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‘Opae'  
A legend and song about a girl held captive by a mythical eel.
Editorial

Norman Goldstein MD, FACP
Editor, Hawaii Medical Journal

Telemedicine

Thirty-five years ago, when I was the Dermatologist at “The Medical Group,” now the Honolulu Medical Group, I received an urgent phone call from a physician at the Honolulu International Airport. He had a suspect case of smallpox and I had to come right over to diagnose the patient. The plane was on hold and they were going to quarantine the entire airport.

From his description, I explained that it probably was not smallpox but rather chicken pox, but I still had to come over to examine the patient. I left my busy office, drove post haste to the airport, and confirmed that it was indeed chicken pox. No need for quarantine, and the planes resumed their schedules, although a bit late.

I thought it would be so nice if the airport medical facility had a TV camera that could broadcast images directly to my office. But that was 35 years ago, and the modern telecommunication equipment was just not available.

This Special Issue is devoted to some of the many exciting applications of modern telemedicine we have available today. Thanks to Benjamin Berg, M.D., FACP, Director of Health Education & Training, and Associate Professor of Medicine, Medicine Department, John A. Burns School of Medicine, University of Hawaii, for serving as a Guest Editor for this issue.

Guest Editor's Message

Benjamin W. Berg MD, FACP
Guest Editor, Hawaii Medical Journal

Enabling technologies in healthcare are now enhancing and improving research, education, patient care, global health, quality, and safety. These enabling technologies contribute to the explosion of applications of “Telemedicine”. This term has come to encompass a greater scope of activities than “…the use of electronic information and communications to provide and support health care when distance separates the participants”, as defined by the Institute of Medicine. Haptics, virtual reality, simulations, broadband data transmission, video, audio, digital imaging, and RFID technologies are integrated in a multitude of manners to overcome not only the tyranny of distance, but many other barriers to improved outcomes in healthcare. This special issue of the Hawaii Medical Journal highlights functional Hawaii programs which utilize enabling technologies in healthcare. Global health education (Dr. Witty) and clinical consultation in orthopedics (Dr. Ono) in the underserved rural Pacific Basin are exemplary programs that project regional expertise to remote sites. Dr. Eron’s management of acute infections in an outpatient “Virtual Hospital”, demonstrates the power to decrease risks and costs associated with inpatient management, through thoughtful implementation of simple technology to deliver effective home based care. Land mine education for providers in Hawaii, through a new Internet-2 communications link (Dr. Vincent) facilitates sharing of bi-directional global expertise. Research in telehealth education (Dr. Burgess) is presented through the Telehealth Research Institute, an innovative University of Hawaii JABSOM venture. Remote echocardiographic interpretation between Honolulu and Guam (Dr. Munir) and Dr. Gallagher’s school based assessment program for children encompass the spectrum of diverse practical telehealth applications at work today in Hawaii. These articles represent a small proportion of the extensive telehealth experience in Hawaii. The Hawaii Telemedicine Compendium (http://www.pacifichui.org/compendium.cfm) lists 29 Hawaii organizations with multiple telehealth initiatives. Collaboration between and private healthcare, not-for profit organizations, federal healthcare, university, and community based initiatives have positioned Hawaii as a national and international locus of expertise in “telemedicine”.

Until there's a cure, there's the American Diabetes Association.
How Hawaii/Pacific Basin Area Health Education Center (AHEC) is Using Technology to Make the Pacific Smaller

Kelly Withy MD, Shaun Berry MD, Nicole K. Moore, and Deedri P. Veehala

Abstract

Introduction: In order to improve health literacy in rural areas, the Hawaii/Pacific Basin AHEC and Ke ‘Anuenue AHEC are working to connect rural communities via video teleconferencing. Methods: Video teleconferencing connectivity has been established to 15 rural and underserved locations across Hawaii and to the Republic of the Marshall Islands. Results: An average of 15 individuals participate in weekly facilitated health education sessions. Discussion: Participants have reported lifestyle change as a result of sessions and attendance is significantly increasing. In some areas, mid level health care professionals attend in order to obtain information for their patients.

Introduction

Rural areas of the US have increased infant mortality rates, decreased life expectancy, and increased mortality from chronic disease. Part of the cause for this is lack of adequate healthcare resources, such as hospitals, physicians and specialists. A secondary cause, however, may be lack of access to health information and educational resources. The Institute of Medicine recently studied health literacy in the US and found that half of all Americans had sub-optimal health literacy. Therefore, the Hawaii/Pacific Basin Area Health Education Center (AHEC) and Ke ‘Anuenue Area Health Education Center (AHEC), Inc. have established a regular health education seminar series for rural community members to provide information requested by the participants in a real-time discussion group format using video teleconferencing.

The Hawaii/Pacific Basin Area Health Education Center is a federally funded program within the UH John A. Burns School of Medicine with the goal of “improving health for the underserved through education”. Ke ‘Anuenue AHEC, Inc. was created in 1995 to help meet the health education and health professions training needs of Hawaii and Maui Counties. Activities conducted by both offices include recruitment to health careers for students of all ages, training of health professional students in rural areas and interdisciplinary teams, health workforce assessment and recruitment, continuing education and community health education. Because of the nature of the educational activities, distance learning capabilities have long been an interest of both AHECs.

Prior to 2000, there were few functioning VTC units in rural areas available for public use, and many of the VTC units provided to rural clinics and hospitals were left unutilized due to lack of training and discomfort with the technology. Additionally, the digital networks that provide connectivity to rural areas utilize different VTC protocols making connectivity between units impossible. Three years ago, the Hawaii/Pacific Basin Area Health Education Center (AHEC) was awarded a grant by the U.S. Department of Commerce’s National Telecommunications and Information Administration’s Technology Opportunities Program to establish video teleconferencing for health information acquisition in rural areas. Funding was received for the AHEC Hawaii Unified Telehealth (HUT) project that aims to improve the health of underserved populations in Hawaii by facilitating health education through distance learning and intergenerational peer education. With distance learning technologies and rural/minority health disparities being foci of the Hawaii/Pacific Basin AHEC mission, the AHEC HUT project is a perfect fit to attempt to bridge the wide channels, which can limit the exchange of ideas and information across the Hawaiian Islands and the Pacific Rim to expand health literacy and knowledge in some of the most remote areas of the world.

Methods

The AHEC HUT project is different from many more traditional uses of video teleconferencing (VTC) within health care. While AHEC supports remote consultation, and store and forward technology, the AHEC HUT project is designed to provide peer health education in a community based location, often not associated with a healthcare facility. This is to provide easy access, and not risk any potential reluctance to participate on the part of community members.

In order to develop community based sites, partnerships were formed with various community organizations that have established local community run meeting facilities and with community health centers.
education centers and Native Hawaiian Health System sites where access to public for VTC connectivity was available. Interested communities identified where they would like units placed, and in some cases, in partnership with Ke ‘Anuenue AHEC, even developed learning centers to allow for public access. Each of the 15 partner locations received installation of a Polycom video teleconferencing machine and connectivity as needed. AHEC personnel worked closely with the communities to train at least two individuals at each site to facilitate the sessions, and provided telephone or in-person technical support when necessary. Different methods of connectivity had to be utilized to connect the different centers, principally ISDN in rural areas and T1 in areas where University of Hawaii Information Technology System provided connectivity. In order to connect the different locations, the State of Hawaii Telehealth Access Network was contracted to bridge the different digital networks.

After the VTC system was established, it was anticipated that community members would request topics that would then drive the schedule of sessions. However, initially there seemed to be a lack of interest in utilizing the equipment and little to no requests for talks from communities. Ke ‘Anuenue Area Health Education Center conducted an informal survey to determine the cause of this reluctance. Quite simply, community members had no clear idea of how the technology could be used to their benefit. An initial plan to hold one session per month on chronic disease management (diabetes, heart disease, etc.) starting in October 2003 changed to twice monthly sessions by January 2004. By April 2004, with additional funding obtained by Ke ‘Anuenue from Young Brother’s Tug and Barge, AlohaCare, HMSA, and The Ouida and Doc Hill Foundations the series became a weekly program. Topics that originally were developed based on the CDC list of health topics are now community driven. Participants attending sessions were asked to request topics for future sessions keeping in mind that two sessions per month would focus on Diabetes. Speakers are recruited from health care professionals in the communities served, or at the academic institutions in Hawaii and include specialists such as pharmacists and nutritionists, as well as physicians and nurse practitioners.

The weekly real-time series of health education sessions were initially called “Ask-A-Doc”, but has been renamed by the participants to a more culturally sensitive name: the E Ninai Aku l Ke Kauka (Ask-A-Healer) series. Speakers and participants attend from any site with VTC accessibility and up to 10 sites can participate at once due to the contracted use of the State of Hawaii Telehealth Access Network (STAN) bridge. Health topics covered have included: teen pregnancy; cervical cancer; diabetic foot care; nutrition – how to read and understand food labels, food demos of healthy meals for people on the go; organ donation; injury prevention – drinking and driving under the influence; the “Social Host Liability Law – Underage Drinking”; and, the Modernization of the Medicare Drug Bill.

Human subjects exemption was received from the University of Hawaii Committee on Human Subjects to collect feedback information from participants. The format included feedback of the sessions and a request for additional topics. However, only 1 of the 15 sites regularly submits the feedback forms, therefore, at the end of each session questions are asked verbally evaluating the quality of the connection, the benefit of the program to health, if the participants would use the information at work or at home, if they would be back the next week, and what other topics should be covered.

Results
Since April 2004, when the E Ninai Aku l Ke Kauka program was fully established, there has been increasing participation. Although completion of the evaluation forms has been spotty, one site has submitted their evaluations consistently. At this site, all 8 regular participants reported taking home valuable information and 5 of the 8 reported making lifestyle changes as a result of the sessions. At a separate site, 3 of the 11 participants committed to make lifestyle changes after the topic of renal failure was covered.

Verbal feedback from participants indicates that they find this method of information delivery to be safe, non-threatening, and unique—reasons they have been so active in this program. A majority of participants report utilizing the information at home, but note that family members are not as likely to be interested in the information when they tell them about it. A high percentage of the participants are repeat participants. Diabetes education has been the number one requested subject, however in recent months the focus has begun to shift to prevention (better nutrition, adoption of a regular exercise program). Topics such as vitamin therapy, food exchange, how native foods fit into the food pyramid, native healing methods, drug prevention (specifically ice/crystal methamphetamine) and medication interactions have been requested. Interestingly, in the Republic of the Marshall Islands, the most committed participants are the nursing staff of Majuro Hospital, who are seeking to learn from other rural island communities how to improve the health of the native population who sometimes are reluctant to seek professional help, but might be open to an informal educational activity.

Discussion
While not the traditional version of telemedicine, the AHEC HUT project is working to increase health literacy and health education in the rural areas of the Pacific. The direct beneficiaries of this program are the rural community members who obtain current health information from health care professionals not normally accessible to them. Initially, interest was limited in utilizing the technology offered. However, the technology is now a reason that some of the participants enjoy taking part in the sessions. The key to this program is the willingness of rural communities to learn and utilize the new technology and the successful collaborations and partnerships including community, academic, nonprofit and healthcare organizations. An unanticipated but welcome outcome of the project is that public service agencies such as the Alzheimer’s Association and the Hawaii Department of Health have learned of the ongoing program and have offered speakers and additional needs assessment information regarding health education requests by communities.

Future directions for the program include expanding further into the Pacific, working with other agencies to provide training for Community Health Workers to obtain their certification, and also to develop a cross-cultural health education program that will focus on native healing practices. In the near future, incentives, such as t-shirts, will be offered for completing and submitting the evaluation forms. The authors hope that the video teleconferencing medium for health information exchange will facilitate improved health literacy across the Pacific.

References
Distance Learning on the Internet: Web-Based Archived Curriculum

Lawrence P. A. Burgess MD, Victoria Garshnek PhD, Deborah Birkmire-Peters PhD, and Steven E. Seifried PhD

Abstract
Web-based education through archived educational modules offers a significant opportunity to provide didactic education. By archiving lectures and teaching materials, it reduces the educators’ time of preparation, especially when many students will need to take the same curriculum over a long period of time. The site can package educational material in multiple formats including audio, video, and readable text, allowing the student to tailor the educational experience to his/her learning preferences. This can be a stand-alone program, or integrated into a program combining distance and in-person education. Assessment through online tests can also be conducted, but these must be considered open-book assessments where collaboration cannot be prevented. As such, this vehicle can be utilized effectively for continuing education programs in health care, where open book is permitted and credits are generally awarded on the honor system. However, tests for certificate courses should only be given with a proctor in attendance. In this instance, online tests can be used as pre-tests for the student, while being structured to enhance further learning.

Introduction
The United States Distance Learning Association (USDLA) defines distance learning as the delivery of education or training through electronically mediated instruction including satellite, video, audio graphic, computer, multimedia technology and other forms of learning at a distance. The USDLA notes that distance education refers to teaching and learning situations in which the instructor and the learner are geographically separated and therefore rely on electronic devices and print materials of instructional delivery. Distance Education includes distance teaching – the instructor’s role in the process; and distance learning – the student’s role in the process. Most theorists of distance education agree on a basic definition of the field that includes four basic characteristics: (a) the teacher and learner must be separated for most of the learning process; (b) the course of program must be influenced or controlled by an organized educational institution; (c) some form of media must be used, both to overcome the physical separation of teacher and learner and to carry course content; (d) two-way communication in some form must be provided between teacher and learner.

Modern distance learning is an extension of the early forms of distance learning with the difference that it is interactive and uses a mix of media. Earlier models such as correspondence still exist at various universities but these technologies are giving way to more modern communication tools. The most common strategies for distance learning are the use of synchronous communications such as videoteleconferencing and web-based forums such as chat rooms, or asynchronous vehicles such as a web site with archived material.

