBS-R responses range from 1 (strongly disagree) to 7 (strongly agree), except the final item, which asks participants their spirituality on a 7-point scale (with “7” being the most spiritual). The scale’s scoring range is 22-154, with a higher score reflecting a strongly spiritual individual. The BVS27 is a Likert-type assessment scale to measure cognitive, behavioral, and affective expressions. This scale was developed to measure spirituality for use in clinical research. BVS consists of 20 items with response options ranging from 0 (strongly disagree) to 4 (strongly agree). The scale’s total scoring range is 0-80, with a higher score reflecting “stronger spiritual beliefs” and a Cronbach’s α of .94. Prior research of the BVS, demonstrated mean scores of the BVS varied significantly among several demographic characteristics, including religious belief.27 The third section was the resuscitation decision which requested the patient to check-mark yes/no to two questions developed by the researcher:

• If your heart were to stop would you want someone to try to restart it?
• If you were to stop breathing would you want a breathing tube and machine?

Patients who responded “yes” to either of the resuscitation decision questions were categorized as a “yes” or Full Code; otherwise, they were considered Do Not Attempt Resuscitation (DNAR). Because the patients were hospitalized and their code status was already documented on admission to the hospital, no additional information was documented regarding the definition or descriptions of the resuscitation decision. The researcher did compare the patients’ code status documented in the computer and the one manually collected during the research. If there was a discrepancy the medical team was notified. This occurred in three of the 84 patients in the study: in one situation the decision was made by family members and the other two changed their mind.

Procedure

This study was approved by QMC’s Research and Institutional Review Committee (RA-2015-307) and the University of Hawai‘i Institutional Review Board (#22966). Over an eight-week period, hospital patients meeting the inclusion criteria (Table 2: Inclusion Criteria) were recruited and invited to participate. None of the authors identify any conflict of interest.

Recruitment and Data Collection

Nurses identified patients cared for by hospital-employed physicians, screened for inclusion criteria, and ascertained whether patient was available. Researchers requested 20 minutes of patient’s time to participate in the study. Each eligible patient personally signed a witnessed consent form. Upon consenting, the Montreal Cognitive Assessment (MoCA)28 was administered and, if the patient scored 26 or higher, s/he was invited to complete paper administered SB&RDQ. If the patient scored <26, could not personally sign the consent form, or no witness was located then no further information was requested. All aspects of patient participation took place in a neutral place, their hospital room or a private room. A researcher was present to answer any questions patient had. Completion of questionnaire took approximately 10-15 minutes. Patients were able to discontinue questionnaire at any time.

Table 1. Demographics and Current Health Status Questions

<table>
<thead>
<tr>
<th>Gender</th>
<th>Sex self identified with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Social Support (relationship status):</td>
<td>Married or supportive person, or Single, divorced, or widowed</td>
</tr>
<tr>
<td>Activities Needing Assistance</td>
<td>Number of activities unable to perform for self-care, such as eating, bathing, dressing, or grooming</td>
</tr>
<tr>
<td>Primary Spiritual/Religious Belief</td>
<td>Patients’ responses were then categorized into two groups* 1) theistic beliefs (Christian, Catholic, Jewish, Mormon, Protestant) and 2) non-theistic beliefs (Agnostic, Atheist, Buddhist, and Hawaiian)</td>
</tr>
<tr>
<td>Race/Ethnicity:</td>
<td>Asian-Cambodian, Chinese, Filipino, Japanese, Vietnamese; Hawaiian/Part, Pacific Islander, or Caucasian/White, or Other: African American/Black, Other</td>
</tr>
<tr>
<td>Medical Diagnosis/Co-morbidities</td>
<td>Patients’ responses were then categorized as either low or high risk of death. Low risk of death during hospitalization (low risk) was codified as participants with 0-3 medical diagnosis/co-morbidities. High risk of death during hospitalization (high risk) was codified as participants with 4+ medical diagnoses/co-morbidities, and/or a cancer diagnosis, and/or a liver disease diagnosis.</td>
</tr>
<tr>
<td>Current Pain Level</td>
<td>Scale of 0-10, 0 = no pain and 10 = worst pain ever</td>
</tr>
</tbody>
</table>

*Clarence Liu, Jr. personal communication January 16, 2016
Table 2. Inclusion Criteria

Inclusion Criteria Were:

- Hospitalized patients.
- Under acute, skilled, or intermediate levels of care in QMC: including protective isolation.
- Under care of a QMC hospitalist or gerontologist.
- ≥ 18 years old.
- Oriented to person and place.
- Not currently cared for by pain and palliative care team.
- Demonstrated mild or no intellectual impairment with Montreal Cognitive Assessment (MoCA) (score of ≥ 26).
- Consented to participate and complete questionnaire.
- Able to read, write, and speak English.
- Able to read at an 18-point font size.

Statistical Analysis

All statistical analyses were performed in SPSS version 23.0.0.0 (IBM, Chicago, IL). A two-tailed statistical test was executed and $P < .05$ was treated as statistically significant. An estimated sample size of 84 patients was calculated with a two-tailed test, 0.3 effect size, desired power = .80, and $\alpha = .05$. The internal reliability of SIBS-R and BVS scores were examined by Cronbach’s alpha. One-way Analysis of Variance (ANOVA) was conducted to examine mean differences between two or multiple group comparisons for continuous variables. The post-hoc multiple comparisons were done by Tukey procedure. For two group comparison for a categorical variable, Fisher’s exact tests were performed.

Results

Four hundred and three patients were under care of hospital-employed physicians during data collection period from November 20, 2015 to January 16, 2016 (Figure 1). Data were collected on 49 days on a random rotation of nursing units. Twenty-seven patients on Pain & Palliative Care Service were not eligible for recruitment. Nurses identified 311 who spoke English, 291 were oriented to person and place, and 135 were not available per nurse caring for patient resulting in 156 available. Six were not available when recruitment was attempted, and 56 declined to participate in study. Ninety-four patients provided consent, and 84 passed MoCA and completed survey (56% participation rate out of 150 eligible participants). Analysis herein is based upon 84 participants.

Fifty-seven participants were men (68%) (Table 3). Patients’ responses were categorized into two groups (1) theistic beliefs and (2) non-theistic beliefs. Sixty-six identified theistic spiritual beliefs (79%). Twenty-seven participants identified their ethnicity as Caucasian (32%), 20 Asian (24%), 26 Native Hawaiian/Pacific Islander (31%), and 11 as “Other” (14%). Of the sample population, 34% were categorized as high risk of death during this hospitalization ($n = 29$). Mean age of participants was 58.6 (± 15.6 SD) years old (range 22-89), mean days hospitalized was 10 (± 10.91 SD) (range 1-68), mean pain level was 5.4 (± 3.3 SD) (range 0-10) and 68% reported a pain score of greater than 4 out of a maximum of 10, where > 4 indicates moderate to severe physical pain.

To the two resuscitation decision questions, 17% of study patients responded “no” and were categorized as DNAR participants ($n = 14$). Eighty-three percent of participants ($n = 70$) answered “yes” to one or both resuscitation decision questions and categorized as “Full code”. One participant said “no” restarting heart and “yes” to breathing; while 16 said “no” to breathing and “yes” to restarting heart. These seventeen patients (20%) did not answer two questions consistently with medical practice and were also categorized as “Full code” in the study.

Demographics and Spiritual/Religious Beliefs Scales

Cronbach’s alpha for SIBS-R was $\alpha = .88$, and for BVS was $\alpha = .96$. These scales demonstrated internal reliability and scales had internal consistency when used with study population. Participants with theistic beliefs had significantly different SIBS-R, and BVS scores than those with non-theistic beliefs and reported in Table 4. Mean scores of SIBS-R 120.17 for theistic belief and 97.56 for non-theistic beliefs [$F(1,80) = 16.91, P < .0001$]. Mean scores of BVS for theistic belief 64.97 and 41.72 for non-theistic beliefs [$F(1,80) = 31.14, P < .0001$].

Participants SIBS-R scores compared by gender were not significantly different. Participants BVS scores compared by gender were significantly different: mean scores $= 65.73$ for women vs $57.14$ for men, $F(1,80) = 4.06, P = .047$.

Table 4 also demonstrates participants’ SIBS-R and BVS scores by ethnicity. SIBS-R scores were found to be significantly dif-
Table 3. Demographic and Clinical Characteristics by Resuscitation Decisions (N = 84)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Full Code (n=70) n/%</th>
<th>DNAR (n=14) n/%</th>
<th>Total (N=84) n/%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>46/66</td>
<td>11/79</td>
<td>57/68</td>
</tr>
<tr>
<td>Women</td>
<td>24/34</td>
<td>3/21</td>
<td>27/32</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>17/24</td>
<td>3/21</td>
<td>20/24</td>
</tr>
<tr>
<td>Caucasian</td>
<td>22/31</td>
<td>5/36</td>
<td>27/32</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>21/30</td>
<td>5/36</td>
<td>26/31</td>
</tr>
<tr>
<td>Other</td>
<td>10/14</td>
<td>1/7</td>
<td>11/13</td>
</tr>
<tr>
<td><strong>Primary Beliefs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theistic</td>
<td>57/81</td>
<td>9/64</td>
<td>66/79</td>
</tr>
<tr>
<td>Non-theistic</td>
<td>13/19</td>
<td>5/36</td>
<td>18/21</td>
</tr>
<tr>
<td><strong>Social Support</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married or living with someone</td>
<td>35/50</td>
<td>6/43</td>
<td>41/49</td>
</tr>
<tr>
<td>Single, divorced, or widowed</td>
<td>35/50</td>
<td>8/57</td>
<td>42/51</td>
</tr>
<tr>
<td><strong>Medical Diagnosis/Co-Morbidities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk of death</td>
<td>44/63</td>
<td>11/79</td>
<td>55/66</td>
</tr>
<tr>
<td>High risk of death</td>
<td>26/37</td>
<td>3/21</td>
<td>29/34</td>
</tr>
<tr>
<td><strong>Activities Needing Assistance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No needs</td>
<td>35/50</td>
<td>10/71</td>
<td>46/55</td>
</tr>
<tr>
<td>1-3 needs</td>
<td>23/33</td>
<td>2/14</td>
<td>25/37</td>
</tr>
<tr>
<td>4-6 needs</td>
<td>12/17</td>
<td>2/14</td>
<td>14/18</td>
</tr>
</tbody>
</table>

(N=84) Full Code M±SD | DNAR M±SD | Total M±SD | t(df) | P
Age               | 58.19±15.97 | 60.71±14.05 | 58.61±15.62 | .55(82) | .58
Pain              | 5.15±3.24   | 6.61±2.49   | 5.39±3.34   | 1.50(82) | .14
Days Hospitalized | 10.56±11.26 | 8.50±9.14   | 10.21±10.91 | -.64(82) | .52
SIBS-R (69)/(13)   | 115.51±22.19| 113.62±25.26| 115.21±22.55| -.28(80) | .78
BVS (68)/(14)      | 60.00±16.95 | 59.21±24.58 | 59.87±18.29 | -.15(80) | .89

