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AVOIDING OPIOIDS AND THEIR HARMFUL SIDE EFFECTS IN THE POSTOPERATIVE PATIENT: EXOGENOUS OPIOIDS, ENDOGENOUS ENDORPHINS, WELLNESS, MOOD, AND THEIR RELATION TO POSTOPERATIVE PAIN

Bradley C. Stephan MD and Fereydoun D. Parsa MD

63

RETINOPATHY OF PREMATURE AND ETHNICITY IN HAWAI'I: A RETROSPECTIVE STUDY (1996 – 2006) OF MEDICAL RECORDS FROM KAPI'OLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

Lynne Mackin Wolforth PhD; Sherry W. Loo MD; and Sneha L. Sood MD

68

PILIWAIWAI: PROBLEM GAMBLING IN HAWAI'I

Robin-Marie Shepherd PhD

73

MEDICAL SCHOOL HOTLINE

Liaison Committee on Medical Education Accreditation, Part V: Clerkship Education

Kyra A. Len MD; Sheldon Riklon MD; Linda J. Anegawa MD; Lawrence P. Burgess MD; Gretchenjan C. Gavero DO; Karen T. Lubimir MD, DMD; Jill S.M. Omori MD; Michael C. Savala MD; Royce T. Shimamoto MD; Gregory A. Soares MD; Damon H. Sakai MD

78

INSIGHTS IN PUBLIC HEALTH

The Current State of Sexual Health Education in Hawai'i Public Schools

Kathleen Johnson RDN

82

THE DANIEL K. INOUE COLLEGE OF PHARMACY SCRIPTS

Transition from Traditional to Western Medicine in Hawai'i (Part 1)

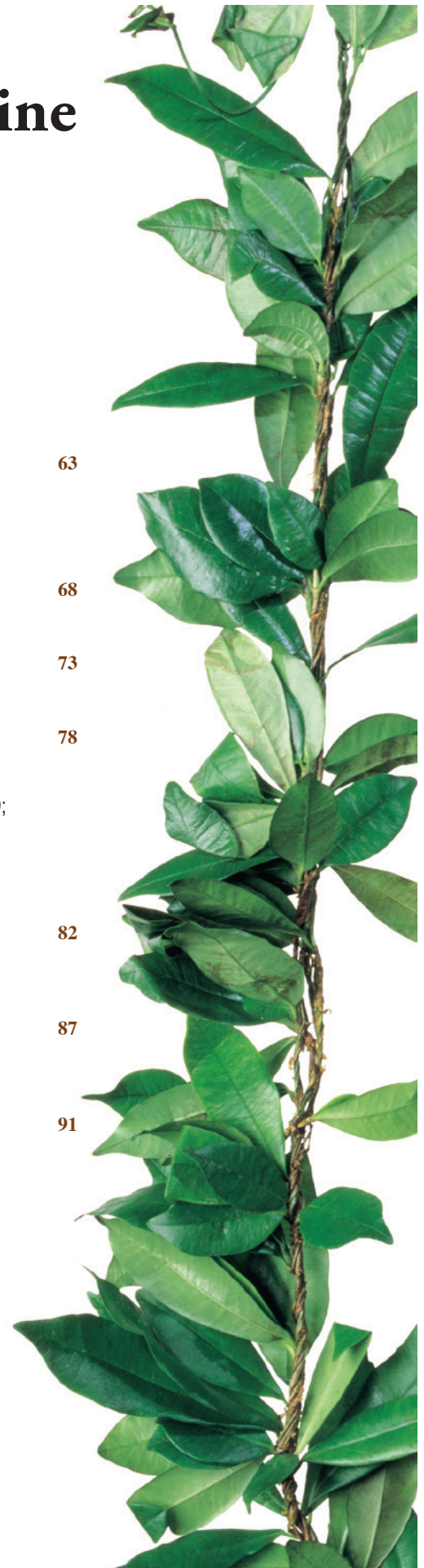
Helen Wong Smith MLIS, CA

87

THE WEATHERVANE

Russell T. Stodd MD

91



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Avoiding Opioids and Their Harmful Side Effects in the Postoperative Patient: Exogenous Opioids, Endogenous Endorphins, Wellness, Mood, and Their Relation to Postoperative Pain

Bradley C. Stephan MD and Fereydoun D. Parsa MD

Abstract

Prescribed opioids are routinely used for many postoperative patients. However, these medications have daunting adverse effects on the body's innate pain management system – the action of the beta-endorphins. The prescribed opioids not only severely impair the function of the mu-opioid receptors, but also inhibit the release of beta-endorphin. This is unfortunate, because beta-endorphin appears to be a much more potent agonist of the mu-opioid receptor than opioids. In addition, beta-endorphin indirectly elevates dopamine, a neurotransmitter related to feelings of euphoria. Therefore, by prescribing opioids, practitioners may inadvertently prolong and increase the overall intensity of the postoperative patients' pain as well as herald anhedonia. This article highlights the relationships between prescribed (exogenous) opioids, beta-endorphins, mu-opioid receptors, wellness, mood, and postoperative pain. The role of patient education, opioid alternatives, and additional recommendations regarding pain control in the postoperative patient are also discussed.

Keywords

beta-endorphin, opioid, non-opioid, postoperative pain, mu-opioid, wellness

Introduction

Prescription opioid analgesic (hydrocodone, oxycodone, morphine, hydromorphone, etc.) use in the United States has significantly increased within the past two decades.¹ Similarly, so has the rate of opioid analgesic-related deaths.¹⁻³ It is estimated that the number of mortalities attributable to opioid analgesics has more than tripled since 1999.³ This has reached near epidemic proportions with an estimated 16,651 deaths attributable to opioid analgesics in 2010¹ and an estimated 16,235 deaths due to opioid analgesic prescriptions in 2013.⁴ This slight decrease in the annual death rate due to opioids is directly proportional to the number of prescriptions for these medications as physicians attempted to curtail opioid abuse.¹ However, the sheer number of deaths related to opioids remains astounding.

Opioid analgesics have other significant adverse effects including nausea, vomiting, constipation, excessive sedation, clouded sensorium, dizziness, respiratory depression, and addiction.^{5,6} Unfortunately, many patients suffer with these side effects in a futile attempt to control their pain. Moreover, by using opioids, some patients experience paradoxical hyperalgesia due to a relatively poorly understood mechanism of opioid-induced neural plasticity changes in the peripheral and central nervous systems, which may lead to sensitization of the pain pathways.⁷ The harmful effects of opioids have prompted much research into non-opioid modalities for pain control. However, few clinicians possess a thorough understanding of the interplay between opioid medications, endogenous beta-

endorphins, wellness, mood, and postoperative pain control. The purpose of this article is to review the interplay of these factors, illustrate the importance of limiting opioids, and discuss non-opioid modalities for post-operative pain control.

Beta-Endorphins

In order to better understand the interplay between endogenous endorphins, exogenous opioids, mood, wellness, and postoperative pain, it is important to have a basic understanding of our body's production and utilization of endogenous endorphins – specifically the beta-endorphins.

The hypothalamus releases corticotrophin-releasing hormone (CRH), a peptide hormone and neurotransmitter, from the periventricular nucleus in response to stress. The “stressor” may take various forms. For the purposes of this review, we will focus on postoperative pain as the primary stressor. Once CRH is released from the periventricular nucleus of the hypothalamus, it travels through the hypothalamo-hypophyseal portal system into the anterior pituitary gland. Here, CRH stimulates basophilic cells to cleave protein proopiomelanocortin (POMC) into smaller proteins – beta-endorphin, alpha-melanocyte stimulating hormone (MSH), and adrenocorticotropin (ACTH).⁸ Each one of these have specific target receptors, and therefore, different physiologic effects. If there is an over-accumulation of these POMC byproducts, feedback inhibition ensues and the hypothalamic production of CRH is halted.⁸ Of note, cells of our immunologic system are also capable of producing smaller amounts of beta-endorphin.⁹

The primary action of beta-endorphin is to serve as an endogenous ligand for the mu-subtype opioid receptor. This is the same receptor site on which synthetic opioids exert their effects. In the peripheral nervous system, beta-endorphins bind to mu-opioid receptors on both pre-synaptic and post-synaptic nerve terminals.⁸ Binding leads to activation of the receptors, and resultant disinhibition of the presynaptic release of gamma-Aminobutyric acid (GABA). In turn, GABA inhibits the release of substance P, a tachykinin protein involved in the transmission of pain.^{8,10} In the central nervous system, beta-endorphins bind mu-opioid receptors at the presynaptic nerve terminals and inhibit the release of GABA. Since GABA normally inhibits the release of dopamine, the binding of beta-endorphin to these receptors indirectly results in an overproduction of dopamine – the neurotransmitter primarily associated with the feeling of pleasure and motivation.^{8,11} Thus, the overall effect of beta-

endorphin is to decrease pain and to help produce a sense of wellbeing in response to a stressor.

Exogenous opioids halt production of beta-endorphins as well as down-regulate and impair the function of mu-opioid receptors.^{8,12-14} The profound effect of exogenous opioids on the production of beta-endorphins and the expression/alteration of mu-opioid receptors leads to tachyphylaxis. Interestingly, studies have suggested that beta-endorphins are 18 to 33 times more potent analgesics than morphine.¹⁵ Therefore, counterintuitively, the administration of exogenous opioids may lead to the prolongation and overall increased intensity of postoperative pain. In addition, these opioids do not target the inflammatory response, the usual underlying cause of patients' discomfort.¹⁶

Wellness

The definition of the term "wellness" is controversial. The general consensus is that wellness does not solely entail the absence of disease, but rather the full realization of an individual's potential as related to social, occupational, spiritual, physical, intellectual, and emotional aspects of their life.¹⁷ Regarding emotional wellness, dopamine levels are inversely proportional to depressive behavior.¹⁸ Activation of the mu-opioid receptors in the central nervous system leads to a dopamine excess, and a feeling of relative euphoria.^{8,19} The acute administration of exogenous opioids *can* produce a short-term feeling of euphoria due to the indirect overexpression of dopamine. However, at the same time, exogenous opioids inhibit the production of beta endorphins (via down-regulation of POMC), as well as downregulate mu-opioid receptors.^{8,12,20} This leads to a relative paucity of dopamine resulting in a depressive mood and lack of "wellness". Additionally, exogenous opioid administration often leads to poor physical wellness due to the numerous side effects of opioids.

The Role of Patient Education

Exogenous opioids can have incredibly deleterious effects on an individual's physical and mental state via derangements of beta-endorphin production and mu-opioid receptor function. Therefore, it behooves practitioners to discuss manners to limit exogenous opioid use with their patients.

In 2013, Sugai, Deptula, Parsa, and Parsa demonstrated how effective communication in the preoperative setting can significantly reduce postoperative opioid use. The authors demonstrated that 90% of patients who received preoperative oral and written education concerning the body's response to pain (and how endogenous endorphins cause natural analgesia) declined a hydrocodone prescription preoperatively, and did not request opioids postoperatively. Moreover, it was demonstrated that the patients who received this education reported lower postoperative pain scores. The authors concluded: "By empowering the patient with a sense of control and proper education, it is possible to minimize and in many instances eliminate the use of opioid analgesics."²¹

Opioid Alternatives

Due to the harmful side-effects of opioids, many practitioners have decided to forgo the excessive use of these medications and pursue non-opioid modalities for postoperative pain control—often acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs)/cyclooxygenase-2 (COX-2) inhibitors, gabapentin, local anesthetic infusion pumps, paravertebral or transverse abdominis plane nerve blocks, long-acting local anesthetics, botulinum toxin, as well as various combinations of these non-opioid modalities. Numerous articles regarding non-opioid methods of pain control for various patient populations or patients undergoing various procedures have been published. General consciousness supports the use of these non-opioid alternatives in light of the potential side effects of the opioids. However, the practitioner must be careful to not generalize one modality of pain control for all of their postoperative patients. The practitioner must also be aware of the potential adverse effects of these non-opioid analgesics, and weigh the risks and benefits for individual patients.