After review of these general methodologies, we will focus on web-based learning through archived material. The Telehealth Research Institute at the University of Hawaii, John A. Burns School of Medicine has experience in this arena, after helping to develop two archived, distance-learning web sites programs.

Videoteleconference (VTC) and the Internet allow a geographically distant learner to participate in a synchronous learning experience with a teacher or other students. This increases access to education for isolated patients due to geography and circumstances, and can play a role for students with physical disabilities that can limit access to the classroom. Most commonly, VTC programs are usually driven by large organizations with education as a major component of their mission. The organization places hardware at sending and receiving sites to conduct the interaction in classrooms. Connectivity is provided through closed circuit networks, or through commercial carriers. A common example is a large university campus that is linked to other campuses such as the community colleges to deliver lectures and seminars. Due to infrastructure and broadband connectivity utilized for this enterprise-wide solution, the hallmark of this model is excellent interactivity between sites, and therefore between teacher and student. It mirrors the classroom model but over a distributed campus network. The model is also cost efficient if there is enough volume of attendees at receiving sites, as it reduces the need for the number of qualified lecturers per classroom hour. As in any classroom situation, interactivity will
decrease with an increasing number of students, but this will not be due to the quality of the interaction that is available through VTC.

VTC can also be accomplished over the Internet. The limiting step here is available bandwidth for the receiving end user, which will affect resolution and the quality of the interaction. In this instance, the receiving site usually has little infrastructure and bandwidth, so interactivity is decreased. This model is commonly used to broadcast lectures or seminars using streaming video from a large organization to students in different geographic areas. This model balances the need for interactivity from students at the receiving end in exchange for wider access to any individual having access to the Internet. As the video images are generally small when viewed on the receiving monitor, it may only be a small improvement over audio transmission.

Web-Based Learning. For individuals who are unable to attend conventional classes, Internet courses have clearly emerged as the technology of choice,4 with the natural evolution of the World Wide Web taking center stage. Web based learning is often called online learning or e-learning because it includes online course content. This may take two forms: live events such as discussion forums via email, VTC, and live lectures through video streaming; archived courses that may be accomplished when desired by the end user with static pages such as downloadable course materials, and archived audio and/or video lectures. One of the values of using the web to access course materials is that web pages may contain hyperlinks to other parts of the web, thus enabling access to a vast amount of web-based information.5

Of these methodologies, archived web sites are emerging as a viable tool in distance learning. If properly designed, such a site can permit the student to tailor the educational experience. Visual learners may choose to scan through the slides of a presentation, and then read a transcribed document of the speakers talk. Auditory learners may prefer to listen to audio files while scrolling through the slides. Kinesthetic learners may prefer to watch the actual videotape of the person giving the talk, to better engage with the speaker. As such, if the educational content is packaged properly in multiple formats, the site could actually enhance individual learning for certain students as they can tailor the experience to their own learning preferences. This would also assist persons with auditory or visual disabilities, who could experience programs in their preferred format.

The ability to disseminate a curriculum through an archived web site is attractive for several reasons. A large organization can disseminate a core curriculum enterprise-wide, reducing the need for educators at each individual site to develop and teach the curriculum. This initial savings in time and expense can be substantial, with larger organizations having greater savings as the initial investment is leveraged for a larger audience of students. Web-based electronic media is also more readily updated and disseminated than any other type of educational media. This permits timely and rapid notification of users for important additions or changes. Common web technologies could alert providers to visit the site through an e-mail or telephone alert system.

A significant benefit of this platform is that user interactions with the site can be readily tracked and studied through standard tools and an associated database. Educators would know who is being trained, how they are training on the site, the assessment of training through test scores, and student assessments of the educational experience. These records would not exist in such a complete format through other communication media. As the grading of test scores is done automatically, this also saves time for educators. It is necessary to recapture this and initial time savings to review this data and update the site to improve the educational experience.

In assessing students through on-line tests, due to the nature of the interaction, the test must be considered open book with students able to interact with others to obtain answers. Students may not study at all and just take the test. If the test is set up to retake until passing, then this can be done via trial and error. The site and test can be programmed to avoid some of this. Standard web-based tools can track individual’s actions on the site to determine when and how long someone spent on the site prior to taking the test, as well as how many times the test was taken. This can help to ascertain if an individual is actually studying the material as desired.

Multiple tests can also be utilized for the same group of students and this could be accomplished for two reasons. The first would be to discourage cheating, if a formal type of examination program was desired beyond the open-book format currently utilized. The second would be to study whether different testing methodologies assisted with the on-line learning experience. It is postulated that by using questions where all answers are correct except for one incorrect answer, the questions will help the student review correct concepts when he/she reads the question.

Web-based learning can be a part of a total training module that includes live training. In this format, the on-line training can be conducted first, with the live training soon to follow. This maximizes the time of the trainers to give live training exercises, as opposed to giving didactic lectures. Lectures can be archived on the site, with students completing assignments before live training exercises. This combination of archived and live instruction is especially valuable for procedurally based tasks. If certification is required, then a pretest can be given at the start of the live exercise and the final test at the end. If given at the start, those that fail are excused as they have not studied or assimilated the material yet. If students know the consequences ahead of time, they will more likely study the archived material as required.

Web-Based Programs for Health Care Providers. A growing number of professional institutions and associations have started offering modules on-line, such as continuing medical education (CME) or continuing education units (CEUs), complete with examinations that can be e-mailed or otherwise returned electronically immediately after completion. One requirement for CME is interaction with the student and the tests are utilized for this reason. CME is generally based on the honor system that the activity was completed, but the examination is considered open book.

Though many of the on-line CME modules are also available as mail-away packets, the on-line versions have an overall faster turn around time and can be instantly scored. One such organization that offers CME credits is the National Institutes of Health (NIH), who base their modules on their expert consensus statements developed for various subject areas. The NIH develops its consensus statements through conferences attended by recognized panels of experts to improve clinical consistency in controversial practice areas.6
Methods: Telehealth Research Institute, University of Hawaii, John A. Burns School of Medicine (UHTRI)

UH Telemedicine Project. UHTRI is a federally funded program of the John A. Burns School of Medicine. One of the main areas of focus has been the telemedicine project. Through experiences in deploying telemedicine infrastructure and programs in the State of Hawaii, an on-line curriculum was produced (http://www.uhtr.telemed.hawaii.edu/curriculum/). This curriculum was designed to help providers incorporate telemedicine techniques into daily clinical practice and is appropriate for physicians and allied health care practitioners. The curriculum consists of 10 modules including “Conducting a Telemedicine Patient Visit,” “Patient Education,” as well as case studies and simulations. The curriculum also has an assessment/evaluation component that enables continuous refinement. The progress of each participant can be monitored and any problems participants find with the curriculum or its website are reported to the technical and/or educational team and corrections made.

During validation of the modules with on-line tests, it was felt that 2 of 23 students may have taken the test without reviewing the material, despite repeated direct instructions that review of the material was important to the validation process. All students were warned on two occasions that their activity could be tracked on the site. The problem was identified after looking at site data for individual participants. The modules under review take approximately 6-8 hours to complete, and in both cases, all tests were completed within 2 hours of the initial log on.

Military Medical Unique Curriculum. UHTRI also supported development of the Military Medical Unique Curriculum Web Site with funding through the Pacific Telehealth and Technology Hui (HUI). The HUI is a joint DoD/VA venture that develops and provides telehealth research, services, education and training. One of us (L.B.) was the PI for the project while in the military, and remained on the project after joining UHTRI. Another UH faculty member worked (S.S.) on the project from its inception.

The Military Medical Unique Curriculum Web Site was launched with 24 complete educational modules. This was originally hosted on Hui servers, and then transferred to the Army’s Medical Department after the first year. The curriculum is currently being utilized in 35 military facilities in the United States, Germany and Korea and is a mandatory training vehicle for U.S. Army interns in 10 teaching hospitals across the nation. It is available through the Army Knowledge Network, which restricts access to Army personnel only. The requirement to train interns was an Army Medical Department Initiative that was defined at the same time that funding for this proposal was identified. The curriculum was developed from subject matter experts identified by the PI and the Army Medical Department at large.

Module development included standardized assessment following the completion of the module and provided certification of continuing education for both physicians and nurses. Each module consisted of the following: abstract, digital photo of the presenter, presentation slides, audio of the presentation synced with the slides, a transcribed text document of the presentation, a test to evaluate the student, and a survey for the student to complete. The Military Medical Unique Curriculum Web Site has achieved significant success over the past few years. In the first year, more than 5700 modules were completed by users during the first year of the site. The project had a one year return on investment of 168% and with continued operation, will conservatively save $2.5 million in 5-years for the Department of Defense.

Discussion

Distance learning through archived material available on the Web is in its infancy. The vehicle permits wide dissemination, with excellent central control by educators and administrators. The challenge with such a site is to maintain adequate funding to continuously review and update the site. This task is not time consuming, but administrative oversight must direct the updating on a regular basis and educators must be paid for their efforts.

The ability to package the site with multiple learning methodologies is a significant advantage to this format. A full study of how people learn on such sites must be conducted to better understand the utility of these sites and how they should be constructed. Should the site utilize full video presentations, or is audio synced to a slide presentation adequate? Does the transcribed text of the talk actually detract from the other modes of instruction as audio and video, or does it enhance it? Is the selection of learning method offered to the student of benefit, or do all students only utilize one or two tools?

Assessment of students through the Internet is generally open book as discussed. This is not problematic for continuing education of health care providers as opposed to certificate granting programs. If true certification is required, then the examinations must generally be accomplished in a setting with a proctor. In this instance, the curriculum can still be provided through the Internet, but the assessment needs to be accomplished in person. Although there are multiple on-line tracking methods to verify that a certain educational module is being studied in the desired fashion, there is nothing to prevent students from collaborating with one another on a web-based examination.

The lessons learned from our validation process of the telemedicine curriculum substantiates this claim. In this case, the main issue for students was the time it took to complete the curriculum, and we desired participants to review the curriculum closely for their suggestions and input. Despite several warnings, some individuals still risked losing their stipend to save time. In a certificate granting program, one cannot underestimate the means that some might go to fraudulently receive certification, even though the majority will follow the honor system.

One possibility is to change the model to a live setting for the assessment, where the test is made available for a short time period and everyone must access and complete the test at the same time. However, a wireless network and students sitting together with lap-top computers would easily overcome this suggestion. Multiple versions of the test can be released at the same time, which makes collaboration more difficult. Even then, however, the student might have other students or professionals take the test for them. Clearly, there are methods to make collaboration more difficult, but they can all be readily overcome by students if desired.

Site utilization is an issue. The telemedicine curriculum is a valuable resource and gets some utilization from select individuals and groups, but not to the degree necessary to maintain it as a continuing medical education enterprise. It largely serves as an on-line textbook, with no specific target audience. The Military Unique Curriculum...
site has been well utilized, as it was designed for a specific need and requirement. The technology transfer of the site to the Army Medical Department went smoothly, as again, the site fulfilled an important need for a continuous flow of new students requiring the same curriculum. Funding for site maintenance was readily accomplished as it was added to an extensive array of on-line activities sponsored by the Medical Department. In constructing similar sites, it is important to identify needs of partnering organizations so that the curriculum is utilized. Constructing a curriculum without specific needs will not engender the long-term success of the site.

References
The Virtual Hospital: Treating Acute Infections in the Home by Telemedicine

Lawrence J. Eron MD, FACP, Michelle Marineau MSN, Ernesto Baclig MBA, Cyndee Yonehara BS, and Paula King MSN

Abstract
The growth and aging of the population of Hawaii mandates a need for more effective utilization of hospital beds. One approach is early hospital discharge and outpatient treatment. However, as the acuity of illness increases, satisfactory outcomes of outpatient treatment may be difficult to achieve. We have utilized telemedicine to closely monitor acutely ill patients with infections, such as community-acquired pneumonia, skin and soft tissue infections, and urinary tract infection, in the home setting. Our treatment paradigm achieved satisfactory outcomes, cost savings, and at the same time resulted in more rapid convalescence than hospitalization.

Introduction
Nationwide there were 35 million people age 65 and older in the year 2000. By 2030, this is expected to double.1 In Hawaii, there were 160,000 residents age 65 or older in the year 2000. This number is projected to grow to 309,000 by 2025.2 With the growth and aging of the population, there will be an increasing need for acute care hospital beds. Alternative strategies to hospitalization must be developed to care for patients with, among other things, common infections such as community-acquired pneumonia (CAP), skin and soft tissue infections (SSTI), and urinary tract infections (UTI).

Treating patients at home is one alternative that can reduce the need for hospital beds. In order to care for more seriously ill patients in home settings as opposed to hospitals, we need to be able to monitor patients’ vital signs and “look in on them” as we would if they were hospitalized. Telemedicine makes this possible by providing real-time transmission of vital signs and audio-video contact between patients in their homes and clinicians in the hospital. This “virtual umbilical cord” simulates the normal physician-nurse-patient interaction in the hospital and provides closer home monitoring of patients who might normally be hospitalized.

The majority of telemedicine use in the home has been directed at chronically ill patients with congestive heart failure, emphysema, and diabetes. This approach has proven to be cost effective, reducing the need for hospitalization and emergency room visits.3,4 Using telemedicine in the home, the average number of daily home-nursing visits can be increased from five actual visits to fifteen televisits.5 Telemedicine can also be used to care for acutely ill patients in remote locations.6 We have utilized this same technology in a pilot trial, which monitored acutely ill patients with infections in the home setting.7 To the best of our knowledge, no one else has attempted this to date. We report here further results from this study.