Table 4. Spiritual/Religious Beliefs by Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>M±SD</th>
<th>F (df1, df2)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BVS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theistic</td>
<td>64.97±12.26</td>
<td>31.14(1, 80)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Non-Theistic</td>
<td>41.72±24.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>50.96±22.50</td>
<td>4.44(3, 78)</td>
<td>.0062</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>57.80±16.90</td>
<td>67.09±10.64</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>57.14±20.21</td>
<td>4.06(1, 80)</td>
<td>.0472</td>
</tr>
<tr>
<td>Female</td>
<td>65.73±11.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIBS-R</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theistic</td>
<td>120.17±19.13</td>
<td>16.91(1, 80)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Non-Theistic</td>
<td>97.56±25.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>106.67±23.37</td>
<td>5.39(3, 78)</td>
<td>.0020</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>125.17±15.01</td>
<td>106.66±25.71</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>113.1±22.96</td>
<td>1.49(1, 80)</td>
<td>.225</td>
</tr>
<tr>
<td>Female</td>
<td>119.55±21.45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tested by one-way ANOVA.
different according to ethnicity $F(3,78) = 5.39, P = .002$. Similarly, participants’ ethnicity and BVS score [$F(3,78) = 4.44, P = .006$] were significantly different. Adjusting for multiple comparisons, Native Hawaiian/Pacific Islanders participants reported significantly higher spirituality scores compared to Caucasians for both SIBS-R and BVS scores, $P = .007$ and $0.012$, respectively. Compared to Asians, Native Hawaiian/Pacific Islanders participants reported significantly higher spirituality scores for SIBS-R ($P = .023$) and not for BVS ($P = .287$).

**Resuscitation Groups**

Independent t-test analysis identified no significant differences found between Full code and DNAR groups in SIBS-R and BVS scores. At first glance, differences between theistic (13%) and non-theistic (27%) appeared to be associated with code status but the difference was not statistically significant.

**Discussion**

**Participants**

Over two-thirds of participants were men (68%) similar to QMC patient population cared for by hospital-employed physicians. Seventy-eight percent of participants cited theistic spiritual beliefs, which is higher than reported in Religious Landscape Study which reported “63% of the state population identifies as religious.” This difference is most likely due to this study’s self-reported data collection method, as opposed to surveys and reports regarding the practice of specific religions. Ethnicity of sample population demonstrated no majority, which is reflective of Hawaii’s population as a whole. The majority of the sample population had moderate to severe physical pain ratings and it would seem unlikely in such pain they would want to participate in a research study. A significant majority of participants preferred resuscitation (83%).

**Spiritual/Religious Belief Scales and Demographics**

SIBS-R scale ($\alpha = .88$) demonstrated respectable reliability and within range of previous studies. (Robert L. Hatch e-mail communication May 30, 2013). BVS scale ($\alpha = .96$) demonstrated very high reliability and similar to previous study using the same scale. Analyses using Pearson’s $r$ revealed significant positive correlations between SIBS-R and BVS scores (0.77), and between SIBS-R scores. These correlations demonstrate that SIBS-R, and BVS may measure similar but not the same concepts of spiritual/religious beliefs. Consistent with existing literature on development of these scales, participants with theistic beliefs had much higher average SIBS-R and BVS scores. Analysis of SIBS-R and BVS scales offer a high degree of specificity, which facilitates discernment between theistic beliefs and non-theistic beliefs. This study supports the use of SIBS-R and BVS scales to assist in determining the strength of spiritual/religious beliefs.

This study found significant differences in BVS scores according to gender. Similar to findings of King, et al., Allen, et al., this study found women had higher BVS scores 65.73 (± 11.54) when compared to men 57.14 (± 20.21), $P = .031$. However, this study found no significant differences in SIBS-R scores according to gender; similar to findings of an examination of HIV-seropositive patients. This suggests each scale is consistent in measurement of gender differences.

**Spiritual/Religious Beliefs and Decisions**

Spiritual/religious beliefs research is often based upon a single question of primary religious preference or self-rated scale of “religiosity.” No previously reported study has employed two scales to measure spiritual/religious beliefs in addition to a self-selected designation of primary beliefs. Even with three measures of spiritual/religious beliefs, this study revealed no associations between spiritual/religious beliefs and resuscitation decisions in the sample recruited from hospitalized patients. These findings are consistent with Song and Hanson and Delgado-Guay, et al., where intensity of spiritual/religious beliefs and practices were not found to be associated with resuscitation decisions of dialysis or cancer patients, respectively.

However, other published research has shown associations between spiritual/religious beliefs and resuscitation decisions. One study of hospitalized patients at end-of-life identified increased use of life-prolonging care which is contrasted with the relatively healthier population recruited for this study and measured use of care vs. desire of care. There is limited research of hospitalized patients’ desire for life-prolonging care. Another study of community participants examined responses to hypothetical scenarios whereas this study questioned participants in reference to reality. Finally, numerous studies report patients’ assertions that spiritual beliefs influence their resuscitation decisions. Patients’ assertions may not be representative of their decisions when personally facing resuscitation decisions. Research regarding associations between patients’ spiritual/religious beliefs is not consistent.
Other Factors and Resuscitation Decisions

This study found no significant associations between demographic characteristics of participants and their resuscitation decisions. These findings may be due to the small sample size of DNAR patient participants. Results may be related to the greater proportion of generally healthy patients in sample population.40 Other investigators have suggested possibilities of patient acceptance of a poor prognosis38,41 or knowledge46 are confounding variables influencing resuscitation decisions. Evidence is inconclusive regarding other factors that may influence patients’ resuscitation decisions.

Incidental Findings

Two potentially significant observations unrelated to this study’s primary aims warrant mention. First, this study population had a surprisingly high pain rating (average 5.3) considering patients’ function levels. Medical diagnosis/co-morbidities of patient population did not reflect painful conditions, as patients who participated were mostly hospitalized for infections vs cancer or surgical interventions. This higher pain rating may, then, be related to placement of question between the two spiritual/religious scales. Patients may have been rating their spiritual pain, psychological pain, or overall suffering instead of only their physical pain. A second significant finding indicated 20% of sample participants requested one, but not both, of the resuscitation interventions. Since resuscitation would most likely require both chest compressions, and intubation to be successful, these patients’ responses may reveal a lack of understanding about resuscitation measures, similar to hospitalized patients of Kaldjian, et al.13

Study Strengths and Limitations

This study is timely as healthcare is moving to have resuscitation discussions when patients are healthier. Strengths of this study are specific to limits of previous research. First, there is a paucity of data regarding spiritual/religious beliefs of hospitalized patients. This study adds to that body of knowledge with regard to the influence of spiritual/religious beliefs on resuscitation decisions, and also with regard to spiritual/religious beliefs scales in measuring spirituality. Second, this study represents a population of mixed ethnicity participants. In addition, participants represented both theistic and non-theistic beliefs, whereas majority of research in spiritual/religious beliefs examines a population solely with theistic beliefs.42

Four potential limitations to this study were identified. First, sample population did not answer resuscitation questions consistent with medical practice. In further research, education regarding most likely the need for both chest compressions and intubation should be communicated, and if there is incongruence with participants’ request, it should be clarified at the time of study. Second, sample population appears healthier (based upon co-morbidities and risk for death) than anticipated. This may have been due to relatively high cognitive functioning required to pass MoCA. In future research, a greater tolerance for less cognitive functioning may be warranted. Third, the order effect of pain rating question between the two spiritual/religious beliefs scales may have influenced patients’ responses. In future research, pain rating should be moved to demographic section of questionnaire or retrieved from electronic data. Finally, the ethnic groups and spiritual/religious groups could be considered too heterogeneous. In future research, a larger sample size may allow for analysis of additional more homogenous ethnic groups, and subsets of spiritual/religious beliefs.

Implications for Future Research and Practice

Three additional considerations should be addressed in future studies. First, a larger sample size is required to allow the numerous ethnicities that made up “Asian” group to be individually identified. A larger sample size may also result in a larger number of patients requesting DNAR for further comparison. Second, future research should address complexity of resuscitation decision, including individual factors such as patient understanding of medical interventions and anticipated prognosis, and influencing factors regarding cultural collectivist decision-making. Finally, a variety of factors that appear to influence resuscitation decisions suggests a deeper understanding may be possible with evaluation of even more demographic variables, such as total length of stay, status at discharge, accurate reflection of comorbidities, insurance, and total hospital charges/cost during hospitalization.

This study brought to light several implications for clinicians and public health professionals. First, research regarding association between patients’ spiritual/religious beliefs as a whole is inconclusive and clinicians should not assume any association between patients’ primary spiritual/religious beliefs and their resuscitation decisions. Second, prior to asking resuscitation questions, clinicians should confirm a patient’s understanding of medical terms such as intubation, chest compressions, and understanding of personal medical condition and anticipated prognosis, and should readdress resuscitation decision as a patient’s health changes. And third, need for public health professionals to increase community awareness, implement advanced healthcare planning, and research these areas will assist patients to have their wishes followed at end of life.

Conclusion

Although no associations between resuscitation decisions and spiritual/religious beliefs were found in this study, the spiritual/religious beliefs scales were shown to offer an effective measure of the level of spiritual beliefs in this population. In addition, differences in spiritual/religious beliefs according to ethnicity were found, suggesting the importance of further study with a larger sample population. Further research should address the
complexity of resuscitation decision, including individual factors such as patient understanding of medical interventions and anticipated prognosis, and influencing factors regarding cultural collectivist decision-making. In the interim, this study calls for an individualized approach to assisting patients in determining their resuscitation decisions.

**Conflict of Interest**

None of the authors identify a conflict of interest.

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Lymphocytic Myocarditis and Cardiogenic Shock in Hawai‘i: A Case Series

Luke Lam MD; Sakda Sathirareuangchai MD, LLB; Jared Oyama MD; Gihan Devendra MD; and Robert Hong MD

Abstract

Lymphocytic myocarditis is an inflammatory disease of the heart that may present in a myriad of fashions ranging from mild febrile illness to florid myocarditis and cardiogenic shock. Given its nonspecific clinical presentation, the diagnosis of lymphocytic myocarditis is often challenging. The authors describe four cases of lymphocytic myocarditis in young women who presented with cardiogenic shock. Two patients survived and two died. This presentation has not been seen previously in Hawai‘i and the public awareness of this condition is critical. Early diagnosis and the prompt initiation of biventricular mechanical circulatory support appear to have been critical in improving patient survival.

