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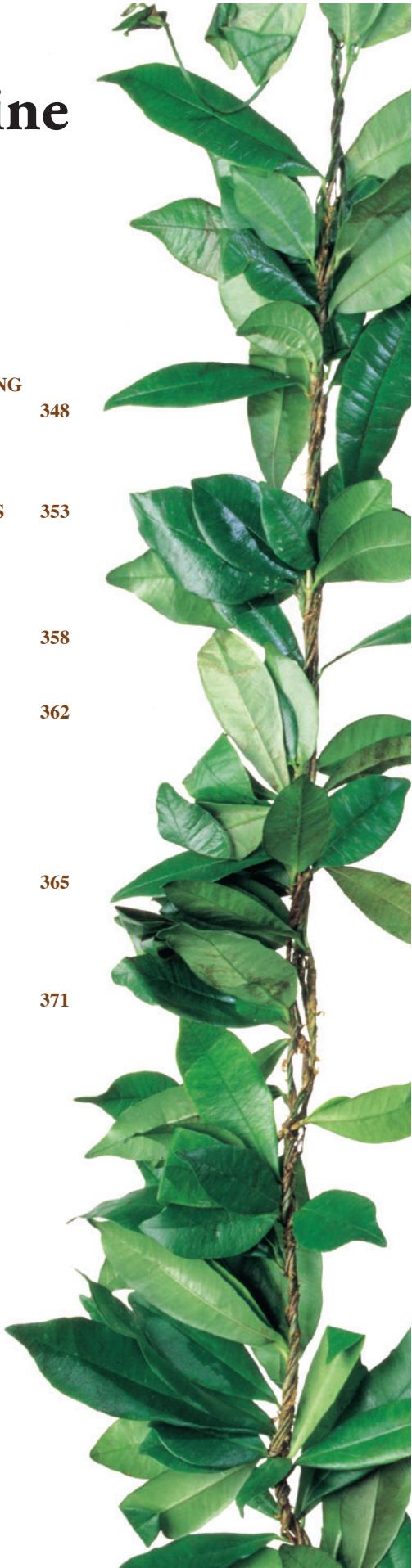
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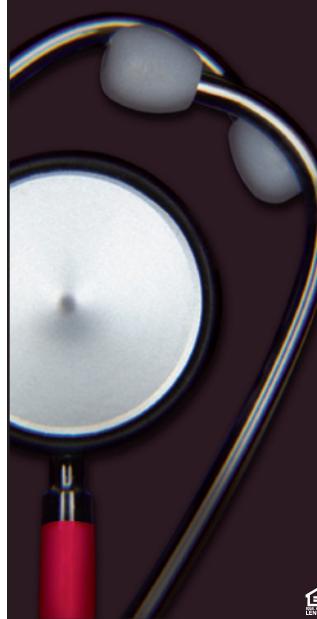
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A Rare Case of Medullary Carcinoma of the Colon Presenting as Intussusception in an Adult with Rectal Bleeding

Shilpa Jain MD; Ankur Jain MD, FACG; Neil Onizuka MSIV; and Sarag A. Boukhar MD

Abstract

Medullary carcinoma is a recently recognized rare subtype of colorectal cancer resembling both poorly differentiated adenocarcinoma and neuroendocrine tumors. Medullary carcinoma most commonly presents in the proximal colon and can be differentiated from other right-sided malignant lesions by histology and immunochemical markers. We present here a rare case of an adult patient with rectal bleeding who was found to have an intussusception due to underlying medullary carcinoma of the splenic flexure. A 72-year-old woman presented to our GI clinic with rectal bleeding. Colonoscopy revealed a necrotic mass of the sigmoid colon, later determined by CT to be a colo-colonic intussusception at the level of the splenic flexure. Patient underwent diagnostic laparoscopy with findings of a large splenic flexure mass, which was resected and found to be medullary carcinoma of the colon. The tumor was poorly differentiated and exhibited microsatellite instability but was discovered at an early stage and thus did not require any adjuvant chemotherapy. Unlike most previously reported cases of medullary carcinoma, our patient presented with a left sided tumor. To our knowledge, this is the first report of a medullary colon cancer presenting with intussusception.

Introduction

Intussusception is the prolapsing of a segment of the gastrointestinal tract into an adjacent segment. It is largely considered to be a pediatric phenomenon with only 5% of cases occurring in adults.¹ In children, clinical presentation is usually acute with colicky pain, vomiting, bloody mucoid stools, and the presence of a palpable mass. In adults however, the presentation is usually subacute or chronic and patients complain of nonspecific symptoms. They can present with symptoms of intermittent partial bowel obstruction such as abdominal pain, nausea, vomiting, and constipation. Rectal bleeding however, is uncommon. In adult patients, malignant lesions account for up to 30% of cases occurring in the small bowel and up to 66% in the large bowel.² The presence of intussusception in an adult should raise concern for potential malignancy, including cancer of the colon.

Most colon cancers are adenocarcinoma, which present with a typical histologic type. However, a relatively newly recognized rare subtype called medullary carcinoma of the colon has been characterized. Medullary colorectal carcinoma resembles both poorly differentiated adenocarcinoma and neuroendocrine tumors, but lacks glandular formation and is negative for neuroendocrine markers.³⁻⁵ It does not have neuroendocrine lineage. A small number of studies examining immunohistochemical characteristics of this tumor have shown it can be differentiated from adenocarcinoma of colon by strong calretinin staining and loss of both MutL homolog 1 (MLH1) and homeobox transcription factor (CDX2).⁶ Clinically, medullary carcinoma usually presents proximally, is less aggressive, and confers a better

prognosis when compared with colonic adenocarcinomas of similar differentiation.^{3,4}

We present here a rare case of an adult patient with rectal bleeding who was found to have an intussusception due to underlying medullary carcinoma of the splenic flexure.

Case Report

A 72-year-old Filipino woman presented to our outpatient clinic with complaints of rectal bleeding. She also reported recent onset of abdominal cramping and loose stools, which had resolved. She denied any associated fevers, nausea, vomiting, or weight loss. There was no family history of colon cancer. A colonoscopy in 2008 was normal. Patient's hemoglobin was 11 g/dL (11.2-15.7), with a component of iron deficiency. Liver tests were normal and stool studies were negative for pathogens.

A colonoscopy was performed which revealed a large necrotic mass in the sigmoid colon, at approximately 30 cm. The mass was friable and ulcerated and occupied almost the entire lumen (see Figure 1). The surrounding lumen was not visible and a pediatric colonoscope could not be advanced beyond the mass. Multiple deep biopsies were taken from the mass and the distal margins were tattooed with India ink. Pathology came back as showing only necrotic ulcer material with no viable cells.

A serum carcinoembryonic antigen (CEA) level was mildly elevated at 4.8 ng/mL (normal up to 2.9). A CT of the abdomen and pelvis with contrast revealed a colo-colonic intussusception at the level of the splenic flexure with approximately 10cm telescoping distally. An underlying mass could not be excluded (see Figure 2).

Due to high suspicion of malignancy, the patient was referred to surgery service. She was later taken for diagnostic laparoscopy and found to have a mass at the splenic flexure. She underwent laparoscopic assisted resection of splenic flexure colon with primary anastomosis (see Figure 3). Pathology was reported as poorly differentiated (high grade=G3) colonic medullary carcinoma with extension through submucosa into muscularis propria (T2), but no carcinoma in nearby lymph nodes (N0), and no distant spread of carcinoma (M0) (G3T2N0M0; stage 1) (see Figures 4a-b). There was loss of MLH1 and mismatch repair endonuclease (PMS2) protein expression on immunohistochemistry (See Figures 5a-d).

Since surgical resection, patient has been doing well. She was evaluated by oncology but did not require chemotherapy. A follow-up colonoscopy to evaluate the remaining colon showed only 2 small adenomatous polyps. Patient will continue to be followed closely by both GI and oncology services.



Figure 1. Necrotic ulcerated sigmoid mass seen on colonoscopy. Mass occupied almost the entire lumen.

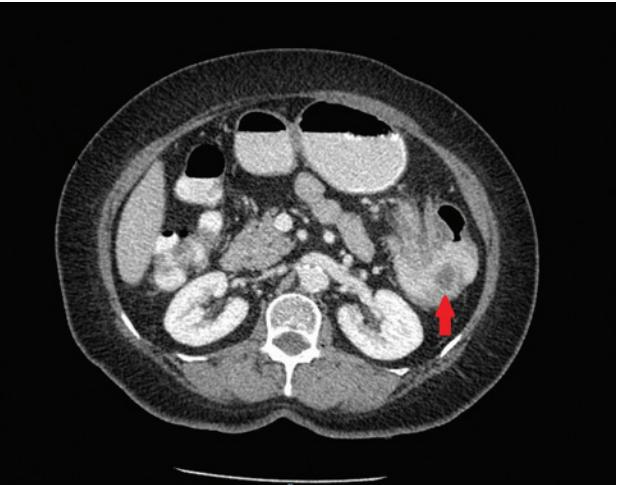


Figure 2. Colo-colonic intussusception at the level of the splenic flexure. Arrow points to origin (lead point) of telescoped portion of bowel.



Figure 3. Partial colectomy revealed a tan-brown pedunculated mass at the splenic flexure measuring 8x6x4 cm.

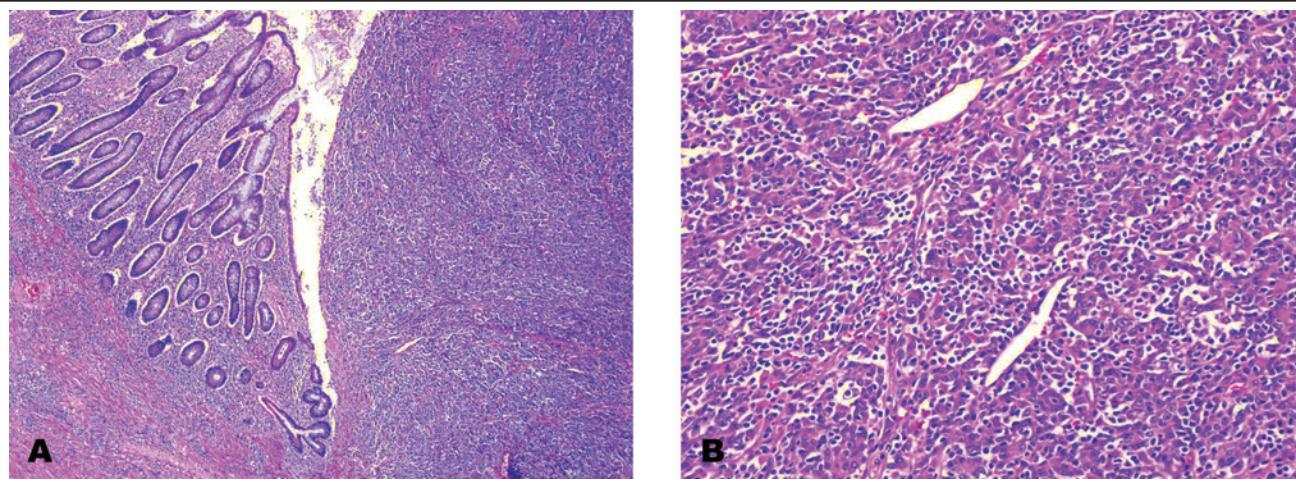


Figure 4. Colectomy, splenic flexure mass, H&E (40x and 200x, respectively).