Acetaminophen is believed to raise the pain threshold via inhibition of isoforms of cyclooxygenase, primarily in the central nervous system.²²⁻²⁴ The IV form of acetaminophen provides the most predictable bioavailability in comparison to the oral and rectal forms.^{24,25} Studies have demonstrated decreased opioid use in patients treated with both acetaminophen and morphine; however, literature has often been unable to demonstrate a decreased incidence in opioid-related adverse effects in these patients.²⁶⁻²⁸ Numerous studies have been conducted which depict the efficacy of acetaminophen for pain control. A meta-analysis performed by De Olivera et al showed that a single preventative dose of systemic acetaminophen significantly decreased postoperative opioid consumption as well as postoperative nausea and vomiting.²⁹ Acetaminophen has minimal adverse side effects when used as recommended by the Food and Drug Administration (FDA),^{30,31} and therefore, has been a common modality for postoperative pain management.

Nonsteroidal anti-inflammatory drugs (NSAIDs) act primarily by inhibiting the activity of both cyclooxygenase-1 (COX-1) and cyclooxygenase-2 enzymes (COX-2), and thereby produce analgesic, antipyretic, and anti-inflammatory effects by inhibiting prostaglandin synthesis.^{24,32} NSAIDs have proven to be efficacious and associated with significantly decreased opioid use in postoperative patients.³³⁻³⁵ However, the nonselective NSAIDs have been associated with significant gastrointestinal, cardiovascular, renal, and coagulopathy adverse effects.^{36,37} Selective COX-2 inhibitors have been developed to reduce gastrointestinal bleeding associated with the nonselective NSAIDs and have been shown to reduce, but not eliminate, the risk for gastrointestinal bleeding.³⁸ This is in part due to an almost negligible effect on platelet function (in contrast to the nonselective NSAIDs).³⁹ However, the COX-2 inhibitors are associated with an increased risk for myocardial infarction, stroke, and renal failure.^{40,41} Given the strong correlation be-

tween the administration of NSAIDs and the reduction of opioid use, combined with the decreased incidence of gastrointestinal bleeding associated with the COX-2 inhibitors, we have added celecoxib to our multi-modality non-opioid management of postoperative pain in the majority of our patients. However, caution must be used to not administer COX-2 inhibitors to patients at higher risk for myocardial infarction, stroke, or renal failure.

Gabapentin is a widely used antiepileptic drug which has been shown to have analgesic effects, possibly related to regulation of arachidonic acid, nitrenergic, and serotonergic systems.⁴² This medication has been used extensively for the treatment of neuropathic pain, epilepsy, and restless leg syndrome, with the majority of literature citing dizziness and somnolence as the primary side effects.^{43,44} Regarding perioperative opioid consumption, a meta-analysis of 12 randomized controlled trials consisting of 896 patients undergoing a variety of surgical procedures was performed by Hurley, et al. Their findings demonstrated a significant decrease in opioid use in patients who received between 300 and 1200 mg of gabapentin within one to two hours prior to the operation.⁴⁵ However, the study failed to show a significant decrease in postoperative nausea, vomiting, or lightheadedness in these patients, and a significant increase in postoperative sedation was observed in the gabapentin group.⁴⁵

The efficacy of local anesthetic infusion pumps (“pain pumps”) appears to vary greatly with location of placement. For example, the use of pain pumps has not been shown to significantly decrease the amount of postoperative opioid use, or opioid-related side effects in patients undergoing abdominoplasty, open acromioplasty, or rotator cuff repair.^{46,47} However, these pain pumps have been shown to be extremely efficacious in lowering the overall opioid consumption in patients undergoing other procedures such as breast reconstruction after mastectomy, thoracotomy, open-heart surgery (when 0.5% bupivacaine was used), and open inguinal hernia repair.⁴⁸⁻⁵¹ Overall, pain pumps have been associated with a relatively low complication rate, with pump failure being the primary complication.⁵²

Thoracic and lumbar paravertebral nerve blocks have often been demonstrated to be efficacious in the immediate postoperative period regarding pain control for various procedures, resulting in decreased opioid use and decreased postoperative nausea and vomiting.⁵³ However, in a study of 620 adults and 42 children, Naja and Lonnqvist reported a 6.1% failure rate in adults (none in the children), 6.8% rate of vascular puncture, 4% experienced hypotension, 1% had epidural or intrathecal spread of the anesthetic, 0.8% had pleural puncture, and 0.5% suffered from a post procedural pneumothorax.^{54,55} Thus far, transversus abdominis plane block has shown promise; however, additional evidence is necessary in order to determine its true efficacy and complication rates. Similarly, the use of long-acting liposomal bupivacaine local anesthetic and botulinum toxin for postoperative pain relief require additional research.

The authors of this article have extensive experience involving pre-operative administration of gabapentin and celecoxib

as well as pre-operative and intra-operative administration of long-acting local anesthetic for patients undergoing various plastic surgery procedures.^{5,56,57} These non-opioid modalities of postoperative pain control have resulted in significant limitation of post-operative opioid administration for patients undergoing extensive abdominal wall reconstruction, sub-pectoral breast augmentation, and other aesthetic operations. One of the authors has been able to forgo the use of opioids in almost all of his patients undergoing various plastic surgery procedures—for approximately the last 10 years.

Discussion

Exogenous opioids are commonly, almost routinely, provided in the immediate postoperative period after numerous types of surgeries. Unfortunately, these medications are not without significant adverse effects. Per our ongoing studies and literature review, opioids appear to increase the overall intensity and duration of post-operative pain by inhibiting the body’s production of endogenous beta-endorphins, as well as down-regulating the expression of and inhibiting the function of mu-opioid receptors. These opioids also indirectly limit the action of dopamine in the central nervous system, leading to a feeling of anhedonia.

Exogenous opioids effectively inhibit the body’s innate pain management system—a system which has been postulated to be more potent than prescribed opioids. Therefore, escalating doses of opioids are often used for pain control. This further impairs the action of beta-endorphin. Unfortunately, additional research is needed to fully understand how we may promote the body’s production and response to endogenous beta endorphin.

The many adverse effects of opioids has prompted numerous practitioners to seek alternatives for pain control in the post-operative patient. Additional research into non-opioid manners of pain control is needed and forthcoming. Tremendous results regarding postoperative pain control while eliminating opioid use in patients after various plastic surgery procedures have been experienced by the authors of this article.^{5,21,56} It has been shown that postoperative opioid use may be significantly reduced, and often completely eliminated, for procedures that historically require a substantial amount of postoperative opioid analgesia (i.e. subpectoral breast augmentation).

The primary advantage of eliminating the use of opioids for postoperative pain control appears to be avoidance of the common negative side effects of opioid analgesics. In addition, patients who do not use opioids are often more pleased with their overall postsurgical wellness in our experience. We believe that the profound impacts of beta-endorphin are often underscored in literature. Based on our research, the following guidelines should be implemented to achieve adequate opioid-free postoperative pain control:

- (1) The patient must be provided adequate preoperative verbal and written education concerning the rationale for eliminating the use of opioids in the perioperative period.
- (2) The preoperative and intraoperative use of local anesthetic is strongly recommended.

- (3) Preoperative use of gabapentin and celecoxib (in appropriate-risk patients) is advised.
- (4) The practitioner should avoid intraoperative use of opioids in order to preserve the effects of endogenous beta-endorphins.
- (5) Avoidance of postoperative opioid use is strongly recommended.

Limitations

A limitation of this article includes a lack of case-control analysis. This article's principal focus is expert opinion and literature review. The purpose of this article is to acquaint the reader with the relationship between opioid analgesics, beta endorphins, mu-opioid receptors, postoperative pain, and patients' sense of wellness, as well as describe various opioid alternatives for the operative patient. Another limitation of this article is that our research focuses primarily on non-opioid reduction of postoperative pain in patients undergoing plastic surgery procedures, which may limit the generalizability of our study. Also, additional research regarding opioid-free modalities of postoperative pain management are needed.

Conflict of Interest

The authors report no conflict of interest.

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Retinopathy of Prematurity and Ethnicity in Hawai'i: A Retrospective Study (1996 – 2006) of Medical Records from Kapi'olani Medical Center for Women and Children

Lynne Mackin Wolforth PhD; Sherry W. Loo MD; and Sneha L. Sood MD

Abstract

The objective of this research was to identify risk factors for Retinopathy of Prematurity (ROP) in Hawai'i's ethnically unique population, with a focus on ethnicity. The study design focused on a 10-year retrospective chart review of neonates at Kapi'olani Medical Center in Honolulu, Hawai'i. Results showed that 23.3% of infants of Native Hawaiian and/or Pacific Islander ethnicity (NHPI) developed ROP. Necrotizing enterocolitis, intraventricular hemorrhage, and the severity of respiratory disease were significantly related ($P < .001$) to the incidence and severity of ROP. In a multiple logistic regression model, gestational age, birth weight, bronchopulmonary dysplasia, and postnatal steroids were significant predictors ($P < .001$) for presence of ROP. Significant predictors for severe ROP included gestational age ($P < .001$), birth weight ($P = .001$), postnatal steroids ($P = .001$), necrotizing enterocolitis ($P = .025$), and NHPI ethnicity ($P = .004$). Further research is recommended.

Keywords

retinopathy of prematurity, retrospective review, co-morbidities of prematurity, multiple logistic regression

Introduction

Retinopathy of prematurity (ROP) is a developmental vascular disorder of the retina. It is characterized by abnormal growth of retinal blood vessels and can result in disease that is mild and spontaneously resolves, or in progressive disease that can cause retinal detachment and blindness. Normal growth of retinal blood vessels begins at approximately 16 weeks gestation and is completed between 35 and 44 weeks postmenstrual age. If an infant is born prematurely before these blood vessels have reached the edges of the retina, normal vessel growth may be affected resulting in ROP.¹

ROP was first recorded in 1942. ROP incidence decreased in the late 1950s and early 1960s following the publication of research results identifying oxygen exposure at more than 40% as a causal factor. With advances in neonatology and the increased survival of premature infants, ROP incidence increased in the 1970s. At the time, there were no agreed upon criteria for measuring the progression of ROP or when to begin intervention, leading to wide frustration among pediatric professionals. Consequently, an international group of ophthalmologists and the National Eye Institute published new and effective criteria in 1984.¹ As part of the same effort to reduce ROP, a large multi-center research project was conducted (CRYO-ROP Study Group).²⁻⁶ The CRYO-ROP Study Group identified multiple contributing factors that were associated with ROP, the most important of which were early gestational age (GA), low birth weight (BW), oxygen exposure, and ethnicity.^{2,3,6,7}

With regard to ethnicity, the CRYO-ROP Study Group found a decreased incidence of progression to severe ROP in black infants when compared to white infants.^{2,3,6-8} No uniform results, however, have emerged from further research into ethnicity and ROP. In two studies of Alaska Native people, as well as in a small group of Asian neonates, there was an increased incidence of severe ROP.^{9,10} In studies of Asian groups there was no statistical difference in the incidence or severity of ROP in infants of Asian ethnicity.^{9,11,12} However, Aralikatti, et al, found that Asian and black infants had a higher risk of developing threshold ROP compared to white infants in the United Kingdom.¹³ Hispanics showed no significant difference in the risk of ROP, although a greater incidence was attributed to their lower birth weight and gestational age at birth.¹⁴

The relationship between ethnicity and severe ROP is of interest given the findings by the CRYO-ROP Study Group which found that infants of certain ethnicities were less likely to progress to threshold ROP. With a condition like ROP that develops after birth and must be managed by a watch and wait methodology, factors that may result in the spontaneous resolution of a condition are worth exploring. Moreover, ethnicity is a risk factor of particular interest given Hawai'i's unique and varied ethnic population. The study of ROP in Hawai'i provides an opportunity for comparison with both Western and foreign studies that have more homogeneous populations.¹⁵⁻¹⁸

Materials/Subjects and Methods

Subjects

Kapi'olani Medical Center (KMC) for Women and Children (Honolulu, Hawai'i) is located in Honolulu, Hawai'i. It is Hawai'i's only children's hospital and the state's only 24-hour pediatric emergency room and pediatric intensive care unit.