Keywords

lymphocytic myocarditis, inflammatory heart disease, mechanical circulatory support, immunosuppressive therapy

Introduction

Myocarditis is a relatively rare cardiac disorder defined as an inflammatory disease of the myocardium, with an incidence of 22/100,000 or approximately 1.5 million cases in the 2013 world population. Myocarditis has a slightly higher prevalence in men than in women, with a reported female to male ratio between 1:1.5 and 1:1.7. Lymphocytic myocarditis is a subgroup of myocarditis characterized by lymphocytic infiltration of the myocardium and is thought to be caused by a viral infection. Endomyocardial biopsy is the gold standard for definitive diagnosis of lymphocytic myocarditis. However, because endomyocardial biopsy is an insensitive test for lymphocytic myocarditis and is seldom performed due to perceived risks of the procedure, the true incidence of lymphocytic myocarditis is not well known. In fact, lymphocytic myocarditis can clinically manifest as subclinical disease and therefore go undetected. Clinically, patient’s presentation ranges from subclinical disease to cardiogenic shock and sudden death. Patients with lymphocytic myocarditis may also present with new onset atrial or ventricular arrhythmias, complete heart block, or in a fashion similar to an acute myocardial infarction. Symptoms are nonspecific and include fatigue, dyspnea, chest pain, heart failure, and palpitations. Due to the highly variable clinical presentation, a clinician needs to always keep lymphocytic myocarditis in the back of his or her mind in order to make the proper diagnosis. Initial testing with electrocardiogram (ECG), cardiac biomarkers, chest radiography and routine blood and urine studies are often normal or reveal only nonspecific abnormalities. Given these challenges, making the diagnosis of lymphocytic myocarditis is difficult.

The aim of this article is to highlight our experience in diagnosing and treating four patients with lymphocytic myocarditis in our institution but also to increase a local awareness of this disease presentation. Lymphocytic myocarditis as a cause of cardiogenic shock has not been described in Hawai‘i. Increased awareness of this condition may provide for early diagnosis and the initiation of mechanical circulatory support.

Case Series Description

Four cases of lymphocytic myocarditis were confirmed by pathology in the inpatient care setting at a single academic/community medical center.

Case 1

A 69-year-old female with no significant cardiac history presented with fatigue and dyspnea on exertion for one week. The patient had pulmonary edema and hypotension. She denied symptoms of angina but her initial ECG showed sinus tachycardia with lateral ST elevations (Figure 1). Initial cardiac biomarkers demonstrated a troponin T level of 32 ng/mL (reference range <0.03 ng/mL). She was taken emergently to cardiac catheterization and was not found to have significant coronary artery disease. Her initial transthoracic echocardiogram (TTE) showed a left ventricular ejection fraction (LVEF) of 50%-55%. A repeat TTE three days after admission demonstrated a fall of LVEF to 20%. The patient was placed on inotropic support with milrinone but remained in cardiogenic shock. The patient required biventricular support devices with percutaneous impeller pump system (Impella CP and RP: Abiomed, Danvers, MA). The patient was treated with intravenous methylprednisolone for immunosuppression at doses used for cardiac transplant rejection. Her hospitalization course was complicated by pulmonary edema requiring mechanical ventilation. The patient was also documented to have recurrent polymorphic ventricular tachycardia requiring multiple cardioversions. An endomyocardial biopsy was performed and demonstrated lymphocytic myocarditis (Figure 2) with patchy lymphocytic infiltrate and associated myocyte injury. After 6 days of mechanical circulatory support, the patient’s LVEF recovered. She was weaned off of mechanical and inotropic support and was discharged on immunosuppression with prednisone and mycophenolate. A repeat endomyocardial biopsy was performed 1 month later which showed resolution of active lymphocytic myocarditis.

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Figure 1. Initial ECG of Case 1 Demonstrating Sinus Tachycardia with Bigeminal Premature Ventricular Complexes and Lateral ST Elevations.

Figure 2. High-power View of the Endomyocardial Biopsy Showing Patchy Lymphocytic Infiltrate with Associated Myocyte Injury (Hematoxylin-eosin, Original Magnification x400).
Figure 3. An Endomyocardial Biopsy Performed 1 Month Later from Figure 2, Showing No Active Myocarditis (Hematoxylin-eosin, Original Magnification x400).

Serial TTE documented normal left ventricular function on tapering doses of steroids.

Case 2

A 21-year-old female with no significant past medical history presented with chest pain and dyspnea for 3 days. Initial ECG showed diffuse ST elevations and troponin T levels were increased at 73 ng/mL. She was taken emergently to cardiac catheterization and coronary angiography showed no coronary artery disease. Her initial TTE showed a LVEF of 40%-45%. After cardiac catheterization, the patient developed worsening shortness of breath and hypotension. A repeat TTE that same day showed a decrease in LVEF to 15%-20%. The patient was started on inotropic support with milrinone and a left ventricular support device (Impella CP: Abiomed, Danvers, MA) was placed. The patient subsequently developed a low cardiac output state because of right ventricular failure, and a right ventricular support device was required (Impella RP: Abiomed, Danvers, MA). Her hospital course was complicated by ventricular tachycardia requiring cardioversion and the patient was subsequently placed on amiodarone. The patient was started on immunosuppression with cyclosporine and methylprednisolone. The patient was transferred to a mainland facility on temporary biventricular support as there were concerns that she would require permanent mechanical support. An endomyocardial biopsy demonstrated lymphocytic myocarditis. After 5 days of mechanical circulatory support, the patient’s LVEF recovered and she was weaned off of mechanical support. She was discharged on maintenance immunosuppression with high dose steroids. Repeat serial TTE have documented persistent impairment of left ventricular function with ejection fraction of 35%-40%. The patient remains on immunosuppression with prednisone and cyclosporine with plans for weaning based upon endomyocardial biopsy findings.

Case 3

A 34-year-old female with a history of methamphetamine use presented to our institution with chest pain and shortness of breath for 1 day. Her initial ECG showed diffuse ST elevations (Figure 4). A troponin T was elevated at 7.9 ng/mL. Upon arrival, the patient was in cardiogenic shock. A TTE showed LVEF of 10% with global hypokinesis. Within 2 hours of presentation, the patient developed recurrent wide complex tachycardia.
Figure 4. Initial ECG of Case 3 Demonstrating Sinus Tachycardia with Bigeminal Premature Ventricular Complexes with Diffuse ST Elevation.

Figure 5. Microscopic Section from the Left Ventricle Showing Diffuse Lymphocytic Infiltrate (Hematoxylin-eosin, Original Magnification x100).
Electrical cardioversion and treatment with intravenous amiodarone were unsuccessful at restoring sinus rhythm. The patient was diagnosed to have incessant monomorphic ventricular tachycardia which degenerated into polymorphic ventricular tachycardia and then ventricular fibrillation. The patient could not be resuscitated and expired within hours of admission. An autopsy showed an enlarged heart weighing 360 grams, with gross examination showing multiple areas of patchy white discoloration consistent with previous scarring possibly secondary to a methamphetamine-induced cardiomyopathy. There was no ventricular hypertrophy or valvular pathology. Microscopic examination of the heart revealed diffuse heavy lymphocytic infiltrates with foci of myocyte necrosis seen with lymphocytic myocarditis (Figure 5 and 6).

Case 4

A 27-year-old female with no significant past medical history presented to our institution with shortness of breath for 2 days. The patient was hypotensive and tachycardic. Her initial ECG showed sinus tachycardia. Troponin T levels were mildly elevated at 2ng/mL. She also had a significant leukocytosis at 17 x 10^3/uL (reference range: 3.8 - 10.8 x10^3/uL), an elevated procalcitonin at 11 ng/mL (reference range: <0.05 ng/mL), and lactic acidosis at 7.8 mEq/L (reference range: 0.5 - 2.2 mEq/L). The patient was initially felt to be septic but TTE showed a LVEF of 35% (reference range for females: 54% - 74%) and a small pericardial effusion. There was evidence of right ventricular diastolic collapse consistent with possible tamponade physiology. The patient was treated with fluids but had minimal improvement in her blood pressure and shock physiology. A pericardiocentesis procedure was performed emergently, but was unsuccessful at removing the small amount of fluid. The patient was monitored closely with interval stabilization of her blood pressure after further aggressive volume resuscitation, although she remained tachycardic throughout her hospitalization. A repeat TTE 12 hours from initial presentation showed a decrease in LVEF to 15%-20%, but also a decrease in pericardial effusion. After 15 hours of hospitalization, the patient suddenly became more tachycardic, hypoxic and hypotensive. Attempts at resuscitation were unsuccessful. The patient developed progressive bradycardia and pulseless electrical activity followed by asystole. After 2 hours of cardiovascular resuscitation efforts, the patient ultimately expired. An autopsy confirmed lymphocytic myocarditis.
Discussion

The diagnosis of lymphocytic myocarditis is difficult to make as many patients present with nonspecific symptoms. In a study of 3055 patients with suspected acute or chronic myocarditis, 78% had dyspnea, 32% had chest pain, and 18% had arrhythmias. Troponin elevations may be helpful in diagnosing lymphocytic myocarditis with a reported high specificity (89%) but relatively poor sensitivity (34%). Electrocardiogram of patients with lymphocytic myocarditis often demonstrates sinus tachycardia with nonspecific ST segment and T wave changes. Occasionally, ST segment elevations and ST-segment depression mimicking acute myocardial infarction may be seen. In our case series, all of our patients presented with symptoms of dyspnea and troponin elevations. Two of four patients presented with ST segment elevations on ECG.

Echocardiography may be helpful in diagnosing lymphocytic myocarditis. Still, echocardiographic findings in this disease are nonspecific and reported findings include: left ventricular dilation, increased sphericity of the left ventricle, and systolic dysfunction. The wall motion abnormality may be global or segmental. In this case series, all four patient demonstrated rapid decline in left ventricular systolic function with hours to days of presentation and global left ventricular hypokinesis.

Endomyocardial biopsy is the gold standard for diagnosing lymphocytic myocarditis. In 2007, American Heart Association, America College of Cardiology and European Society of Cardiology developed a joint statement addressing the indication for endomyocardial biopsy. Class I, or generally accepted appropriate indications for biopsy includes patients with unexplained, new onset heart failure of less than 2 weeks’ duration in association with a normal size or dilated left ventricle and hemodynamic compromise, for suspected fulminant myocarditis. Class I indications also include patients with unexplained, new onset heart failure of 2 weeks to 3 months duration in association with a left ventricular dilation, arrhythmias or Mobitz type II or second degree or third degree heart block and in a subgroup of patients who have not responded to usual care within 1 to 2 weeks. The sensitivity of endomyocardial biopsy for lymphocytic myocarditis is relatively low, in the range of 10%-35%. Cardiac magnetic resonance imaging (cMR) has been increasingly utilized to assess myocarditis and to localize site for endomyocardial biopsy.

The Lake Louise criteria is a well published criteria utilized to evaluate myocardial tissue for edema, hyperemia and necrosis/scar using T2 weighted, early gadolinium and late gadolinium enhancement imaging sequences. The Lake Louise criteria has a sensitivity of 80% and a specificity of 88%.