Methods
Equipment was purchased from American Telecare, Inc (Minneapolis, MN) and consisted of one Aviva Tower central station and four Aviva 1010 XR patient stations. We kept one patient station in reserve and therefore could treat a maximum of three patients at one time. The telemedicine connection between the patient station in the home and the central station in the hospital was through POTS (plain old telephone service) lines. The teledicine team consisted of a physician (LE), two nurse practitioners (PK and MM), an IT consultant (EB), and a project coordinator (CY).

Patients were referred for telemedicine in the home, either from the emergency room or, if admitted, from the hospital, and were screened by the physician for inclusion in the telemedicine program. Before considering discharging a patient from the hospital on telemedicine in the home, we evaluated their Karnofsky performance score7 and Charlson Comorbidity Index.8 For example, if a patient had a relatively severe case of CAP with a high pneumonia severity index (PSI),9 but had a high performance score and few comorbidities, he might be considered a candidate for treatment by telemedicine in the home. However, if he had a relatively less severe case of CAP, but had a low performance score and multiple comorbidities, he might be excluded from treatment by telemedicine.

If the patient met the inclusion criteria (Table 1), the nurse practitioner discussed the trial with the patient and family members. It was extremely helpful to have a least one face-to-face interaction with the patient and their families prior to their discharge from the hospital on telemedicine in the home. This assisted us in gaining their trust and provided a comfort level in their acceptance of telemedicine in place of hospit-
talization. The patient and family members were typically anxious over this new technology and needed reassurance that they would be monitored closely in their home environment. It also allowed us to obtain a face-to-face baseline history and physical exam.

After screening, they were asked to provide written informed consent, if they were found to be acceptable for treatment by telemedicine in their home. Reasons for exclusion included an unsuitable home environment, such as homelessness or living alone, an inability to learn self-administration of intravenous antibiotics, and a lack of suitable phone lines in their house. In four cases patients refused to be treated by telemedicine because of a lack of familiarity with, or fear of, computer technology.

Once they agreed to treatment by telemedicine in the home, a member of the telemedicine team met them in their home to set up and instruct them or a family member, friend, or neighbor, in the use of the equipment. The first televisit was then conducted between the patient in the home (in the presence of the telemedicine team member) and a clinician at the central station in the hospital (either a physician or a nurse practitioner trained in the management of these types of infections). After demonstrating a televisit, the telemedicine team member in the home observed the patient’s technique. Once patients mastered the application of the blood pressure cuff to their arm, the stethoscope to their chest, and the pulse oximeter to their finger, they managed subsequent visits faultlessly. Problems encountered involved suboptimal lighting or excessive movement of the patient, which resulted in fragmentation of images due to excessive pixelation. The best lighting was indirect without any back-lighting.

The initial televisit usually lasted for one hour, subsequent follow-up visits 15 minutes, during which time patients in their home and the clinician at the central station were able to see each other and converse. The clinician at the central station was able to determine the patients’ clinical status by auscultating their lungs, and monitoring their blood pressure, heart rate, respiratory rate, temperature, and oxygen saturation. With the loss of face-to-face encounters, strategies for meeting other family members and pets and for commenting on the patient’s home surroundings while conducting televisits, assisted in gaining the patients’ and the families’ confidence and trust. Most patients televisit once daily, but for patients with more severe illnesses, televisits can be conducted several times daily. When patients improved to the point where they would normally be discharged from the hospital, patient stations were removed from homes. Should a patient’s clinical status have deteriorated at any time, he was instructed to either call a member of the telemedicine team or return to the hospital.

Results of a pilot trial:
We have reported the outcomes of a trial of telemedicine in the home in which we treated 25 patients6. The types of patients that were treated are illustrated by the four examples in Table 2. We compared patients treated by telemedicine in the home in a case control fashion to a comparable control group of hospitalized patients. While the large majority of patients in each group were cured, those treated with telemedicine in the home recovered at a more rapid rate, as judged by their earlier return to their normal activities of daily living.

Through the use of telemedicine, we were able to accomplish five things.

- The patient could be monitored several times a day, as if he were in the hospital.
- The patient was reassured by maintaining audiovisual contact with his health care providers.
- More efficient bed utilization was accomplished by discharging hospitalized patients earlier than would otherwise have been possible, and in some cases avoiding hospitalization altogether.
- The patient felt more comfortable at home than in the hospital.
- Based on our prior experience 6,10 and that of others,11 patients who were managed as outpatients returned to their normal activities of daily living more rapidly than comparable patients who were hospitalized.

### Table 1: Criteria for Treatment of Patients with Telemedicine in the Home

| Patients must have a domicile with a second person to assist the patient (usually family or a friend). |
| Patients must be ill enough to ordinarily require hospitalization, but have a low predicted 30-day mortality rate. |
| Patients must not have sepsis syndrome or the need for intensive care monitoring. |
| Patients with CAP are excluded if they have a mild (Class I) or life-threatening (Class IV) CAP. |
| Patients with SSTI are excluded if they have mild SSTI (Class I), or if they have sepsis syndrome or life-threatening (Class IV) infection. |
| Patients with UTI are excluded if they have uncomplicated pyelonephritis or if they have an obstructed ureter or sepsis syndrome. |
| The patient’s medical condition must be such that an episode of care can be managed without hospitalization. |

### Table 2: Types of Patients Treated by Telemedicine in the Home

- A 76 year old male with leukemia and an absolute neutrophil count of 400/mm³ developed bilateral infiltrates, a temperature of 102°F, and an oxygen saturation of 90%.
- A 48 year old female with metastatic carcinoma of the breast and a white blood cell count of 2,500/mm³ developed cellulitis extending from her left hip to her axilla.
- A morbidly obese 53 year old male with a mechanical aortic valve prosthesis developed high grade enterococcal urosepsis (5 of 5 sets of blood cultures and a urine culture positive).
- A 66 year old male with severe aortic insufficiency and a previous right nephrectomy for a renal cell carcinoma, developed Gemella endocarditis with a vegetation on his aortic valve.
Technical problems:
We experienced several problems that must be overcome before telemedicine in the home can be widely deployed. First and foremost is that of technical problems, such as poor video images and freeze-ups. This problem is caused by low bandwidth (a measure of the amount of information that can be transmitted over a telecommunications line) of POTS. Equipment offered by the major home telemedicine vendors is, for the most part, POTS-based. The low-bandwidth of POTS connections did not consistently support the minimum telemedicine requirements of two-way video and audio connections plus one-way data transmission of patients' vital signs. With the broadband connections via cable, DSL, and Wi-Fi, that are becoming commonplace, there is now sufficient, available bandwidth to allow for higher-quality video and audio connections that could vastly improve televisits. Moreover, once the telemedicine vendors adopt the Internet protocol, then there will be even better flexibility in terms of mixing and matching devices, using different types of connections, and more easily moving the clinician's station between sites, such as the clinician's home and office.

The established telemedicine vendors have been slow to embrace the rapid technical advances in telecommunications of the past five years, and computer equipment vendors, whose products use the latest broadband and Internet protocol technologies, have generally been reluctant to enter the telemedicine marketplace. At the end of the day, it will be up to us, the telemedicine equipment buyers and users, to pressure vendors to move beyond POTS-based equipment, and to partner with them to develop and test new equipment.

Patient acceptance:
Patient reactions to telemedicine in the home may differ depending on age, gender, educational level, family support, and cultural factors. This may be especially true in Hawaii where there is such a diverse cultural representation. Telemedicine may not be appropriate in certain cases based on these considerations. Two examples of this are as follows: elderly patients who feel safer in a hospital environment than in the home;12 individuals of Philippine or Hawaiian descent who are more accepting of hospitalization and reluctant to receive treatment by telemedicine in the home.

Care-providers may in certain cases be dissatisfied with telemedicine in the home compared to hospital care for their wards.13 They may be unwilling to bear the entire burden of caring for a patient. It may be necessary to provide respite workers in selected cases to shop, cook, clean, bathe, and otherwise provide companionship for certain patients. This relieves a care-provider from shouldering the entire burden of a patient's care. However, it also increases the cost of telemedicine in the home.

Telemedicine is a relatively new technology that both intimidates and fascinates our patients. Once when we set up a patient station in a home, family members gathered around the camera to watch the video visit. One elderly patient remarked, "It's just like when the first television set arrived in my neighborhood." We need to take advantage of this type of attitude toward telemedicine while diminishing negative reactions to it. Acceptance of telemedicine in the home will not happen overnight and will take a concerted educational program to promote it.

Clinician acceptance:
Clinician acceptance of novel treatment strategies is traditionally slow, especially if it impacts negatively on remuneration and is accompanied by extensive government regulation with attendant loss of autonomy. Most third-party insurers, especially Medicare, do not reimburse clinicians or hospitals for home televisits except to rural areas, such as the outer Hawaiian Islands. Because of this, the development of telemedicine has been retarded largely for economic reasons. Nonetheless, there are many reports of successful cost-savings and increased productivity from telemedicine trials.14

There is still considerable skepticism amongst clinicians about changing the current practice of watching patients in the hospital until they are completely stable.14 This reaction may be based on traditional teachings, as well as clinicians' fear of an unsuccessful outcome and the potential threat of litigation. Medical-legal challenges for bad outcomes from telemedicine in the home will undoubtedly occur. However, with additional outcomes data confirming our preliminary results, telemedicine in the home will be advanced to the level of a standard of care.

Conclusion
Telemedicine in the home has several advantages over hospitalization. It promotes more efficient utilization of hospital beds resulting in cost savings. Our results would indicate that it promotes more rapid convalescence than hospitalization. How it does this is not known, although it may relate to several factors, one of which is the removal of patients from a passive, dependent posture in the hospital to being a more active participant in their own medical care at home. This may promote in patients a sense of empowerment over their illness. Whatever the reason, outcomes such as this will hasten the acceptance of telemedicine by patients, care-providers, clinicians, and insurers.

References
An International Landmine Telehealth Symposium between Hawaii and Thailand using an Internet2 and Multi-protocol Videoconferencing Bridge

Eugene K. Soh MD, Dale S. Vincent MD, Benjamin W. Berg MD, Suwucha T. Chitpatima PhD, and Donald H. Hudson MPH

Abstract
An international telehealth symposium was conducted between healthcare institutions in Hawaii and Thailand using a combination of Asynchronous Transfer Mode, and Internet2 connectivity. Military and civilian experts exchanged information on the acute and rehabilitative care of landmine victims in Southeast Asia. Videoconferencing can promote civil-military cooperation in healthcare fields that have multiple international stakeholders.

Introduction
Landmines are a major public health problem in Thailand. The 2001 Landmine Impact Survey found that landmines along the Cambodia, Laos, Burma, and Malaysia borders affected 531 Thai communities in 27 provinces. According to the Survey, 346 new landmine casualties were recorded between June 1998 and May 2001.

This telehealth symposium enabled landmine experts from Thai Non-Governmental Organizations (NGOs), the Royal Thai Army (RTA), a Hawaii charitable service organization (Shriners Hospital for Children), and the U.S. military to exchange information on the acute and rehabilitative care of landmine victims in Thailand.

We have previously reported successful, regularly conducted videoconferences on healthcare topics using either digital telephone (ISDN) or Internet2 connectivity between two tertiary care hospitals in Hawaii and Thailand. Expanding on this model, we conducted the landmine symposium between three sites, two institutions in Hawaii and one in Thailand, using a combination of ISDN, Asynchronous Transfer Mode (ATM), and Internet2 connectivity over an electronic bridge.

Methods
A three-hour seminar was conducted 27 July 2004 at 1600 (Honolulu) and 0900 28 July 2004 (Bangkok). There were three participating sites. The Thailand videoconferencing site was Phramongkutklao Medical Center (PMK), a 1000-bed tertiary care hospital in Bangkok operated by the Royal Thai Army that treats civilians and military personnel. There were two participating sites in Honolulu: Tripler Army Medical Center (TAMC), a 242-bed tertiary care center for U.S. military personnel and their families; and Shriner’s Hospital for Children (SHC), a free 40-bed surgical and rehabilitative orthopedic hospital.

The three participating sites utilized two differing forms of connectivity and a multi-protocol videoconference bridge to enable the sites to interconnect. Two sites (TAMC and PMK) utilized International Telecommunications Union standard H323 videoconferencing using Internet protocol (IP) over the Internet2 network to connect to the bridge. These two sites utilized Tandberg videoconference equipment. The third site (SHC) utilized a private ATM circuit carrying H323 IP to connect to the bridge, and also used Tandberg equipment.

The device enabling these disparate systems to communicate is called a multi-protocol videoconference bridge, and is operated by the State of Hawaii Telehealth Access Network and housed on the UH campus. The bridge maintains H320 (ISDN) ports to the public switched telephone system, H323 (IP) ports to the public Internet and Internet2, as well as ATM ports to private circuits. The bridge translates an incoming H320 protocol into an outgoing H323, and vice-versa, enabling the differing systems to communicate. The bridge can be configured for “Continuous Presence” where all sites hear all participants and see all participants on a split-screen (Hollywood Squares); for “Voice Activated” where all sites hear all participants and see only the actively speaking site; and for “Central Control” where the bridge operator makes determinations of who-hears-and-sees-what for the duration of a videoconference.
All lectures were presented in English, with supporting PowerPoint slides. Thai NGO experts discussed the landmine problem; mine risk education; mobile prosthetic clinics; manufacture of prosthetics using local materials; research on social issues; and victim assistance. A Royal Thai Army physician discussed acute resuscitation and victim transport in Thailand, and three U.S. military healthcare providers discussed Blast Resuscitation and Victim Assistance (BRAVA) programs in Sri Lanka and Vietnam. At the conclusion of the program, participants anonymously used a wireless Audience Response System to rate the technical and educational quality of the videoconference on a 9-point Likert scale (1 = awful, 9 = excellent).