Cases for this study were extracted from the "Neonatal Summary Note" captured in Karelink, an electronic database maintained by KMC for billing purposes. Each case drawn from the database was validated against their paper chart. A case was selected if the child fit the following criteria: (1) admitted or transferred between January 1, 1996 and December 30, 2006; (2) gestational age of ≤ 32 weeks or weighing < 1500 grams; and (3) if the subject reached 35 days of life (DOL). Cases were excluded if: (1) the subject was transferred out of Hawai'i; (2) if either GA or BW were missing or undeterminable. Data collection was approved by the Western Institutional Review Board.

Description of Variables

GA in completed weeks was collected from an inspection of medical records. This variable was derived from a comparison of chart values, which included gestational age in weeks plus days and gestational age by Ballard Maturational Assessment. If the value of any of these differed by more than two weeks, the chart was evaluated by one of our team doctors in order to determine the most accurate figure.

Ethnicity was derived from self-reported labels used in the KMC medical records. The wide variety of labels that appeared in the records was collapsed into the following categories for use in this research: Asian Mixed, Caucasian, Filipino, Native Hawaiian & Pacific Islander (NHPI), and Others/Unknown. NHPI included the self-reported categories found in the medical record of Hawaiian, Part Hawaiian, Pacific Islander, Other Pacific Islander, Marshallese, and Samoan. Others/Unknown was a category collected by KMC and was retained as a viable category.

ROP was coded as present for any noted classification of ROP. ROP classification was based on position (zone), severity (stage), and extent (clock hours); and also includes whether or not there is “plus disease” (tortuosity of vessels) present. Serial eye examinations are necessary to identify and monitor the progression of ROP and to determine which neonates will become candidates for further treatment. Treatment recommendations are made based on threshold disease, which is defined as stage 3 with plus disease in zone 1 or zone 2, or 5 contiguous, or 8 cumulative clock hours of plus disease.¹ Treatment is usually either cryotherapy or laser therapy, which stops the process of abnormal vascular growth in the retina. The KMC medical record used in this study did not record in a consistent way the diagnosis of threshold disease. Therefore, the treatment recorded—in this case the presence or absence of treatment (either cryotherapy or laser therapy)—was used as a surrogate for severity of ROP.

The study controlled for two other factors: (1) general illness of the infant and (2) the types of treatment administered. The illness variables used were four co-morbidity variables. These included respiratory distress syndrome (RDS), bronchopulmonary dysplasia (BPD), necrotizing enterocolitis (NEC), and intraventricular hemorrhage (IVH). Three measures of treatment that might change the course of ROP included antenatal steroids and postnatal steroids, and whether or not an infant was discharged on nasal cannula oxygen.

Data Analysis

All analyses were performed with PASW/SPSS statistical software, version 23 (IBM SPSS).

Univariate analysis of risk factors and co-morbidities in relation to the presence/absence of any stage ROP and also between severity of ROP were conducted using Chi-square (χ^2) and Student's *t* test as appropriate with statistical significance at $P < .05$. All variables were binary except GA and BW, which

were continuous. GA was used as completed weeks and BW as grams. A categorical GA was created for univariate analysis (See Table 1).

The variables identified as significant at $P < .05$ in univariate analyses were entered into a multivariate logistic regression model. Logistic regression analysis was employed to predict the probability that an infant would have ROP or be treated for severe ROP. A model was constructed using an iterative maximum likelihood procedure. A process of refitting was performed with individual predictors deleted and verified at each stage. The fit of the models was checked with the Hosmer-Lemeshow goodness-of-fit statistic. The predictor variables used were GA, BW, RDS, BPD, surfactant, postnatal steroids, NEC, IVH, and ethnicity. In the first model, RDS, surfactant, IVH, and ethnicity were not significant so they were not used in the final analysis. However, ethnicity was retained as a variable because it is of primary interest.

Results

Descriptive Analysis

There were 1525 cases that met the criteria for selection (Table 1). The mean birth weight was 1312 g and the mean GA was 29 weeks. The ratio of male to female was about the same at 1.14:1 (data not shown). Of the 1525 cases, 19.9% (303) were diagnosed with ROP. An independent-samples *t*-test was conducted to compare the mean birth weight or mean gestational age for infants diagnosed with ROP and those without. There was a significant difference in mean gestational age for ROP infants compared to non-ROP infants ($P = .012$). Similarly there was a significant difference in the birth weight of ROP infants compared to non-ROP infants ($P < .001$). The same appeared to be true for those treated for severe ROP although they make up only 3.74% (57) of the study population.

A large proportion of the subjects were NHPI (521 of 1525 = 34.2%) (Table 2). Also, 19.8% of NHPI infants were in the earliest GA category (23-26 weeks), and 28% of NHPI infants were in the smallest BW category (0-1000 g). However, no significant differences in GA ($P = .068$) or BW ($P = .179$) were observed by ethnicity.

ROP occurred in similar proportions across all ethnic groups ($P = .068$), whereas severe ROP varied significantly by ethnicity ($P = .002$), with NHPI infants accounting for most of the cases (59.6%) (Table 3).

An explanation of the relationship between severe ROP and ethnicity benefited from an exploration of the general illness of an infant. NEC was used as one measure of infant illness. Overall, 26.5% of NHPI infants with ROP were treated for NEC compared with 17.4% of all other infants ($P < .001$) (Table 4). Finally, because of the recognized association between ROP and oxygen, we examined the proportion of NHPI infants with BPD. Ninety seven percent of NHPI infants with severe ROP were treated for BPD compared to 87% of other infants ($P < .01$).

		N 1525 ^a	Mean	Standard Deviation	t-value	Degrees of Freedom	Significance (P)
Gestational Age Mean = 29 weeks	No-ROP	1219	30.23	2.01	32.25	1520	.012
	Yes-ROP	303	26.17	1.74	35.17	531.42	
	No-Severe ROP	1441	29.59	2.4	14.42	1496	< .001
	Yes-Severe ROP	57	24.96	1.2	26.58	74.44	
Birth weight Mean = 1312 g	No- ROP	1219	1422.89	341.98	27.29	1520	< .001
	Yes- ROP	303	860.07	218.83	35.32	714.64	
	No-Severe ROP	1441	1334.35	380.85	11.97	1496	< .001
	Yes Severe ROP	57	728.3	164.56	25.26	82	

^aROP missing values = 3, Severe ROP missing values = 27.

BW, birth weight; g, grams; GA, gestational age; ROP, retinopathy of prematurity.

		Native Hawaiian & Pacific Islander	Asian Mixed	Filipino	Caucasian	Other/ Unknown ^c	Total
GA (weeks) [% (N)] Mean: 29	23-26	19.8 (103)	13.9 (44)	13.8 (41)	16.9 (29)	15.6 (34)	16.5 (251)
	27-31	57.2 (298)	59.8 (189)	60.7 (181)	64 (110)	66.5 (145)	60.5 (923)
	>31	23 (120)	26.3 (83)	25.5 (76)	19.2 (33)	17.9 (39)	23 (351)
	Total	100 (521)	100 (316)	100 (298)	100 (172)	100 (218)	100 (1525)
Birth Weight (g) [% (N)] Mean: 1312	0-1000	28 (146)	20.6 (65)	22.5 (67)	25.6 (44)	22.9 (50)	24.4 (372)
	1001-1250	17.7 (92)	17.7 (56)	22.1 (66)	21.5 (37)	20.6 (45)	19.4 (296)
	1251-1500	24.6 (128)	28.5 (90)	25.8 (77)	25 (43)	19.7 (43)	25 (381)
	>1500	29.8 (155)	33.2 (105)	29.5 (88)	27.9 (48)	36.7 (80)	31.2 (476)
	Total N	100 (521)	100 (316)	100 (298)	100 (172)	100 (218)	100 (1525)

^aX² (8, 1525) = 14.58, P = .068. ^bX² (12, 1525) = 16.27, P = .179.

^cOther/Unknown = category collected by KMC hospital not a missing value.

BW, birth weight; g, grams; GA, gestational age.

		Hawaiian & Pacific Islander	Asian Mixed	Filipino	Caucasian	Other/ Unknown ^c	Total
ROP	[% (N)]	23.3 (121)	14.9 (47)	19.8 (59)	19.8 (34)	19.4 (42)	303
	Total N	520	316	298	172	216	1522 ^d
Severe ROP	[% (N)]	6.6 (34)	1.9 (6)	2.7 (8)	1.8 (3)	2.9 (6)	57
	Total N	516	310	292	170	210	1498 ^e

^aX²(4, 1522) = 8.74, P = .068. ^bX²(4, 1498) = 17.24, P = .002. ^cOther/Unknown = category collected by KMC hospital not a missing value. ^dMissing values, N = 3. ^eMissing values, N = 27.

		NEC [% (N)]	No NEC	Total	BPD	No BPD	Total
Hawaiian & Pacific Islander	Severe ROP	26.5 (9)	73.5 (25)	100 (34)	97.1 (33)	2.9 (1)	100 (34)
	No Severe ROP	7.3 (35)	92.7 (446)	100 (481)	29.3 (141)	70.7 (340)	100 (481)
	Total	8.5 (44)	91.5 (471)	100 (515)	33.8 (174)	66.2 (341)	100 (515)
All Others	Severe ROP	17.4 (4)	82.6 (19)	100 (23)	87 (20)	13 (3)	100 (23)
	No Severe ROP	4.6 (44)	95.4 (914)	100 (958)	25.1 (240)	74.9 (718)	100 (958)
	Total	4.9 (48)	95.1 (933)	100 (981)	26.5 (260)	73.5 (721)	100 (981)

^aFET(1, 1496) = 10.5, P = <.001. ^bFET(1, 1496) = 67.8, P = <.001.

NEC, necrotizing enterocolitis; BPD, bronchopulmonary dysplasia.

Multivariate Analysis

A multiple regression analysis was conducted to assess whether ethnicity predicted presence of ROP (Table 5) and severe ROP (Table 6) while controlling for measures of prematurity (GA, BW), measures of illness (IVH, NEC, BPD), and medical treatments (steroids, discharged on nasal cannula oxygen). For the ROP model, GA ($P < .001$), BW ($P < .001$), BPD ($P = .006$),

and postnatal steroids ($P < .001$) had significant partial effects (Table 5). NHPI ethnicity as compared to all other ethnicities combined did not have a significant effect ($P = .612$). In the severe ROP model (Table 6), infants of NHPI ethnicity did appear as a significant variable ($P = .004$). Also in the severe model, NEC ($P = .025$) and postnatal steroids ($P = .005$) were significant.

Predictor Variables	B	Wald X2	P	OR (95% CI)
GA	-.475	50.37	< .001	.622 (.546-.709)
BW	-.309	38.13	<.001	.734 (.665-.810)
BPD (Y/N)	-.601	7.51	.006	.548 (.357-843)
Postnatal Steroids (Y/N)	-1.037	18.35	<.001	.354 (.220-570)
Native Hawaiian & Pacific Islander Ethnicity ^a	-.103	.258	.612	.902 (.605-1.344)

^aReference group = All other ethnicities.

BPD, bronchopulmonary dysplasia; BW, birth weight; CI, confidence intervals; GA, gestational age; OR, odds ratio; ROP, retinopathy of prematurity.

Predictor Variables	B	Wald X2	P	OR (95% CI)
GA	-.498	12.33	<.001	.608 (.460-.803)
BW	-.420	11.93	.001	.657 (.518-.834)
Postnatal Steroids (Y/N)	-1.007	8.07	.005	.365 (.182-.732)
NEC (Y/N)	-.955	5.02	.025	.385 (.167-.887)
Hawaiian & Pacific Islander Ethnicity ^a	-.977	8.843	.004	.376 (.195-.728)

^aReference group = All other ethnicities.

BW, birth weight; CI, confidence intervals; GA, gestational age; NEC, necrotizing enterocolitis; OR, odds ratio; ROP, retinopathy of prematurity.

Discussion

In this study, ROP infants and those who progressed to severe illness were born earlier and smaller than the study population as a whole. Similarly, the NHPI infants with ROP and severe ROP were also born earlier and smaller. Our statistics also suggested that NHPI infants with severe ROP were more ill and exposed to oxygen; thus, partially explaining the high representation of this ethnicity in the severe ROP group. These are expectable results given the pathophysiology of ROP and based on previous research (See Introduction).