The goal of treatment for patients with lymphocytic myocarditis is supportive therapy for left ventricular dysfunction. Patients with stable hemodynamics should be started on standard medical therapy, which include ACE-inhibitors, beta blockers, diuretics as needed for hypervolemia and mineralocorticoid receptor antagonist in patients with persistent left ventricular dysfunction. In patients with hemodynamic compromise who are not responsive to medical therapy, treatment would include inotropic support and consideration of mechanical circulatory support. In patients with myocarditis with cardiogenic shock, treatment with a ventricular assist device can be used successfully as a bridge to recovery. Biventricular support is often needed as both ventricles may be involved. Cardiac transplantation should also be considered in patients with intractable heart failure. Patients with lymphocytic myocarditis who underwent cardiac transplantation have an overall survival rate similar to patients who underwent cardiac transplantation for other causes.

Lymphocytic myocarditis is felt to be caused by viral infection. The most frequently implicated viruses are Coxsackie B virus, adenovirus, hepatitis C, cytomegalovirus, echovirus, influenza virus, and Epstein-Barr virus. It is theorized that in older populations, patients have antibodies to most viral serotypes, and the humoral response soon after a viral infection is beneficial, acting to decrease inflammation. In our case series, three out of four patients were less than 35 years old, suggesting this relatively young population may be disproportionately susceptible to the adverse effects of lymphocytic myocarditis.

Antiviral treatment has not been demonstrated to be effective in the treatment of lymphocytic myocarditis but questions have been raised whether delays in establishment of specific viral pathogens may have compromised the ability to deliver virus-specific therapies.

Immunosuppressive therapy has not been proven to be effective in lymphocytic myocarditis. However, several randomized, controlled trials of immunosuppression for acute myocarditis were marginally positive. Though not studied in lymphocytic myocarditis, a combination of corticosteroids and cyclosporine has been shown to improve survival in giant cell myocarditis. A combination of azathioprine and corticosteroid has also been shown to improve cardiac function and New York Heart Association functional class in myocarditis patients with chronic dilated cardiomyopathy. Immunosuppressive therapy were started in two of the four patients with good clinical outcomes.

Lymphocytic myocarditis has not been previously described as a cause of cardiogenic shock in Hawai‘i. It is important to recognize the potential profound hemodynamic compromise that may be associated with this disease. While the value of immunosuppression in the treatment of patients remains conjectural, early recognition and mechanical support in the setting of cardiogenic shock may be of critical importance in survival in patients presenting with lymphocytic myocarditis and cardiogenic shock. We feel that health care providers in Hawai‘i should be aware of the clinical presentation of patients with lymphocytic myocarditis and the need for early interventions in patients with cardiogenic shock.
Conclusion

Lymphocytic myocarditis varies widely in its clinical presentation, and it is often difficult to diagnose given its nonspecific presentation. However, prognosis also varies widely, ranging from subclinical disease to cardiogenic shock and death. Therefore, a clinician needs to always keep lymphocytic myocarditis in the back of his or her mind in order to make the proper diagnosis. Prompt and appropriate treatment with inotropic support and mechanical circulatory support can potentially change the clinical outcome of the patients.

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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References

Recurrent Inactive Hydatid Cyst of the Liver Causing Restrictive Pulmonary Physiology

Dacia S.K. Boyce MD; John S. Ellis MD; Stephanie L. Hightower MD, MSc; Jeffery L. Lew MD; Michael W. Price MD; Kevin M. Lin-Hurtubise MD; and Jordanna M. Hostler MD

Abstract

Hydatid and alveolar cysts are formed by the helminths Echinococcus granulosus and Echinococcus multilocularis, respectively, which are endemic to pastoral areas, and are more commonly found in South America, the Mediterranean, Russia, and China. Hydatid cysts can cause bacteremia, form abscesses, or cause mass effect by compressing surrounding organs. Strategies to prevent such complications include benzimidazoles, surgical resection, and Puncture, Aspiration, Injection and Re-aspiration (PAIR) procedure. A 71-year-old Egyptian man with remote history of Echinococcus infection one year status post PAIR procedure, presented with dyspnea on exertion. On exam, the patient had a palpable right upper quadrant mass. The patient had a known small hydatid liver cyst on prior ultrasound, however repeat imaging showed growth to 15x19x14cm, with right hemidiaphragm elevation, compressive atelectasis, and compression of the right atrium. He had no peripheral eosinophilia and negative echinococcal serology, consistent with remote infection. The patient underwent repeat PAIR procedure and 3L of serous fluid was drained from the cyst. Fluid analysis was negative for scolices, cysts or hooklets. His symptoms improved; however the cyst re-accumulated 1 month later. Total cystectomy was performed surgically by hepatic wedge resection, with permanent improvement in symptoms. This case is a rare example of Echinococcus infection causing significant respiratory morbidity requiring repeated invasive procedures and surgery, in the setting of inactive disease.

Keywords

hydatid cyst, Echinococcus granulosus, PAIR procedure, cystic echinococcosis

Abbreviations

ADLs = Activities of Daily Living
AE = Alveolar Echinococcus
CE = Cystic Echinococcus
CT = Computed Tomography
FEV1 = Forced Expiratory Volume in 1 second
FVC = Forced Vital Capacity
IWGE = Informal Working Group on Echinococcosis
OHS = Obesity Hypoventilation Syndrome
OSA = Obstructive Sleep Apnea
PAIR = Puncture, Aspiration, Injection and Re-aspiration
RUQUS = Right Upper Quadrant Ultrasound
WHO = World Health Organization

Introduction

Hydatid cysts are formed from the larva of the helminthic organism Echinococcus granulosus. This helminth is endemic to pastoral areas of the Mediterranean, China, Russia, Eastern Europe, and South America. It lives its normal life cycle within its definitive hosts, and transmission to humans occurs when eggs released in feces of the host are ingested by humans via contaminated soil, water, and food.1 Eggs, once ingested, hatch in the small bowel and penetrate the intestinal wall, migrating into various organs, where they develop into cysts. E. granulosus frequently forms liver cysts, causing Cystic Echinococcosis (CE), while E. multilocularis often forms intrapulmonary cysts, causing Alveolar Echinococcosis (AE). Cysts can be found in nearly any organ system, but hepatic hydatid cysts remain the most common by a large margin.2,3

Within endemic areas, annual incidence of CE ranges from <1 to 200 per 100,000 persons.1 Prevalence varies, but is generally above 20% in such areas.3 Most infected individuals within the United States are immigrants, believed to be infected within their country of origin; the majority are of Asian, Hispanic, or Pacific Islander descent. In endemic countries, rural areas are most affected due to the presence of sheep, goats, and canines which serve as preferred hosts.1,4-6

Symptoms of human CE may take years to manifest. In the first year of growth, cysts may expand rapidly by 5-10cm, but in subsequent years, the growth rate slows, and on average ranges from 1mm to 10mm yearly.1 Common sequelae of CE include anaphylaxis and secondary hydatidosis (seeding of the peritoneum); if the cyst should rupture or erode into the biliary tree; intrathoracic cysts are known to cause obstructive jaundice. They can also, through virtue of their size and location, exert pressure on surrounding organs, usually resulting in chronic abdominal pain. Hydatid cysts located within the abdomen are known to cause jaundice, abdominal pain, and nausea, but are not generally known to cause pulmonary dysfunction via mass effect.2,3

Cysts are both diagnosed and staged via ultrasound, using the World Health Organization—Informal Working Group on Echinococcosis (WHO-IWGE) classification system (Table 1).1,7,8 Radiographic appearance of septations, calcifications, and membranes determines the cyst activity level. Laboratory diagnosis can be confirmatory when imaging studies are not conclusive. For initial screening, ELISA is the most sensitive test, and confirmation can be performed with the echinococcal antigen immunoblot.3,9 However, intact cysts can illicit little response from the host compared to a leaking or ruptured cyst; therefore a negative test does not rule out echinococcal disease.1,4 Peripheral eosinophilia supports the diagnosis of active infec-
Table 1. Scheme of differentiation for human CE on ultrasound, as described by the World Health Organization.

<table>
<thead>
<tr>
<th>STATUS</th>
<th>CLASS</th>
<th>CLASS DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDIFFERENTIATED</td>
<td>CL</td>
<td>Unilocular anechoic cystic lesion without internal echoes/septation</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>CE1</td>
<td>Uniformly anechoic cyst with fine echoes settled in it (hydatid sand)</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>CE2</td>
<td>Cyst with multiple septation; multivesicular/rosette/honeycomb appearance with unilocular mother cyst</td>
</tr>
<tr>
<td>TRANSITIONAL</td>
<td>CE3</td>
<td>Unilocular cyst, with daughter cysts with detached laminated membranes (water lily sign)</td>
</tr>
<tr>
<td>INACTIVE</td>
<td>CE4</td>
<td>Mixed hypo- and hyperechoic contents, with absent daughter cysts (ball of wool sign)</td>
</tr>
<tr>
<td>INACTIVE</td>
<td>CE5</td>
<td>Arch-like, thick, partially or completely calcified wall</td>
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Figure 1. Plain anteroposterior (A) and lateral (B) radiographs of the chest demonstrating significant, abnormal elevation of the right hemidiaphragm.

Case Presentation

A 71-year-old man of Egyptian descent presented to the pulmonology clinic with several months of progressive dyspnea on exertion and orthopnea. Medical history included paroxysmal atrial fibrillation, obstructive sleep apnea (OSA), obesity hypoventilation syndrome (OHS), and a remote history of *E. granulosus* infection for which he underwent successful PAIR procedure one year prior. The patient was initially evaluated by Cardiology to rule out atherosclerotic coronary artery disease or dysrhythmias. Coronary CT and cardiac event monitoring were not supportive of a cardiac etiology.

Prior to this presentation, the patient had a baseline home oxygen requirement of 2 liters/minute secondary to his underlying OSA/OHS. Despite no reported changes in lifestyle or oxygen use in the past year, the patient became more symptomatic, and was unable to perform activities of daily living (ADLs). He underwent further evaluation with spirometry, chest radiograph,
and Right Upper Quadrant Ultrasound (RUQUS). Spirometry demonstrated a severely restrictive pattern with a Forced Vital Capacity (FVC) 1.89 liters (42% expected) and Forced Expiratory Volume in one-second (FEV₁) of 1.37 liters (41% expected) (ratio 0.72). Radiographs of the chest demonstrated abnormal elevation of the right lung base to the level of the right hilum and pulmonary arteries (Figure 1), and RUQUS revealed reaccumulation of a 19.2 cm by 15.3 cm hydatid cyst (Figure 2). Ultrasound presence of calcifications, and absence of daughter cysts or active ‘hydatid sand’ classified the cyst as stage CE4 by WHO-IWGE classification system (Table 1). A repeat PAIR procedure was performed by interventional radiology with successful drainage of 3 liters of chalky, serosanguinous fluid. 98% dehydrated ethanol was injected into the cavity as a precaution for any remaining active protoscolices. Laboratory studies showed no eosinophilia, and echinococcal serologies

Figure 2. Ultrasound images during PAIR procedure. (A) Shows ultrasound image of cyst prior to procedure, with partial calcification and mixed hyper and hypo-echoic contents, consistent with an inactive, WHO-IWGE stage CE4 cyst. (B) Confirmation of drain placement in cyst. (C) Ultrasound of Liver after drainage of 1300 cc of fluid.