Results
Seventy-one people participated in the seminar, 16 in Thailand and 55 in Honolulu. There were attendees from ten countries, including Thailand and the U.S. A total of 14 different NGOs were represented at the conference. In Hawaii, nine (18%) of the attendees represented NGOs, 32 (65%) were members of the Royal Thai Army or the U.S. military, and 14 (16%) were non-NGO civilians. In Thailand, ten (63%) of the attendees represented NGOs and six (37%) attended were either in the Royal Thai Army or the U.S. military. Nearly half of the attendees were physicians, with a higher percentage (62%) in Hawaii than in Thailand (31%). Attendees agreed that there was significant training value in the conference (mean 6.97, SD 1.29, n=33). The quality of sound (mean 6.35, SD 1.57, n=34) and video (mean 6.16, SD 1.32, n=33) was good at all sites. No sites lost sound or video.

Discussion
The United States has a long history of participating in demining activities in Thailand. In 2002-3, U.S. humanitarian demining assistance totaled over $800,000, including $650,000 from the State Department for Thai Mine Action Center activities, and the remainder allocated for U.S. military personnel to conduct two on-site train-the-trainer mine awareness sessions. This was the first landmine symposium conducted simultaneously in Thailand and the U.S. using videoconferencing.

Most international distance learning initiatives have occurred in academic settings. A two-way interactive video and internet course for nurses between the University of North Carolina and the Mie Prefecture College of Nursing in Japan has been described. Ekblad et al recently reported a pilot study with Swedish medical students, in which teachers from the U.S., Australia, and Sweden used videoconferencing to train the medical students in refugee mental health.

In our experience, NGO workers are uncommonly used as teachers in undergraduate or graduate medical education training programs. Trehan et al reported that medical students from Northwestern University routinely travel to Central America to work in rural health clinics staffed mainly by NGOs, with the goal of exposing the students to a different set of medical and public health issues than they would typically encounter in the U.S.

Our previous Internet2 videoconferences have been conducted point-to-point between PMK and TADC. In the current model, the use of the bridge at the University of Hawaii allowed an audience from a non-Internet2 site to participate. One disadvantage of using the bridge was the loss of the capability to show speaker and PowerPoint content simultaneously, a suboptimal situation when many participants speak English as a second language. Though it was possible to switch video input from “talking head” camera to direct input of PowerPoint slides, the resolution and scan conversion resulted in reduced legibility of images and small typeface on the PowerPoint material.

The bridge allowed the collaboration between Internet2, ATM, and ISDN-enabled sites, but a newer open-source software ensemble called the Access Grid™ permits more robust group-to-group interaction to take place over a distributed network such as Internet2. The simultaneous multipoint-to-multipoint capability of the Access Grid™ has the potential to overcome many limitations of traditional videoconferencing.

Conclusion
The landmine symposium demonstrated that videoconferencing technology can be used to promote civil-military dialog for a healthcare problem that is typically encountered only in the developing world, but that has relevance to stakeholders in developed countries as well. Videoconferencing is an effective method for members of the international medical community to link geographically remote teachers and learners with common educational goals. The high bandwidth capability of the Internet2 permits high quality point-to-point videoconferencing, and new Access Grid™ software offers the possibility of expanding the international telehealth conversation to multiple sites that are all interacting at the same time.

Acknowledgements
The authors wish to thank these individuals for their expert assistance in coordinating the symposium: Dr. Norman Akamthe of the Hawaii State Telehealth Access Network; Michael vonPlaten of the Telehealth Research Institute, University of Hawaii; Sonia Lee-Gushi of the Pacific Telehealth and Technology Hui, Honolulu; Erika Bjorklunds and Natchaya Khaophuangsoo of the Phramongkutkla Medical Center, Bangkok; Jana Lindsey of the Shriners Hospitals for Children, Honolulu; Major Todd Barlow and Major Scott Elder both of the Joint United States Military Advisory Group, Thailand.

References
Shriners Hospitals for Children, Honolulu’s Experience with Telemedicine: Program Implementation, Maintenance, Growth, and Lessons Learned

Craig M. Ono MD and Jana L. Lindsey RN

Abstract
Shriners Hospitals for Children, Honolulu Telemedicine Program conducts real-time video consultations with remote sites in Hawaii, Guam, Saipan, American Samoa, the Federated States of Micronesia, and the Republic of the Marshall Islands. The program began in 1999 and has provided over 240 consultations. This report is a summary of the Shriners Hospitals experience and lessons learned regarding program implementation and maintenance.

Introduction
Shriners Hospitals for Children - Honolulu is one of 22 hospitals within the Shriners Hospital system. The hospital provides care to children with primarily pediatric orthopaedic conditions. The hospital’s mission also includes evaluation and treatment of chronic burn scar conditions and other conditions requiring plastic surgery. Since its establishment in 1923, the Honolulu hospital has treated over 22,000 children. The majority of the children are from Hawaii, but the hospital also draws patients from the Commonwealth of the Northern Marianas (Islands), The Federated States of Micronesia, Guam, American Samoa, Samoa, Fiji, the Republic of the Marshall Islands, and the Republic of Palau. Outreach trips for outpatient clinic evaluations are scheduled on a regular basis to each of these areas. All patients requiring operative procedures or further evaluation are seen at the Honolulu hospital.

Since the large geographic area of responsibility poses significant time and distance barriers, establishment of an effective telemedicine program became a priority beginning in 1998. A generous grant from the Harry and Jeanette Weinberg Foundation provided the initial funds needed for equipment purchase. The stated goals of the program included: increasing pediatric orthopaedic surgery care access at geographically remote sites; decreasing the need for travel with its associated costs for patients and providers; providing education in the area of pediatric orthopaedic surgery for these remote and medically underserved areas; improving the coordination of care between the hospital and remote site care providers; providing further distance education opportunities for the staff of the Honolulu hospital; and gaining access to other telemedicine sites on the mainland United States such as the Shriners Hospital in Sacramento. This article reviews our experience and outlines how our telemedicine service functions along with lessons learned from implementation and maintenance of our program.

Program Implementation and Development
The telemedicine program began in 1998 with a grant from the Harry and Jeanette Weinberg Foundation providing funds to purchase a video-teleconferencing system. This system complemented the State of Hawaii’s initiative to develop a comprehensive statewide telemedicine network through the Hawaii Health Systems Corporation (HHSC). Once funding was obtained, a full-time temporary telemedicine coordinator was appointed, and a medical director for the telemedicine program was appointed.

The first demonstration of the program occurred in September of 1999 when one patient was seen at Kohala Hospital on the island of Hawaii. Because the patient and family were unable to travel, the telemedicine coordinator traveled to the remote site, using the equipment at the HHSC facility and televising to the physician at the Shriners Hospital site. The videoconference successfully demonstrated ability to evaluate and manage a patient through this communication format.

During our initial start-up period, a variety of information technology programs were being developed around the Pacific to include the State of Hawaii Telehealth Access Network (STAN) and distance education initiatives such as the Pacific Resources in Education and Learning (PREL). The Harry and Jeanette Weinberg Foundation funded videoconferencing equipment for 30 key healthcare organizations in the State of Hawaii. Various granting agencies such as the National Telecommunications Information...
Agency (NTIA) and the Rural Utilities Services (RUS) assisted with the purchasing of videoconferencing equipment for areas such as Guam, Saipan, American Samoa. The PREL Star program helped the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands. Healthcare providers at remote sites found that they were able to connect up with Shriners Hospital for consultations, and providers at Shriners Hospital found they could successfully connect with remote sites for new patient evaluations and follow-ups. Subsequent telemedicine visits were then arranged on an as-needed basis with these remote sites.

The telemedicine coordinator was a vital key in developing effective relationships with remote sites, providers and funding resources. These relationships were fundamental to setting the stage and gaining access to necessary networks. The coordinator had to understand the technical capabilities and roles of all the participants in the process, how to troubleshoot problems and obstacles that arose, understand and comply with ever-changing regulations governing the industry, and play promoter/marketer for an innovative service.

Shriners Hospitals for Children – Honolulu, showed its continued commitment to the program by making the telemedicine coordinator position a permanent one and continuing to support a medical director. The central headquarters for Shriners Hospitals for Children demonstrated support and responsibility by developing and advancing telemedicine throughout the Shriners Hospitals system. As a result, more than 15 of the 22 Shriners Hospitals have telemedicine capabilities.

**Program Growth and Maintenance**

The Shriners Hospitals Telemedicine program has had its share of growing pains. Initial equipment purchase in 1998 included the PictureTel Concord 4500 ZX video teleconferencing system with two monitors for remote and local viewing. Three Integrated Service Digital Network (ISDN) lines were installed. Additional peripheral devices purchased included a document camera, a general handheld camera, an electronic otoscope, an electronic ophthalmoscope, an electronic stethoscope, a digital camera/camcorder, and a video recorder.

Since our initial efforts, we have installed a direct T1 line to the State of Hawaii Telehealth Access Network located at the University of Hawaii. The STAN bridge has the ability to connect Shriners Hospital to the Federated States of Micronesia and American Samoa without per minute usage charges. The STAN bridge is the only conduit to these remote areas.

The PictureTel equipment failed in 2002 and was replaced by the Tandberg 2500 system. This system has the capability to do encryption, dual video, and can connect through Integrated Service Digital Network (ISDN), Asynchronous Transfer Mode (ATM), or Internet Protocol (IP). We continue to use the document camera, general handheld camera, and the digital camcorder, but have found little use for the otoscope, ophthalmoscope and stethoscope in our orthopaedic practice.

Telemedicine consultations have been successful with Guam, Saipan, the Federated States of Micronesia, the Republic of the Marshall Islands, and American Samoa. (Table 1). Efforts to serve Guam have been slowed by legal and financial issues. Consultations with Saipan have been influenced by the departure of key Saipan personnel who were responsible for scheduling and coordinating the clinic at their remote sites. Access to Shriners Hospital pediatric orthopaedic care did not significantly drop, as we continued to conduct outreach clinics at those locations twice a year.

Telemedicine consultations with American Samoa and the Marshall Islands benefited by American Samoa’s direct T1 line to Hawaii with a high quality transmission connection of 384 kbps, and only a one-hour time difference between the two centers. There is also a dedicated off-island referral liaison that is active in coordinating and scheduling American Samoa patients. Most importantly, there is an orthopaedic surgeon in American Samoa who found value in the process and developed a physician-to-physician relationship with providers in Honolulu.

Telemedicine consultations with the Republic of the Marshall Islands have increased because of similar factors. The Majuro Hospital has assigned a dedicated liaison to coordinate the clinics. The physician in Majuro is active in the referral and telemedicine process. Since Shriners Hospital staff travel to the Republic of the Marshall Islands and American Samoa only once a year, telemedicine at these two locations has improved access to specialized pediatric orthopaedic care throughout the year.

Telemedicine referrals have not been as successful on the neighboring islands of Hawaii because of multiple factors. Most children have insurance that pays for travel to Honolulu. Shriners Clinics are held on the neighbor islands every 4 to 6 months. General orthopaedic surgeons perform the initial evaluation on most of these children and refer directly to Shriners Hospital if there is an acute problem requiring immediate referral. In those situations, the child is brought to Honolulu for evaluation.

![Table 1.— Shriners Hospitals for Children, Honolulu’s Telemedicine Consults 1998–2004](image)
Discussion: Lessons Learned

Over the course of the past 7 years we have learned some valuable lessons. Shriners Hospital for Children - Honolulu has relied on the telemedicine program to improve access to pediatric orthopaedic care for children in the areas we serve, and it is committed to further development and expansion of the program, despite the challenges encountered at every turn.

Seeing a child through the telemedicine format is not straightforward. Videoconferencing format for a medical encounter seeks to replicate what happens in the health care provider’s office. This process includes: gathering the medical history; conducting the physical examination; developing a diagnostic and therapeutic plan; counseling the patient and/or family as to the treatment plan; arranging follow-up. Challenges and barriers to accomplishing each and every one of these tasks through the videoconferencing format abound.

Since the videoconferencing format is a different encounter for both care providers, a written consent from the patient and/or family is necessary. The encounter does not occur in the usual, relative privacy of a clinic examination room. There are concerns regarding the extent of privacy when the patient visit includes a video signal moving from a remote site, through several networks and bridges to another site that typically has technical personnel and clinic coordinators present. Concerns regarding the efficacy of the encounter and whether or not adequate clinical information can be formulated by this venue are considered. If the encounter is unsatisfactory, then arrangements are made for the child to be seen in person.

Patient history is obtained by interview with the remote site provider as facilitator. Barriers to an effective interview include language, cultural mores, age, level of comfort or discomfort talking to a television screen, seeing oneself projected on a television screen, lag time and technical glitches. As an interviewer, one needs to be attuned to body language in order to gain an understanding of whether or not the medical history interview is effective.

A good orthopaedic physical exam is a definite challenge as it is part observational and part hands-on. The observational part of the examination includes assessment of active range of motion, gait, posture, and, signs of inflammation such as swelling and redness. The hands-on examination assesses areas of local tenderness, quality of any swollen or indurated areas, passive range of motion, joint crepitus, stiffness, muscle tone and provocative examinations for joint stability. The quality of the hands-on part of the examination is directly dependent on the skill of the examiner at the remote site.

(Figure 1.)

A videoconference camera focused on a standard x-ray view box is usually used to transmit radiographs. Radiographic and transmission quality varies. The radiographs are usually relayed well enough using this technique to see gross anatomic changes such as displaced fractures. But subtle bone dysplasias, early infections, and permissive bone lesions cannot be easily identified using this modality. When this occurs, alternate means of transmitting data is required – such as digitization of the image and e-mail transmission or mailing the radiograph to the facility.