The results of the multiple regression analysis found that NHPI ethnicity was a significant variable for severe ROP. Ethnicity remained significantly associated with severe ROP after adjusting for BW and GA. This implies that there is some other factor currently unaccounted for that explains the association. Future studies should examine other variables, including socio-economic status (SES) variables. This study did not collect reliable variables for measures of SES.

One limitation of this study involves the effects of recording bias on important variables like ethnicity. The largest group in this study was Native Hawaiian & Pacific Islanders ($n = 521$, 34%). This category of ethnicity was a combination of several labels; the most frequent of which was the label “Part Hawaiian.” The category accounted for 28% ($n = 425$) of the study population. Because the study did not directly collect information on ethnicity but instead relied on the self-reported ethnicity in the medical record, there was no control or uniform criteria for determining the ethnicity “Part Hawaiian.” The investigators chose to believe that there was validity to the choice and therefore Part Hawaiian became the largest part of the Native Hawaiian & Pacific Islander variable.

Our focus in this research was on retinopathy of prematurity and ethnicity in Hawai‘i’s unique ethnically diverse populations. Understanding ethnicity as a factor in the progression or lack thereof in the pathophysiology of retinopathy of prematurity gives the pediatric professional one more factor that will help them as they work toward keeping premature infants alive.

Conflict of Interest

None of the authors identify any conflict of interest.

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Piliwaiwai: Problem Gambling in Hawai'i

Robin-Marie Shepherd PhD

Abstract

Gambling is illegal in Hawai'i, but it is accessible through technology (eg, the internet), inexpensive trips to Las Vegas, and illegal gaming such as lottery sales, internet gambling, and sports betting. Where there are opportunities to gamble, there is a probability that problem gambling exists. The social costs of gambling are estimated to be as high as \$26,300,000 for Hawai'i. Because no peer-reviewed research on this topic exists, this paper has gathered together anecdotal accounts and media reports of illegal gambling in Hawai'i, the existence of Gamblers Anonymous meetings operating on some of the islands, and an account of workshops on problem gambling that were provided by the author on three Hawaiian Islands. Through these lenses of gambling in Hawai'i, it is suggested that there are residents in Hawai'i who do experience problem gambling, yet it is unknown to what extent. Nonetheless, this paper argues that research and perhaps a public health initiative are warranted.

Keywords

problem gambling, at risk groups, public health

Introduction

Over the past four and a half decades gambling has proliferated throughout the United States,¹ increasing the prevalence of problem gambling. The current lifetime prevalence of problem gambling in the United States is 2.2%.² Problem gambling is defined as, "Persistent and recurrent problematic gambling behaviour, leading to clinically significant impairment or distress."³

Despite the illegal implications of gambling, gambling exists in Hawai'i and the increase of technology offers more access to gambling.⁴ This paper argues for more research on gambling and problem gambling in the state of Hawai'i, as well as a public health approach to address the current gambling.

Gambling in Hawai'i

According to the Hawai'i Revised Statutes §712-1220, it is illegal for a person to engage "in gambling if he stakes or risks something of value upon the outcome of a contest of chance or a future contingent event not under his control or influence, upon an agreement or understanding that he or someone else will receive something of value in the event of a certain outcome."⁵ This is distinguishable from social gambling, whereby an individual does not benefit financially,⁶ players compete on equal terms, and the activity is not conducted in a public place.

Problem Gambling in Hawai'i

Although there is a lack of empirical research on problem gambling in Hawai'i, the National Council of Problem Gambling estimated the social and financial damage from problem gambling in Hawai'i could be as high as \$26,300,000.⁷ Furthermore, each problem gambler can potentially cost society \$1,200 each year.⁸ In addition to these costs, problem gamblers often suffer from other addictions, mental illness, and medical problems,⁹

which place a high burden on the healthcare system.¹⁰ Although research is warranted, the Hawai'i House economic development committee rejected a resolution asking the state to study the potential social and economic effects of gambling in Hawai'i.¹¹ Consequently, we can only rely on anecdotal accounts to get a glimpse of problem gambling. The next section describes media reports on gambling problems related to arrests in Hawai'i.

Media Reports

Gambling related arrests have been reported in several local newspapers in Hawai'i. Gambling and crime, particularly problem gambling have been known to be linked.¹² Media reports in the local papers contained two types of gambling arrests in which a percentage are linked to problem gambling. The first type involved individuals who engaged in illegal gambling activities, for example, selling lottery tickets to make money from gamblers. The second type focused on problem gamblers who gamble frequently, lost their money, chased their losses, and resorted to illegal activities to fund this chase. Although the chase is about regaining the financial loss, it is also about the continuation of gambling with the hope that they can absolve feeling powerless and other negative effects.¹³ (see Appendix for a succinct summary).

More recently, local newspapers in Hawai'i featured a story on problem gambling around a recent Super Bowl football event in 2015.¹⁴ Correspondence with staff from a Hawai'i hotline confirmed a significant increase in the number of phone calls both before and after the Super Bowl. One informant noted that this increase was a normal occurrence with other related sports events in which bets were placed (personal communication, Gamblers Anonymous [GA] hotline, 2015). The media also reported that some people in Hawai'i were not aware that sports betting is illegal.¹⁵

Some illegal gambling that occurs in Hawai'i is also done in so called "gambling" houses which attract other illegal activities, including drugs and prostitution.¹⁶ The treasurer of the non-profit Friends of Chinatown in Honolulu said, "Where there's gambling, there's also drugs around."¹⁷ One challenge to the police was that gambling operators often change venues. Also, the presence of internet gambling has decreased the need for gambling houses.¹⁸ Internet gambling now has 10% of the gambling business worldwide, growing globally at 17% annually.¹⁹ This shift will only make gambling more accessible. If there are more opportunities for less overt gambling, the prevalence of problem gambling is likely to increase.²⁰

Although the internet is taking a large chunk of gamblers away from the gambling houses, residents of Hawai'i are attracted to cheap package deals to Las Vegas. Approximately 700,000

trips are made every year from Hawai'i to Las Vegas and some travelers go more than once a year. Airline companies offer inexpensive travel packages with some deals, including complimentary gambling chips. These junkets are competitively priced to entice residents. In fact, hotels, restaurants, and stores cater to residents of Hawai'i so much so that Las Vegas is commonly called "the 9th island" (Hawai'i is comprised of eight islands). There is some evidence of residents experiencing problem gambling and ringing the national problem gambling helpline, but to what extent needs to be explored. Some of the queries from the helpline were: "Do you have anything for a gambler who lives in Hawai'i;" "I'm a social worker in Honolulu hospital and I'm trying to find a number to help a problem gambler;" or "we don't have GA in Kaua'i;" (personal communication, Louisiana Helpline for problem gambling, 2014). Therefore, the only potential support for problem gamblers in Hawai'i is GA and there are only a few groups on two of the islands.

Gamblers Anonymous

GA is a self-help group for problem gamblers which aligns its self-help framework to that of Alcoholics Anonymous.²¹ There are currently three GA meetings on O'ahu, including a Gam-Anon meeting for significant others affected by gamblers as well as a GA meeting available in Kona on the Big Island. The author attended a GA open meeting in Honolulu. It was a multicultural mix of 15 men. The primary form of problem gambling was sports betting (personal communication outside of the meeting, 2012). The stories told were confidential and anonymous, and therefore, the author is not able to disclose the specifics. However, the stories resonated with those told at other GA meetings the author had attended on the mainland. This indicated that there are people suffering from problem gambling. The facilitator of the group expressed a need for an organization for problem gambling, similar to the Councils for problem gambling on the mainland, which organize public health initiatives for professionals and the communities (Anonymous, oral communication, September 2012). However, the council for problem gambling is unable to fund a council in a state where gambling is not legal; this is because the gambling industry primarily provides the financial assistance for these councils (Director of California Council for Compulsive Gambling, oral communication, 2015).

Sabbatical Workshops

During the author's sabbatical at the end of 2012, the author held workshops for both staff and clients at mental health and/or substance abuse treatment facilities in Hawai'i to see if there was a need to learn about problem gambling. With this in mind, my experience suggested that problem gamblers would likely go for treatment for other issues than gambling.²² This may be more likely the case in Hawai'i where treatment for problem gambling is not freely advertised.

The author offered the workshops free of charge and the staff received educational credit for attendance. Consequently, the author was invited to conduct workshops on Moloka'i, O'ahu,

and Kaua'i. There were between 15 and 45 participants at each workshop and attendance alone suggested a need for more professional development in this area. Depending upon the timeframe limitations for the participants, the workshops were between 1.5 hours to 6 hours long. Therefore, each workshop was tailored to a specific time frame with lectures, discussions, and DVDs on problem gambling.

In general, the staff reported many concerns about problem gambling in the communities. Some of their clients believed that certain forms of gambling should be legal, stating, for instance, "cockfighting is part of our culture." Another client asked, "Is going to Las Vegas twice a month a gambling problem?" Data was not collected at these workshops because this was not a research study. At the initial start of each workshop, each participant introduced themselves and shared (if they felt comfortable) if there was any problem gambling in their personal or professional experience. There was concern about problem gambling in their communities.

The professionals were relieved to be taught how their skills can be transferred to helping gamblers. Easy screens to administer was another resource provided in the workshops. Information about potential gamblers anonymous meetings in their areas was also welcomed. Providing services to those with gambling addictions places extra responsibility on the staff when many are already inundated with caseloads. The section on co-morbidity in the workshop was helpful for many, as participants learned that gambling may be an invisible addiction among clients in their existing caseloads. Participants came from clinics that specialize in treating those special populations that may be at-risk, for example, those who suffer from mental illness and/or substance abuse or both.²³

At-Risk Groups

The following is a summary of some groups that may be at greater risk to problem gambling. International research reported Asian cultures as well as indigenous cultures such as Pacific peoples,²⁴ Maori,²⁵ Inuits²⁷ and Aboriginals of Australia have a higher-than-expected incidence of gambling problems.²⁸ Hawai'i has a diverse ethnic population, including some of these groups: Native Hawaiian, Asian cultures, and Pacific Island groups, in particular,²⁹ many of whom could be vulnerable to problem gambling given that research.

Historically, Native Hawaiians practiced gambling in their culture, similar to some Native American tribes.³⁰ However, today's westernized forms of gambling have highly addictive properties (eg, continuous forms such as scratch cards and slot machines).³¹ To date, only one study explored gambling behavior in one ethnic community in Honolulu.³² It was reported that 33.2% (n=1,262) of Filipino Americans residing in Honolulu gambled within a 12 month timeframe. Although this study did not specifically identify problem gamblers or include other ethnic groups, it provided evidence that Filipino Americans in Hawai'i engage in gambling to a worrying extent.³³ Further research is needed to identify other ethnic groups in Hawai'i with problem gambling.

Another vulnerable group, the homeless, has been identified as struggling with problem gambling on the US mainland.³⁴ In one community center on the mainland, 18% of the homeless sample believed that gambling was a reason for their homelessness and 70% reported that gambling had limited their ability to enhance their lives.³⁵ The researchers also reported that 12.8% had subclinical levels of problem gambling and a further 5.5% were identified as having been diagnosed with pathological gambling which includes more symptoms of problem gambling and its severity.³⁶ This is of concern, considering Hawai'i's burgeoning homeless population. In 2014, more than 2,206 homeless were reported living in Hawai'i, a number which had increased by 24% from 2013.³⁷ Research showed that the more severe the gambling problem, the more likely individuals were to become homeless, get less treatment for substance abuse, and require more psychiatric treatment.³⁸ While there are many factors that contribute to homelessness besides gambling, and there are recognized limitations to generalizing findings from mainland data to Hawai'i, the study raises the issue that research has suggested an association between problem gambling and homelessness. Therefore, assessing whether gambling for some could be a result of, or have resulted in homelessness³⁹ would be an important undertaking in the islands.