Figure 3. (A) Axial and (B) Coronal view on triphase liver CT demonstrates a nonenhancing, fluid attenuating hydatid cyst with scattered calcifications, measuring 15x19x14 cm, with abnormal right hemidiaphragm elevation and compression of the right lung and right atrium.
were negative. Fluid analysis showed acellular debris and rare macrophages, but was negative for scolices, cysts, or hooklets, all findings consistent with inactive infection.

The patient experienced relief of his symptoms, however his activity-limiting shortness of breath returned four weeks later. 3-phase Computed Tomography (CT) of the liver and non-contrast Chest CT revealed re-accumulation of the cyst, persistent elevation of the right hemidiaphragm with compression of the right lung, and mass effect on the right atrium (Figure 3).

Due to the recurrence of the cyst following repeat PAIR procedure and the profound impact on his quality of life, the patient elected for surgical intervention. Total hepatic cystectomy was planned, however due to cyst adhesion to the right hemidiaphragm, partial cystectomy was performed by open hepatic wedge resection (Figure 4). To avoid potential protoscolex spillage 20% hypertonic saline was injected into the cyst before removal. Pathologic analysis showed fibrinous material, neutrophils, and lymphocytes, but again no scolices, cysts or hooklets. Surgical therapy resulted in lasting resolution of his dyspnea and right hemidiaphragm elevation (Figure 5).
Discussion

Hydatid cysts located within the abdomen are known to cause jaundice, abdominal pain, and nausea, but are not generally known to cause pulmonary dysfunction via mass effect.\textsuperscript{2,3} It is especially unusual in industrialized nations to see an abdominal hydatid cyst of this size causing pulmonary symptoms, given the diagnosis of inactive disease by both ultrasound staging and negative serology. In AE, pulmonary pathology is manifested by cough, dyspnea, and pleuritic chest pain, but AE is not a common cause of restrictive physiology.\textsuperscript{1,3} Usual complications of CE include cyst rupture with resultant risk for anaphylaxis and hydatosis within the peritoneum. However, in this rare case, hepatic CE exerted mass effect on the right hemidiaphragm and lung, causing restrictive lung physiology.

Treatment strategies for human CE utilize a combination of observation, benzimidazoles, PAIR procedure, and, in certain cases, surgical cystectomy with caution not to rupture the cyst during surgery.\textsuperscript{1,2,7,10,11} Surgical management is normally indicated for stage CE2 and CE3b cysts, with daughter vesicles, as well as when percutaneous treatment is unavailable. This patient’s cyst was classified as WHO- IWGE stage CE4.\textsuperscript{7,10} For cysts of stage 4 and 5, considered inactive, the preferred treatment is observation.\textsuperscript{3,4} Due to recurrent growth causing restrictive lung physiology and symptomatic dyspnea from mass effect, surgical intervention was advocated for this patient.

It is unclear why the hydatid cyst recurred after 2 PAIR procedures in absence of high risk imaging features (CE1-CE3B). The accepted mechanism of recurrence is from spillage of protoscolices into the surgical field.\textsuperscript{1,8} In inactive cysts, simple drainage, without injection of scolicidal agents, is considered sufficient treatment. In addition, it is uncommon to have recurrence after a PAIR procedure; in a study of 350 patients with hydatid disease of the liver treated with various methods, only 3.5% had recurrence in a 10-year follow up when treated with PAIR.\textsuperscript{10} The outer layer of the cyst (pericyst) is a combination of endothelial cells, parenchymal cells, and dense fibrous tissue, around which a calcified layer forms (as seen in stage CE5 cysts). The surrounding liver collapses the cyst after drainage. This patient, with his longstanding disease, may have had an especially tough, thick cyst wall which resisted collapse, allowing reaccumulation of fluid. However, in one study with over 200 participants, only stage CE1 cysts required a repeat drainage.\textsuperscript{12} The patient’s medical history was negative for other etiologies that could cause extravascular edema such as heart failure, cirrhosis, or nephrotic syndrome. Despite official staging recommendations, the remote \textit{Echinococcus} infection caused significant morbidity to this patient, requiring repeated percutaneous drainage procedures and finally surgery despite the inactive nature of his cyst and negative laboratory studies.\textsuperscript{7,9,13}

The patient, although living in the United States, was an emigrant known to reside in Egypt, an endemic area, until adulthood. Human CE flourishes in temperate zones, notably the Mediterranean, central Asia and China, Australia, and within South America. While sheep and goats are the most common intermediate hosts, in North America, reindeer and moose also act as reservoirs.\textsuperscript{2} Although both \textit{E. granulosus} and \textit{E. multilocularis} are endemic to certain parts of the country, such as Utah and Alaska, the majority of disease burden is borne by Asian, Pacific Islander, and Hispanic immigrants from endemic areas.\textsuperscript{5}

This case highlights how a patient with risk factors and known history of CE should be investigated further for progression of disease when unexplained symptoms develop. In particular, repeat ultrasound of the liver and ELISA for cryptococcal antigen should be assessed to exclude active disease. Despite low risk findings, certain patients will benefit from intervention, especially those suffering from mass effect. In patients with a travel or emigration history consistent with possible exposure, it is important to keep a wide differential. This includes zoonoses and other unusual manifestations of parasitic diseases endemic to their country of origin. This case also highlights the importance of deviating from standard treatment practices when indicated by the patient’s clinical presentation and quality of life.

Conflict of Interest

None of the authors identify any conflict of interest.

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References


Medical School Hotline

Education and End-of-Life Options: Hawaii’s Our Care, Our Choice Act

Kathleen Kihmm Connolly PhD; Patricia Lanoie Blanchette MD, MPH; and Diane Oue RN, BA

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.

On April 5, 2018, Governor David Ige signed the Hawai’i Our Care, Our Choice Act. This legislation allows eligible terminally ill adults to request medical aid-in-dying (MAID). MAID is defined as “A safe and trusted medical practice in which a terminally ill, mentally capable adult with a prognosis of six months or less to live may request from his or her doctor a prescription for medication, which she or he can choose to self-administer to bring about a peaceful death.” MAID has also been referred to as physician-assisted suicide, or physician-assisted death. On January 1, 2019, Hawai’i became the eighth US jurisdiction (preceded by California, Colorado, Montana, Oregon, Vermont, Washington state, and Washington, D.C) to implement the law authorizing MAID.

Oregon was the first state to legalize MAID in 1997, and was used as a model in creating MAID bills, including the Hawai’i Our Care, Our Choice Act. Hawai’i’s law is the most restrictive in safeguards of all the eight US jurisdictions. It deviates from the model in two major areas: an increased minimum waiting time, from 15 to 22 days between the patient’s initial MAID request to their physician and receiving the prescription; and the requirement of an additional mental health screening beyond that of the attending physician. These safeguards create more complexity with the intention of greater safety for patients and physicians. Understanding the process and having open discussions are vital to a patient’s success in ensuring quality end-of-life care free of undue influence in making decisions, such as the option to pursue MAID.

The Hawai’i Our Care, Our Choice Act authorizes, but does not require, physicians to support MAID for their patients. It is up to the physician to decide whether they will participate in MAID, unless they are restricted by their employment, as may be the case with some institutions. Physicians may face ethical or moral questions, such as the time honored principle to “do no harm.” Thus, physician support of MAID may present a grey area in caring for terminally ill patients who may be vulnerable and influenced to make unwitting emotional decisions. Physicians must also be able to discuss the availability of hospice services where careful attention to pain control, symptom management, and compassionate counseling services have greatly alleviated pain and suffering at the end of life. Hospice services provide skilled counseling and support services for patients and families. Many of the painful negative experiences described by supporters testifying in favor of MAID occurred before hospice services were available or widespread.

Most of Hawai’i’s hospitals and clinics are taking a neutral stance on MAID, but are not currently allowing patients to intentionally end their lives in their facilities. Kaiser Permanente Hospitals, for example, will arrange for the patient to be transferred home or to another appropriate location for such actions to take place. This is in keeping with the policies of facilities in other states, such as Oregon, where MAID-like laws have existed for many years, and where most patients who choose to end their lives do so in their own homes surrounded by supportive friends and loving families. Physicians may make an individual decision to support their patient’s requests for MAID directly, or to make the necessary arrangements for transfers to other physicians’ care and to other appropriate locations. Education and training will potentially help physicians understand both the law and how to approach end-of-life options to provide better comprehensive care for patients.

Education on End-of-Life Options for Medical Students

The first cohort of the John A. Burns School of Medicine (JAB-SOM) medical school graduates since the passage of MAID will enter training programs in Hawai’i in 2019. At some time in their careers, regardless of specialty, they will face end-of-life situations. Training to assist the students in providing end-of-life care is broader than training in MAID, although a discussion of the pros and cons of this option is appropriate. Education on end-of-life issues in medical school have improved students’ comfort level, preparedness, and self-efficacy in discussions on end-of-life issues including MAID. In several studies, medical students felt that training in end-of-life care would be beneficial in medical school. This training would incorporate pain and symptom management, patient and caregiver coun-
A study surveying first through fourth year medical students from Australian medical schools (n=373) reported 90% of the students believed that they should be involved in end-of-life discussions. And approximately 51% of the students agreed that, as future physicians, they should be active participants in the end-of-life decision. Other studies have similar results with approximately 50%-60% of medical students in favor of assisting in the end-of-life process. Specific to MAID, a study surveying Canadian medical students showed that comfort levels in discussing issues surrounding MAID with patients and the likelihood to provide MAID significantly increased after training or clinical experiences. The majority of students surveyed desired training in areas that include legal, communication, and technical issues of MAID.

Studies have also shown that medical students have an interest in learning more on the topic of the end of life, and that they are aware of the importance of the issue. This is especially relevant in situations when personal, ethical, and/or moral beliefs may come to play on their decisions regarding options at the end of life. Gaining knowledge and skills to cope with personal values versus patients’ wishes could help mitigate any potential ethical dilemmas. Skills to manage conflicts can also help provide care with both cultural and emotional sensitivity, without compromising their own beliefs or the patients’ well-being. Similar results were demonstrated with residents-in-training. In a study surveying medical residents across disciplines, education on end-of-life care was associated with a higher comfort level in discussing end-of-life care with patients. Being open to discussions, which include intentions and consequences, and training on options can lead to improved care for terminally ill patients.