- A) Mucosal involvement by a tumescent mass comprised of solid sheets of poorly differentiated tumor devoid of significant gland formation.
- B) Higher power (200x) examination demonstrates a diffuse proliferation of markedly pleomorphic tumor cells occurring in a background of intense peri- and intra-tumoral lymphocytic infiltration. The tumor nuclei are vesicular with frequent prominent nucleoli, and surrounded by abundant eosinophilic cytoplasm.

Literature Review and Discussion

Medullary carcinoma (MC) is a rare type of colorectal adenocarcinoma. In one study utilizing the Surveillance Epidemiology and End Results (SEER) database, the authors identified all cases of medullary carcinoma between 1973 and 2006. They observed that medullary carcinomas constituted just 5 to 8 cases for every 10,000 colon cancers diagnosed.³ The mean annual incidence was 3.47 (+/-0.75) per 10 million population. Mean age at diagnosis was 69.3 (+/-12.5) years, with incidence increasing with age. MCs were twice as common in females and extremely rare among African-Americans.

These tumors tend to be proximal, are almost always microsatellite-unstable, and have a strong association with hereditary nonpolyposis colorectal cancer (HNPCC or Lynch syndrome). In the above study, the authors found that MCs were most common in the proximal colon (74%), where they present at a later age than in the sigmoid colon.³ There were no cases reliably identified in the rectum or appendix. CEA levels were elevated prior to first course of treatment in 40% of the patients. MCs were more commonly poorly differentiated (72%), with 22% being undifferentiated. MCs commonly presented with Stage II disease, with only 10% presenting with metastases at the time of diagnosis. Early outcome analyses showed that MCs have 1- and 2-year relative survival rates of 92.7% and 73.8% respectively. Although MCs showed a trend towards better early overall survival, undifferentiated MCs present more commonly with Stage III disease, with comparatively worse early outcomes than poorly differentiated subtype. In a recent case series published by Cunningham, et al, two patients with medullary colon carcinoma presented with non-specific

symptoms of malaise, nausea, and weakness. Both were found to have advanced disease requiring chemotherapy.⁶

The differential diagnosis of large right-sided colonic tumors also includes neuroendocrine tumors of the colon and poorly differentiated and undifferentiated adenocarcinoma. The distinction between medullary carcinoma of the colon and these other malignancies is made via microscopy and special staining for markers.

Medullary carcinoma of the colon is characterized by a solid growth pattern with poorly differentiated or undifferentiated, non-glandular, solid sheets of uniform type large eosinophilic, polygonal cells that are heavily infiltrated by small intraepithelial lymphocytes.

Despite their similar histology to neuroendocrine tumors, medullary carcinomas of the colon maintain some intestinal differentiation, frequently staining positive for Mucin1, cell surface associated (MUC1), Mucin2, oligomeric mucus gel-forming (MUC2), and transcription termination factor 2 (TTF2). Medullary carcinoma of the colon can be differentiated from poorly differentiated and undifferentiated colon adenocarcinoma by microsatellite instability, with loss of staining for MLH1 and intestinal transcription factor CDX2. There is also a strongly positive calretinin staining compared to other poorly differentiated colonic adenocarcinomas. In one study, it was also noted that there was more commonly a lack of stabilization of the p53 protein, and microsatellite instability was almost completely limited to poorly differentiated adenocarcinoma of the medullary type.⁶

Due to the rarity of the tumor, optimal treatment strategies including specific chemotherapy regimens have not been de-

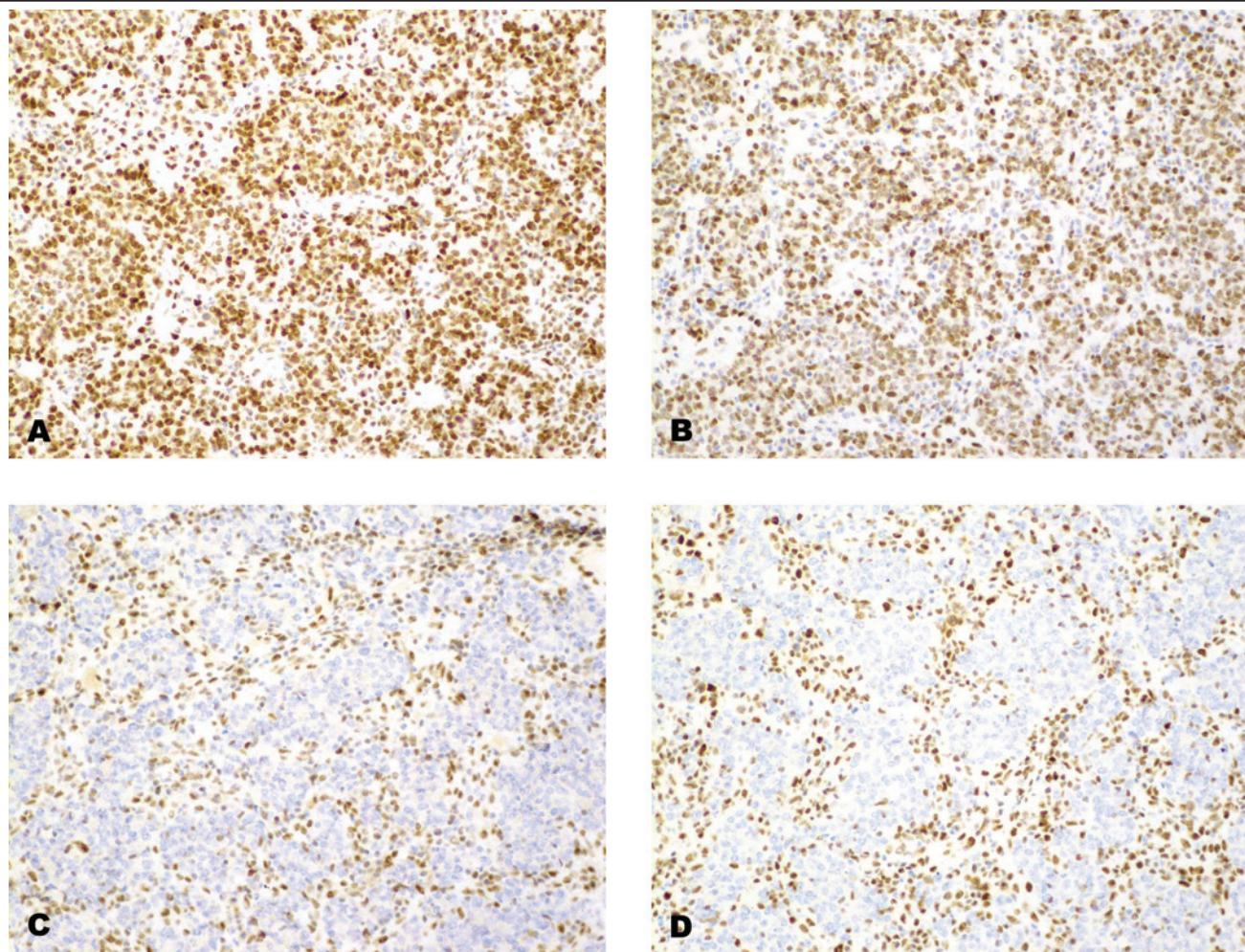


Figure 5. Immunohistochemical stains MSH2, MSH6, MLH1, and PMS2, respectively (200X).

A-B) Positive staining for MSH2 and MSH6 in both the medullary carcinoma and lymphocytes.

C-D) Loss of MLH1 and PMS2 protein expression by the medullary carcinoma, while the background lymphocytes retain their normal expression.

termined. However in the previously published case series, all patients underwent surgery and three of the thirteen patients died within 1 year of diagnosis due to advanced disease.^{5,6}

To our knowledge, this is the first report of a medullary carcinoma of the colon, a rare occurrence in adults, presenting with intussusception. The tumor was large, poorly differentiated, and exhibited microsatellite instability but was found at an early stage and was thus amenable to surgery alone without the need for any adjuvant chemotherapy. Unlike most previously reported cases of medullary carcinoma, our patient presented with a left sided tumor, which in itself is a rare location for colonic intussusception due to fixation of the descending colon to the retroperitoneum. It is likely that the size of the tumor was a contributing factor for the intussusception and it remains to

be seen from future case reviews whether intussusception is a typical presentation of left-sided medullary cancer.

Conflict of Interest

None of the authors identify a conflict of interest.

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A Qualitative Study of Transportation Challenges Among Intracerebral Hemorrhage Survivors and Their Caregivers

Marissa M. Ing MSW; Megan A. Vento BS; Kazuma Nakagawa MD;
and Kristen F. Linton PhD, MSW

Abstract

Post-discharge barriers of hemorrhagic stroke survivors in Hawai'i have not been extensively studied. The purpose of this qualitative study was to identify common driving and transportation barriers among patients with intracerebral hemorrhage (ICH) and their caregivers in the Honolulu community. Semi-structured interviews were conducted with ICH patients ($n=10$) and caregivers ($n=11$) regarding their driving and transportation barriers. Inductive content analysis was used to analyze the interviews. Participants reported that they needed transportation to attend to their recovery and remain safe. Informal transportation was desired, yet not always available to patients. A local paratransit service for people with disabilities was the most common form of alternative transportation used by patients; however, they reported difficulty obtaining this method of transportation. Participants with no other option used costly, private transportation. Most ICH survivors expressed great challenges with the available transportation services that are essential to their reintegration into the community after hospitalization. Greater effort to provide transportation options and eligibility information to the ICH patients and their caregivers may be needed to improve their post-discharge care.

Introduction

Transportation is an essential part of post-hospitalization care for stroke survivors in order to attend to their ongoing outpatient medical and rehabilitation care. Furthermore transportation is essential for stroke survivors to physically attend stroke support groups and work, which would help them reintegrate into the community. Because the majority of stroke survivors are initially medically unfit to drive, they typically depend on their families, friends, or public means for transportation during the first year after their stroke.¹⁻³ Prior studies have shown that stroke survivors often experience difficulty finding transport and encounter unpredictability and unreliability of readily available transportation services.⁴⁻⁵ Therefore, lack of adequate transportation often becomes a barrier to receiving recovery services for people who have had strokes.⁶⁻⁹ While some public transit agencies have provided more transportation options for people with disabilities that go above and beyond those required by the Americans with Disabilities Act of 1990 (ADA), others have not.¹⁰ This study aimed to assess common transportation barriers for patients who survived acute intracerebral hemorrhage (ICH), and their caregivers, in the Honolulu community.