The elderly are vulnerable to developing gambling problems,⁴⁰ which places them at risk for difficulties in both mental and physical health.⁴¹ A study done amongst older people playing electronic machines reported that single elderly and those who suffer a disability were more likely to utilize their savings to play electronic gaming machines which suggested they spend more than they can really afford to play.⁴² This research may be relevant to Hawai'i given that the proportion of those who were sixty years of age and older rose 139.8% from 1980 to 2010.⁴³ The higher the prevalence of this vulnerable group in the state of Hawai'i, the more likely the chances of society not being able to meet their specific needs, particularly in financial and medical areas, needs which are greater than other age groups. The specter of problem gambling should add to this concern.

College students are another vulnerable group at-risk of problem gambling.⁴⁴ College students have a higher prevalence (3-6% vs 0.04-1.9%) than the general population.⁴⁵⁻⁴⁷ It was reported that college students were, "four times more likely to place a bet via the internet" and this type of gambling was significantly linked with worse mental and physical health amongst college students compared to their adult counterparts in the general population.⁴⁸ Since the internet is ubiquitous and freely available day and night, the risk of problem gambling is increased in this group of highly computer-literate people.⁴⁹ Also, young adulthood is a time for people to engage in several types of risky behaviours, including gambling. Young people's brains are still maturing including the subcortical parts of the brain for processing reward. Yet, the subcortical area for motivation is mature which conflicts with the prefrontal cortical systems that regulate inhibitory control over these impulses. Consequently, this imbalance of maturity creates more of a challenge to resist behaviours such as substance use and more

specifically excessive gambling.⁵⁰ Hawai'i has 13 colleges and universities across the islands.⁵¹ The University of Hawai'i at Manoa alone has 19,507 students with 28% out of state and 6% international students. It has a multi-cultural student body with 36% Asian and 17% Hawaiian or Pacific Islander.⁵² These statistics alert us that there may be at-risk groups, suggesting the need for more research in this area. The statistics also suggest that 34% of this student population may be coming from an environment where they were exposed to gambling.

Lastly, the military are vulnerable to gambling problems.⁵³ Many military personnel also experience mental illness and other addictions inclusive of problem gambling.⁵⁴ Given this, they are vulnerable to psychiatric conditions which are usually related to military trauma.⁵⁵ One innovative study offered problem gambling treatment on an American military base in Japan.⁵⁶ The needs assessment for problem gambling was conducted because of the high prevalence of suicide and substance abuse problems on the military base; 20% of the cohort assessed were suicidal at some point and 38% of military personnel within the sample had received a diagnosis of substance abuse disorder. The assessment revealed a strong need for providing gambling treatment for the military, and resulted in treatment being implemented. Thirty-six self-referrals were made. Within this perspective, there are over 50,000 military personnel in Hawai'i.⁵⁷

Discussion

This paper provides examples, although anecdotal, of problem gambling in Hawai'i, illustrating clear gaps in gambling research in Hawai'i which need to be addressed. With the increase of specific population groups vulnerable to developing problem gambling such as the elderly and the homeless, priority should be given to discovering whether Hawai'i is following the trends identified by overseas research that consistently identified problem gambling within these populations. Prevalence studies would be a start. For example, although the GA group the author attended was multicultural in its membership as well as diverse in age (early 20s to 60s), no women attended. A prevalence study is imperative to answer queries regarding demography as highlighted in the at-risk group section of this paper. What are the demographic characteristics of problem gamblers in the islands? Is problem gambling more of a concern for certain islands? Do problem gamblers seek help? Where do they go if they don't attend GA?

Research on the need for public health initiatives is recommended. This effort may include, employing focus groups to explore gambling and problem gambling in select communities. Questions that elucidate the problem may be included, such as: Are they aware of persons in their communities affected by gambling problems? Are health disparities in one group (eg, Hawaiian or Asian) associated with gambling or problem gambling? Do they know people who travel to Las Vegas to gamble? How often? Do they know of anyone who has gambled in Las Vegas to the point that they couldn't afford to return home?

Another area to implement public health approaches is to make use of training opportunities among health professionals to discuss problem gambling, provide resources such as brief screening tools, as well as incorporate prevalence studies or audits into existing substance abuse treatment facilities.

If there is a need to address problem gambling within the community groups then the next way forward for a public health initiative would be to employ “low cost triage” approaches:

- (1) Establish protocols in treatment settings to assess high risk clients, such as substance abusers, for gambling problems.
- (2) Train a core group of certified substance abuse/mental health counselors in problem gambling to build rudimentary capacity for referral and treatment.
- (3) Add problem gambling questions or a brief screen to ongoing health and addictions surveys such as a brief biosocial screen. (Personal communication, Executive Director, Keith Whyte, of problem gambling council; Washington, D.C., 2012).

Conclusion

The anecdotal evidence presented in this paper suggests a need for research examining problem gambling amongst residents in Hawai'i. Although Hawai'i outlaws gambling, it appears that people continue to gamble illegally. Information from the media and that gathered from informational workshops on problem gambling further supports the existence of problem gambling on some of the Hawaiian Islands. Furthermore, identifying possible vulnerable groups such as those experiencing other addictions or mental illness as well as certain ethnic groups may provide awareness of groups who may be at-risk of developing a gambling problem.

A proactive public health approach is suggested to minimize harm from gambling that appears to be already present among residents of Hawai'i. Such an approach would include initiatives such as publicizing existing GA meetings on O'ahu and the Big Island, creating GA meetings on other islands, educating about the risks of problem gambling on college campuses, and incorporating gambling information and brief screening as part of workforce development.

Conflict of Interest

The author identifies no conflict of interest.

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Appendix

- In 2000 it was reported that former city housing supervisor Michael Kahapea was sentenced to 50 years in prison for stealing \$5.8 million in public funds. Kahapea spent the money to travel to Las Vegas to gamble due to his gambling addiction (Source: Pang GYK. Casino official outlines Kahapea gambling debt. Pang. Honolulu Starbulletin. <http://archives.starbulletin.com/2000/06/14/news/story5.html>. retrieved January 13, 2015)
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MEDICAL SCHOOL HOTLINE

Liaison Committee on Medical Education Accreditation, Part V: Clerkship Education

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This article is the fifth in a series that addresses various aspects of John A. Burns School of Medicine (JABSOM) medical education related to the LCME accreditation process.¹ JABSOM is scheduled for its LCME visit in early 2017. This installment, provides an overview of clerkship education at JABSOM vis-à-vis LCME standards.

Introduction

The Clerkship Education Program occurs during the last two years of medical school. During the third year, students rotate through the required core clerkships of Pediatrics, Family Medicine, Internal Medicine, Surgery, Obstetrics and Gynecology (OB/GYN), and Psychiatry. The students have a choice of participating in a longitudinal or block schedule for their third year curriculum (Table 1). During the fourth year, all students participate in the required clerkships of Emergency Medicine and Geriatric and Palliative Medicine as well as electives of their choosing. These electives are often in their chosen specialty.

The majority of core clerkship courses are 7 weeks long for the block schedule; Internal Medicine is 11 weeks long. Students participating in the longitudinal curriculum spend one semester in the outpatient setting rotating through Pediatrics, Family Medicine, Internal Medicine, Surgery, OB/GYN and Psychiatry clinics. During the other semester of the longitudinal

curriculum, they participate in abbreviated inpatient blocks.

All third year students also participate in colloquia sessions throughout their third year. These sessions occur approximately every 5 weeks. Colloquia sessions include topics that are important interdisciplinary curricular topics such as *transitioning care of patients or patient ethics*. At the end of their clerkships, all students take a standardized National Board of Medical Examiners (NBME) Shelf Exam. The curriculum of the third and fourth year is overseen by the Clerkship Education Committee (CEC), which is a subcommittee of the Curriculum Committee.

Voting members of the Clerkship Education Committee consists of:

- Clerkship Directors of Family Medicine and Community Health, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Psychiatry, and Surgery
- Clerkship Directors of Emergency Medicine and Geriatric and Palliative Medicine
- Director of the Longitudinal Clerkship Program
- Course Directors of the Third-Year Colloquia and Senior Seminars

Non-voting members of the Clerkship Education Committee consists of:

Table 1. Clerkship education during the third year, Block and Longitudinal sample schedule							
BLOCK SCHEDULE							
	Pediatrics (PED531)	Family Medicine (FMCH 531)	Internal Medicine (MED531)	Surgery (SURG 531)	OB/GYN (OB/GYN 531)	Psychiatry (PSTY 531)	
	7 wks	7 wks	11 wks + 2 weeks optional elective	7 wks	7 wks	7 wks	
LONGITUDINAL SCHEDULE							
Outpatient Semester			Inpatient Semester				
Weekly schedule: ½ day in Pediatrics, Internal Medicine, Surgery, OB/GYN, and Psychiatry and two ½ days in Family Medicine			PED 532	MED 532	SURG 532	OB/GYN 532	PSTY 532
			4 wks	6 wks	4 wks	4 wks	4 wks

- Director of the Office of Medical Education
- Director of the Office of Student Affairs
- Longitudinal Clerkship Program Departmental Directors
- Clerkship Coordinators for each clerkship

The CEC oversees the curriculum of the third and fourth years and the day to day operations of the clerkship years. The roles of the CEC include:

- Review and coordinate implementation of the curriculum for each clerkship experience.
- Review educational outcomes relevant to the clerkship curriculum.
- Review educational outcomes relevant to the Accreditation Council for Graduate Medical Education (ACGME) expectations that students be ACGME Level-1 Milestone Ready upon the end of their fourth year.
- Periodically review the clerkship curriculum for gaps and redundancies.
- Recommend and implement curriculum adjustments based upon student need or feedback.

The following are examples of LCME Elements related to clerkship education and how the CEC have addressed these items.

Element 6.2 Required Clinical Experiences
LCME Element 6.2 states:

The faculty of a medical school define the types of patients and clinical conditions that medical students are required to encounter, the skills to be performed by medical students, the appropriate clinical settings for these experiences, and the expected level of medical student responsibility.

The respective clinical departments determined clinical conditions that students are expected to experience during the required clinical clerkships. The mechanism used to determine the list of required conditions and the appropriate clinical settings for these experiences included a review by clerkship directors and their respective department educational committee of the following:

- Receive input from guidelines endorsed by national organizations within their specialty (for example the Council of Medical Student Education in Pediatrics)
- Evaluate epidemiology of various conditions including their clinical importance in Hawai‘i and the Pacific region
- Review data on the number and type of patient encounters that students have had in each clerkship.

Annually, the faculty of the respective clinical departments reviews departmental required clinical conditions, level of responsibility and clinical settings. These required clinical conditions are then reviewed by the CEC to ensure adequate coverage and avoidance of redundancy across all clerkships. Finally, these expectations are reviewed and approved by the JABSOM curriculum committee.

LCME Element 6.4: Inpatient/Outpatient Experiences

LCME Element 6.4 states:

The faculty of a medical school ensure that the medical curriculum includes clinical experiences in both outpatient and inpatient settings.

The balance between inpatient and outpatient clinical experiences is monitored closely at different levels at the medical school. The amount of time a student spends in the outpatient or inpatient setting is dependent on the respective clerkship objectives. Each of the required clerkships regularly monitors student progress in meeting set clinical objectives. Students follow clinical schedules determined by each clerkship to ensure they meet the requirements and learning objectives. The clerkships report on their individual curriculum as it relates to their specialty area to the Clerkship Educational Committee, which in turn, reports to the JABSOM Curriculum Committee annually on its various activities completed in the previous academic year.

Table 2. Percent of clerkship spent in outpatient and inpatient settings		
	Percentage of Total Clerkship Time	
	% Ambulatory	% Inpatient
Family Medicine	95%-100%	0-5%
Internal Medicine	40%	60%
Ob-Gyn	20%	80%
Pediatrics	50%	50%
Psychiatry	33%	67%
Surgery	10%	90%
Geriatrics	30%-50%	50%-70%
ER	100%	0%

LCME Element 8.6: Monitoring of Completion of Required Clinical Experiences

LCME Element 8.6 states:

A medical school has in place a system with central oversight that monitors and ensures completion by all medical students of required clinical experiences in the medical education program and remedies any identified gaps.