At the conclusion of the teleconference, a diagnostic or therapeutic plan is formulated and communicated to the provider, patient and family at the remote site. Language and cultural barriers are critical at this juncture. Follow-up is then arranged around the availability of the providers at both the local and remote sites.

Using dedicated providers at the local and remote sites has helped lower some of these barriers. The providers have to be familiar and comfortable with the process. During outreach trips to these remote areas, we meet with the local providers in order to provide education and to review the orthopaedic physical examinations. Follow-up and assistance in management of our shared patients is provided. The success of the system relies on having qualified, dedicated, consistent personnel on both ends of the connection.

Regularly scheduled clinics, regardless of the number of patients to be seen, allows providers to exercise the videoconference equipment and hook-ups. Technical personnel gain experience and follow-up appointments can be more routinely scheduled for healthcare providers and patients alike.

The organization needs to support the telemedicine effort. Telemedicine clinic volume accounts for just over 1% of the total outpatient volume of Shriners Hospital - Honolulu. Despite the small percentage, the hospital continues to support a full time coordinator plus a clinician who commits 1 day-a-week to the program – actively seeing patients via the telemedicine venue. The program budget continues to be supported by Shriners Hospitals for Children.

Finally, telemedicine has not replaced our need to travel to remote areas and conduct outreach clinics. However the quality of our clinic visits to these remote areas has improved. It is extremely beneficial to see and discuss a new child with the provider at the remote site before we see the child in person. As a result, treatment and diagnostic plans can be instituted earlier. Occasionally parents just need to be counseled and reassured. This can easily be done through the videoconferencing format. Patients with acute issues that require immediate referral and travel to Honolulu can be identified earlier and their care can be expedited. While telephones are the standard way of communicating this information, usually it is provider-to-provider only and rarely family/patient-to-provider.
The videoconferencing format allows both. As such we consider telemedicine to be an adjunct to our outreach program and not a replacement.

Conclusion
Through the use of the telemedicine technology, geographic and time barriers are no longer a hindrance to receiving and providing healthcare to rural areas. The experiences from the Telemedicine Program at Shriners Hospitals for Children - Honolulu has proven to be an additional clinical and education tool that has value and potential to improve healthcare.

The human factor has a critical impact on success of a telemedicine program. It doesn’t matter how good the technology is if two sites do not want to communicate with each other. The value of telemedicine and its frequency will increase as healthcare providers begin to accept and become comfortable in its applications. Collaboration and partnerships in sharing of resources such as network capabilities and video conferencing equipment is a demonstration of the synergistic effect to the development and maintenance of telemedicine programs. Sustainability will depend on organizations’ commitment to supporting healthcare providers’ initiatives. As in any clinical application, without the healthcare providers’ participation, there would be no clinical value whether it is through telemedicine or the traditional hands-on assessment.

References
Augmentation of Special-needs Services and Information to Students and Teachers “ASSIST” — A Telehealth Innovation Providing School-based Medical Interventions

Thomas E. Gallagher MD

Abstract

An innovative school-based telehealth technology was introduced in Hawaii with the purposes of: (1) evaluating students for medical/developmental conditions with educational implications, (2) providing a professionally-monitored Internet-based system of learning/development, and (3) delivering medically-based physical and occupational therapy at the student's school. Electronically recorded satisfaction surveys from parents, teachers, and providers revealed significant improvement in all three areas.

Introduction

Many school-aged children have medical/developmental conditions that affect their ability to learn and to succeed in school. Included are: Attention-Deficit/Hyperactivity Disorder, autism/pervasive developmental disorders, and specific learning disorders. These conditions impact both the medical and educational domains, as the evaluation for the conditions generally rests with the medical/psychological professionals, while intervention affects, and is the primary responsibility of, the educational system. Physician evaluation of these children is often inefficient, inadequate, and/or unavailable for a number of reasons, including: (1) Physicians vary in their level of training, experience, and comfort in dealing with these conditions; (2) Even for an experienced and motivated physician, the time constraints imposed by a busy office practice may limit the ability to provide a thorough evaluation; (3) Office-based evaluations and follow-up visits require repeated absences from school, further impeding the child's educational progress; and (4) There is a lack of consistency and quality control in the evaluation process.

This is particularly relevant to military dependent children in Hawaii. The Department of Defense (DoD) considers Hawaii to be an Outside the Continental United States (OCONUS) location, and therefore tours of duty in Hawaii are considered overseas tours. But Hawaii is unique among OCONUS duty areas because of the relatively high level of available medical resources. Furthermore, the military’s Exceptional Family Member Program (EFMP) requires that the availability of services for dependents with special needs must be considered in determining a service member’s duty assignment. Therefore, a service member who has a child with special medical or educational needs may be more likely to be assigned to Hawaii for an overseas tour than to other overseas locations with fewer medical resources. Additionally, there are no Federally-run schools for military dependents in Hawaii; all military dependent children who attend public school in Hawaii are enrolled in the State Department of Education (DOE) schools. The educational system in Hawaii has been criticized in the past for a lack of responsiveness to parents' concerns regarding the availability and quality of intervention services for children with disabilities. In addition, because the military represents a significant portion of the population in Hawaii, and particularly on Oahu, factors that affect military dependent children can have an appreciable effect on the school system statewide.

In March of 1999, a request was made of the Commander, Tripler Army Medical Center (TAMC) to help in the provision of services to special needs students who were dependents of active duty personnel in the State of Hawaii. Congressional funding provided the basis of a research/demonstration project entitled “Augmentation of Special-needs Services and Information to Students and Teachers (ASSIST)”. Prior to any intervention, a thorough Needs Assessment, was carried out with careful collaboration between the Departments of Education, Health, and Defense, and the University of Hawaii. This collaborative effort identified three areas of greatest need for military dependent special-needs students in Hawaii. The Needs Assessment also provided a baseline for the project’s outcome measures.
The three identified areas of need became the three major components of ASSIST:
1. Evaluation of children suspected of having one of the four most common medical diagnoses that affect a student’s ability to learn in school and require specific educational planning. These diagnoses are: Attention-Deficit/Hyperactivity Disorder (ADHD), Auditory Processing Disorder (APD), Autistic Spectrum Disorder (ASD), and dyslexia. The survey also found a need to decrease the amount of time that these children spend out of school for evaluation, treatment, and monitoring of their medical condition.
2. The development of an educational web site with professionally-monitored website linkages to various educational/developmental sources of information for providers, parents and teachers of children with special needs.
3. The delivery of school-based, medically-indicated physical and occupational therapy intervention at the school, so as to limit educational/classroom interruptions.

Each of the three components of the project had specific objectives and anticipated benefits. Component 1, the evaluation of medical conditions with educational implications, had three objectives:

1. To demonstrate that children with these conditions could be evaluated using telemedicine, thus minimizing time away from school,
2. To improve parental satisfaction with the child’s educational experience, and with the diagnosis and management of the medical condition,
3. To decrease the number of classroom problems and interruptions attributable to the medical condition affecting the child’s education by providing early detection and intervention.

The anticipated major benefits of this aspect of the project included:

- Less time spent by the families visiting physicians or other professionals in order to make the diagnosis,
- An expedited evaluation process compared with standard methods,
- Creation of a remotely-accessible store-and-forward video of the child in the classroom setting as a valuable diagnostic tool,
- Development of educational presentations for students and teachers (initially focusing on learning disabilities), with an emphasis on understanding and acceptance of children with special needs.

The major objective of Component 2, development of a web site, was to provide parents, teachers, and health care professionals with a reliable, thorough, single source of information on educationally-relevant medical and developmental conditions. The primary goal for the website was to create a professionally-monitored Internet-based system of learning/development, including a central source of links to websites that would be rated and monitored by the professional staff of the project (psychologists, social workers, developmental pediatricians, occupational and physical therapists). The links needed to be accessible via the same portal that the parents and professionals use to access the ASSIST evaluation and feedback system. The development of this learning center resulted in over 100 links to internet websites, in the following categories: Advocacy, Autism, Behavior Problems/ADHD, CAPD, Disaster-Related Anxiety, Federal/Military, General Information, Genetics, Learning Disabilities / Early Intervention, Motor Development, Physical Disabilities, and Unique Military-Related Information.

Component 3, the delivery of medically-based physical and occupational therapy, had two major objectives:
1. To improve the children’s quality of life, and
2. To increase patient, family and provider satisfaction.

The benefits included the ability to:

- Provide medically-indicated occupational and physical therapy services in the classroom setting,
- Allow occupational and physical therapy assistants to provide services in the schools, using electronic, web-based supervision by fully-trained pediatric occupational and physical therapists,
- Reduce absenteeism, and augment the student’s educationally-based occupational and/or physical therapy services.

Methods
The research was approved by the TAMC Institutional Review Board and Human Use Committee, and consents were obtained from parents and assents from the students participating in the study. Schools on federal property were chosen due to their high percentage of military students (most over 90%). All students were referred for evaluation through the Student Services Coordinator (SSC) at their respective school, and were entered onto the secure Project ASSIST website. Students at all 9 of the Hawaii Department of Education schools located on federal property were eligible for services from Project ASSIST; however, certain conditions needed to be met in order for children to participate in the research study. For Component 1, only children never previously evaluated / diagnosed with one of the four medical conditions were enrolled in the research, secondary to difficulties discontinuing medication or other services. In Component 3, only children who had educationally mandated OT and/or PT on their Individualized Educational Plan (IEP) were enrolled in order to determine if the addition of medically indicated OT and/or PT services would improve their quality of life and parent/provider satisfaction.

Component 1: Medical Conditions with Educational Implications. The four educationally relevant diagnoses were approached in the following manner.

For children suspected of having ADHD, we identified a set of questionnaires that were already being used in our institution’s ADHD evaluation clinic, and adapted them for use in an interactive electronic format. The questionnaires included the Comprehensive Behavior Rating Scale for Children (CBRSC)2, School Situations questionnaire, ADHD Rating Scale, ADHD Comprehensive Teachers/Parents Rating Scales (ACTeRS)3, Home Situations Questionnaire, and marital and depression scales for the parents. Some of these questionnaires had been developed in our facility, some were “freeware”, while the CBRSC and ACTeRS were commercially available. These questionnaires are included as appendices. For copyrighted questionnaires, we obtained permission from the pub-
lishers to allow us to develop an electronic version.

We then set up a secure website with password-protected access. When a teacher or parent identified a student as having difficulties at home and/or in the classroom that could be an indication of ADHD, ASSIST or school personnel informed the parent about the project and assigned them an identification code and password to enable access to the site. The parent and teacher then completed the questionnaires on-line. Once each questionnaire was submitted, it could not be recalled or modified. At no time were the responses of parents or teachers available to each other. Response data was electronically tabulated, with standard scores and/or T-scores recorded on a data summary sheet. The specific questionnaire answers and data summaries were then accessible to ASSIST personnel, including psychologists and developmental pediatrics.

An additional benefit of the online questionnaires for our military dependent population was that parents who were deployed from Hawaii, or otherwise inaccessible, could still provide information on their child by using the website.

In order to provide a form of direct observation of the child, we used a small video camera in the child’s classroom to compare the child’s in-classroom behavior to that of an adjacent control student (student assent and parental consent were obtained from the control student and parent respectively without identifying the identity of the subject student). The camera was connected to the school’s Local Area Network (LAN), and was controlled from a remote location via the LAN. A 15-minute store-and-forward video-clip of the child’s (and control’s) behavior during individual deskwork was recorded to allow for observation of distractibility and impulsiveness in the classroom setting. This was used in lieu of the method used by our existing ADHD evaluation clinic, in which a child is asked to perform a standardized “pseudoacademic” task for 15 minutes, while being monitored by a trained observer.

Control satisfaction surveys were obtained from the parents of students being evaluated through the ADHD clinic at TAMC. Most, but not all, parents were willing to serve as controls.

If the teacher felt the student had difficulties primarily in the areas of speech/language and socialization, an assessment for an Autistic Spectrum Disorder was initiated, using the DoD Clinical Pathway; an assessment tool adapted from the recommendations of a multidisciplinary task force1.

Students were screened for Auditory Processing Disorders using specific on-line questionnaires. If results were suggestive of the diagnosis, screening intellectual/academic testing was done. If those results were also compatible with APD, the child was referred to an audiological specialist for further assessment.

If a student was experiencing reading difficulty but was not identified as having a Specific Learning Disability (SLD) on standardized testing by the DOE, or if the student was still having difficulties and suspected of having dyslexia despite special education intervention, specific online questionnaires were completed by parents and teachers, and a child psychologist carried out a full evaluation for dyslexia.

Research for Aspect 1 centered on two distinct areas: (1) Parents’ satisfaction with the evaluation process, including accessibility, ease, and timeliness, and (2) comparison of behavior problems in the classroom before and after the evaluation. To accomplish this, 5-point Likert scale parent satisfaction questionnaires (Appendix 1) were contrasted using T-tests comparing the means between students being evaluated for any of these diagnoses at the target schools versus the currently functioning Developmental Pediatrics ADHD clinic at TAMC.

To assess whether the evaluation process made a difference in the student’s functioning in the classroom, parents and teachers were asked to complete two commonly used surveillance questionnaires for treatment efficacy: the ADHD Comprehensive Teacher Rating Scale (ACTeRS) and the ADHD IV Rating scale (a 4-point scale of severity composed of the 9 inattentive and 9 hyperactive/impulsive criteria listed in the Diagnostic and Statistical Manual of Mental Disorders - DSM-IV (Appendices 2 and 3). Each child served as his/her own control (pre- vs. post-evaluation classroom behaviors).