To better address the aging population and the need for education on both healthy aging and end-of-life care, JABSOM has incorporated a required clerkship in geriatric medicine and palliative care in the fourth year of medical school. Though the US aging population is recognized as an important issue, only a few medical schools require geriatric or palliative medicine clerkships in medical education, although the curriculum in geriatrics is expanding. The American Association of Medical Colleges (AAMC) has pointed out that a primary driver in increased demand for healthcare is the aging US population of those 65 and older. As such, they strongly recommend required training in geriatric medicine. JABSOM is a recognized and early leader in implementing these recommendations. The Institute of Medicine of the National Academies identifies the lack of education in palliative care as one of the greatest challenges in providing quality end-of-life care and recommends expanding educational opportunities in both educational and professional organizations.

As Hawai‘i enters the first year of legalized MAID, the geriatric medicine and palliative care education that JABSOM students experience will help our future JABSOM physicians be prepared to handle end-of-life issues, including a terminally ill patient’s request for MAID.

**JABSOM Students Training in Geriatric Medicine and Palliative Care**

Since 2005, all fourth-year JABSOM students have a required four-week clerkship in geriatric medicine and palliative care. This clerkship provides medical students with an overview of geriatric medicine and palliative medicine in the outpatient, inpatient, home care, and/or nursing home settings. A variety of instructional methods are utilized, including clinical experiences and didactic and seminar sessions. In addition to a range of clinical settings and patient experiences, this rotation also involves a range of interdisciplin ary teachers such as nurses, social workers, rehab specialists and chaplains. Teaching and learning across disciplines are key components of both geriatric and palliative medicine.

The Department of Geriatric Medicine also offers a geriatric medicine research elective to medical students where students develop a research project in the field of aging. Basic principles of epidemiology and statistics are demonstrated so that the student is better able to critically assess the medical literature. Other elective course options include a geriatric and palliative medicine clinical experience in outpatient, inpatient, home care, and nursing home settings, and an introduction to clinical, research, and academic experiences in geriatric medicine.

In graduate medical education, JABSOM’s Geriatric Medicine Fellowship Program is one of the four largest fellowship programs in the United States, accredited by the Accreditation Council for Graduate Medical Education (ACGME). To date, there are approximately 191 fellowship graduates, with three additional set to graduate in 2019. All graduates of the program are certified or eligible for specialty board certification in Geriatric Medicine. The program has an excellent geriatric board examination pass rate, many with scores well surpassing the national average. Among the geriatricians practicing in Hawai‘i, it is estimated that over 90% received their training from this program.

For more information on JABSOM’s Department of Geriatric Medicine, visit their website at http://geriatrics.jabsom.hawaii.edu.

**Mixed Support for MAID**

With Hawai‘i becoming the eighth US jurisdiction to pass a MAID law, general support across the United States for MAID is growing; in a Gallup poll, approximately 68% of US adults surveyed agreed that physicians should assist in MAID. This is increased from previous years. Physician support of MAID is mixed. In October 2018, the American Academy of Family Physicians (AAFP), the second largest medical association with
over 130,000 members adopted an official stance of “engaged neutrality.” This means the AAFP supports the physician’s choice to assist patients who request MAID. Other national organizations such as the Academy of Hospice and Palliative Medicine have taken a stance of “studied neutrality”, whereby they encourage members to strive for the best care to alleviate suffering. The American Medical Student Association (AMSA) openly supports aid-in-dying legislation.10

As medical students graduate and gain experience in medicine, many become less certain about the need and morality of assisting patients to intentionally end their lives. Thus, several organizations actively oppose MAID. The largest US medical organization, the American Medical Association firmly opposes MAID stating “Physician-assisted suicide is fundamentally incompatible with the physician’s role as healer, would be difficult or impossible to control, and would pose serious societal risks.”11 The National Hospice & Palliative Care Organization, the largest US organization representing hospice and palliative care, also does not support MAID, stating that their goal remains to focus on improving access to high quality end-of-life care. The organization respects the patient’s choice for self-determination, but does not support the legalization of physician assisted suicide.12

Healthcare organizations have also shown mixed support for MAID. Most health organizations in Hawai‘i have taken a neutral stance regarding MAID. No hospitals in Hawai‘i will allow MAID to occur in the facility, in part due to the complicated nature of the process. Hawai‘i’s law requires that the patient self-administer the end-of-life medication; the physician or healthcare worker cannot take any part in the patient’s ingestion of the lethal medication. Leaving medications at the bedside for patients to self-administer, but where others might also access it, presents unique and unacceptable risks. Uniquely, Kaiser Permanente of Hawai‘i (KPH) is taking a proactive approach and assembled a special team to help patients who request MAID. KPH has designated a MAID attending physician who will serve as a mentor on compassionate end-of-life medical practice for KPH’s patients. KPH also contracted with a psychologist to make available a mental health consultation, as required by law.4

KPH’s support for MAID comes from experience. Data from Kaiser Permanente Southern California (over 4.5 million members) revealed that within the first year of California End of Life Option Act, 379 patients inquired about the option, of those, 176 patients (46%) were eligible to proceed in their first request to their attending physician. Of those who proceeded, 92 (54%) received the end-of-life prescription, and 68 (74%) of those ingested the medication. At each step of the way, approximately half discontinued the process, with many dying due to their illness.13 As these statistics show, less than 20% of those that initially enquired about MAID actually completed the process. It takes great perseverance for patients to navigate through both safety requirements of the process while dealing with a terminal illness. Many of these patients only want the comfort in knowing that if their suffering becomes intolerable that they will have the choice to end their lives.

Conclusion

Several grey areas regarding MAID must be discussed and explored. This includes institutional workplace policies, which are likely to impact the ability to allow MAID at inpatient facilities. Financial issues may also be a concern, as the significant cost of MAID medications is not covered by federal dollars funded via Medicare, Medicaid, or the Veterans Administration. Additionally, understanding the motivations and desires at the end of life, such as caregiver support, or patients’ desire to not want to be a burden on loved ones, may lead to hasty decisions in requesting MAID. Terminally ill patients also need to understand the need for a strong caregiver support to help facilitate the process of MAID since the process is fundamentally patient-led and occurs outside of a healthcare setting.14 Training in geriatric medicine, hospice services, and palliative care will lead to a better understanding of end-of-life care, and hence better care for patients. This includes a thorough understanding of end-of-life options, which may include MAID if requested, as well as, understanding the availability of skilled hospice services and palliative care that are covered by insurance. For many people, hospice services will replace the fear or motivation that leads to a request for MAID.

As more terminally ill patients become aware of and inquire about the Hawai‘i Our Care, Our Choice Act, Hawai‘i’s physicians should be prepared to discuss this option or to refer a knowledgeable consultant. They should help patients make informed choices, while navigating their own personal beliefs and ethical values. Overall it is the goal of physicians and healthcare workers to provide the best care at end of life, as this can be a significant time in one’s life that can be a period to reflect and reconnect with loved ones. Hawai‘i’s MAID law now provides an option for self-determination; however, this choice must be an educated and unbiased choice by the terminally ill patient, knowing palliative care options are available to provide comfort at the end of life.

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References
**Use of Psychotropic Medications by Older Adults Presenting to the Emergency Department After Fall-Related Injuries**

Chad Kawakami PharmD and Deborah Taira ScD

HJH&SW contributing editor of the Daniel K. Inouye College of Pharmacy (DKICP) Scripts column is Jarred Prudencio PharmD, BCACP, BC-ADM. Dr. Prudencio is currently Assistant Professor of Pharmacy Practice, and is a Board Certified Ambulatory Care Pharmacy Specialist with experience in outpatient family medicine and specialty clinics.

**Abstract**

Falls are among the leading causes of morbidity and mortality in older adults in Hawai‘i. According to a recent report, 101 older adults in Hawai‘i died from falls from 2011 to 2015, while another 9,158 had fall injuries resulting in hospitalizations or emergency department visits. Because certain medications can increase the risk of falls, medication reviews should be a component of any fall treatment plan. The purpose of this column is to examine medication interventions attempted before hospital discharge in patients taking psychotropic medications upon admission after a fall. A retrospective review of electronic medical records was conducted for the year 2016. All older adults admitted to a large hospital in Hawai‘i after a fall-related injury who were taking a psychotropic medication were included. During the study period, 19 patients were admitted to the hospital on a psychotropic medication after a fall. Of the 19 patients, 18 (95%) had no change in their psychotropic medication during hospitalization. In 15 patients (79%), EMR documentation did not demonstrate an attempt to review psychotropic medications. The study confirms the need for medication reviews to address potentially inappropriate medications in older adults who are admitted to the hospital after a fall.

**Keywords**

falls, medications, older adults, psychotropic medications

**Introduction**

Hawai‘i ranks eighth in the United States for the percentage of the state population that is aged 65 or older, with 16.5% of the population belonging to this group.¹ Falls are a serious problem for older adults and are one of the primary causes of injury-related death in this age group in Hawai‘i and nationally. Over the 2011 to 2015 period, 101 Hawai‘i residents ages 65 and older died from fall-related causes, while another 9,158 people in this age group with fall injuries were treated at hospitals and emergency departments.² Fall-related injuries continue to be a leading cause of functional decline, hospitalization, and early entry into residential care.³,⁵

Although most falls are multifactorial in etiology, medications play a significant role in increasing the risk of falls. Psychotropic medications are drugs that affect brain activities associated with mental processes and behavior. Psychotropic medications represent an independent modifiable risk factor for falls and should be included in any medication assessment.⁶,⁷ Psychotropic medications can impair mood, decision making, and behavior. Antipsychotics, antianxiety medications, antidepressants, and hypnotic medications are considered psychotropic medications based on the Centers for Medicare and Medicaid Services’ Minimum Data Set 3.0 definitions.⁸ The American Geriatrics Society / British Geriatrics Association Clinical Practice Guideline: Prevention of Falls in Older Persons recommends that those who present for medical attention because of a fall, report recurrent falls in the past year, or report difficulties in walking or balance (with or without activity curtailment) should have a multifactorial fall risk assessment.⁹ The multifactorial fall risk assessment includes numerous medication-related interventions. The medication risk assessment starts with a medication review of all prescribed and over-the-counter medications. Interventions to discontinue or minimize psychotropic medications should be considered as these medications are consistently linked to increased risk for falls.⁷, 10-13

We have heard anecdotally that, upon hospital admission and through discharge, medication reviews and other interventions geared toward eliminating psychotropic medications seldom occur; however, published literature on the topic is scarce. This problem is significant for all health care organizations because patients who have fallen are at high risk for future falls.¹⁴,¹⁵ Therefore, steps must be taken to prevent falls and minimize fall-related injuries. This paper aims to determine if psychotropic medications are being assessed as potential contributing factors to falls and if any intervention is being attempted.