All students are required to use the centralized computer-based tool for tracking patient logs (T-Res®² program) as their patient encounter monitoring system in the required third year clerkships and required fourth year rotations (Geriatric and Palliative Medicine and Emergency Medicine). Patient logs are monitored for each of the required clinical rotations as the students rotate through each clerkship. In addition, the extent of completeness of the required clinical encounters for each clerkship and required fourth year rotation are reported to the CEC.

The clerkship director regularly monitors the required clinical conditions with the assistance of the clerkship coordinator who checks the students' T-Res®² logs. The students are provided feedback regularly as to the required clinical conditions that they still need to meet. Feedback is also provided to preceptor (clinical faculty) so the preceptor can help the students complete these conditions. Data on completion rates of these required clinical conditions are reviewed for gaps by the respective departmental medical student committees and used to address and possibly re-evaluate the required clinical conditions. Any changes to the required clinical conditions are then brought before the CEC and ultimately the Curriculum Committee.

Special Projects by the Clerkship Education Committee

The CEC develops programs deemed useful to enhance the third and fourth year curricula.

The following are examples of projects by the CEC.

Fourth year Boot Camp: At graduation, medical students are expected to possess a wide array of skills and attitudes when they enter residency training programs. "Boot camp" curriculum of intensive procedural and skills training can help teach medical students clinical skills and procedural techniques.³⁻⁵ The AC-GME created milestones to assess the competency of learners during residency.⁶ A school-wide 2-day "boot camp" for fourth year medical students was organized to help students to achieve level 1 milestones preparation for their matched specialty. Because of overlapping milestones or skills, faculty resources were pooled to create workshops for students in the various specialties. For example, students entering Surgery, Obstetrics and Gynecology, Family Medicine and Emergency Medicine residencies attended a suture workshop. Students participated in various workshops including a transition of care workshop, which is an important milestone that is common to all residency specialties. Numerous subspecialty specific workshops were also included. Following the boot camp, students achieved improved confidence in milestone related skills.

Annual Clerkship Reviews: Annual clerkship reviews were conducted as a method to review clerkship curriculum and to help standardize practices such as evaluation processes. The annual reviews allow the CEC to examine the different clerkships for redundancies in curriculum and share best practices for clerkship administration. Sharing clerkship best practices has enabled clerkship directors to adopt innovations from other clerkships. For example, the pediatric clerkship offered an elective during the seventh week of the clerkship with different pediatric subspecialists such as Pediatric Cardiology and

Pediatric Infectious Disease. The surgery clerkship adopted the seventh week elective and offered a surgical subspecialty. This elective week proved to be a popular and well-received elective by the students. The clerkship annual reviews also enabled central monitoring of important curricular elements for residents and faculty, and ensure that students complete required clerkship experiences.

Colloquia: As part of the third year curriculum at JABSOM, all the students must participate in a course separate from their clerkship rotations named the Third Year Colloquia Series (MDED 563). This course starts with a "Transition to Clerkship" week before the start of their first clerkship block, which includes topics to help prepare students for their clinical clerkships.⁷ Topics include reviewing history taking and physical exam techniques, presentation skills, surgical gowning and gloving, universal precautions, and other useful skills. This week also allows the faculty to orient students to the hospitals and the electronic health record systems. Throughout the third year, the colloquia series brings the students back to the main campus on one Friday a month for a day of lectures, workshops, and clinical skills activities. These sessions are improved continually to:

- Provide the students with topics that bridge all of the clinical disciplines and address overlapping level one residency milestones, such as medical ethics, patient safety, and transitions of care.
- Address essential LCME related topics such as student mistreatment, professionalism, cultural awareness and interprofessional education.
- Prepare the students for their fourth year with sessions such as addressing the National Residency Match Program and interview process.
- Introduce clinical specialties that the students may be interested in pursuing that are not part of the third year rotations (ie, Physical Medicine and Rehabilitation, Radiology, Ophthalmology, etc)

Final Thoughts

The third and fourth year of medical school are known as "the clinical years," when students learn and practice clinical medicine in a range of specialties including Pediatrics, Family Medicine, Internal Medicine, OB/GYN, Psychiatry, Surgery, Emergency Medicine, and Geriatric and Palliative Medicine. The CEC ensures students to experience an appropriate variety of clinical conditions. By collaborating with faculty across departments, the goal is to assure that students graduating from JABSOM are prepared to begin residency training in the subspecialty field of their choice.

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The Current State of Sexual Health Education in Hawai'i Public Schools

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Introduction

On June 16, 2015 the Hawai'i Board of Education (BOE) passed a revision to the Sex Education Policy resulting in a more comprehensive approach to sexual health education.¹ Since 1995 BOE policy 2210 had instructed that school sex education must be abstinence-based.¹ Policy 103.5 replaces policy 2210 and is a step toward providing all Hawai'i youth a comprehensive sex education. Yet sex education in Hawai'i still has challenges, including financing, curriculum selection and sharing, parent involvement, and educator training and instruction time. This article will explore the current state of sex education in Hawai'i and issues in policy implementation.

What is Comprehensive Sex Education?

Sexual health education is not solely provided or learned from a single course or conversation; it is rather a synthesis of lifetime experiences and knowledge to form attitudes, beliefs, and values on identity, relationships, and intimacy.² School based sex education programs help to promote these conversations. School-based sex education programs can also be an effective and cost saving method for reducing teen pregnancy and sexually transmitted infections (STI).³

There are several types of school-based sexual education program options. Traditional abstinence programs emphasize abstaining from sexual behaviors with different programs varying in curriculum content.⁴ Abstinence programs include those labeled as abstinence-only until marriage, abstinence based or abstinence-plus, and fear-based.⁴ Abstinence based or abstinence-plus programs present abstinence as the preferred option, but present some information about other sexual behaviors, contraception, and disease prevention.⁵⁻⁷ Fear-based programs use scare tactics to portray sexual behavior as dangerous and harmful.⁶ Many traditional abstinence programs are medically inaccurate and provide erroneous or negative information about condoms and STIs and are often subject to heteronormative bias.^{4,6,8} Abstinence programs vary in their length of instruction and age of exposure but many focus instruction that begins in adolescence such as the 7th and 8th grade. A number of research studies have shown that abstinence-only, abstinence-only

until marriage, or fear-based programs do not reduce sexually transmitted diseases or decrease teen pregnancy.⁹ In fact, some studies have shown they can deter the use of contraception, which increases such outcomes.¹⁰ Despite these findings, federal funding has continued to support these programs even after multiple studies have found that most Americans actually support a more comprehensive approach to sex education.^{11,12}

Evidence about the value of comprehensive sexual education is strong. Those who oppose sex education in schools often promote an unproven theory that sex education increases the likelihood that young people will engage in sex.^{12,13} However, evaluation has shown that sex education that includes information about both abstinence and contraception does not increase the frequency of youth engaging in sex or make them more likely to do so at earlier ages.^{10,14} Comprehensive sex education programs typically begin in kindergarten, cover age appropriate material, and continue through 12th grade.⁴ States with comprehensive sex education programs that include abstinence in the curriculum, but do not emphasize abstinence as the only, or the most highly preferred option, have been found to have lower teen pregnancy rates.¹² The National Guidelines Task Force identified six essential concept areas for comprehensive sex education which include medically accurate information on human development, relationships, personal skills, sexual behavior, sexual health, and society and culture.² They broadly cover decision-making, abstinence, contraception, and disease prevention in a format that encourages skill development and knowledge obtainment.⁴ As part of the risk reduction approach, comprehensive programs also cover topics such as STIs including human immunodeficiency virus (HIV) and contraceptive methods, including condom use.²

Evidence-based teen pregnancy prevention programs have been shown to change teens' sexual behavior by increasing youths' knowledge and understanding of risk (eg, pregnancy, STI) and protective (eg, contraception, sexual values, and confidence to avoid unprotected sex) factors that influence behavior.¹⁰ Thus, teens who experience sex education and make more positive choices in their sexual health, may experience lower rates of teen pregnancy and STIs.¹⁰ Although cost-related

research on this topic is limited, one study estimated the cost-effectiveness and cost-benefit of a comprehensive sex education program. That study found that for every dollar invested in the Safer Choices Program, \$2.65 was saved in medical and social costs by preventing pregnancy and STIs.¹⁵ The 2014 School Health Policies and Practices Study found that 72% of high schools in the United States taught pregnancy prevention, with 76% teaching abstinence as the most effective method to avoid pregnancy, HIV, and other STI.¹⁶

Why is Comprehensive Sex Education Needed in Hawai'i?

Hawai'i has one of the lowest rates of condom use amongst sexually active youth compared to the rest of the nation. The 2013 High School Youth Risk Behavior Survey (YRBS) found that 54% of Hawai'i youth did not use a condom during last sexual intercourse compared to 41% of youth nationally.¹⁷

In turn, Hawai'i has high rates of teen pregnancy, particularly in rural areas. For the aggregated years of 2008-2012, pregnancies among females aged 15-19 years in the state of Hawai'i were 49.6 per 1,000 women, which was higher than the national average of 29.4 pregnancies per 1,000 women.¹⁸ Hawai'i county had the highest rate of 55.1 teen pregnancies per 1,000 women compared to Kaua'i with 51.4, Honolulu with 48.9, and Maui with 45.4 per 1,000 women.¹⁸

Teen pregnancy and subsequent teen births have significant risks, consequences, and social disadvantages for teen parents and their children. Teenage mothers are less likely to complete school, go to college, and more likely to remain single, which in turn puts them at high risk for living in poverty.¹⁹ Children born to teen parents are more likely to become teenage parents themselves as well as have less stimulating home environments, lower cognitive development, less education, more behavior problems, and, for boys of teenage parents, higher rates of incarceration compared to children born to non-teen parents.¹⁹ It is estimated that in 2010, teen childbearing cost the United States approximately \$9.4 billion from federal, state, and local taxes.²⁰

STIs are also a serious public health issue and can result in long-term health effects. Since 2001, cases of gonorrhea have continued to rise in Hawai'i along with continued concerns with treatment due to antibiotic resistance.²¹ In 2014, Hawai'i ranked 23rd nationally in chlamydial infections (457 per 100,000 persons).²² Chlamydia infections are high among male adolescents 10-19 years (1,944 cases per 100,000) and among females (4,446 cases per 100,000).²³

Efforts to reduce teen pregnancy in Hawai'i can help reduce poverty, increase educational achievement, and improve the social welfare of children and their families. Reducing teen pregnancy and birth would also help to reduce public spending on teen pregnancies and strengthen both the United States and Hawai'i's economic competitiveness.²⁴ Efforts to increase protection during sexual activities could also reduce STIs including chlamydia and gonorrhea as well as protect against the transmission of HIV.

Health Disparities

Teens in rural communities in Hawai'i can face health access consequences associated with living in geographically remote areas. They may have limited access to health care providers and public clinics, both of which are key locations for youth to receive sexual health and contraception education. Additionally, teens in rural communities may have issues with transportation and fear confidentiality, since the local providers may know or even be part of the teen's family or social networks.^{25,26} While teen birth rates have been declining since the 1990's, rates in rural communities have been slower to decline.^{27,28} The National Campaign's 2013 analysis on Teen Childbearing in Rural America identified that the 2010 teen birth rate in rural counties was approximately one third higher than the rest of the country.²⁹

Mandatory sex education in public schools allows those students in rural settings of the state to receive similar sexual health education as their urban counterparts. Without a mandate, small rural schools, which typically have fewer resources than urban schools, are less likely to offer sex education to their students. This is particularly important as Native Hawaiians and Other Pacific Islanders in rural areas of Hawai'i have some of the highest rates of teen pregnancy in the state and nationwide.³⁰

Some have reported that rural communities are more conservative when it comes to sexual education.²⁹ Assumptions about opposition from rural communities toward sex education should not deter leaders to approach parents and gather feedback about community support and concerns regarding educational programs and curricula.²⁹ Outside of education from family, research has found parents in rural communities perceive school as one of the best places to supplement sex education instruction.³¹

Sex Education Policy in Hawai'i Gets A Makeover

The controversy over the University of Hawai'i's Pono Choices curriculum, which started in late 2013, helped further the ongoing discussion about how best to provide sexual health education to youth enrolled in Hawai'i Public Schools. Sexual health education is provided to youth in Hawai'i as part of their health education curriculum. The Hawai'i Content and Performance Standards (HCPS) III Health Education Standards also includes content standards in areas such as mental and emotional health; healthy eating and activity; safety and preventing violence, and injury, tobacco, alcohol, and drug free lifestyles.³² The policy revision was part of an ongoing comprehensive policy review by the BOE, that also included policies related to discipline, suspension, graduation requirements, and Hawaiian language.