Component 2: Website Development for a CSPD. Visitors to the site were queried as to whether they were a parent, teacher, or provider of services, to then asked to complete a simple four question pop-up survey as they exited the site. The four questions were:

- Did this website provide you with more credible/useful information than other sites you have visited?
- Was the information on this site up-to-date in comparison to other sites you have visited?
- Was this website easier to use than other sites?
- Would you recommend this site to others?

Component 3: Provision of medically-based occupational and/or physical therapy. Objectives and outcomes were established prior to the provision of services. Parent and teacher questionnaires were developed (Appendix 4) using a 5-point Likert scale, and were administered before and three months after the initiation of services. Each child served as his/her own control. Parents were given the entire questionnaire, while teachers were asked only the first eight questions. Results of pre- and post-intervention questionnaires were analyzed using the Student T test.

Results

Component 1: Evaluation of Medical Conditions with Educational Implications:

As of the end of April 2004, 599 students have been referred and 508 evaluations have been completed for students suspected of having medical conditions with educational implications. Of these, 172 were referred for an evaluation of an ADHD and met the criteria for participation in the research. Of these 84 completed satisfaction questionnaires. Table 1 compares the parent satisfaction survey results between students evaluated through ASSIST and students evaluated through the Tripler ADHD Clinic. The survey results were overwhelmingly positive. On 10 of the 20 questions, the increase in parent satisfaction was highly significant (p<0.01). The most significant findings included satisfaction with timeliness, referral process, forms, location of the evaluation, and the evaluation itself. The parents also felt they were better able to enjoy and advocate for their child. There was only one question in which ASSIST parents reported lesser satisfaction than the parents who had gone through the standard ADHD clinic evaluation; that being the understanding and use of medication for an ADHD.
We also compared the teacher’s perception of the child’s behavior in the classroom before and 3 months after the evaluation, using the ACTeRS and ADHD-IV questionnaires. These results are summarized in Tables 2 and 3. Note that the ACTeRS is designed in such a way that post-treatment minus pre-treatment improvement in a child’s behavior is reflected by positive scores in Attention and Social Skills, but negative scores in Hyperactivity and Oppositional Behavior. Also, treatment of a child who is diagnosed as having ADHD is individualized, and determined by the child’s physician and the family, so these results do not reflect whether or how the child was treated for the condition.

Component 2: Website Development for a CSPD. As of the first of June 2004, there have been 566 pop-up surveys completed. The four questions asked and the percentages of respondents answering “yes” to the questions are included in Table 4. Overall, greater than 84% of the respondents answered “yes” to each of the four questions.

Component 3: Provision of Medically-Based Occupational and/or Physical Therapy. The results of the pre- and post-intervention questionnaires completed by teachers and parents are summarized in Tables 5 and 6. For the parent questionnaires, every question showed a significant positive change (p<0.05), and for 5 of the 8 questions the change was highly significant (p<0.01). For the teacher questionnaires, all of the changes were positive, but only three were statistically significant.

Discussion
It is important to realize that significant stressors for military personnel have been present since September 11, 2001, with a significant number of military personnel deployed in the Global War on Terrorism to Iraq and Afghanistan. Because of this, it was anticipated there would be an overall decrement in satisfaction questionnaires, particularly those dealing with quality of life issues. Surprisingly, this was not the case.

Component 1: Medical Conditions with Educational Implications. The parent and teacher satisfaction questionnaires indicate a significant improvement in the satisfaction of the evaluation process at Target Schools compared to a long-standing ADHD clinic at Tripler AMC, despite a similar evaluation process in place at both locations. The major improvements were in timeliness, accessibility, availability of school-based evaluations, and ease in accessing the evaluation process.

Since one goal of the project was to make the diagnosis of ADHD more efficient and streamlined for families by doing the evaluations in the school and on line, we would have anticipated that the ASSIST parents would report increased satisfaction on questions dealing with timeliness and location of the evaluation. This was in fact the case. In addition, an unexpected benefit was that the parents also showed significantly improved satisfaction (compared with those going through the standard ADHD clinic) on questions concerning the benefit of the recommendations, their ability to advocate for their child, and their enjoyment of the child after the completion of the process. This could be due to a “halo effect” from the increased parental satisfaction with the process, or it could represent a benefit of the improved efficiency of the evaluation. Since the treatment of ADHD was left to the family and physician of each individual child, the questionnaire results did not reflect whether or not the child had received medical treatment for ADHD. The only area in which improvement was not noted was in a thorough understanding of medication. The TAMC ADHD program has a very detail-oriented, educational system in place to ensure understanding of the types of medication, effects, side effects, timing and duration of action of medications used for ADHD, which was not necessarily present when children were referred to their primary care physician/care manager for medical intervention.

The classroom behaviors as rated on the ACTeRS and ADHD-IV Rating Scale indicate that there was improvement in all behaviors rated on the ACTeRS. The improvement in attention on the ACTeRS scale was significant at a p value of <0.05. This is especially encouraging because impairment of attention is the most important obstacle to learning in the classroom. Social skills and oppositional behaviors also improved, though not at a statistically significant level. Improvement in these traits may take longer than in attention or hyperactivity. It might be interesting to repeat the ACTeRS questionnaires at six months to one year following the evaluation; however, the mobility and transience of military families make this impractical in this population.

The least amount of improvement on the ACTeRS was in the area of hyperactivity. This is somewhat surprising, since reduction of hyperactivity is often one of the most rapid and reliable effects when children with ADHD are treated with stimulant medication. One possible explanation is that some of the children may not have started medication at the time of the follow-up study, either because they had not yet had an appointment with their physician, or because their families had decided not to initiate medical treatment. A lack of medical intervention would not explain the improvement in attention, however, that measure could have been due to other factors, for example classroom placement, and a better understanding by the teacher of the student’s medical condition.

The ADHD-IV rating scale revealed an improvement in all aspects, both attention and impulsivity/hyperactivity. None of the improvements achieved a p value of <0.05. Like the ACTeRS, there was less significant change in the hyperactive/impulsive criteria, although improvement was documented in all criteria.

Component 2: Website Development for a CSPD. With so much information available on the Internet, and so few ways to determine its bias, accuracy, or scientific validity, we felt it would be helpful to provide a website that filters and professionally monitors other websites that deal with children’s disabilities and educationally-related disorders. Teachers, parents, and therapists all reported that they found our site beneficial. Each of the three groups made positive comments regarding the utility and benefit of the site. Occupational and physical therapists had a somewhat lower rate of positive responses concerning their personal use of the site, perhaps because they have already determined their own list of discipline-specific “favorite” sites. Still, 85% of therapists said they would recommend the site to others. The question identifying the respondent as a parent, teacher or provider was not asked when the site was first developed, so it was impossible to correctly identify those 210 early respondents, they were placed in the category “other”. Although it is still possible to respond as “other”, there have been only 19 who have chosen that category, suggesting the majority of visitors to the site are parents and teachers, the population identified as benefiting from such a website filter/monitor.
Component 3: Provision of medically-based occupational and/or physical therapy. The responses of parents and teachers to the questions regarding their satisfaction with the services provided by ASSIST were uniformly positive. The pre vs. post intervention parent questions relating to services were all (100%) statistically significant at a p-value = <0.05. Teachers responded positively to three out of eight of the questions at a statistically significant level. Both of the questions dealing with delivery of services to students (amount of service and availability of therapist) were statistically significant. The questions dealing with the teachers’ knowledge of how to access services for their students were not statistically significant, suggesting that teachers know how to access services, but are unable to obtain the degree of service they felt their student needed.

Acknowledgements
To Mark L. Cohen MD for his assistance in manuscript preparation and to the professional and administrative staff involved with the project for their dedication and desire to assist in the improvement of the lives and education of military students in the State of Hawaii.

References
3. Ullmann, RK, et al. ACToRS, MenTech, Inc. 121086, 4106 Fieldstone Road, Champaign, Illinois 61821.

Appendix 1.— Parent Questionnaire of Satisfaction with the Evaluation
A collaborative effort of the Department of Defense, Department of Education, Department of Health, Pacific Telehealth & Technology Hui, and the University of Hawaii.

Project ASSIST / Pacific Telehealth & Technology Hui wants your honest opinions on the ease or difficulties you have experienced in getting your child/student evaluated. There are no right or wrong answers.

Parent(s) to Complete
For each question, check the box that best describes the situation.

Q1) How long did it take from the initial referral to starting an evaluation for a medical condition with educational implications?
   1. Less than one week
   2. One to two weeks
   3. Two weeks to one month
   4. One to two months
   5. Greater than 2 months

Q2) How long did it take from the initial referral to completing the evaluation for such a medical condition?
   1. Less than one month
   2. One to two months
   3. Two to three months
   4. Three to four months
   5. Greater than 4 months

Q3) Overall, how satisfied are you with the timeliness of your child's evaluation?
   1. I am very dissatisfied with the timeliness.
   2. I am dissatisfied with the timeliness.
   3. I am neither satisfied nor dissatisfied.
   4. I am satisfied with the timeliness.
   5. I am very satisfied with the timeliness.

Q4) How satisfied are you with the referral process?
   1. I am very dissatisfied.
   2. I am dissatisfied.
   3. I am neither satisfied nor dissatisfied.
   4. I am satisfied.
   5. I am very satisfied.

Q5) How satisfied are you with the forms you were asked to complete for the evaluation?
   1. I am very dissatisfied.
   2. I am dissatisfied.
   3. I am neither satisfied nor dissatisfied.
   4. I am satisfied.
   5. I am very satisfied.

Q6) How satisfied are you with the location of the evaluation?
   1. I am very dissatisfied with the location (distance too great or location not convenient).
   2. I am dissatisfied with the location.
   3. I am neither satisfied nor dissatisfied.
   4. I am satisfied.
   5. I am very satisfied.

Q7) How satisfied are you with the evaluation done for your child's condition?
   1. I am very dissatisfied with the length, ease, and type of questions asked.
   2. I am dissatisfied with the questions.
   3. I am neither satisfied nor dissatisfied.
   4. I am satisfied.
   5. I am very satisfied.

Q8) How beneficial were the recommendations for your home?
   1. The recommendations are irrelevant, impractical and not able to be implemented.
   2. The recommendations are somewhat helpful, and some should be incorporated.
   3. The recommendations are both practical and are able to be implemented.

Q9) If your child is currently on medication for attention or hyperactivity, do you understand the medication(s)?
   1. I don't understand the medication(s).
   2. I partially understand the medication(s).
   3. I have an excellent understanding.

Q10) Did your child start receiving services as soon as he/she needed to?
    1. The diagnosis was made too late and he/she missed needed services.
    2. It took longer than I wanted, but my child / student didn't miss any important services.
    3. From start to services was very short.

(Questions 11-21)
For each question, check the box that best describes how you feel. Use boxes 2 or 4 if your answer falls between 1, 3 or 5. There are no correct answers and everyone experiences the care giving challenges differently.

Q11) Are you able to be an advocate?
    1. I haven't figured out how to be an effective advocate for my own child or for other children.
    2. I can advocate for my child, but I haven't yet found ways to make a difference for others.
    3. I have found ways to make life better for my child and others.

Q12) Do you need help coordinating your child's care?
    1. I have to do all the care coordination myself and the hassle and complexity is overwhelming.
    2. 3. Most of the time I can handle the coordination and paperwork, but I would like...
some help.

4. I don't need any help with care coordination.

Q13) How much of a problem is worry for you?
1. I constantly worry about my child. There is never a time I do not think about it.
2. I worry a fair amount but not all the time.
3. I don't worry.

Q14) Is grief and sadness a problem for you?
1. I feel constant grief and sadness over my child's condition.
2. I usually feel grief and sadness.
3. I usually do not feel grief and sadness.

Q15) Do you have any physical symptoms of stress?
1. Because of my child, I have many physical symptoms of stress: headaches, bowel problems, insomnia, and/or fatigue.
2. I have a few mild physical symptoms of stress.
3. I have no effects on my own physical health.

Q16) Do you have any time to do something just for yourself?
1. I devote all my time to my child due to his needs with no spare time for myself.
2. I can get some housework and shopping done, and some time to do little things I like.
3. I spend some time taking care of my child, but I have time to do things just for myself.

Q17) Are you able to be hopeful?
1. I find no purpose or hope in this unfortunate situation for my child.
2. Sometimes I can make sense out of what has happened and see some hope.
3. I have been able to find inner peace about my child's condition.

Q18) Are you able to enjoy your child?
1. I can't find anything that my child and I enjoy doing together and I don't know where to start.
2. I sometimes find enjoyable things to do with my child.
3. I am usually able to find or create fun experiences for me and my child.

Q19) Do you get a break from care giving (respite care)?
1. We never get away from the constant demands of care giving.
2. We sometimes get away, but not enough.
3. We have frequent enough breaks from care giving.

Q20) Overall, how satisfied are you with your quality of life?
1. Most of the time, I am very dissatisfied with the quality of my life.
2. Sometimes I'm satisfied with the quality of my life and sometimes I am dissatisfied with the quality of my life.
3. Most of the time, I am very satisfied with the quality of my life.

FINAL COMMENTS
If you could make one change to the special needs services here in Hawaii, what would you change? Please be specific.