**Methods**

This descriptive study used data from a retrospective review of electronic medical records (EMR) of older adults who presented to the emergency department and were subsequently admitted after a fall-related injury to a single community hospital in Hawai‘i in 2016. The determination of a diagnosis of fall was...
based on the International Statistical Classification of Diseases and Related Health Problems (ICD 10) codes of W00 to W19, as either a primary or secondary diagnosis. This study examined whether any medication assessment or intervention was attempted in order to modify the medication regimen before discharge.

Psychotropic medications were divided into 4 broad categories: antipsychotics, antidepressants, antianxiety medications, and hypnotic medications. The use of psychotropic medications upon admission and on discharge was recorded in detail. Furthermore, documentation on whether any intervention or recommendation for discontinuation or dose adjustments was attempted during the hospital stay was gathered. A medication was considered discontinued only if a patient was taking it upon admission and it was discontinued before hospital discharge.

Demographic and clinical information was also collected to identify and compare relationships between psychotropic medication use, patient characteristics (age, sex, race, comorbidities), and falls. The number of falls was also assessed, with frequent fallers being defined as 2 or more falls in a 6-month timeframe.

All patients aged 65 or older admitted to the hospital after presenting to the emergency department for a fall-related injury with an ICD 10 code of W00 to W19 and prescribed a psychotropic medication were included in this study. Patients who died before discharge, those whose diagnoses fell under ICD 10 codes other than W00 to W19, patients not taking any psychotropic medications, and patients without a full admission were excluded. IRB approval for the study was obtained from the Hawai‘i Pacific Health Research Institute (HPHRI Study Number 2017-095).

Results

Patient Characteristics

The initial review of the EMR was conducted, and 457 patients who presented to the ED with a fall were identified. Of these, 72 patients (16%) were taking psychotropic medications upon presentation to the ED. Nineteen patients were admitted and met the inclusion criteria. Most of the included patients (58%; n = 11) were 80-89 years old. There were more women (n=13) than men (n=6). The most common ethnicities were Asian (47%) and white (42%). Patients’ demographic and clinical characteristics are presented in Table 1. Of the 19 patients, 14 (74%) patients had at least 1 psychiatric comorbidity. Dementia was the most prevalent psychiatric comorbidity with 8 (47%) patients with dementia, and 1 (5%) patient with both dementia and depression. There were also 3 (21%) patients with depression, 1 (5%) patient with schizophrenia, and 1 (5%) patient with anxiety.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-69</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>70-74</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>75-79</td>
<td>3</td>
<td>16%</td>
</tr>
<tr>
<td>80-84</td>
<td>6</td>
<td>32%</td>
</tr>
<tr>
<td>85-89</td>
<td>5</td>
<td>26%</td>
</tr>
<tr>
<td>&gt; 90</td>
<td>1</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>32%</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>68%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>9</td>
<td>47%</td>
</tr>
<tr>
<td>White</td>
<td>8</td>
<td>42%</td>
</tr>
<tr>
<td>Native Hawaiian / Pacific Islander</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Psychiatric Comorbidities</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Dementia</td>
<td>8</td>
<td>47%</td>
</tr>
<tr>
<td>Depression</td>
<td>3</td>
<td>21%</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Dementia + Depression</td>
<td>1</td>
<td>5%</td>
</tr>
</tbody>
</table>

Falls were categorized by the researcher based on the identified cause as documented in the EMR by the admitting physician. A mechanical fall was defined as a slip, trip, or loss of balance. Medical causes of falls include conditions such as hypotension, seizure, and dizziness. Medication-related falls were defined as any fall that can be attributed to a medication side effect. Most falls were classified in the ED as mechanical falls (68%). Medical (26%) and medication (5%) made up the other causes of falls. There was a total of 6 frequent fallers, including 1 patient with a previous admission to the hospital for a fall. Table 2 summarizes the characteristics of the falls.

Several types of psychotropic medications were used by the study population (Table 3). The most common type was antidepressants (74%), followed by antianxiety medications (32%) and antipsychotics (16%). None of the patients were on hypnotics. Patients’ antidepressant medications varied widely, but citalopram was the most commonly prescribed antidepressant. Of the 19 patients, 5 (26%) were taking multiple psychotropic medications.

Twelve patients sustained an injury as a result of their falls (Table 4). Fracture (42%) was the most common injury sustained, followed by subdural hematomas (16%).

In terms of interventions, 4 of the 19 patients had documentation in their EMRs that indicated their medications were reviewed...
Table 2. Cause and Fall History

<table>
<thead>
<tr>
<th>Type of Fall</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>13</td>
<td>68%</td>
</tr>
<tr>
<td>Medical</td>
<td>5</td>
<td>26%</td>
</tr>
<tr>
<td>Medication</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Previous Admission with Fall</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>History of falls</td>
<td>5</td>
<td>26%</td>
</tr>
</tbody>
</table>

Table 3. Psychotropic Medications

<table>
<thead>
<tr>
<th>Psychotropic Medication</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidepressant</td>
<td>14</td>
<td>74%</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Buspirone</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Bupropion</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Citalopram</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Duloxetine</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Mirtazapine</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Trazodone</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Fluoxetine</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Nortriptyline</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>3</td>
<td>16%</td>
</tr>
<tr>
<td>Fluphenazine</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Olanzapine</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Quetiapine</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Antianxiety</td>
<td>6</td>
<td>32%</td>
</tr>
<tr>
<td>Alprazolam</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lorazepam</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Multiple Medications</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Olanzapine + Citalopram</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mirtazapine + Lorazepam</td>
<td>1</td>
<td>26%</td>
</tr>
<tr>
<td>Buspirone + Bupropion + Fluphenazine + Quetiapine + Lorazepam</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Duloxetine + Mirtazapine</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Citalopram + Trazodone</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Type of Injury

<table>
<thead>
<tr>
<th>Injury</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>7</td>
<td>37%</td>
</tr>
<tr>
<td>Fracture not Requiring Surgery</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Fracture Requiring Surgery</td>
<td>6</td>
<td>32%</td>
</tr>
<tr>
<td>Subdural Hematoma</td>
<td>3</td>
<td>16%</td>
</tr>
<tr>
<td>Lung Rupture</td>
<td>1</td>
<td>5%</td>
</tr>
</tbody>
</table>

(Figure 1). Only 1 patient had a medication discontinued (quetiapine), while 3 patients’ medication regimens were reviewed and no changes were made. Fifteen patients (79%) had no documentation in the EMR indicating that any medication assessment was conducted.

Discussion

In 2016, 457 patients presented to the emergency department for falls, a rate of 1.25 patients per day. The findings of the study suggest that most older adults who are admitted to the hospital with a fall-related injury who are taking a psychotropic medication do not have their medications reviewed as a potential contributing factor. Moreover, only one patient had a psychotropic medication changed during the hospitalization following their fall. Even though patients were taking psychotropic medications, many of their falls were attributed by the admitting provider to either mechanical or medical causes, rather than seen as medication-related; however, medication side effects cannot be ruled out as a potential contributing factor. For example, 13 falls were attributed to mechanical reasons such as slips, trips, or loss of balance without mention of possible contributory effect of psychotropic medications. In these 13 events, psychotropic medications may have caused drowsiness, dizziness, cognitive impairment, or slowed reaction times that could either have directly contributed to or served as the root cause of the fall. Medical-related causes of falls may also be directly related to psychotropic medications either through bradycardia, syncope, or orthostatic hypotension.

There could be many barriers that prevent medication interventions designed to reduce fall risk from routinely occurring. Some of those barriers may be related to limited time providers and hospital staff have to fully conduct a comprehensive fall assessment that includes identification of a potential medication-related fall. Secondly if a medication is identified, there may be hesitancy by the hospital provider to discontinue or adjust a medication that was initiated by an outpatient provider. Anecdotally, providers are reluctant to discontinue or adjust medications for an indication that they have not been managing especially without an adequate understanding of the patient’s complete medication history.

Providers often classified falls as mechanical without further documentation about other causes or circumstances that may have been present. Each event should be carefully assessed and analyzed because falls are often multifactorial. Without a complete understanding of the exact etiology of the fall, the patient remains at risk for future incidents especially if medications may be involved. Because it is well established that psychotropic medications play a direct or contributing role in falls, there should be an increased focus on considering psychotropic medications as a possible contributing factor irrespective of the cause of the fall.6,9
In this retrospective study, it was challenging to identify the reason(s) why psychotropic medications were initially prescribed. However, knowing the reason for prescribing the medication is essential in order for clinicians to make an accurate assessment of whether a medication intervention is indicated. Medications should be routinely evaluated for appropriate indication as well as continued efficacy and safety. This review also identified that documentation in EMRs about medication reviews is lacking. It was difficult to determine whether any medication evaluation was conducted and whether the appropriateness of the psychotropic medication was assessed because most patients did not have documentation addressing this topic during this retrospective study. It is possible that other patients did receive a medication evaluation, but it was not adequately documented in the EMR.

A limitation of the study was that the EMR review captured data from a single institution over one year, so the sample size was small. Another limitation was the inability to identify patients’ history of taking a psychotropic medication. Another shortcoming was the inability to review all patients’ outpatient medication histories to identify their indication for taking psychotropic medications, as these drugs may be used for more than 1 indication (eg, duloxetine can be taken for depression or chronic pain). Also, dementia was present in 47% of the patients included in the study. Dementia represented the most common psychiatric illness in the study. Patients with dementia often are unable to articulate their complaints of depression or pain. These symptoms often manifest as behavioral issues that without careful assessment may result in the inappropriate use of psychotropic medications.

**Recommendations for Practice**

These findings may provide opportunities for pharmacists to expand their services by providing comprehensive medication reviews for patients who are admitted for a fall-related injury and entering appropriate documentation. Recommendations from the pharmacist could help bring potential medication issues to a patient’s care team for intervention or could be forwarded to the patient’s primary care provider for further evaluation. In conjunction with providers, pharmacist-led deprescribing initiatives may also help decrease medication-related adverse events by discontinuing medications that may no longer appropriate.

Other pharmacist interventions may include medication education targeted at raising the awareness of patients, families, and caregivers about potential side effects that should be brought to the provider’s attention. Pharmacists should also encourage patients to give each of their providers an updated medication list with each visit. Pharmacists should also be included as a critical member of the institution’s fall committee and as part of a team charged with preventing, managing, and monitoring in-house fall events.

**Conclusion**

Overall, in this retrospective review, 79% of patients admitted to the hospital through the emergency department with a fall while on a psychotropic medication did not have any documented medication review or intervention. Only 1 patient had a medication discontinued. Emergency departments should call on pharmacists to provide comprehensive medication reviews of patients with a fall admission. Pharmacists also can engage with the care team and provider to recommend medication interventions designed reduce falls that may be related to psychotropic drug use, especially in older adults.
References
NEW DETAILS OF THE 2016 HEPATITIS A OUTBREAK
An epidemiological investigation reveals details about the 2016 hepatitis A outbreak in Hawai‘i. The investigation confirmed that scallops imported from a single Philippines distributor by a single restaurant chain were associated with hepatitis A illness and therefore the outbreak’s likely source. Of the 292 confirmed cases, only 2 were pediatric cases. Both were adolescents; one had not received the hepatitis A vaccination and the other had not completed the vaccination series. Researchers, including David I. Johnston, MPH, of the Hawai‘i State Department of Health, also found that during the outbreak, more than 100,000 hepatitis A vaccinations were administered in Hawai‘i, a 3.5-fold increase compared with the same period during 2015. There is a pressing need to invest in global food safety, as well as vaccination campaigns, the researchers wrote. The paper, Public Health Investigation and Response to a Hepatitis A Outbreak from Imported Scallops Consumed Raw—Hawaii, 2016, is published in Epidemiology and Infection.