Prior to the June 16, 2015 revision of the sex education policy by the Hawai'i Board of Education (BOE), sexual health education was required by BOE Policy 2210 to be abstinence-based education and use one of the seven Hawai'i Department of Education (HIDOE) approved curricula.³³ Abstinence-Based Education Policy 2110 supported abstinence as the "most responsible way to prevent unintended pregnancies, sexually

transmitted diseases such as HIV/AIDS, and consequent emotional distress.”³⁴

Sexual Health Education Policy 103.5 replaces the previous abstinence-based policy and requires comprehensive sexual health education to be offered in Hawai‘i Public Schools. The new policy, in accordance with state law (HRS 321-11.1), states that the HIDEOE “shall provide sexual health education to include age appropriate, medically accurate, health education.”^{1,35} The new policy further clarifies that education must include both abstinence and contraception and must include methods of contraception to prevent pregnancy and STIs, including HIV.³⁶ The policy also encourages healthy relationships and communication skills along with developing certain life skills such as critical thinking, decision making, and making decisions about sexuality.³⁶ Parents are no longer required to opt-in their children for instruction. Instead, they are allowed to excuse their child with a written request.³⁶ However, one limitation that remains is the state does not mandate that sexual health or HIV education be culturally appropriate and unbiased.³⁷ Eight states, including California, have sexual health legislation that protects youth from instruction that is biased toward disability, gender, nationality, race or ethnicity, religion, sexual orientation, and religion.^{37,38}

Contraception may include a discussion of birth control devices; however, the HIDEOE forbids the distribution of condoms or other prophylactic devices on school grounds or activities related to school.³³

Considerations for Implementation

Implementing the new policy will require collaboration from many departments including the BOE, HIDEOE, administration, teachers, parents, and students. While efforts to implement the new policy are already underway, there are a number of challenges.

One challenge is data limitations. There is currently no standard for sex education data monitoring across the state. Currently each school conducts its own method of data collection related to sex education which may include data on attendance, frequency, and curriculum. There is no standardized system to monitor the quality and fidelity of program implementation. Establishing a data management system that could be implemented state wide in schools that want to begin tracking sex education, is an important step which can help compare curriculum choices and outcomes to other parts of the state or nationally.

Another issue is funding. Schools can use money from their Health Education budget allotted by the state to pay for expenses associated with implementing sex education. Funding is also available from the Hawai‘i Department of Health to supplement teacher’s professional development in standards-based health education. Providing additional funding particularly for teacher/facilitator training and continuing education will be important for program success. Schools can also apply for additional funding through grants. However, applying for grants can be time consuming and may be more likely in school districts with more resources, which are often not the rural communities with

higher rates of teen pregnancy.

Both national and local organizations face obstacles associated with the lack of professional development opportunities for instructors along with lack of funding, training, and general support with sensitive topics.³⁹ The HIDEOE is working closely with the Hawai‘i Department of Health for support with implementation in addition to searching for further funding, which could support such efforts. Once teachers and staff have adequate training, they could then facilitate further train-the-trainer style workshops to increase the overall capacity of sex educators in Hawai‘i. The HIDEOE began providing professional development statewide in the form of breakout sessions and a statewide webinar to explain the new policy. Upon request, the HIDEOE will provide professional development.

The new policy makes an effort to address and include the important role that parents have in their child’s sexual health education. A provision in the policy requires that a description of the curriculum used by each school be available for parents.³⁶ Schools are encouraged to share this information via the school’s website, mail, and parent information nights.³⁶

Another logistical challenge with implementation is ensuring adequate curriculum and qualified teachers. The HIDEOE currently has 7 approved sex education curricula from which schools can choose from to implement sex education.⁷ In their efforts to address the new policy the HIDEOE’s Office of Curriculum, Instruction and Student Support recruited individuals interested in being part of the Health Education Workgroup, including health and physical education teachers from across the state. The Health Education Workgroup will review and update approved curricula. However, no new additional curricula will be added to the approved list until the HIDEOE issues a “Call for Curriculum.” The process ensures a fair opportunity for all those who may be interested in submitting new curriculum for review. All curricula chosen must be medically accurate, age appropriate and align to the HCPS III benchmarks, the National Sexuality Education Standards, and the Center for Disease Control and Prevention Health Education Curriculum Analysis Tool (HECAT).³³

Once curricula are chosen by schools, additional challenges, including timely delivery, cultural acceptability, and program efficacy must be addressed along with implementation. Studies to evaluate the issues faced by Personal Responsibility Education Program (PREP) and Teen Pregnancy Prevention Program (TPPP) grantees in implementing similar types of evidence-based teen pregnancy prevention programs provide insights for implementation considerations. Findings from PREP and TPPP grantees utilizing a classroom-based curriculum faced challenges in delivering the complete curriculum within the time constraints of the school day, schedule, and calendar.⁴⁰ Grantees that implemented culturally tailored sexual education curriculum found the task challenging in schools with diverse populations; also, when delivered as part of an after school program, attendance became an issue.⁴⁰

Monitoring implementation of sex education programs can help ensure sustainability and quality along with accountability.

As part of ongoing evaluation monitoring, grantees receiving funds from the Office of Adolescent Health regularly collect student demographics, attendance, and conduct pre- and post-tests with sex education instruction. Additionally, fidelity is monitored with ongoing logs and monitoring observations of class instruction. Findings from the fidelity logs, along with the other data collected, help to identify program challenges and barriers as well as highlight areas where the program is successful and performing well. Consideration to best determine how to monitor and evaluate curriculum implementation across the public school system is necessary along with long term planning for data collection and objective measurements of outcomes. For instance, the Youth Risk Behavior Survey, which is conducted every other year in public secondary schools, may be useful in this type of evaluation.

Acceptability

There is support for comprehensive sexual education from adolescents and parents. The 2012 Hawai'i Adolescent Reproductive Health Survey, which surveyed 605 adults who were demographically representative of the Hawai'i population, found that 97% of survey participants said it was important or very important to have sex education as part of the school's curriculum, while 87% supported teaching other means of pregnancy prevention and STIs in addition to abstinence.

Incorporating the public and parents into the sex education conversation, and in helping determine which curriculum is appropriate for each community, is a crucial step. A variety of evidence based comprehensive sex education programs exist and some have been found effective in rural communities, such as Making Proud Choices (MPC) and Reducing the Risk (RTR).^{5,41} RTR is on the HDOE approved curriculum list. Fostering trusted relationships from within communities is an important component for success with programs aimed to address teen pregnancy.²⁹ Curricula are designed for different communities and settings, and for different groups of young people. Allowing communities to participate in review and selection of curricula generates community buy-in. Although this will likely not eliminate all ideological concerns among some of the public, it will provide a forum for discussion and, potentially, compromise. Parent nights offer a platform for communities to have open discussions about curriculum. Although some may choose to not to attend, these provide an opportunity for parents and guardians to voice concerns and learn about the program.

Conclusions

Hawai'i stands with 22 other states in the adoption of the BOE policy requiring Hawai'i Public Schools to provide comprehensive sex education that is medically accurate, age appropriate, and include information on contraception.⁴² This will likely reduce teenage pregnancy, decrease STI rates, and improve knowledge of safe sexual practices in youth. However, many questions remain unanswered regarding implementation, funding, curriculum, instruction, and information sharing.

As discussed, effective and sustainable implementation of this policy requires additional resources such as funding and instructor training which will need further support from the state. Despite the significant upfront costs and yearly budgeting allowances, the long-term effects of this policy and its proper implementation will contribute to reducing teen pregnancy and STIs across the state. By establishing such a dedicated policy committed to comprehensive education, Hawai'i sends a strong message to their youth and provides them with the necessary knowledge, skills, and resources they need to grow up sexually healthy and responsible.

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THE DANIEL K. INOUE COLLEGE OF PHARMACY SCRIPTS

Transition from Traditional to Western Medicine in Hawai‘i (Part 1)

Helen Wong Smith MLIS, CA

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“No element out of their past is more firmly rooted than the use of native herbs and allied therapeutic practices.”

“More than a hundred years of contact with European medicine have not made medical converts of the Hawaiian people.”

Handy, Pukui, Livermore Outline of Hawaiian Physical Therapeutics, 1943

Aspects of traditional Hawaiian medical practices have appeared in this journal throughout the decades with the December 1994 issue in this serial, then titled the *Hawai‘i Medical Journal* dedicated to Hawaiian Medicine and Health.¹⁻⁷ Building on these articles, this and the next Scripts column will focus on the historical record of Western pharmaceutical activities in Hawai‘i and Western legislative impact on Hawaiian traditional medicine.

Traditional Medicine

The first written account of traditional healing was presented by David Malo in “The Medical Treatment of the Sick” in *Hawaiian Antiquities*.⁸ It provides the holistic approach of mind and body: “The medical treatment of the sick was the matter that belonged to the worship of the gods...[the] *kahuna lapaau*, taking with him an offering for Mai-ola, the god of medicine.”⁹ Domains of traditional healing include *lā‘au lapa‘au* (healing medicines), *kāhea* (to call out), *lomilomi* (softening), *ho‘oponopono* (to make right), *pule* (prayer) and *oli* (chant). The art of compounding remedies was the specialty of *kāhuna lapa‘au*, a profession based on empirical practice. *Lā‘au lapa‘au* was just one of the medical specialties, the others being: *Hāhā* – ability to diagnose, *Ha‘ihai‘i iwi* – bones and bone setting, *Pā‘ao‘oe* – infants and young children, *Ho‘ohāpai* – conception, *Ho‘ohānau* – give birth, *‘Ō‘ō* – to pierce, *Po‘i ‘uhane* – soul snatching : to restore life. In all of Polynesia, only in Hawai‘i were there such *heiau ho‘ola* (temple dedicated to healing or giving life) for: (1) training of *haumāna* (students) with a rigorous 20-year or so curriculum; (2) research, with development of simple surgery, fracture-setting, clyster enema, thermo-helio-therapy, and *lā‘au* (medicinal plants); (3) special practices, such as cultivation, gathering, and preparation of *lā‘au* (medicines).¹⁰

Epidemics & the Introduction of Western Medicine

The first Western prescription is dated July 12, 1825 by William Davis, surgeon aboard the frigate *HMS Blonde* for *Kuhina Nui* (Prime Minister) Ka‘ahumanu, who is often cited as the favorite wife of Kamehameha I. (The ship was retuning the bodies of King Kamehameha II and Queen Kamāmalu who while visiting England succumbed to the measles in 1824.)¹¹ It is postulated Ka‘ahumanu’s acceptance to Western medicine resulted from observing Dr. Davis’ aspiration of Kalanimoku’s peritoneal cavity of accumulated fluid on May 23, 1825. Dr. Davis’ prescription for Ka‘ahumanu was for a liquid preparation of infusion of gentian, fluid extract of eriodictyon, and simple syrup, three teaspoons taken twice a day. Davis also prescribed pills of hydrasis and colocynth and in his accompanying letter expressed a desire for a feather gift.¹²

The native population was severely impacted by the importation of bacterial and viral organisms in the 19th century, beginning with gonorrhea, syphilis, and tuberculosis. Later, pneumonia, influenza, measles, mumps, typhoid, and other infectious diarrheas, smallpox, leprosy, plague, diphtheria, and the streptococcus’s were introduced to the islands. Ships visiting Hawai‘i sailed from the East Coast ports, and reached the islands by a long voyage around South America. These ships often carried sick and dying passengers or crew who quickly spread disease upon arriving in the islands.