Stroke survivors with disabilities that limit their ability to drive may access transportation services, which were developed as a result of ADA.¹⁰ The ADA, as amended in 2008, prohibits discrimination and ensures equal opportunity for people with disabilities in receiving public services and transportation. People with disabilities include those who have a physical or mental impairment that substantially limits one or more major

life activities, such as walking, caring for oneself, concentrating, or communicating. Public transportation, including buses and rail systems, is included as a public entity that must be accessible to and usable by individuals with disabilities, including those using wheelchairs. Additionally, paratransit services must be provided for: (1) individuals who are unable to board, ride, or disembark public transportation vehicles due to their impairment, (2) individuals whose impairment prevents them from traveling to a boarding location or from a disembarking location, and (3) another individual accompanying a person with a disability.¹⁰ Paratransit or other special transportation services for people with disabilities should be "comparable to the level of designated public transportation provided to individuals without disabilities using such systems" and "in the case of response time, which is comparable, to the extent practicable, to the level of designated public transportation services."¹⁰

One study found that 46% of people with disabilities use public transportation rather than private transportation or obtaining a ride from a friend or family member for general transportation purposes.¹¹ Approximately 40% of people with disabilities use public transportation to go to and return from work, which demonstrates the significance of public transportation to their community integration.¹¹ Most people with disabilities who are evaluated for paratransit services are eligible. A study of evaluations of 500 potential paratransit customers found that 92% were eligible, and 11% of those evaluations were for stroke survivors.¹²

Evaluations for paratransit are conducted by a physical or occupational therapist who administers cognitive and physical ability tests.¹² The cognitive test assesses temporal orientation as well as the ability to identify bus routes and landmarks, handle bus fare, and communicate travel destination information. A modified version of the Mini-Mental State Examination is included in the evaluation. The physical abilities test assesses ambulation skills, use of mobility devices, and the applicant's ability to ascend and descend curbs, slopes, and bus steps.¹²

While paratransit services are widely used by people with disabilities, the service costs are much higher than fixed route transit, such as buses and rail systems. In expert panel focus groups of transit providers, a transit agency reported that 40% of expenses went to paratransit services, while less than 40% of their customer base included paratransit riders.¹³ Because of the cost of this service, transit agencies have developed several methods to encourage paratransit eligible customers to

use fixed route transit or taxis.¹⁴ Some agencies provide travel training for newly certified paratransit customers, which teaches them how to use fixed route transportation. This has decreased paratransit use by 12% thus decreasing public transit costs and increasing inclusion of people with disabilities in public transit services for people with and without disabilities.¹³ The second method offers paratransit eligible customers the use of a taxi to get to their destination instead of paratransit. It is offered as a supplement to paratransit. A study of 40 city transit agencies found that taxis provide services that are “above and beyond” ADA standards.¹⁴ Taxis can be scheduled on the same day of the service. This offers more flexibility than paratransit, which must be scheduled 24 hours prior to an appointment. The passenger pays the standard ADA paratransit fare; the transit agency pays the cost above the typical one-way ADA fare up to a set limit, and the passenger pays anything above the set limit. For example, if an agency sets a limit of \$15.00 per one-way trip, and the customer takes a trip costing \$20, then the ADA customer would pay a standard ADA fee of \$2.00 and the transit agency would pay \$13.00. The customer would also have to pay the remaining \$5.00 of the fare. The savings to the transit agency is the difference between the amount of the fare they subsidize (ie, \$13.00) and the typical one-way cost of an ADA paratransit service (ie, \$20.00). In this case, the transit service would save 30%.¹⁴

The City and County of Honolulu Department of Transportation Services provides both a public fixed route transit service and a paratransit service for people with disabilities.¹⁰ The fare in 2014 is \$2.00 per one-way paratransit trip. Paratransit trips must be reserved at least 24 hours prior to an appointment as specified by ADA. Curbside service is provided; therefore, a customer must be able to ascend and descend curbs themselves or with a caretaker’s assistance, who must ride with them. Eligibility is determined by an in-person evaluation (as previously described).¹⁰ Neither supplementary taxi service nor travel training for new paratransit customers are provided. While taxis are available in Honolulu, people with disabilities pay the same fares as other customers. Since Honolulu has not provided these supplementary services, which can offer people with disabilities with more transportation options, this study aimed to assess how ICH patients and their caregivers in the Honolulu community perceived their transportation strengths and challenges.

Methods

Participants

Participants were recruited from an ongoing cohort study of ICH patients at The Queen’s Medical Center in Honolulu, HI. Patients were included if they: were hospitalized with ICH, over 18-years-old, a Hawai‘i resident for more than 3 months, and available by telephone for recruitment and an in-person interview. These criteria were developed for the original purpose of the cohort study. Participants were excluded if their ICH was directly related to trauma or subarachnoid hemorrhage from ruptured cerebral aneurysm, which was related to the original

Table 1. Demographics

	Caregiver (n = 11)	Patient (n = 10)	Combined (N = 21)
Male	6	3	9
Female	5	7	12
Age, mean (s.d., range)	60.8 (9.1, 49-76)	61.1 (13.2, 42-82)	60.9 (11.0, 42-82)
Education			
<High school	1	2	3
High school	2	1	3
Some college	1	2	3
College	7	4	12
Race/Ethnicity			
White	2	2	4
Taiwanese	1	1	2
Asian Indian	1	1	2
Filipino	1	2	3
Japanese	1	1	2
Chinese	2	1	2
Native Hawaiian	2	3	5
Other Pacific Islander	1	0	1
Caregiver Relationship to Patient			
Parent	1	N/A	1
Spouse	6	N/A	6
Son/Daughter	1	N/A	2
Friend	1	N/A	1
Niece/Nephew	1	N/A	1

purpose of the cohort study. Ten interviews are recommended for inductive content analyses to meet saturation, which is met when no new themes are found with each subsequent interview.¹⁵ In order to assess this, the interview transcripts are analyzed following each interview, and the themes from the new interview are compared to themes found in previous interviews conducted.¹⁵ Thirty patients and 30 of their primary caregivers as identified during recruitment for the original cohort study were screened and approached by telephone to participate in the study at least three months post-hospital discharge. Ten ICH patients and eleven caregivers participated in semi-structured interviews. Participant self-identified demographic information is displayed in Table 1. Participants identified their primary race or ethnicity only.

Design

The Queen’s Medical Center institutional review board (IRB) approved this study. Semi-structured audio-recorded interviews were conducted with participants at the hospital after they signed IRB approved consent forms. Two authors conducted interviews utilizing an interview script, which included open-ended questions on topics related to ICH stroke, such as stroke information, emotions, and transportation. The script was developed based on

a literature review, which included identification of important aspects of recovery to people who have experienced strokes in previous research.⁶⁻⁹ Twelve interviews with the participants lasted an average of 47 minutes (*MIN - MAX* 36 – 86 minutes). Nine interviews were conducted with the patient and his or her respective caregiver. One was conducted with two caregivers, and another with one patient. Participants received a \$25 gift card for participation in the interview. Only one gift card was given per interview. For example, if a patient and caregiver participated together, only one gift card was given to them to share as an incentive.

Analysis

Interview recordings were transcribed; pseudonyms were used to refer to participants. Inductive content analysis was used for this study, which is the analysis of text to obtain replicable and valid inferences of the data. This qualitative form of analysis often sacrifices breadth, or large sample sizes, for depth.¹⁵ For the purposes of this study, authors aimed to understand the in-depth phenomenological experience of participants; thus, interviews provided participants with the space to share their lived experiences, and inductive content analysis provided the authors with an opportunity to develop a theory regarding their transportation needs from the data. The authors worked together to develop a codebook, which described each identified theme, by reading the transcriptions and identifying codes in the transcripts. Codes, or themes, were given weight based on participants' repetition, use of stories or examples, or emotion to refer to the themes. All data was read to identify initial codes that were used to identify prominent themes across participants. This study included the development of a codebook with multiple coders with different expertise to prevent bias. The methodology used is referred to as triangulation, which is a common approach used to improve the rigor of qualitative research.¹⁵ The coders discussed the three themes related to transportation they found with one another after each interview until all three coders agreed upon the final codebook. Every segment of text could be double-coded. Two authors independently coded all text with the final codebook. Adequate interrater reliability (*kappa* = .72) was reached on a total of 154 codes. This means that the themes were discussed a total of 154 times throughout the text. A kappa of .70 or above is considered to have good reliability.¹⁶

Results

Three major themes were found pertaining to the transportation needs of participants with ICH and their caregivers: (1) participant reliance on assisted transportation, (2) barriers to informal transportation and (3) barriers to formal transportation.

Reliance on Assisted Transportation

Transportation options were essential to participants for safety, to attend medical appointments, and increase independence. Participants expressed that they could no longer drive themselves safely. One participant, Maile, described her difficulty with driving, "I'm afraid [to drive], only because my right side still comes numb sometimes, and my judgment. Sometimes...

I'll get up and I'll get dizzy or...I miss my step in the house." Participants reported using both formal and informal transportation options. Informal transportation included such options as obtaining a ride from a caregiver. The most common form of formal transportation discussed by participants were paratransit services and mass transit using buses; however, participants discussed issues accessing paratransit services. Other forms of formal transportation discussed by participants included taxis or hired cars.

Barriers to Informal Transportation

While informal transportation was preferred by participants, this option was not always available to the participants in our study. Participants noted several challenges to informal transportation. For example, Sondra, a caregiver, explained that she drives her husband wherever he needs to go, because it is the safest option. However, she explained that he "[has] to squeeze into my little Kia Accent." This suggests that having a car that is suitable for a person with a disability (ie, a minivan or larger vehicle) is essential if a patient is using transportation provided by caregivers, and the absence of a well-suited vehicle can pose an important challenge. In addition, Sondra said, "... if he had to go somewhere, I would have to take off from work." Sondra works full time and helps her husband eat, manage medications, do physical therapy, and shower. This illustrates that informal transportation potentially places an additional burden on caregivers to make themselves available to patients at times that may not be mutually convenient.

Barriers to Formal Transportation

Barriers to formal transportation could be categorized into two primary themes, issues with scheduling paratransit services, and challenges to becoming eligible for paratransit services. Each of these issues is addressed below. In addition, other challenges to formal transportation are discussed in a separate section.

Scheduling Paratransit Services

The most common form of alternative transportation used by participants was the paratransit system. However, every participant who spoke of the paratransit except one reported issues scheduling rides. The one participant who did not report issues simply reported that she used paratransit when she needed. Other participants who reported issues did not appear to be aware of the policies associated with scheduling rides. For example, Ron thought that he had to schedule rides within two hours of the desired pickup time. Ron expressed that in order to get to his interview for this study, he "tried to get the [local paratransit services]." Ron explained:

"I call up at 8 o'clock and I get put on hold...I talk to them, finally, and 'Oh, I doubt we'll be able to get you an appointment today, you should have tried to call a couple of days ago,' and I'm going, 'well, you're supposed to be able to get a ride in 2 hours' ... That's why I had to drive instead of taking the [local paratransit service]. Yeah—not that I particularly care to do that, or am supposed to do that you know? After a stroke you're not supposed to drive for a year."

After revealing that he drove to the appointment, Ron was asked how the stroke had impacted his driving. He said, “I think that the hardest thing for me was getting my right foot coordinated from the gas to the brake, because I don’t have feeling.” Another participant demonstrated her confusion with paratransit scheduling policies, since the policy states that patients must call 24 hours prior to the time they need a ride: “You have to call at least a day before or up to seven days and you have to tell them the time they are going to pick you up and drop off and where, and sometimes you have to wait so long.” In addition, if participants were able to schedule a paratransit ride, they reported that the paratransit often picked them up late. Six participants stated that the paratransit had been at least two hours late on at least one occasion. Many participants said they were using transportation to attend scheduled medical appointments, suggesting that paratransit delays substantially impacted their access to health care.