### Appendix 2 — ADHD Comprehensive Teacher Rating Scale (ACTeRS)

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<tr>
<th>ATTENTION</th>
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<td>1) Works well independently</td>
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<td>2) Persists with task for reasonable amount of time</td>
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<td>3) Completes assigned task satisfactorily with little additional assistance</td>
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<td>4) Follows simple directions accurately</td>
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<td>5) Follows a sequence of instructions</td>
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<td>6) Functions well in the classroom</td>
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<th>HYPERACTIVITY</th>
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<td>7) Extremely overactive (out of seat, 'on the go')</td>
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<td>8) Overreacts</td>
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<td>9) Fidgety (hands always busy)</td>
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<td>10) Impulsive (acts or talks without thinking)</td>
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<td>11) Restless (squirms in seat)</td>
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<th>SOCIAL SKILLS</th>
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<td>12) Behaves positively with peers / classmates</td>
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<td>13) Verbal communication clear and connected</td>
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<td>14) Nonverbal communication accurate</td>
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<td>15) Follows group norms and social rules</td>
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<td>16) Cites general rule when criticizing ('We aren't supposed to do that')</td>
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<td>17) Skillful at making new friends</td>
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<td>18) Approaches situations confidently</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPOSITIONAL</th>
<th>Almost Never</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Almost Always</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>19) Tries to get others into trouble</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20) Starts fights over nothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21) Makes malicious fun of people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22) Defies authority</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23) Picks on others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24) Mean and cruel to other children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3.— ADHD IV Rating Scale

<table>
<thead>
<tr>
<th>Attention</th>
<th>Not at All</th>
<th>Just a Little</th>
<th>Pretty Much</th>
<th>Very Much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Often fails to give close attention to details or makes careless mistakes in schoolwork, or other activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Often has difficulty sustaining attention in tasks or play activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Often does not seem to listen when spoken to directly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Often does not follow through on instructions and fails to finish schoolwork or chores</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Often has difficulty organizing tasks and activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, or books)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Is often easily distracted by extraneous stimuli</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Is often forgetful in daily activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hyperactivity/Impulsivity</th>
<th>Not at All</th>
<th>Just a Little</th>
<th>Pretty Much</th>
<th>Very Much</th>
</tr>
</thead>
<tbody>
<tr>
<td>10) Often fidgets with hands or feet or squirms in seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11) Often leaves seat in classroom or other situations in which remaining seated is expected</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12) Often runs about or climbs excessively in situations in which it is inappropriate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13) Often has difficulty playing or engaging in leisure activities quietly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14) Is often ‘on the go’ or often acts as if ‘driven by a motor’</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15) Often talks excessively</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16) Often blurts out answers before questions have been completed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17) Often has difficulty awaiting turn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18) Often interrupts or intrudes on others (e.g., butts into conversations or games)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix 4.— Parent Satisfaction with Provision of Occupational / Physical Therapy at the School

A collaborative effort of the Department of Defense, Department of Education, Department of Health, Pacific Telehealth & Technology Hui, and the University of Hawai‘i.

Project ASSIST / Pacific Telehealth & Technology Hui invites you to participate in this important survey. There are no right or wrong answers. The survey must be completed by the primary care giving parent. A repeat survey will be required one to three months from now.

Parent To Complete

For each question, check the box that best describes how you feel. Use boxes 2 or 4 if your answer falls between 1, 3 or 5. There are no correct answers, and everyone experiences the care giving challenges differently.

C1) Does your child have all the therapy he/she needs?
   - 1 I can not get the appropriate amount of therapy for my child.
   - 2
   - 3 My child receives some therapy that he needs, but definitely needs more.
   - 4
   - 5 My child receives all the therapies necessary to enhance his/her medical care and education.

C2) Do you understand how to get the services your child needs?
   - 1 I don’t know how to get services for my child and I usually give up or get upset.
   - 2
   - 3 I know how to get services but it involves lying, getting hysterical, or nasty.
   - 4
   - 5 I know how to get services and I usually do it in a positive way.

C3) Do you need help coordinating your child’s care?
   - 1 All the care coordination is mine, the hassle/complexity is overwhelming.
   - 2
   - 3 in general I can handle the coordination, but I would like some help.
   - 4
   - 5 I don’t need care coordination help.

C4) Can you reach the provider of your child’s occupational and/or physical therapy when you need to?
   - 1 I can never get the provider on the phone in a reasonable period of time.
   - 2
   - 3 Sometimes I can reach him in reasonable time.
   - 4
   - 5 I can always talk to him in a reasonable time.

C5) Does your child’s therapist listen to you?
   - 1 The therapists don’t care about my feelings.
   - 2
   - 3 Sometimes they listen but they are too busy.
   - 4
   - 5 They always listen and believe me.

C6) Does your child’s therapist respond to the developmental and emotional needs of your child?
   - 1 My child’s therapist is insensitive to his developmental/emotional needs.
   - 2
   - 3 His therapist sometimes responds.
   - 4
   - 5 His therapist always responds.

C7) Is your child’s therapist sensitive to ethnic and cultural diversity?
   - 1 I don’t think my child’s therapist ever heard of cultural diversity or sensitivity training.
   - 2
   - 3 My child’s therapist tries to understand different cultural practices.
   - 4
   - 5 My child’s therapist understands my culture and beliefs and works with me.

C8) Do you trust your child’s therapist?
   - 1 I don’t trust them.
   - 2
   - 3 I have a fair amount of confidence.
Table 1.— Parental Satisfaction with the Evaluation Process at Target Schools Compared to the TAMC ADHD Clinic (control) Using 5-point Likert Scale

<table>
<thead>
<tr>
<th>Question</th>
<th>Target (n=84) Mean</th>
<th>Control (n=67) Mean</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time - referral to starting evaluation</td>
<td>2.47</td>
<td>4.75</td>
<td>2.27</td>
</tr>
<tr>
<td>Time - referral to completion of evaluation</td>
<td>2.21</td>
<td>4.49</td>
<td>2.28</td>
</tr>
<tr>
<td>Satisfaction with timeliness</td>
<td>4.30</td>
<td>2.40</td>
<td>-1.90</td>
</tr>
<tr>
<td>Satisfaction with referral process</td>
<td>4.50</td>
<td>3.12</td>
<td>-1.38</td>
</tr>
<tr>
<td>Satisfaction with forms</td>
<td>4.29</td>
<td>3.78</td>
<td>-0.51</td>
</tr>
<tr>
<td>Satisfaction with location of evaluation</td>
<td>4.69</td>
<td>3.84</td>
<td>-0.85</td>
</tr>
<tr>
<td>Satisfaction with evaluation</td>
<td>4.69</td>
<td>4.04</td>
<td>-0.65</td>
</tr>
<tr>
<td>Benefit of recommendations</td>
<td>4.58</td>
<td>3.84</td>
<td>-0.74</td>
</tr>
<tr>
<td>Medication understanding</td>
<td>1.29</td>
<td>1.48</td>
<td>0.19</td>
</tr>
<tr>
<td>Timeliness of services</td>
<td>2.95</td>
<td>2.40</td>
<td>-0.59</td>
</tr>
<tr>
<td>Ability to advocate</td>
<td>3.82</td>
<td>3.15</td>
<td>-0.67</td>
</tr>
<tr>
<td>Worry</td>
<td>3.44</td>
<td>3.01</td>
<td>-0.43</td>
</tr>
<tr>
<td>Hopeful</td>
<td>4.39</td>
<td>4.12</td>
<td>-0.27</td>
</tr>
<tr>
<td>Enjoy child</td>
<td>4.80</td>
<td>4.31</td>
<td>-0.49</td>
</tr>
</tbody>
</table>

Q15) Are you getting the sleep you need?
   1. Because of my child, I never get enough sleep and am perpetually fatigued.
   2. Sleep is only an occasional problem
   3. Sleep is never a problem.

Q16) How do you spend your time?
   1. The needs of my child are so great I don’t get anything else done.
   2. Most of the time, I can get some housework and shopping done.
   3. I spend time taking care of my child but I also get many other things done.

Q17) Do you have any time to do something just for yourself?
   1. I devote all my time to my child and have no spare time for myself.
   3. I have some time for myself to do little things I like.
   5. I have plenty of time to do things just for myself.

Q18) Are you able to be hopeful?
   1. I find no purpose or hope in this unfortunate situation for my child.
   2. Sometimes I can make sense out of what has happened and see some hope.
   4. I have been able to find inner peace about my child's condition.
   5. I can’t find anything that my child and I enjoy doing together and I don’t know where to start.

Q19) Are you able to enjoy your child?
   1. I can’t find anything that my child and I enjoy doing together and I don’t know where to start.
   2. I can sometimes find enjoyable things to do with my child.
   5. I am usually able to find or create fun experiences for me and my child.

Q20) Overall, how satisfied are you with your quality of life?
   1. Most of the time, I am very dissatisfied with the quality of my life.
   2. Sometimes I’m satisfied with the quality of my life and sometimes I am dissatisfied with the quality of my life.
   4. Most of the time, I am very satisfied with the quality of my life.

FINAL COMMENTS
If you could make one change to the special needs services here in Hawaii, what would you change?
### Table 2: ADHD Comprehensive Teacher Rating Scale (ACTeRS) \( n=61 \)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pre-Evaluation Score</th>
<th>Post-Evaluation Score</th>
<th>(-)</th>
<th>( p)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>15.98</td>
<td>18.02</td>
<td>2.74</td>
<td>0.01</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>12.69</td>
<td>12.43</td>
<td>-0.26</td>
<td>0.83</td>
</tr>
<tr>
<td>Social Skills</td>
<td>22.98</td>
<td>24.90</td>
<td>1.92</td>
<td>0.08</td>
</tr>
<tr>
<td>Oppositional</td>
<td>10.51</td>
<td>9.67</td>
<td>-0.64</td>
<td>0.54</td>
</tr>
</tbody>
</table>

### Table 3: ADHD-IV Rating Scale \( n=64 \)

<table>
<thead>
<tr>
<th>Scale (total)</th>
<th>Pre-Evaluation Score</th>
<th>Post-Evaluation Score</th>
<th>(-)</th>
<th>( p)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>5.55</td>
<td>4.53</td>
<td>-1.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>2.89</td>
<td>2.39</td>
<td>-0.50</td>
<td>0.34</td>
</tr>
<tr>
<td>Social Skills</td>
<td>2.64</td>
<td>2.33</td>
<td>-0.31</td>
<td>0.07</td>
</tr>
</tbody>
</table>

### Table 4: Website Satisfaction

<table>
<thead>
<tr>
<th>Question</th>
<th>Respondents answering &quot;YES&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did this website provide you with more credible/useful information than other sites you visited?</td>
<td>Parent (n=192)</td>
</tr>
<tr>
<td></td>
<td>86.5%</td>
</tr>
<tr>
<td>2. Was the information on this site up-to-date in comparison to other sites you visited?</td>
<td>94.8%</td>
</tr>
<tr>
<td>3. Was this website easier to use than other sites?</td>
<td>85.9%</td>
</tr>
<tr>
<td>4. Would you recommend this site to others?</td>
<td>94.3%</td>
</tr>
</tbody>
</table>
Table 5. — Parent Questionnaire (5-point Likert Scale) n=34

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does your child have all the therapy he/she needs?</td>
<td>-1.07</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>2. Do you understand how to get the services your child needs?</td>
<td>-0.47</td>
<td>0.02</td>
</tr>
<tr>
<td>3. Do you need help coordinating your child’s care?</td>
<td>-0.43</td>
<td>0.03</td>
</tr>
<tr>
<td>4. Can you reach the provider of your child’s occupational and/or physical therapy when you need to?</td>
<td>-0.83</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>5. Do your child’s providers of OT and/or PT listen to you?</td>
<td>-0.53</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>6. Does your child’s therapist respond to the developmental and emotional needs of your child?</td>
<td>-0.80</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>7. Is your child’s therapist sensitive to ethnic and cultural diversity?</td>
<td>-0.37</td>
<td>0.02</td>
</tr>
<tr>
<td>8. Do you trust your child’s therapist?</td>
<td>-0.77</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

Table 6. — Teacher Questionnaire (5-point Likert Scale) n=35

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does your student have all the therapy he/she needs?</td>
<td>-1.03</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>2. Do you understand how to get the services your student needs?</td>
<td>-0.10</td>
<td>0.45</td>
</tr>
<tr>
<td>3. Do you need help coordinating your student’s care?</td>
<td>-0.27</td>
<td>0.10</td>
</tr>
<tr>
<td>4. Can you reach the provider of your student’s occupational and/or physical therapy when you need to?</td>
<td>-0.40</td>
<td>0.03</td>
</tr>
<tr>
<td>5. Do your student’s providers of occupational and/or physical therapy listen to you?</td>
<td>-0.10</td>
<td>0.45</td>
</tr>
<tr>
<td>6. Does your student’s therapist respond to the developmental and emotional needs of your student?</td>
<td>-0.63</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>7. Is your student’s therapist sensitive to ethnic and cultural diversity?</td>
<td>-0.27</td>
<td>0.13</td>
</tr>
<tr>
<td>8. Do you trust your student’s therapist?</td>
<td>-0.17</td>
<td>0.23</td>
</tr>
</tbody>
</table>

FIVE WAYS TO DIE ON THE GOLF COURSE:

1. Hit by a golf ball.
2. Run over by a golf cart.
3. Whacked by a golf club.
4. Struck by lightning.
5. Forgot your hat.

Surprisingly, one million new cases of skin cancer are detected every year. One person an hour in the U.S. dies from melanoma, the deadliest form of skin cancer. If you spend a lot of time in the sun, you should protect yourself. One out of five Americans develops skin cancer during their lifetime. Don't be one of them. Stay out of the midday sun. Cover up. Wear a hat. Seek shade. And use sunscreen. For more information on how to protect yourself from skin cancer, call 1-888-462-DERM or visit www.aad.org.
A Novel Approach to Tele-Echocardiography Across the Pacific

Jamalah A. Munir MD, Eugene K. Soh MD, Thomas N. Hoffmann MD, and Jeffry P. Stewart MD

Abstract

Telecardiology provides remote delayed interpretation of echocardiographic images through a store and forward program between the interpreting center, Tripler Army Medical Center, Honolulu Hawaii, and the image acquisition center, Guam Naval Hospital, Guam USA. This routine store and forward system has inherent delay, limiting application for management of acute medical conditions. In this case report we describe a novel methodology for real-time echocardiographic interpretation methodology integrated methodology with the eICU® system (VISICU Inc., Baltimore MD). This case report demonstrates the feasibility of a clinically relevant remote real-time echocardiographic interpretation strategy, utilizing commonly available equipment.