In 1804 an estimated 15,000 lives were claimed (out of a population of 800,000) due to an epidemic of *ma‘i ‘ōku‘u*, either cholera or typhoid.¹² Also, during the last four months of 1848 and the early part of 1849, an estimated 10,000 lives, more than one-tenth the population died as a result of measles, whooping cough, dysentery, and influenza. The epidemics toll was one of the most devastating in Island history.¹³ Introduced diseases decreased the native population to 135,000 in 1820 and 53,900 by 1876.¹⁴⁻¹⁶

The *ali‘i* (rulers) took steps to curtail the introduction of these new diseases in 1836 by screening all visiting vessels for smallpox. King Kamehameha III signed a quarantine law in 1839 and established a Board of Health in 1851, preceding any in the United States.¹⁷ In 1859, King Kamehameha IV and

Queen Emma raised \$13,530 in private funds supplemented by \$2,000 by the kingdom's legislature to establish Queen's Hospital now known as the Queen's Medical Center.¹⁸

The Congregationalist missionaries who played pivotal roles in Hawai'i's economic and social fabric shared a concern for the dramatic decline of the Hawaiian population. In 1838, Dr. Gerritt Judd of the third company of missionaries from the American Board of Commissioners for Foreign Missions published *Anatomia*, one of the first medical texts written in the Hawaiian language for the students at Lahainaluna Seminary. In 1870, Dr. Judd headed a medical school established by the Department of Education and in 1872 graduated and licensed ten students. Unfortunately, the medical school dissolved shortly after his death in 1873.¹⁹

Introduction of Pharmacies

For about a century following Western contact, pharmacies did not exist separately from medical treatment, as it was a function of the physician. A contributing factor for the lack of drug store ownership is attributed to the lack of trained druggists in early years. International pharmaceutical manufacturers marketing policies influenced in sales Hawai'i and the development of plantation medicine. Plantations offered universal health care for workers and families and dispensed drugs and medications from their own dispensaries and clinics. The first public pharmacy was established by Dr. Robert W. Wood in 1847 in Honolulu.²⁰ Drs. John Mott-Smith and William Hillebrand (who was named the Queen's Hospital's head physician in 1860) established Family Drug Store in 1853 which was later purchased by Hollister & Co. in 1869. As a member of Kamehameha V's Privy Council, Hillebrand was sent in 1865 by the Bureau of Immigration to China to arrange for laborers from that country to be sent to Hawai'i to work in the plantations now dominating the economy.

There were few medical personnel among the arriving Asian immigrants. Dr. C.T. Akana arrived from China in 1873 and for 39 years practiced in Honolulu. In later years he specialized in diseases of males and used many herbs imported from China in his treatments. His notices in the *Commercial Pacific Advertiser* promised "cures where other doctors have failed." In 1886 three physicians arrived from Japan to administer care to the Japanese immigrants hired to work on the plantations. Plantation doctors requested pharmaceutical components from the drug stores, often in bulk. Dispensing and often, compounding was left to para-professionals as relayed in this account: "*Our medical keeping at Kohala was primitive but worked. We would write brief notes on a small sheet which also ordered medications from what we termed the "pharmacy window"—a square hole through a wall into the "drug room," presided over by a bright young girl whose pharmacy training was from visiting drug salesmen, the Physicians' Desk Reference (it was thinner then), the Merck Manual, and what it said on the bottle.*"²¹ The Territorial Association of Plantation Physicians in 1949 reported that most plantation hospitals met national standards and there was a better distribution of doctors and hospitals than any other rural state or territory.

During the 1909 legislative session Senator Charles F. Chillingworth proposed the "Qualifications of applicants, in order to be licensed as a pharmacist under this chapter an applicant shall not be less than 21 years of age and he shall present to the board satisfactory evidence that he is a graduate of a reputable school or college of pharmacy or that he had had four years of experience in pharmacy and shall also pass a satisfactory examination before the board."²²

While still a territory, administration of laws regulating pharmacy activities was divided between the Department of Health and the Hawai'i Board of Pharmacy. The Department of Health's Food and Drug Branch enforced the Revised Laws of Hawai'i 1955 creating the Hawai'i Board of Pharmacy (Chapter 71). Under the provisions of Chapter 71, the Board determined who would practice pharmacy in Hawai'i and had wide latitude in defining what constitutes the practice of pharmacy.²³

In the summer of 1960, the Board of Pharmacy formulated for the first time regulations designed to implement the provisions of Chapter 71, Revised Laws of Hawai'i 1955. Physicians, nurses, hospital administrators, and others who practice the medical arts raised questions. Disagreements existed concerning the dispensing of drugs in small hospitals, filling of oral prescriptions, dispensing of medicines by employees of physicians, and other similar matters. These concerns and related problems in the field of pharmacy prompted Legislative Report No. 4 *The role of the State in the regulation of pharmacy*. The report concluded with an analysis of pharmacy laws in Hawai'i and an exploration of alternative approaches to regulation of drugs as a commodity and pharmacy as a profession.²³ The report proposed alternative means of regulating pharmacy activities in the State. At the time of the report there were 230 registered pharmacists in Hawai'i.

In the next column Western legislative impacts on Native Hawaiian medicinal practice through Hawai'i's five governments (Kingdom, Provisional, Republic, Territorial, Statehood) will be presented.

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General Recommendations on Data Presentation and Statistical Reporting (Biostatistical Guideline for HJMPH) [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 HJMPH. 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.



THE NATIONAL FOOTBALL LEAGUE TRIED TO SHUT HIM UP.

Bennet Omalu MD, is a Nigerian-American forensic pathologist at the University of California Medical School, Davis. He holds multiple advanced degrees and certifications from top American medical schools, and is currently the medical examiner for San Joaquin County. In 2002 Dr. Omalu studied the brain of 50-year-old Mike Webster, former center for the Pittsburgh Steelers football team. Before his death Webster had suffered a steep decline in his mental capacity with depression, violent behavior swings, loss of memory, and severe chronic pain. Dr. Omalu published a paper in the journal *Neurology* “Chronic Traumatic Encephalopathy (CTE) in a National Football League Player,” documenting Webster’s brain damage. He had hoped to initiate an academic discussion of athletic concussion trauma. Instead the NFL demanded that he and the journal *Neurology* retract the paper. He was shocked, and both sources refused a retraction. The NFL’s “Mild Traumatic Brain Injury” committee stated that Dr. Omalu misinterpreted his own work, and the paper had serious flaws. (The committee members were paid by the NFL and the chairman was a rheumatologist.) In an attempt to discredit him the NFL committee demanded that his work be reviewed by an expert trauma pathologist. Big mistake! Their expert not only substantiated Dr. Omalu’s work, but found Webster’s brain damage worse than reported. Moreover, with subsequent additional studies the NFL opened the door on the serious threat of concussion injury by competing in pro football. Congress is now involved, forcing the NFL to study and act upon the CTE that is obviously permeating the brains of many retired athletes.

FOR PETE ROSE IT’S MAKEOVER TIME.

Pete Rose was known as “Charlie Hustle” in his playing days. He gathered more base hits than any player in baseball history, and his competitive spirit was best exemplified by his head-first slide to make the next base. He did not use performance-enhancing drugs, did not beat his wife nor children, and he is revered in Cincinnati where he spent most of his baseball career. Peter Rose is banned from baseball for life because it was found that he gambled. He admitted that during one season while he managed the Cincinnati Reds he bet on his own team. He claimed that he did not bet while he was playing. According to Commissioner Robert Manfred, “He hasn’t presented credible evidence of a reconfigured life.” How does one prove he “reconfigured” his life at age 74? Major league baseball is replete with illicit drug-users, and several have even confessed that they were injected with various compounds, often steroids. Full on cheaters. None have been banned, and only rarely even suspended. The Commissioner apparently does not find any hypocrisy in his portrayal of Peter Rose as a lifetime sinner.

OKAY, BOSSIE. DID YOU DONATE THIS AT NIGHTTIME?

A study reported in the *Journal of Medicinal Food* found that drinking cow’s milk produced at night may be a potential treatment for anxiety and insomnia. A glass of milk taken at bedtime has long been touted as a sleep aid. Researchers in South Korea gave lab mice varying doses of dried milk powder from cow’s milk collected during the day or night and mixed with distilled water. Analysis of the powders showed the night milk contained 24% more tryptophan and nearly 10 times as much melatonin as day milk. The mice underwent a series of tests about an hour after treatment. Mice that got night milk were significantly less active than either the mice fed day milk or water controls. Caveat: the effects of night milk haven’t been tested on people with sleep problems and anxiety disorders. Still, for insomniacs it is worth a try.

SUNGLASSES FOR CHILDREN ARE NOT A FASHION STATEMENT.

Most parents are careful to spread sunscreen on their children when they hit the beach or the great outdoors, but do not think of possible

damage from ultra-violet rays to young eyes. Everyone buys into what happens to skin when it comes to sun damage, but most parents are unaware of what happens with cumulative u-v damage to the eyes. For kids, bright summer days at the beach, surfing and sailing, pose the highest risk. In extreme cases, especially at high altitudes, exposure can cause photo-keratitis that can lead to temporary loss or blurring of vision. The same effect can occur with u-v reflection from snow, often referred to as snow blindness. It may be difficult to get the child to wear sunglasses, but special shades are available designed for infants or toddlers. They are durable, flexible and safe. It’s a bright world out there.

IT’S YESTERDAY ALL OVER AGAIN.

The fanciful premise of the movie “Groundhog Day” is that the hero wakes up each morning believing it is the previous day. It is an amusing, entertaining, and meaningful film. The story has largely come true for the patient of a British psychologist. Following general anesthesia for a root canal procedure, the patient awakened with amnesia. His memory span has been reduced to approximately 90 minutes. He wakes up each morning believing he has an appointment for dental work. He has been examined by numerous neurologists who could find no abnormality to that part of the brain associated with amnesia or anesthesia. He is able to function with the aid of an electronic diary, probably an iPhone.

HEY WAIT, GOVERNOR. WE ARE NOT IN THE KILLING BUSINESS.

In October 2015, Governor Jerry Brown signed the End of life Option Act into law, thereby legalizing physician aid-in-dying in California. Eligible patients must be 18 years or older, residents of the state, of sound mind, and diagnosed with a terminal illness that will prove fatal within 6 months. The significance of this is overwhelming. When the country’s biggest state allows physician-assisted suicide, many other states will follow.

STARBUCKS IS LOOKING BETTER, OR MAYBE NOT.

To no one’s surprise, after dinner coffee can lead to sleepless nights. A new study posted in *Science Translational Medicine* from the University of Colorado Boulder helps explain why. Caffeine before bed distorts the master clock that tells the body what time it is. Clocks tick throughout the body, managing the circadian rhythms that control everything from sleep to appetite to hormone levels. Caffeine taps directly into the master clock that syncs these far-flung timekeepers. Researchers noted that caffeine has a larger impact than we previously realized. The team found that caffeine’s clock-shifting effects could be used for good to help regulate people’s sleep patterns, like avoiding jet lag.

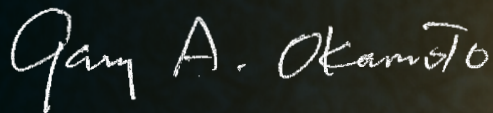
ADDENDA

- Kaiser Permanente will launch a medical school focused on training students in its integrated style of care. They plan to build in Southern California with the goal of enrolling a first class of 48 students in 2019.
- A University of Michigan survey, backed by the National Institutes of Health, found daily smoking of cigarettes by teenagers has fallen 50% over the past five years. The percentage of 10th graders who report daily use of marijuana is now higher than cigarette smoking, largely because of the drop in tobacco use.
- Whether they be the musician cats in my band, or the real cats of the world, they all got style. (Ray Charles).
- We are not attempting to circumcise the rules. (Bill Cowher Pittsburgh Steeler coach)
- Dawn! A brand new day! This could be the start of something average.
- I would help my wife get pregnant if I could be assured she would have puppies.

ALOHA AND KEEP THE FAITH rts

(Editorial comment is strictly that of the writer.)

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Gary Okamoto, MD
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