Eligibility for Paratransit Services

Paratransit was not reported as a viable transportation option by everyone. Two participants reported that their disability prohibited them from using the paratransit services. Kealii, a caregiver, described how his wife’s physical abilities prevented her from using paratransit:

“[The local paratransit service] only does curbside service. So if she cannot do the curb or get to the curb or get off the curb and into the house by herself, then I pretty much have to bring her. I mean we got a ramp and stuff like that, but with the [local paratransit service]—I mean you could be stuck at the hospital 2-3 hours if the [local paratransit service] gets delayed. She cannot sit in the chair for 2-3 hours waiting on the curb for this [local paratransit service].”

Other Formal Transportation Challenges

While riding the bus was possible for some participants, many expressed that it was very difficult, because it did not directly take them to where they needed to go. Many of the participants described experiencing confusion and physical challenges that prevented them from taking the local public bus service. Patients who had no other options were subject to expensive private transportation. Kealli reported, “Tried the private service once, and that cost me \$185 a run, and I’m going, ‘you’re crazy!’” Another reported spending \$70 to \$140 for a one time private transportation trip to a medical appointment.

Discussion

This study showed that hemorrhagic stroke participants in our study had new dependence on public and private transportation services after their stroke. These transportation services were felt to be limited in availability and inadequate in meeting their needs. These findings are consistent with prior studies in other population.⁴⁻⁵ Those who were unable to use the public transportation services were making unsafe decisions, such as driving themselves prior to medical clearance. The strength of this study is that transportation issues after stroke hospitalization specific to Honolulu County have not been previously published and

highlight the possible need for further local system improvement. While this study has the limitation of generalizability due to its qualitative methods, small sample size and selective eligibility criteria, it provides a first glance into the barriers of ICH survivors and their caregivers in Honolulu. Although saturation was reached with our study size, the small number of participants in this study weakens the generalizability of the results. Furthermore, there may have been selection bias toward those with transportation issues, since ICH patients and caregivers who lacked post-discharge barriers may not have shown interest in participating in this study.

Specific needs reported by participants could be addressed by the medical professionals and local transit department. Overall, it would be helpful to provide education about paratransit services and offer more options that would increase timeliness of services, which are both methods used by 40 other public transit agencies in the United States.¹⁴ Medical professionals could improve the patient discharge process by (1) consistently offering the Disability Parking Permit, which would assist the caregiver with informal transportation; (2) accurately describing the protocol for arranging local paratransit services; and (3) providing a list of known local, privately owned transport agencies to patients and caregivers. Additionally, paratransit services may consider expanding services to include drop off of participants at the door, rather than curbside, of their destination.

The local transportation services could also improve their information delivery. For example, further education about the need to call the paratransit services 24 hours prior to their requested services can be more explicitly stated to the public. Unfortunately, the City and County of Honolulu Department of Transportation Services website specifies that advanced reservations of paratransit services are required, but does not specify the 24- hours advanced notice, which may lead the users to make more last minute reservation attempts.¹⁰ Since people with disabilities in Honolulu are already using taxis as a transportation option, the local transit agency might consider providing taxis as a supplement to paratransit services, since they can provide more reliable and timely transportation and have demonstrated cost savings in other transit agencies.¹³ However, further information pertaining to the average cost of taxi rides among people with disabilities is needed prior to pursuing supplementary taxi services.

Conclusion

A multidisciplinary approach is needed to address transportation challenges among people with disabilities, especially those with ICH. Both medical professionals and transportation agencies need to adequately address the transportation challenges of people with disabilities. Prior to discharge, medical professionals have an opportunity to ease patients’ transition into the community by providing them with a Disability Parking Permit and instructions on paratransit services and other local transportation agencies. Future research should evaluate whether medical professionals are able to successfully implement these

services at local hospitals. Local transportation agencies can provide additional information on their website about their scheduling policies and options for people with disabilities to use taxis for transportation. Future research should assess the feasibility of providing a taxi option for paratransit eligible people with disabilities.

Conflict of Interest

None of the authors identify a conflict of interest.

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Team Size Impact on Assessment of Teamwork in Simulation-based Trauma Team Training

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Abstract

Non-technical skills (teamwork) assessment is used to improve competence during training for interprofessional trauma teams. We hypothesized non-technical skills assessment is less reliable for large size teams, and evaluated team size effects during teamwork training. Small-teams ($n=5$; 5-7 members) and Large-teams ($n=6$; 8-9 members) participated in three simulation-based trauma team training scenarios. Following each scenario, teamwork was scored by participating trauma attending physicians (TA), non-participating critical care trauma nurses (CRN), and two expert teamwork debriefers (E), using the Trauma Nontechnical Skills Assessment tool (T-NOTECHS). Large-team scores by TA and CRN were higher than E scores ($P < .003$); small-team scores did not differ by rater. Small-team inter-observer agreement was substantial ($ICC = 0.60$); large-team agreement was low ($ICC = 0.29$). E and TA scores showed no concordance, whereas E and CRN scores showed poor concordance for large teams ($ICC = 0.41$, $r = 0.53$, $P = .02$). By contrast, correlation between E and TA ($ICC = 0.52$, $r = 0.80$, $P < .001$) as well as E and CRN ($ICC = 0.57$, and $r = 0.65$, $P < .01$) for small teams was high. Team size should be considered in team-training design, and when using teamwork rating instruments such as T-NOTECHS for assessment of simulated or actual trauma teams. Modified rating scales and enhanced training for raters of large groups versus small groups may be warranted.

Keywords

Trauma, Non-technical skills, Simulation, Teamwork, Interprofessional, Assessment, Training

Introduction

Lapses in communication and teamwork failures have been identified as key common contributing factors in patient safety incidents.¹⁻³ Trauma resuscitation is a common, complex and time-critical endeavor performed by interprofessional, ad-hoc clinical teams. As such, trauma resuscitation provides a valuable platform for training and evaluation of healthcare professionals in critical non-technical (teamwork) skills. High-fidelity simulation-based training has been used effectively in a variety of clinical disciplines to modify behaviors and affect patient outcomes.⁴⁻⁶ Recent studies have reported that simulation-based training can improve teamwork, clinical efficacy and trauma process.⁶⁻⁹ Assessing clinical competency during real-life trauma resuscitation is challenging;⁴ there is however a growing body of evidence supporting the use of simulation for assessment and training of trauma teams.¹⁰⁻¹³

Accurate evaluation of non-technical skills is central to optimizing team-based training, assessing competency and gauging the impact of educational interventions. A variety of tools have been developed to assess non-technical skills in the operating room and trauma bay.^{7,11,14} Considerable focus has been appropriately placed upon rater qualifications, training and structured debriefing.¹⁵⁻¹⁷ Less information is available regarding the impact of team composition on the ability to execute

requisite patient care tasks in an optimally safe environment characterized by excellent teamwork, cooperation, and communication. Team training effectiveness is moderated by team size, in addition to other recognized factors such as training content.¹⁸ Teams are thought to be most effective when composed of a sufficient, but not greater than sufficient, number of members to perform team tasks;¹⁹ Definitions of “sufficient” however remain unclear. Larger teams have been noted to suffer from loss of coordination and process, yet have been shown to be more effective in some studies—perhaps dependent on the nature of the tasks and team environment.²⁰ In healthcare studies optimal team size effects are not widely reported. One report documents decreasing clinical performance in pediatric trauma resuscitation when optimal number of team members is exceeded.²¹ Another recent study suggests that increasing team size and variability prolongs operative times.²² Intuitively, team size is a critical component of team function, requiring a minimum number of members to accomplish tasks and prevent individual task overload, balanced by limiting total membership to reduce barriers to communication and cooperation. Generalizable factors which influence optimal team size in healthcare domains have not been well defined to the author’s knowledge.

Teamwork training and feedback depends on an accurate assessment of teamwork, by observers, in both training settings and actual clinical practice. We hypothesized that the total number of team members would influence accuracy of assessment of trauma team non-technical skills. We investigated the effect of team size on trauma teamwork skills as assessed by trauma attending physicians (TA), critical care trauma nurses (CRNs), and teamwork subject matter experts (E) using the modified Trauma Nontechnical Skills Assessment tool (T-NOTECHS).²³ Secondarily, we sought to evaluate the correlation of T-NOTECHS when administered by three types of raters.

Methods

Subjects

A retrospective review was conducted using data from a previously published simulation-based trauma team training project conducted “in situ,” in the emergency department of a Level II trauma center.²³ The research was institutional review committee approved, and participants gave informed consent. Trauma simulation scenario participants were clinical trauma team members, including surgical residents, trauma surgery and emergency department attending physicians, critical care trauma specialist nurses who are designated as Crisis Resource Nurses (CRN), emergency department nurses, respiratory therapists, trauma physicians’ assistants, and emergency department technicians.

Participants were assigned to multidisciplinary training teams for trauma simulation exercises based on professional experience and availability. Each team participated in three randomly sequenced 15-minute trauma resuscitation scenarios, conducted with a high-fidelity human patient simulator (SimMan—Laerdal Medical, Wappingers Falls, NY) in the emergency department trauma bay. Scenario design required the completion of eight key “clinical tasks” for an optimal simulated trauma patient outcome for each scenario. Simulated resuscitation sessions were captured using a digital video recorder and a synchronized simulator event log. Teamwork scores were assigned independently by scenario participants and by non-participants. Scenario participants who completed teamwork assessment were Trauma Attending Physicians (TA) and Crisis Resource Nurses (CRN). The CRN routinely functions as a “scribe” during trauma resuscitations, recording times and clinical interventions, with minimal hands-on patient contact. Only one TA and one CRN were assigned to each resuscitation team. Non-participants who completed teamwork assessment and conducted debriefings for simulation scenarios were “Expert Debriefers” (E). Two authors, critical care (BB) and trauma (SS) physicians with training and multi-year experience in multidisciplinary teamwork training and clinical trauma care served as E. Expert ratings were used as the “reference standard” for comparison. Teamwork was scored on a T-NOTECHS scale from 5 (lower performance) to 25 (higher performance), which evaluates five primary teamwork domains: Leadership, Cooperation and Resource Management, Communication and Interaction, Assessment and Decision Making, and Situation Awareness/Coping with Stress. T-NOTECHS scores were self-scored and collected from participants (TA and CRN) immediately following each simulated resuscitation, prior to videotape review and debriefing, using an automated audience response system (ARS; Turning Point Technologies).

After teamwork scores were assigned, a 30-minute debriefing was conducted focused on T-NOTECHS domains. The a priori identified key clinical tasks for each scenario were not alluded to or included in the debriefing. After each day of training, the E performed an independent video review of each scenario and recorded the time-to-completion for each of the clinical tasks.

Statistical Analysis

Preliminary analysis of group size effects on teamwork assessment outcomes was conducted on three convenience groups considering team sizes of 5-6, 7-8, and ≥ 9 , using ANOVA. Teams with ≥ 9 members had lower teamwork scores especially on cooperation and resource management and communication and interaction items than other groups. Teams were subsequently grouped and sequentially analyzed according the number of members, detecting significantly different teamwork scores between “small” teams with 5-7 members, and “large” teams with 8-9 members. Demographics of study groups (small versus large) were analyzed by Mann-Whitney U test. T-NOTECHS rating scores were reported as mean \pm standard deviation. Comparisons between three raters (TA, CRN, E) were assessed

with a two-way, mixed design analysis of variance (ANOVA). Inter-rater reliabilities were evaluated using intraclass correlation coefficients (ICC) based on absolute agreement for single raters in various settings, as follows: (1) 3 raters: E, CRN and TA, (2) 2 raters: E and CRN as well as E and TA. The correlations of T-NOTECHS ratings were calculated using the Pearson correlation coefficient. The data was analyzed using nonparametric methods when appropriate. All analyses were conducted using SPSS version 17.0 (SPSS, Inc, Chicago, IL). Significance was determined at $P < .05$.