HEALTH DISPARITIES IN NATIVE HAWAIIAN KŪPUNA
Health disparities typically widen in older age groups, resulting in the increased need for health and long term service and supports (LTSS) in elder populations. Native Hawaiian kūpuna (older adults) face more health disparities than older adults of other ethnic groups. Lead author Colette V. Browne, DrPH, of the Myron B. Thompson School of Social Work, and colleagues conducted a mixed-methods study that included key informant interviews, analysis of survey data, and listening groups. Results showed that kūpuna wanted to age in place with help from their ‘ohana (family), but faced financial barriers. Kūpuna also were unaware of their shorter life expectancy and increased risk of disability. The findings show a need for health education throughout the life course for populations with poor social and health profiles, the researchers wrote. The article, Examining Long-Term Service and Support Needs and Preferences of Native Hawaiian Elders: A Mixed-Method Approach, is published in Aging and Health.

CLINICAL PHARMACISTS HELP PATIENTS REACH HEALTH GOALS
Patients with one or more chronic health conditions who receive education and medication management from a clinical pharmacist may be more likely to reach their health goals. Researchers led by Jarred Prudencio, PharmD, of The Daniel K. Inouye College of Pharmacy, conducted a single-center matched retrospective chart review study of 228 adult patients with diabetes. They found that 40% of the patients who underwent the pharmacist-led comprehensive medication management reached the 3 goals of blood pressure control, HbA1C level control, and being prescribed an evidenced-based statin dose. Just 12% of the patients in the control group reached all 3 goals. The findings show that pharmacists should be integrated into primary care teams, the researchers wrote. The paper, The Effect of Clinical Pharmacist-Led Comprehensive Medication Management on Chronic Disease State Goal Attainment in a Patient-Centered Medical Home, is published in the Journal of Managed Care & Specialty Pharmacy.

THE SIGNALING MOLECULES OF COLITIS-ASSOCIATED CANCER
About 20% of patients with ulcerative colitis develop colon cancer. Certain proteins and cytokines are thought to be involved in this process, but their exact roles are unclear. New research led by Wen-Ming Chu, MD, of the UH Cancer Center, shows that proteins called G protein alpha i1 (GNAI1) and G protein alpha i3 (GNAI3) suppress cancer development in mice with colitis, while a protein called GNAI2 and the cytokine called interleukin 6 (IL6) promote cancer development. Moreover, tissue samples from patients with colitis-associated cancer show that low GNAI1 and GNAI3 levels and high GNAI2 levels are significantly associated with cancer development. The findings suggest that medications that induce GNAI1 and GNAI3 expression or block GNAI2 and IL6 expression could one day prevent or treat colon cancer in patients with colitis. The paper, GNAI1 and GNAI3 Reduce Colitis-Associated Tumorigenesis in Mice by Blocking IL6 Signaling and Downregulating Expression of GNAI2, is published in Gastroenterology.

WHICH SUBGROUPS BENEFIT MOST FROM LONG-TERM METFORMIN?
Among adults at high risk of developing type 2 diabetes mellitus (T2DM) who take metformin, those who benefit most from the drug include those with higher baseline fasting glucose levels, those with higher baseline HbA1c levels, and women with a history of gestational diabetes mellitus (GDM). The 15-year study included more than 2100 adults and was conducted by the Diabetes Prevention Program Research Group, which includes Marjorie K. Leimomi Mala Mau, MD, MACP, FRCP, and John S. Melish, MD, FACP, both with the John A. Burns School of Medicine. Among women with a history of GDM, metformin prevented 4.6 cases of T2DM over 100 person-years, compared with preventing 0.4 cases over 100 person-years in parous women without a history of GDM. The paper, Long-term Effects of Metformin on Diabetes Prevention: Identification of Subgroups That Benefited Most in the Diabetes Prevention Program and Diabetes Prevention Program Outcomes Study, is published in Diabetes Care.

RISK FACTORS FOR MILD COGNITIVE IMPAIRMENT IN CHINESE OLDER ADULTS
Among Chinese older adults, the risk of mild cognitive impairment (MCI) is strongly associated with older age, lower educational levels, poorer economic status, and multiple chronic diseases. People with MCI are at risk of progressing to Alzheimer disease or other types of dementia. Researchers including Yuanan Lu, PhD, with UH Public Health, conducted household surveys with 622 adults ages 65 and older living in Wuhan, a city in central China, and showed that overall, 34.1% of participants had MCI. Those with 2 chronic diseases were nearly twice as likely, and those with 3 or more chronic diseases were nearly 2.5 times more likely to have MCI compared with those with no chronic diseases. The study emphasizes that MCI-related health promotion measures are needed in developing countries to target vulnerable populations. The paper, Correlates of Mild Cognitive Impairment of Community-Dwelling Older Adults in Wuhan, China, is published in International Journal of Environmental Research and Public Health.
EUROPEAN DOCTORS ARE DEPARTING ENGLAND’S SHORES.

BREXIT is the portmanteau describing separation of the United Kingdom (UK) from the European Union (EU). Apparently powerful elements within the UK regard working within regulations of the EU as unfair or counter-productive. A significant result of this pending separation is the loss of EU doctors who enjoyed working in Britain, according to the Wall Street Journal. One prominent Italian surgeon, Paolo Mulesan, who performed about 1000 operations in his 26 years in the UK is returning to Italy because of Brexit. “I’m disappointed that the European dream of living in a borderless world, has failed,” Mulesan told the Wall Street Journal. The result of Brexit, hitting in March 2020 is fueling a departure of European workers, worsening labor shortages in industries where native Brits with right skills are in short supply. The impact is especially felt in health care that is dominated by the NHS (National Health Service). Treasured as a pillar of national life, the effect has been acute in some areas of specialized care. Data from the UK’s General Medical Council show that specialist physicians with EU membership dropped to an eight-year low of 10,487 in 2018, the Journal reported. Around 10% of NHS doctors in 2017 were from EU countries, with some specialties percentages higher; ophthalmology 25%, surgery 18%. The result for health care in the UK might be devastating. In the cardiac unit of Dr. Mulesan, one surgeon remarked, “This department is full of people from all over the world, and they are fantastic surgeons. Should they leave, it would be such a loss.” For the National Health Service, the outflow is intensifying and medical professionals expect it to get worse, according to the Journal.

HOORAY, IT’S GONE. LIAR, LIAR. PANTS ON FIRE.

As noted in the Wall Street Journal, in year 2000 the Centers for Disease Control and Prevention (CDC) announced that the infectious disease measles was now history in the United States. So what happened to a disease that had been eliminated? Medical science in New York and various spots in the United States were over-ruled by gossip and rumor. An otherwise intelligent Jewish population in New York City had been told not to take the vaccine, while in Minnesota and Washington state religious and “personal convictions” were used as reasons to reject the vaccine. The latest outbreak of measles is in Clark County Washington, across the Columbia River from Portland, with 53 confirmed cases for a total of more than 839 nationwide in this worst outbreak since 1994. Almost all of the sick children had not received the recommended injections of MMR vaccine, the measles, mumps, rubella package that provides protection from these ugly viruses. Some states require MMR vaccine for all children starting first grade.

THANK YOU. I’D LIKE A GLASS OF WINE.

For those who enjoy a cocktail at sundown at day’s end, the year 2018 brought sobering news. Media headlines delivered the message that Alcohol – in any amount—is bad for your health. A team, led by researchers at the University of Washington, tried to get a snapshot of the world’s health if alcohol was out of the picture. The group considered 23 health problems caused or exacerbated by booze, including tuberculosis, auto accidents, diabetes and various cancers. In a completely sober world there would have been 2.8 million fewer deaths in 2016 alone as reported in September 22 Lancet. The study combined with another this year seemed to contradict the reassuring notion that an occasional drink might be good for you. People who consumed more than seven drinks per week (one drink is 12 ounces of beer, five ounces of wine or 1.5 ounces of distilled spirits) increased the risk of stroke, heart failure, ruptured aneurysm or other problem more than the occasional drinker. A direct connection exists, the more booze imbibed, the greater risk of an early death. So to hear the line, “Having a glass of wine presents a small risk, but I enjoy it.” OK, that’s fine but get away from thinking that’s it is therapeutic.

ONCE AGAIN, THE EYES HAVE IT.

During anesthesia, the behavior of the iris is an aid in determining the depth of narcosis. In Stages I and II the pupil is generally dilated due to emotional stress. In Stage III, the stage of surgical anesthesia, the pupil constricts and becomes smaller than normal. Stage III of surgical anesthesia is often divided into four planes, according to the depth of the narcosis. Stage IV, which heralds medullary paralysis and death is generally ushered in with dilation of the pupils. Provided no morphine or other drugs have been given beforehand, the behavior of the pupil is an excellent guide for the experienced anesthetist.

SPOCK IS THE ROCK FOR INFANT CARE.

Benjamin Spock was a successful New York pediatrician with a background in psychology when he was approached by Pocket Books about writing a childcare book for new mothers. He had previously refused an offer from Doubleday because he was inexperienced and believed he could not write a good book. The editor of Pocket Books reassured him it would not have to be a good book and would sell for about 25 cents. With that reassurance he accepted the offer and wrote The Pocket Book of Baby and Child Care. He began with the admonition “Trust Yourself.” His warm, appreciative tone was what new parents needed. He was careful not to be alarming and said to always listen to your common sense. His book has become the second best selling book in American history, second only to the Bible. It has sold an average of 1 million copies annually since it was first published in 1964. His popularity remained even during the years he protested America’s actions in the Vietnam War. Anyone born in the United States in the last 45 years has a good chance of being a Spock baby.

ADDENDA

- “Bake and Shake:” Slang expression for cremation followed by scattering ashes.
- Douche : a female dune.
- Parakeet is a bird that takes care of you until the real keet arrives.
- Underneath this flabby exterior is an enormous lack of character.
- If there is another way to skin a cat, I don’t know it.
- Only two things are infinite, the universe and human stupidity, and I am not too sure about the former (Albert Einstein).
- Parenthood remains the greatest single preserve of the amateur.

ALOHA AND KEEP THE FAITH rts

(Editedment comment is strictly that of the writer.)
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, 26%, not 26.7%), to avoid the appearance of a level of precision that is not present.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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