Results

Eighty-one trauma team members completed training and had ARST-NOTECHS (teamwork ratings) available. These included 6 attending surgeons, 12 emergency department attending physicians, 16 residents, 29 nurses and 20 other special healthcare providers (10 respiratory therapists, 3 physician assistants, and 7 emergency department technicians). All participating members during each training session were assigned to a single team. Team size varied according to availability of participants in the convenience sample. Five “small” ($n=5-7$) and six “large” ($n=8-9$) teams resulted. There were a significantly greater number of resident physicians in the large (median 2.5, $P < .05$) versus the small (no resident physicians) teams. Otherwise, there was no significant difference in team composition between the two groups. Each team completed three simulated resuscitations; thus, 33 scenarios were available for analysis.

There was no difference between small and large team time to completion or total number of completed key clinical tasks. T-NOTECHS scores showed no significant difference in E ratings between small and large groups. However, when compared to E ratings and clinical task execution, T-NOTECHS scores assigned by both TAs and the CRNs were higher in the large groups (Table 1). Similarly, the three raters showed substantial inter-observer agreement when scoring small ($ICC = 0.60$) but not large ($ICC = 0.29$) groups (Table 2). The difference between TA’s and E’s assessments was particularly prominent in the large groups, where ICC was 0.18 with no statistically significant correlation between the two scores. Inter-observer agreement between E and CRNs also exhibited poor concordance in the large groups ($ICC = 0.41$). In contrast, when evaluating the small trauma teams, there was improved and significant correlation between the E and TA ($ICC = 0.52$, $r = 0.80$, $P < .001$) as well as the E and CRN scores ($ICC = 0.57$, and $r = 0.65$, $P < .01$).

Table 1. Comparison of mean T-NOTECHS score among raters for each group.

Raters	Expert	Trauma Attending	CRN	P-value
Small Teams [#] (n=15)	16.23 ± 2.38	18.93 ± 3.50	17.53 ± 3.07	.054
Large Teams [†] (n=18)	16.44 ± 2.79	$20.26 \pm 2.64^*$	$18.83 \pm 3.36^*$.001

Values are expressed as the mean (\pm SD). [#]Small Teams comprised 5-7 members.

[†]Large teams comprised 8-9 members. *Significant difference versus Expert.

Table 2. Intraclass and Pearson correlation coefficients between raters' T-NOTECHS scores according to team size.

Raters	Small Teams (n=15)				Large Teams (n=18)			
	ICC	P	CC	P	ICC	P	CC	P
E/CRN/TA	0.60	<.001			0.29	.003		
E/CRN	0.57	.004	0.65	.009	0.41	.011	0.53	.023
E/TA	0.52	.001	0.80	<.001	0.18	.082	0.34	.177
TA/CRN	0.84	.001	0.78	.001	0.36	.085	0.37	.144

ICC: intraclass correlation coefficient, CC: Pearson correlation coefficient. E: expert, TA: trauma attending physician, CRN: critical care trauma nurse.

Discussion

The conduct of healthcare team training using simulation utilizes a structured instructional design incorporating the experience of simulated case management involving a technologically advanced human patient simulator. Following participation in a clinical simulation, structured debriefing is conducted for participants by a facilitator, who incorporates elements of the team's simulated clinical performance and specific teamwork behaviors during the interactive post-simulation session. In order to conduct a meaningful debriefing a facilitator uses rating tools to perform team assessment during simulation, and provides debriefing and feedback based on the assessment. Simulation based performance assessment can also be used for formative assessment of both individuals and teams. Thus both formative and summative assessments require accurate assessment of performance to reach educational goals and objectives. Development and application of accurate, reliable, and valid assessment tools remains a challenge for healthcare educators.²⁴

There is growing awareness of the importance of non-technical skills among surgeons, and the necessity to critically examine non-technical training and evaluation methods. T-NOTECHS has been used for the assessment and debriefing of teams in both simulated and actual trauma resuscitations. In both settings, T-NOTECHS has documented high inter rater reliability when utilized by expert evaluators of trauma team performance. T-NOTECHS has also demonstrated a high correlation of teamwork scores with clinical performance parameters.^{14,23} The results reported in this study unveil several considerations relevant to designing team-training curricula, and for real-life assessment and reinforcement of non-technical skills.

First, high-fidelity human patient simulators are a commonly utilized for training but require substantial equipment and trainer. Efficient use of resources with higher in-situ fidelity might favor providing resident training in larger inter-professional groups with clinicians, such as trauma attending physicians and nurses, as instructor-evaluators. Findings showed inaccuracy and decreased reliability of specialty specific trauma clinician teamwork (TA and CRN) scoring using T-NOTECHS, compared to expert teamwork scoring for larger groups (≥ 8 participants). This finding suggests that constructing smaller training groups allows for more accurate and reliable teamwork scoring. There is scant information about precise team size cutoffs for either clinical effectiveness, or accuracy and reliability of teamwork

assessment during training. Our results serve as a pilot to inform the construct of further rigorously designed studies of team size effects. Second, this study reports that despite higher workload for individuals in smaller teams, there appear to be no differences in overall teamwork scores or time to completion of clinical tasks when compared to larger teams. Moreover, the smaller teams were able to accomplish a greater number of tasks per clinical team member – this speaks to efficiency and potentially reduced healthcare costs if the same job can be done, and done better, by smaller teams. Optimal team size is well described in domains outside of medicine^{18,25,26} and our findings generate consideration of a hypothesis that there are identifiable critical team sizes or limits which may be optimized for healthcare teamwork and task performance.

Others have corroborated the findings reported here of the inaccuracy of physician self-assessment.²⁷ Two studies in surgical fields demonstrated a strong correlation between self-assessment and expert assessment scores for technical skills but not for non-technical skills.^{28,29} These reports indicate that, regardless of experience, surgeons are capable of assessing their own technical skills but not their non-technical skills. Together with our data, these studies provide strong rationale for the employment of non-technical skills experts for evaluation and training in this realm.

Assessment and debriefing of non-technical skills in an inter-professional clinical situation is an essential adjunct to simulated training and may be more effective in changing behavior.³⁰ Data from this study suggests that the traditional model of attending physician-led debriefing following real-life resuscitation events may be suboptimal. The noted high self-ratings and very poor concordance with teamwork experts by the trauma physician participants implies that attending physicians are likely to miss opportunities for formative feedback from larger interprofessional teams. The findings suggest that including nurses as teamwork debriefers may improve accuracy, since the CRN T-NOTECHS scores were more concordant with expert raters. However, lower concordance between both clinician groups and the expert debriefers suggests that novel methods for clinical event debriefing, and incorporating external assessors and/or video review, warrant consideration in the development of interprofessional teamwork training and debriefing paradigms.

There are inherent limitations in this single-institution study with a relatively small number of participants, in a single

clinical domain. Multiple factors unaccounted for in our study may influence reliability and accuracy of non-technical skills assessment and debriefing.^{14,17,28} In addition, findings that large versus small groups are more difficult to rate consistently by different rater groups may be a function of the T-NOTECHS rating instrument, and should be confirmed using other validated non-technical skills/teamwork rating instruments.

Conclusion

Findings of this study indicate that trauma resuscitation teamwork assessment and rating using the T-NOTECHS instrument is less reliable for larger teams compared to smaller teams. In trauma resuscitation there is evidence that larger teams perform less well than smaller teams.²¹ This study confirms that teamwork training paradigms should consider team size as a potential confounder during instructional design and application of teamwork assessment tools and processes, and supports the need for further investigations in the role of healthcare team constructs and size in teaching and assessment of non-technical skills. Self-assessment by healthcare professionals remains problematic, particularly for physicians. The impact of team size as a potential confounder should be considered in studies seeking to examine teamwork self-assessment by participants in clinical teamwork settings or training exercises.

Table of Abbreviations

Abbreviations	Definitions
E	Expert teamwork debriefers
TA	Trauma attending physicians
CRN	Critical care trauma nurses
T-NOTECHS	Trauma Nontechnical Skills Assessment tool
ARS	Audience response system
ICC	Intraclass correlation coefficients
SPSS	Statistical Product and Service Solutions – statistical analysis software
ANOVA	Analysis of Variance

Conflict of Interest

None of the authors identify a conflict of interest.

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MEDICAL SCHOOL HOTLINE

The Educational Mission of the Cell and Molecular Biology Department and Program at the John A. Burns School of Medicine

Marla J. Berry PhD; Rebecca Cann PhD; David Haymer PhD; Peter Hoffmann PhD; David Jameson PhD; Olivier LeSaux PhD; Robert Nichols PhD; Steven Seifried PhD; Alexander Stokes PhD; and Cedomir Todorovic PhD

The Medical School Hotline is a monthly column from the John A. Burns School of Medicine and is edited by Satoru Izutsu PhD; HJMPH Contributing Editor. Dr. Izutsu is the vice-dean of the University of Hawai'i John A. Burns School of Medicine and has been the Medical School Hotline editor since 1993.

Overview

The Department of Cell and Molecular Biology at the John A. Burns School of Medical, University of Hawai'i at Manoa is a collection of outstanding faculty, graduate students, postdoctoral fellows, and technical and administrative support staff engaged in a highly diverse array of research and educational endeavors. The department is the home base for the graduate program in Cell and Molecular Biology, an interdisciplinary and interdepartmental MS and PhD program. Faculty in the program participate in teaching graduate students, medical students, undergraduates, and even high school students, with research experiences as an integral component of the educational mission.

Graduate Education

The Cell and Molecular Biology Graduate Program is an integrated program of study for students seeking a PhD or MS degree in health-related research that emphasizes the techniques and approaches of cell and molecular biology. Areas of strength include molecular medicine, neurobiology, immunology, molecular and population genetics, biochemistry, virology, reproductive biology, cancer biology, and cardiovascular research.

Faculty

Participating faculty members are drawn from across the campus: they come from the Basic and Clinical Sciences Departments of the John A. Burns School of Medical, the University of Hawai'i Cancer Center, the College of Natural Sciences, the College of Tropical Agriculture and Human Resources, and the School of Ocean and Earth Science and Technology.

Students

In academic year 2014-2015, the graduate program includes 26 PhD students and 1 MS student, 19 women and 8 men. The ethnicity of our students is generally representative of that of the State of Hawai'i. Training is intended to prepare students for careers in academia, in research institutes, and in biotechnology in the private sector.

Students in the graduate program present their research findings in oral and poster presentations at local, regional, national, and international conferences, and publish their research results in peer-reviewed journals. Over the past five years, Cell and Molecular Biology graduate students have published an average of over 20 manuscripts per year. A listing of publications by current Cell and Molecular Biology graduate students and recent graduates, dating from August 2013 through August 2014, is provided at the end of this document.

Nearly all of the students participate in an annual JABSOM Biomedical Sciences Symposium, competing for awards for best presentations in a number of categories. Other recent awards and grants to students include fellowship funding from the American Heart Association, Student awards from the Achievement Rewards for College Scientists, travel awards from the Alzheimer's Association, the Keystone Symposia, the Society for Neuroscience, the Immunology Society Annual Meeting, and an award from Hawai'i Pacific University for "Distinguished Teaching by an Adjunct Faculty Member" to a graduate student who teaches Chemistry, Anatomy, Physiology, and Biology. A partial listing of conference presentations and awards is appended.

Courses offered in the Cell and Molecular Biology Graduate Program include Cell and Molecular Biology core courses directed by Dr. Olivier Le Saux (Fall semester) and Dr. Peter Hoffmann (Spring semester). The courses are team-taught with students and faculty from multiple disciplines across the campus. These courses focus on cellular and molecular approaches to macromolecule function, emphasizing multicellular plants and animals. A course in Ethics of Biomedical Research is directed by Dr. Jun Panee, offered to a diverse audience, and fulfills requirements of the National Institutes of Health. Biostatistical analysis has become increasingly important for interpreting the "big data" sets generated through studies employing genomics and proteomics, epidemiology, and clinical research. Dr. Steve Seifried provides an Introductory Biostatistics course offering every Fall. The three aforementioned courses are requirements in the program, and are open to students campus-wide.

Securing funds through submission of grant proposals is essential to financing scientific research. A course entitled Essentials in Grant Writing is offered by Dr. Michelle Tallquist in the Department of Medicine and Drs. Peter Hoffmann and Marla Berry in Cell and Molecular Biology. This course addresses the basic principles of identifying funding opportunities, the preparation and submission of proposals, and the peer review process. Dr. Steve Seifried offers a course in Public Health Biology that explores the biological basis of human disease and the role public health measures play in reducing both the extent and impact of chronic and acute diseases on individuals and society. This course is offered online and taken by a diverse group of allied health graduate students including Public Health, Kinesiology, Nutrition, and Molecular Biosciences and Bioengineering. Dr. Alexander Stokes teaches a course in Experimental techniques including biological imaging and bioinformatics, offered through the Molecular Biosciences and Bioengineering Program and open to students campus-wide. Courses are also offered in specialized topics, including immunology and inflammation (Dr. Peter Hoffmann), the neurosciences (Drs. Frederick Bellinger and Cedomir Todorovic), endocrinology (Dr. Lucia Seale), and cardiovascular disease (Dr. Michelle Tallquist). The weekly seminar series in Cell and Molecular Biology (organized by Dr. Olivier Le Saux) is given by invited speakers as well as faculty and students to round out the educational experience.

Medical Education

Cell and Molecular Biology faculty members teach a variety of courses in the John A. Burns School of Medicine curriculum. Dr. Robert Nichols teaches most of the Medical Pharmacology courses offered at the school, and Dr. Peter Hoffmann lectures in Immunology. Several faculty members participate as tutors in Problem-Based Learning (Drs. Martin Rayner, Frederick Bellinger, and Cedomir Todorovic).

Undergraduate Education

Two faculty members in Cell and Molecular Biology (Drs. Rebecca Cann and David Haymer) teach undergraduate courses that focus on human genetics. These courses are in high demand among students in allied areas such as public health and human nutrition, mainly because these programs require an exposure to this important area of medically related education. Genetics, Evolution, and Society, offered by Dr. David Haymer is approved as an "E" (ethics) focus course, required for graduation. It is one of only two such Biology courses offered on a regular basis that can fulfill this graduation requirement. Two other faculty (Drs. Robert Nichols and Matthew Pitts) make significant contributions to undergraduate education, teaching a course on basic neurobiology. In addition to the formal courses, many faculty members in the Department serve as mentors for undergraduate research projects conducted by students in the Honors, INBRE and Biology programs. These research experiences provide invaluable opportunities for motivated undergraduates to go beyond the traditional classroom experience, and have paved the way for many of them to succeed in postgraduate programs in a wide range of medically related fields.

National and International Awards and Conferences attended by Cell and Molecular Biology Graduate Students - August 2013 through August 2014

Naghum Alfulaij

Society for Neuroscience 2013, San Diego, CA
2013 IDeA Network Western Regional Scientific Conference 2013, Honolulu, HI

China Byrns

Society for Neuroscience 2013 San Diego, CA, Oral presentation Award
Miyawaki Family "Trainee in Neuroscience" Award, 2014, Honolulu HI, First place

Gregory Fredericks

American Association of Immunology 2013, Boston, MA

Malina Ivey

IDeA Network Western Regional Scientific Conference 2013 Honolulu, HI
North American Vascular Biology and Yale: Cardiovascular Inflammation and Remodeling.
Award F1000 - Faculty of 1000 poster award for "excellent research", 2014, New Haven, CT

Jill Kuwabara

Scholarship to attend Vasculata: University of Washington and NAVBO 2014, Seattle WA

James Lawrence

IDeA Network Western Regional Scientific Conference 2013, Honolulu, HI

Robert Norton

10th International Symposium on Selenium in Biology and Medicine 2013, Berlin, Germany, Oral presentation

Aaron Rose

10th International Symposium on Selenium in Biology and Medicine 2013 Berlin, Germany, Oral presentation

Anna Pickering

AACR Meeting 2014, San Diego, CA
ARCS Foundation Award

Jessica Swonger Eby

AHA BVCS conference 2014, Las Vegas, NV

Christie Wilcox

Science Online Oceans 2013, Miami, FL
American Fisheries Society 2013, Little Rock, AR
AAAS 2014, Chicago, IL
66th Gulf Coast Fisheries Initiative Conference 2013, Corpus Christi, TX Oral presentation
PADI Foundation Grant
Best Paper Award, Tester Symposium
Women Diver's Hall of Fame/Aggressor and Dance Fleet Scholarship in Marine Conservation
UH Graduate Student Organization Grant

Recent Publications by Cell and Molecular Biology Graduate Students (bold indicates student or students)

Anderson CD, Urschitz J, **Khemmani M**, Owens JB, Moisyadi S, Shohet RV, Walton CB. Ultrasound directs a transposase system for durable hepatic gene delivery in mice. *Ultrasound Med Biol.* 2013;39(12):2351-61.

Andrews KR, Moriwake VN, **Wilcox C**, Grau EG, Kelley C, Pyle RL, Bowen BW. Phylogeographic analyses of submesophotic Snappers Etelis coruscans and Etelis "Marshi" (Family Lutjanidae) reveal concordant genetic structure across the Hawaiian Archipelago. *Plos One.* 2014;10(9):e091665.

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Huang Z, **Rose AH**, Hoffmann FW, Hashimoto AS, Bertino P, Denk T, Takano J, Iwata N, Saido TC, Hoffmann PR. Calpastatin prevents NF- κ B-mediated hyperactivation of macrophages and attenuates colitis. *J Immunol.* 2013;191(7):3778-88.

Owens JB, Matthew J, Davy P, Stoytchev I, Moisyadi S, Allsopp R. Effective Targeted Gene knockdown in mammalian cells using the piggyBac transposase-based delivery system. *Mol Ther Nucleic Acids.* 2013;2:e137.

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Panneerselvam J, **Pickering A**, Han B, Li L, Zheng J, Zhang Y, Fei P. Basal level of FANCD2 monoubiquitination is required for the maintenance of a sufficient number of licensed-replication origins to fire at a normal rate. *Oncotarget.* 2014;5(5):1326-37.

Panneerselvam J, **Pickering A**, Zhang J, Wang H, Tian H, Zheng J, Fei P. A hidden role of the inactivated FANCD2: upregulating NP63. *Oncotarget.* 2013;4(9):1418-26.

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Pitts MW, **Byrns CN**, Ogawa-Wong AN, Kremer P, Berry MJ. Selenoproteins in nervous system development and function. *Biol Trace Elem. Res.* 2014. Jul 1. [Epub ahead of print]

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Rose AH, Bertino P, Hoffmann FW, Gaudino G, Carbone M, Hoffmann PR. Increasing dietary selenium elevates reducing capacity and ERK activation associated with accelerated progression of select mesothelioma tumors. *Am J Pathol.* 2014; 191(7):3778-88.

Seyedali A, Berry MJ. Nonsense-mediated decay factors are involved in the regulation of selenoprotein mRNA levels during selenium deficiency. *RNA.* 2014; 20(8):1248-56.

Walton CB, Ecker J, **Anderson CD**, Outten JT, Allison EZ, Shohet RV. Cardiac angiogenesis directed by stable hypoxia inducible factor-1. *Vasc Cell.* 2013;5(1):15

Wood MA, Acharya A, Finco I, **Swonger JM**, Elston MJ, Talquist MD, Hammer GD. Fetal adrenal capsular cells serve as progenitor cells for steroidogenic and stromal adrenocortical cell lineages in *M. musculus*. *Development.* 2013;140(22):4522-32.

Zhao L, NG ET, Davidson TL, Longmuss E, Urschitz J, **Elston M**, Moisyadi S, Bowles J, Koopman P. Structure-function analysis of mouse Sry reveals dual essential roles of the C-terminal polyglutamine tract in sex determination. *Proc Natl Academy Sci USA.* 2014;111(32):117678-73.

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INSIGHTS IN PUBLIC HEALTH

Promoting Healthy Snack and Beverage Choices in Hawai'i Worksites: The *Choose Healthy Now!* Pilot Project

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Insights in Public Health is a monthly solicited column from the public health community and is coordinated by HJMPH Associate Editors Jay Maddock PhD from the Office of Public Health Studies at John A Burns School of Medicine and Donald Hayes MD, MPH from the Hawai'i Department of Health in collaboration with HJMPH Manuscript Editors Tonya Lowery St. John MPH and Ranjani Starr MPH from the Hawai'i Department of Health.

Abstract

Over half of the adults in Hawai'i are overweight or obese, exposing them to increased risk for chronic diseases and resulting in higher health care expenses. Poor dietary habits and physical inactivity are important contributors to obesity and overweight. Because adults spend most of their waking hours at work, the workplace is an important setting for interventions to solve this growing problem. Changing the nutrition environment to support healthy eating is a recommended practice for worksite wellness interventions. Following this recommendation, the Hawai'i State Department of Health (DOH) launched the *Choose Healthy Now!* Healthy Vending Pilot Project to increase access to healthy options in worksites. *Choose Healthy Now!* utilized an education campaign and a traffic light nutrition coding system (green = go, yellow = slow, red = uh-oh), based on federal nutrition guidelines, to help employees identify the healthier options in their worksite snack shops. Inventory of healthy items was increased and product placement techniques were used to help make the healthy choice the easy choice. DOH partnered with the Department of Human Services' Ho'opono Vending Program to pilot the project in six government buildings on O'ahu between May and September of 2014. Vendors added new green (healthy) and yellow (intermediate) options to their snack shop and cafeteria inventories, and labeled their snacks and beverages with green and yellow point-of-decision stickers. The following article outlines background and preliminary findings from the *Choose Healthy Now!* pilot.

Introduction

Obesity in Hawai'i is prevalent and it is costly. The most recent data shows that in Hawai'i, 23.6% of adults are obese, and another 32.5% are overweight, totaling 56.1% of adults with weight above recommended standards for their height.¹ In 2009, the estimated annual direct medical care costs for obesity among adults in Hawai'i was \$470 million.² Estimates of indirect costs, which include absenteeism, presenteeism (work lost due to illness when present on the job), and disability, vary based on methodology.^{3,4} Conservative estimates show \$610 million in added costs, for a total of over \$1 billion in obesity-related costs in Hawai'i each year.^{3,4}

For most adults in the United States, poor diet and physical inactivity are the most important contributors to overweight and obesity.^{5,6} Snacks and beverages play an important role in diet quality. According to the United States Department of Agriculture (USDA), about one-third of calories consumed come from snacks.⁷ Many studies have shown that beverages, particularly sugar-sweetened beverages, have contributed to overweight

and obesity.^{8,9} Healthy eating carries with it multiple benefits including decreased rates of chronic disease, overweight, and obesity, and improved overall health.⁵ Because adults spend the majority of their waking hours at work and often eat meals or snacks there, worksites represent an important area for public health interventions. The Community Guide to Preventive Services (*The Community Guide*) recommends implementing worksite nutrition and physical activity interventions, including informational and educational strategies, behavioral and social strategies, and policy and environmental approaches, to improve health outcomes related to obesity.¹⁰ In addition, the Hawai'i Obesity Prevention Task Force Report identified worksites as a focus area, and recommended the formation of a work group to develop nutrition guidelines for food sold in vending machines, stores, and cafeterias, among other settings.¹¹

In response to the growing obesity epidemic and recommendations from both *The Community Guide* and the Hawai'i Obesity Prevention Task Force, the Hawai'i Department of Health (DOH), Chronic Disease Prevention and Health Promotion Division, with funding provided through a cooperative agreement with the Centers for Disease Control and Prevention (CDC), launched the *Choose Healthy Now!* Healthy Vending Pilot Project. *Choose Healthy Now!* works by making evidence-based changes in the environment such as improved access, availability, and identification of healthier foods to support healthier eating.¹²⁻¹⁵ There is also evidence that traffic light labeling does not reduce revenue, which is important for the sustainability of this and similar projects.¹⁵ Using easy-to-understand labels (go, slow, and uh-oh), the project aims to enable customers to make informed choices on what they are purchasing and eating. The long-term goal is to bring worksite food and beverage environments into line with the *Dietary Guidelines for Americans*,⁵ and to transform social norms around food and beverage choices.

Theoretical Basis

Choose Healthy Now! is based on the social ecological model and the Analysis Grid for Environments Linked to Obesity (ANGELO) framework, which posit that a person's nutrition behaviors are influenced not only by individual factors, such

as taste preferences, self-efficacy, and motivations, but also by a myriad of environmental factors: the social environment (eg, social norms, role modeling), the physical environment (eg, settings and the foods that are available in them), and the macro-environment (eg, food systems, advertising, prices).^{12,16-18} Addressing obesity at environmental levels has the potential to be more cost effective than individual approaches, as it can reach larger groups of people, can lead to systems changes that can be sustained over time,¹⁸ and does not require individuals to self-select into programs.¹⁹

Research has shown that modifications to the physical nutrition environment can improve eating behaviors in school settings.²⁰ Although there is a gap in high-quality research studies of environmental modification interventions in worksites,¹² one systematic review of thirteen worksite health promotion programs with environmental changes (including point-of-purchase labeling, increased availability of healthy foods, and use of promotional materials) showed a positive effect on employee diets with increased intake of fruits and vegetables, and decreased intake of fat.²¹

Simple labeling schemes such as the one used in this intervention (traffic light colors to indicate overall healthfulness of a snack or beverage) have been found to be an effective means to drive sales towards healthier items.^{13,15} Additionally, it was found that people who noticed the traffic light labels were more likely to purchase the healthier items than people who didn't notice them.¹³ The effectiveness of traffic light labels can be enhanced by choice architecture interventions, a strategy for making healthy choices more accessible through placement of healthy items at eye level, at the cash register, or making them more visible in other ways.¹⁵ With or without a choice architecture intervention, traffic light labels have been found to support sustainable improvements in healthful purchasing patterns and motivate employees from all racial and economic backgrounds to choose healthier items.^{14,15,22} Expanding the proportion of healthy snack choices in a snack shop (to 75% from 25%, in one study) is another way to increase selection of healthy choices without reducing employees' sense of freedom of choice.²³ A study showed that even health-conscious customers often misidentify unhealthy choices as healthy and that customers' preference for healthy items increased once simpler nutrition information was provided.¹³ There is also evidence that the traffic light symbols do not reduce cafeteria or snack shop revenue.¹⁵ This is important when considering the sustainability of these interventions.

The Choose Healthy Now! Healthy Vending Pilot Project

DOH partnered with the Department of Human Services' Division of Vocational Rehabilitation Ho'opono Vending Program (Ho'opono) to increase healthy options in snack bars and cafeterias in government buildings. Six vendors participated in the pilot project between May and September 2014. They represent snack shops in both state and federal buildings, with small, medium, and large operations. Vendors have been encouraged

to continue carrying healthy items after September 2014. The lead Ho'opono vendor for the state, Kyle Aihara, said, "The vendors in our program pretty much all know someone with diabetes or heart disease. Vendors realize that offering healthier foods and beverages can help others to avoid these diseases. We also realize healthy vending is coming, and we need to stay ahead of the trend by increasing healthy foods and beverages now." (Oral communication, August 11, 2014).

In preparation for the pilot project, an employee survey was distributed, via email and in-person, to government employees in the six worksite locations. The purpose of the survey was to gauge interest in having healthy options, to establish the current purchasing habits of employees, and to gather feedback on the types of healthy products employees would be willing to buy. The survey was distributed to approximately 1,350 people, with 436 people responding (an approximate response rate of 32%). The employee survey revealed that employees were most often visiting their worksite snack shops to purchase red items such as chips, candy and other sweets, and sugary drinks. However, respondents were interested in having healthy options available to them. Of the 436 respondents, 75% felt it was important for them to have healthy snacks available to them in their worksite snack shops and 76% reported they were willing to purchase those healthier items. In addition, when employees who did not regularly shop at the snack shop were asked to indicate why they did not shop, the top response was that they wanted healthier options. Employees' preferences for specific healthy products revealed by the employee survey were shared with vendors so they could bring in new products tailored to their customers' needs and preferences.

One of the first tasks of the project was to develop a nutrition-based rating system. Criteria were developed for pre-packaged snacks and beverages that have published nutrition and ingredient information. The *Choose Healthy Now!* criteria (Table 1) were developed by a registered dietitian and are based upon national standards set forth in the *Health and Sustainability Guidelines for Federal Concessions and Vending Operations*^{24,25} and the *2010 Dietary Guidelines for Americans*,⁵ and were modified to fit the availability of snacks and beverages in Hawai'i. Snacks and beverages were subdivided into categories: green (healthiest), yellow (intermediate), and red (least healthy), corresponding with other uses of traffic-light ratings of foods such as "Go, Slow, Whoa" in US schools,²⁶ and two similar worksite projects, the Iowa Department of Public Health Nutrition Environment Measurement Survey - Vending (NEMS-V) Project,^{27,28} and "Go for Green" developed by the US Army.²⁹

Prior to the implementation of the pilot project, a baseline inventory of the snacks and beverages being sold in each of the participating locations was conducted using the *Choose Healthy Now!* criteria. Of the 960 items that were evaluated in the six snack shops, 7% were green, 21% were yellow, and 72% were red items. Given the impact of the nutrition environment on diet and the high percentage of unhealthy options available in workers' food environments, it is very likely that employees are consuming more energy-dense, nutrient-deficient foods relative

Table 1. Snack and Beverage Criteria used by *Choose Healthy Now!* Healthy Vending Pilot Project (Green, Yellow, Red)

Snacks/ Beverages	Food-Based Criteria	Nutrient-Based Criteria (simplified)
Green=Go! (Healthiest)	<p>Nutritious foods to enjoy anytime.</p> <p>These are nutrient-dense foods with minimal or no added sodium, sugar, or fat.</p> <p>Examples:</p> <ul style="list-style-type: none"> • vegetables, • fruit, • whole grains, • nuts, seeds, • non-fat or low-fat dairy, • water and other zero calorie beverages 	<ul style="list-style-type: none"> • 200 Calories or less per serving (except nuts/seeds) • Zero trans-fat • up to 2 grams saturated fat (except nuts/seeds) • up to 10 grams of sugar • up to 230 mg sodium • No artificial sweeteners
Yellow=Slow (Intermediate)	<p>Sometimes or less often.</p> <p>These fall into two basic groups. They either: (1) have food value but contain more sodium, sugar, or fat than the green items, or (2) have reduced, minimal, or zero calories, but contain artificial sweeteners.</p> <p>Examples:</p> <ul style="list-style-type: none"> • vegetables or fruit with syrup or dressing; • 100% juice in > 12 oz. container; • most high-fat dairy products; • nuts with up to 400 mg sodium; • dark chocolate with $\geq 75\%$ cocoa; • beverages with up to 60 calories; • diet products with artificial sweeteners 	<ul style="list-style-type: none"> • 200 Calories or less per serving (except nuts/seeds) • Zero trans-fat • up to 2 grams saturated fat (except nuts/seeds) • up to 10 grams of sugar • up to 400 mg sodium • May have artificial sweeteners
Red=Uh-oh (Least Healthy)	<p>Only once in a while or just for special occasions.</p> <p>These energy-dense foods are the highest in calories, sodium, sugar, and/or fat, with few benefits.</p> <p>Examples:</p> <ul style="list-style-type: none"> • candy bars; • pastries; • most granola bars; • high-fat, high-sodium meat sticks; • sugar-sweetened beverages; • fried foods such as chips 	Do not meet green or yellow criteria.

to healthy, nutrient-dense foods. In fact, this was confirmed by the employee survey which showed that employees most often visit their worksite snack shops to purchase red items.

To aid employees in making healthier choices, point-of-decision stickers in green, yellow, and red were developed to nudge customers toward healthier options. In addition, materials, such as posters, signs, table tents, newsletters and emails were developed to educate employees about making healthy decisions, explain the meaning of the colored stickers, and promote the new healthy items in their worksite snack shops. All materials were designed with a Hawai'i feel by a local graphic design firm. Before adoption, words and images were focus group tested with eight men and women from a variety of positions in multiple departments of DOH. Focus group feedback was used to revise the *Choose Healthy Now!* materials and ensure that they resonated with government employees. Once materials were modified, they were tested again among a random sample of 20-30 additional employees to ensure that they gave the intended message.

Posters (Figure 1) were placed throughout the buildings

in high traffic areas with the suggestion that people “check out the new healthy choices” at their cafeteria or snack bar. Posters inside the cafeteria encouraged employees to “choose green.” Signs and table tents (Figure 2) were used to educate employees on the meaning of the colored stickers. Newsletters and emails were adapted from the Iowa NEMS-V online materials.³⁰ During the 12-week pilot, a total of 6 emails, each with a newsletter attachment, was sent out to educate staff about nutrition and to remind them to select healthy snacks and beverages in support of their vendor’s efforts. Incentive cards were offered that enabled customers to receive 1 free green item for every 7 green items they purchased. Four out of six vendors decided to use the incentive cards to encourage employees to purchase green items. Other incentive items (green chopsticks and green lanyards, each with the *Choose Healthy Now!* logo) were provided free to vendors to pass out with the purchase of a green item during the first days and weeks of the campaign to encourage early participation by employees.

The *Choose Healthy Now!* Healthy Vending Project launched in May 2014 with a press event where pilot vendors were



Figure 1. Example posters from *Choose Healthy Now!*

recognized for their initiative and participation. Vendors were encouraged to add 5-10 new green and yellow products to their inventory for the pilot project, and many added more than that. Vendors chose new products that both fit with their business models, and met the needs and preferences of the employees in their buildings, as revealed by the employee survey. By the public launch of the pilot project, on average, vendors had increased the number of green products they were selling by 128% and the number of yellow products by 10%. To encourage sales of healthier items, green and yellow products in each snack shop were stickered with the point-of-decision prompts and, wherever possible, given prime placement at eye-level to encourage purchasing.^{15,31} During the project, green and yellow 1-inch round stickers were placed in front of healthiest and intermediate items, respectively. However, because the vendors were concerned about discouraging purchases of their top selling red items, they chose not to use red stickers, so the least healthy items were left undesignated. In addition to the distribution of promotional and educational materials, each snack shop had a kick-off event, where employees were able to sample the new products, learn about the *Choose Healthy Now!* coding system, and receive an incentive item for purchasing healthy items.

A variety of evaluation methods are being utilized to assess the outcomes of the project. The project will be evaluated for its impact on snack and beverage choices in work environments,

and to see what changes occurred in vendors' total snack shop revenue. Exit surveys will be conducted at each of the snack shops to ascertain the effectiveness of the point-of-decision prompts on employee purchases. Data from exit surveys will be used to revise messaging in order to improve awareness of the stickers and healthy items. One of the goals of *Choose Healthy Now!* was to see that vendors' revenue was maintained or increased to ensure that the changes are sustainable. Because vendor cash registers do not have the capacity to track sales of individual products, each snack shop's total sales during the pilot project will be compared with the same period of time in the previous year. In addition, vendors will be interviewed on their experience with the project to assess vendor perceptions of the campaign's impact, and to gather feedback to improve the campaign moving forward.

Next Steps

At the end of the 12-week pilot, participating vendors were encouraged to continue with *Choose Healthy Now!* As evaluation data is analyzed, efforts are being directed towards improving and expanding the project. Work will continue on identifying and increasing the number of offerings of healthy foods and beverages from warehouse stores and distributors that sell to retail snack shops and cafeterias. *Choose Healthy Now!* will also focus on recruiting participation from additional Ho‘oponos.



Figure 2. Example educational sign from *Choose Healthy Now!*

vendors, with special emphasis on engaging those on the neighbor islands. Expansion to private businesses and other worksites is already in progress. Castle Medical Center (CMC) on O'ahu, is adopting *Choose Healthy Now!* beginning with items offered in their employee and visitor cafeteria. CMC is in the process of rolling out the campaign with snacks and beverages and will be expanding to other foods, such as entrees, side dishes, soups, and salads, as criteria for such foods are developed. They will be using all three of the colored stickers, green, yellow, and red to mark foods and beverages.

Using the lessons learned from this project, a toolkit will be developed and published online that will give employers access to the marketing materials, simplified criteria for healthy foods and beverages, and model policy for offering healthy foods and beverages in public and private worksites. The toolkit will be made available to use free-of-charge. The project collaborators hope that businesses will not only implement *Choose Healthy Now!* but also adopt policies that ensure that access to healthy foods and beverages will be sustained in worksites statewide.

Conclusion

Addressing obesity and chronic disease with environmental changes has the potential to reach a broader audience at lower cost overall than programs targeting individuals, and the benefits are more likely to be sustained over time. Promising practices to improve employees' diets include expanding the inventory of healthy foods and beverages in worksite settings, and identifying and highlighting those healthy items with point-of-decision prompts and product placement. *Choose Healthy Now!* utilized these strategies to modify the nutrition environment in government buildings on O'ahu and used marketing and nutrition education to promote the purchase and consumption of healthy snacks and beverages. The data analysis at the end of the pilot will be shared and will be used to inform the direction of *Choose Healthy Now!* as it adds new government worksites and expands into food vending sites in private businesses. More research is needed in Hawai'i to confirm the effectiveness of strategies currently in use, to identify worksites that will benefit most from a similar intervention, and to identify new worksite wellness strategies that will support healthy eating.

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HERE IS AN ATHLETE EVERYONE CAN LOVE, ADMIRE AND RESPECT.

What a sublime moment when New York Yankee shortstop Derek Jeter concluded his baseball career with a game winning base hit in the ninth inning against the Baltimore Orioles in Yankee stadium! He topped off an unbelievable baseball career of hitting, running, fielding, and team leadership, including participation in five World Series championships and posting multiple personal records. Yet what really stands out in this man's endeavors is not his marvelous athletic prowess. First, last, and always Derek Jeter has been honest, courteous, thoughtful, generous, intelligent, and kind. If ever America's youth needed and wanted an athlete to mimic, Derek Jeter is that man. Charles Barkley, a great basketball player, stated publicly, "I am not a role model," and certainly some athletes would align with him. A few professional athletes are arrested for various crimes including murder, illegal drug use, and spouse beating. They get the ugly headlines. It is comforting and reassuring for sports addicts young and old to remember that there are many excellent ball players, like Derek Jeter who put on a uniform every day and play their hearts out.

RISKY, YES. BUT STILL EVER SO POPULAR. LOOK, NO SCAR.

In April the Food and Drug Administration (FDA) warned of danger from unknown sarcoma in cases following morcellation for small incision uterine surgery. Johnson and Johnson (J&J) major manufacturer of morcellators, promptly discontinued marketing the device. The FDA regulates drugs and medical devices, but does not oversee the practice of medicine. Their office estimated the risk of undetected sarcoma to be between one in 350 to one in 1000 cases, but precise data is not known. The action sharply divided gynecologists with some believing the FDA overstepped its role, while others want to shelve the procedure until proven safe. The exact number of morcellations is unknown, but estimates are that 50,000 are performed annually. Surgeons now are much more careful and thorough in describing the operation, explaining risks and including careful informed consent. Undetected uterine sarcoma is a reality. It remains to be shown that morcellation alters the trajectory of the cancer.

HEY, WAITER. BRING BACK MY T-BONE.

Lyme disease is enough reason to avoid the blood-sucking culprits, but now another strange tick-born phenomenon has come on the scene. Unusual as it seems, the bite of the lone star tick produces an immune response that makes some people allergic to red meat. Victims of this weird allergy were first reported at the University of Virginia in 2007. Now reports of the condition have come from Nantucket, Mass. and Long Island, New York. The allergic response typically occurs three to six hours after the affected person eats beef, pork, or lamb. Reactions run the full gamut from itching skin, vomiting, abdominal cramps, hives, shortness of breath, and even anaphylaxis. The bite that precipitates the allergy may occur weeks or even months before and patients have little reason to make a link. Erin McGintee, a pediatric and adult allergy physician, in East Hampton, NY, says, "It's a huge problem out here." She knows of more than 70 cases and sees several more each week. "I've been trying to get the word out, but there are a lot of people who still don't believe it."

HIPPOCAMPUS, HIPPOPOTAMUS? WHO CARES? PUT ME BACK IN, COACH.

A college football player who has been diagnosed with a concussion is likely to have a smaller hippocampus, the memory center of the brain. Dennis Molfese, a neuropsychologist at the University of Nebraska-Lincoln, found that football players regardless of whether

they had a concussion had smaller hippocampi than men their own age who do not play football and have no history of brain trauma. Sports related trauma studies have focused on the hippocampus because some memory deficits are linked to head injuries. Much of that work was investigating people who were middle aged or older. Current studies at Laureate Institute for Brain Research in Tulsa, Oklahoma using MRI measurements found that 25 athletes with previous concussions had hippocampi 3/4 normal size. Football players who hadn't suffered a concussion were 5/6 of normal size. The mechanisms underlying this volume loss are unknown. The amygdala, which is close to the hippocampus and shares some emotional and memory function, showed absolutely no difference between the groups.

I TRIED TO TELL YOU. THAT'S HAIR OF THE DOG.

Disputed forensic evidence techniques are drawing fresh legal attention. Standard crime show staples such as using bite marks, hair samples, burn patterns, ballistics evidence, and handwriting analysis are being evaluated for validity. Before the advent of DNA techniques, investigators routinely relied on visually matching hairs from crime scenes with those of suspects. Recent DNA exonerations have cast doubt on the practice. The FBI said it would review 2,100 cases to see if experts exceeded the bounds of science in their lab reports or testimony. The number will probably increase as the studies continue. The Justice Department, in a truly rare move, is on board saying it would not raise procedural objections if the defendants in these cases seek to have their cases overturned. The FBI review raises difficult questions about how to address thousands of convictions that relied on potentially flawed evidence. Some prosecutors and forensic scientists have lamented that the criticisms go too far. Dr. Peter Loomis, president elect of the American Board of Forensic Odontology said the bite marks can still be used to either include or exclude a suspect. So here we are between the devil and the deep deoxyribonucleic acid.

GEEZ, DOC. HOW COME MY THUMB REALLY HURTS?

It was certain to become a physical impairment as illness or disease follows function. Tendonitis of the hand, specifically the dominant thumb, is a medical condition resulting from texting. It is very common to see young people (even older ones) in a texting-trance, ignoring all that is around while they dial messages to a friend, companion, classmate, or whomever. Treatment is fairly simple: stop texting. Does this mean children and young adults will be more inclined to actually converse? For some with serious tendon pain, the answer might be maybe. For the uninjured ones, nothing will change.

WE JUST WANTED TO BE REALLY, REALLY SURE.

"Jane Doe" has filed her lawsuit against the US Custom and Border Protection agency for repeated non-consensual anal drug searches. Border police selected her at random and refused to believe that she was not carrying drugs, despite repeated negative findings. No drugs were ever found. The lawsuit includes the University Medical Center of El Paso, Texas, whose personnel seemed eager to oblige the border police repeated drug searches. Incredibly, the medical center sent the victim a bill of \$5,000 for tests and procedures performed (later withdrawn).

ADDENDA

- On any given day 13% of the US population will eat pizza.
- According to Pew Research 24% of Americans age 18 and over did not read one book in the past year.
- Financial penalty for texting while driving in California is \$20, in Alaska \$10,000. Montana, South Dakota and South Carolina have no driving/texting ban.
- If women were in charge all men's underwear would have an expiration date.
- Do hearses get to use the car pool lane?

ALOHA AND KEEP THE FAITH rts

(Editorial comment is strictly that of the writer.)

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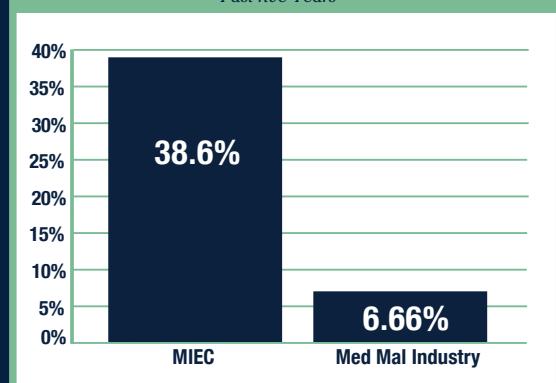
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