The growth of technology and its increasing ability for high volume data transmission is leading to an expansion of medical services via telemedicine. Many centers in remote locations have access to experts through video conferencing. Telecardiology in its simplest form involves telephonic consultation with an on-site physician relaying pertinent history, physical examination, and laboratory data, along with facsimile transmission of an electrocardiogram. In recent years the technology has advanced to include transmission of digital echocardiograms to assist in diagnostic evaluation. Tripler Army Medical Center (TAMC), a 250-bed tertiary care medical center located in Honolulu, Hawaii, has established a telehealth consultation service with the U.S. Navy Hospital (USNH) in Guam. This USNH is a forward deployed 30-bed hospital with six intensive care unit beds. Daily consultation rounds are held by physicians from the two facilities over a distance of over 3,300 miles using the eICU® solution (VISICU, Inc, Baltimore, MD). Typically these consultation rounds are held between general internal medicine or family medicine specialists at USNH Guam and critical care specialists at TAMC.

The eICU® system transmits and receives high volumes of video, audio, and primary physiologic monitoring data over Terrestrial-1 (T1) lines at a rates of up to 1.544 kbits/second (Figure 1). This allows for high-resolution videoconferencing with video patient assessment. Additionally, real-time physiologic data, digital radiographic images, and electronic patient records are accessed via this system. The system is FDA 510(k) approved for marketing and is Health Insurance Portability and Accountability Act (HIPAA) compliant. The connection between these two facilities in Guam and Hawaii spans over 3800 miles, the greatest distance that has been reported using this technology.

Since 2001 TAMC has utilized a “store and forward” telecardiology system with the USNH Guam. Echocardiograms performed on a routine basis in Guam are batched and transmitted to TAMC. Echocardiogram MPEG video images are forwarded over T1 lines, with transfer rates up to 1.54 Mbits/sec, and the NIPRNet (the “uClassified but sensitive Internet Protocol Router Network” of Internet protocol routers used by the Department of Defense) for interpretation by TAMC cardiologists (Figure 2). Due to large file size (each echocardiogram is approximately 90-120 MBytes), file transfers only occur during off-duty hours, when there is reduced network traffic, to increase the efficiency of the synchronous transmission and decrease the loss of potentially vital information. Optimum transfer times occur from 00:00 to 06:00 Hawaii Standard Time and take between 10.8-14.4 minutes for complete file transfer. Given these constraints, there is an approximately 24-hour lag time for interpretation.

We report a unique application of the eICU® system, our initial attempt at a novel mode of tele-echocardiography. This telehealth consultative service link was employed in the care of a 55-year-old man with a history of prior myocardial infarction, prior percutaneous coronary intervention with unknown results, depressed left ventricular (LV) ejection fraction 25-30% in Feb 2004, hypertension, and cerebrovascular accident, who presented with chest pain. His symptoms were intermittent for 2 days, consisting of chest discomfort with a burning or tightness quality with radiation to the throat and left chest and arm, associated dyspnea, nausea, and diaphoresis. These symptoms were relieved with sublingual nitroglycerin.
Upon evaluation in the emergency department, he was hypertensive to the 180s-190s/100s-110s, ECG without ischemic changes, showing normal sinus rhythm with 1st degree AV Block, and left ventricular hypertrophy. There was mild troponin I elevation to 0.68 ng/ml. During his hospital admission he had recurrent chest pain and was treated with intravenous nitroglycerin and morphine. Blood pressure and heart rate were controlled. The clinical presentation was consistent with demand related ischemia and due to his prior diagnosis of depressed LV function and potential wall motion abnormalities to diagnose active myocardial ischemia.

At the USNH Guam in an eICU® monitored critical care bed, an echocardiogram was performed by an experienced technician, with the video camera (resolution 768 x 492 pixels) focused on the echocardiogram screen. There was real-time interpretation by a cardiologist in the TAMD e-ICU®, demonstrating preserved left ventricular systolic function with an ejection fraction of 50%, mild left ventricular hypertrophy, and an inferior and inferoseptal wall motion abnormality. Prior to the real-time bedside echo, physicians were hesitant to use negative inotropic agents due to the prior diagnosis of depressed LV function with EF of 25-30%. The echocardiographic interpretation facilitated tailored medical management of hypertension. His symptoms improved with better blood pressure control and he was later risk stratified with a myocardial perfusion study, which showed a moderate-sized fixed transmural inferior wall defect compatible with prior infarction and consistent with the wall motion abnormality identified by our real-time echo. The same echocardiogram was then stored in the usual fashion and forwarded to TAMD for official interpretation. The final report of the echo was consistent with that of the initial live interpretation.

The e-ICU® has not been used for “real-time” echocardiogram interpretation previously. Although there was “real-time” interpretation of this echocardiogram, the equipment used has not been validated for use with tele-echocardiography. We acknowledge there are potential limitations with our current system. The capture rate of the camera, 32 frames/second (fps), is less than our current frames rates used to store and forward. Second, the gain required to make the image interpretable for live interpretation was significantly higher than our usual settings. In this case there was no appreciable difference in the interpretation of the live vs. store and forward echocardiogram; however, a subtle wall motion abnormality may have
been missed at this frame rate. While stationary structures such as pericardial effusions could be identified with our current real-time settings; the evaluation of mobile structures such as vegetations or contrast studies using agitated saline would require high resolution images with at least 60 fps for the most accurate evaluation.

Digital streaming video at the highest resolution and frame rate is not feasible at this time. Our current store and forward system uses MPEG-2 (Motion Pictures Expert Group) compression technology for a ratio of up to 50:1. Higher compression rates would decrease the file size and allow faster transfers, but may lead to further degradation in image quality that we have not explored. While the data lost may not be critical, this nonetheless remains an identified limitation. Another possibility is a directed echocardiogram, with short segments batched and then forwarded for interpretation. With these limitations stated we still remain optimistic about offering real-time echo for critically ill patients and hope to expand our services.

The potential applications for telecardiology are expansive. Adults and children with suspected or known heart disease are frequently cared for in remote intensive care units, emergency rooms and newborn nurseries, without immediate availability of cardiologists or other specialty trained providers. Essential information can be obtained via echocardiography including determination of congenital heart disease in neonates, pericardial effusions, severe valvular disease, wall motion abnormalities, and overall cardiac function<sup>1</sup>. In 1996, Trippi et al<sup>1</sup> investigated the clinical utility of interpreting after-hours urgent adult echocardiograms by an experienced techni-
and reliability are concerned. These telemedicine services are provided using internet lines, ISDN lines, dedicated cables, and even with satellite phones. Obstacles remain, however, with different formats, different standards, and many questions about legal and regulatory issues. As our initial attempt at real-time tele-echocardiography we acknowledge the potential technical and regulatory limitations of our approach, and are optimistic about improving the system and continuing to offer these services to patients across the Pacific Ocean.

References

Maui Molecular Medicine presents:

Treating Patients Using the New "Genetics in Medicine"

Four Seasons Resort, Wailea, Maui
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Russell T. Stodd MD
Contributing Editor, Hawaii Medical Journal

The annual meeting of the Hawaii Medical Association was an incomparable endeavor in many areas. The meeting included an excellent three day scientific session, participation and subscription by numerous exhibitors (for which we are very grateful), and a marvelous banquet and inauguration of the incoming HMA President, Inam Rahman, MD. If there was a down side it was that so many of our members failed to take advantage of this excellent CME and social program, and gain the knowledge and experience that was offered by the prime time faculty.

The Saturday evening banquet included the installation of incoming President Inam Rahman, MD, and recognition of Don Parsa, MD, as physician of the year. Representative Galen Fox was given an award as the outstanding legislator of the year for his stalwart work in advocating for the best in medical care for Hawaii. We were further honored by the participation of Governor Linda Lingle who gave a barn-burning speech on Hawaiian politics. Her basic message was that doctors are foolish for contributing money, providing testimony and lobbying politicians who do not respect physicians, do not listen to physicians, and invariably vote for vested interests. The lesson was simple: work to elect people who will listen to you, and stop spending your largesse for no return. The meeting was further honored by the presence of J. Edward Hill, MD, the president-elect of the American Medical Association.

The Scientific Session Committee chaired by S. Kalani Brady MD presented an outstanding CME program which provided two and half days of meaningful material.

The Friday morning session was opened by outgoing HMA President Sherrel Hammer MD, who introduced J. Edward Hill MD representing the American Medical Association. His remarks dealt largely with tort reform efforts at the federal level and also AMA plans for helping to provide medical care for the 40 plus million Americans who do not have health insurance. Following the Friday AM plenary program, the meeting broke out into two sessions, HIPAA and telemedicine. Cindy Goto MD, and Roger Kimura MD chaired the HIPAA conference on compliance and security. Andrew H. Melczer PhD, vice president for health policy research at the Illinois Medical Society, provided insight and direction for keeping out of trouble. Privacy was highlighted by an explanation of confidentiality, integrity, availability. In fact the more you know about security, the less secure you feel. As always, documentation is the sine qua non for protecting ones practice, and the HMA will supply a road map when questions arise. Each medical practice’s security program should be based on that practice’s risk. The bigger you are, the more you must do.

At the other venue, Myron Shirasu MD, chaired a presentation by Stanley Saiki MD outlining avenues and devices which are currently under research in a Department of Defense med-tech program with Tripler Hospital. Quite technical. Topping off the morning program was an excellent presentation by Richard Whitten MD, the director for Medicare part B for Alaska, Hawaii and Washington. He emphasized that Medicare is not a health plan, but is a collection of 600 laws. His message is that doctors are leaving money on the table with their inability to code properly, provide documentation, use appropriate modifiers, and failure to stay in contact with his office for beneficial changes. In any coverage determination question, spool up www.noridianmedicare.com/provider/on the keyboard and get the help you need off the internet.

While the above was ongoing, an all day Friday class sponsored by the American Society of Addiction Medicine was offered to instruct physicians in the office-based treatment of opioid dependence using buprenorphine. Donald R. Wesson MD, presented the prerequisites for a physician to prescribe the drug, and how to sort out appropriate patients. Various factors must be considered, and maintenance protocols are necessary to manage office-based treatment.

The afternoon meeting on September 3rd included a tort reform panel discussion, moderated by Mark Bennett, Hawaii Attorney General. On the panel were John McDonnell, MD, J. Edward Hill, MD, Arthur F. Rocco, Esq., and L. Richard Fried, Jr. Esq. Not much light emerged. Plaintiff’s attorney Fried presented the tired statistics blaming the insurance companies for the liability crisis, while physicians described what is really happening, e.g. for-profit carriers have left the field, and awards have sky rocketed. Without question trial attorneys are dreadfully afraid of a MICRA law in Hawaii, and especially in the nation.

At the same time, Gerald McKenna, HMA past president, described the legal action against medical insurers by the Physicians’ Foundation for Clinical Excellence. The HMA is part of this class action law suit which appears to be heading for a favorable resolution.

The Saturday program was dedicated to addictive disease. Ray Baker MD, clinical professor of addiction medicine at University...
of British Columbia, gave an engrossing presentation about the disease of addiction, and especially its relevance for primary care physicians. His teaching technique drew the audience in, captured attention of all, and was both witty and instructive. He was followed by Kevin Kunz MD, MPH and Gerald McKenna MD, who gave additional material in warning signs of addiction which can lead to a diagnosis. Intervention approach and therapy including the 12 step program were discussed. Donald R. Wesson MD, psychiatrist with the California Society on addiction medicine presented additional treatment mechanisms for addictive disease with various disease models.

The Sunday AM plenary session moderated by Danny Takanishi, Jr. MD, began with an alarming, but not surprising, discussion about the obesity epidemic in America. At the present time, 61% of Americans are obese or overweight according to Kenric Murayama MD, who presented excellent slides and numbers to document the problem. Using the BMI (body mass index) a weight to height index, he corroborated how Americans have fatted up over the last 30 years. Moreover, the problem extends to children as well, with sedentary habits, lack of PE in many school programs, computers, video games and lack of physical activity. Obviously, Americans need to exercise more and eat less, and physicians must be the leaders in bringing the message. Drastic therapeutic measures include bariatric surgery for morbid obesity. Of course, the various procedures require specific indications and parameters before undertaking these surgical measures.

Break out sessions followed the plenary meeting with respiratory illness moderated by Raul Rudoy, MD, MPH, and Geriatrics chaired by HMA president-elect Patricia Blanchette.

Iqbal Ahmed MD, Professor Psychiatry at the JABSOM discussed behavior problems, variations in dementia, and the prevalence of depression. The use and efficacy of anti-psychotics and the ABC of behavior therapy were presented. No FDA approved drug is approved for agitation therapy. Various anti-psychotic drugs were discussed with limitations and indications. Emese Somogy-Zalud MD, chief of palliative medicine in the department of geriatric medicine at JABSOM, provided a definition of palliative medicine as the active, total care of patients with serious, chronic and life limiting illness. He noted that dollars spent on the chronically and terminally ill, are an increasing target of public and professional criticism. Dr. Zalud discussed the goals of medical care, the goals of hospice care, and general prognosis guidelines for hospice care. Also presented were palliative care coordination projects with anticipated improvements and outcomes. The morning session concluded with Patricia Blanchette MD, professor department of geriatric medicine at JABSOM, discussing the overuse of antibiotics in nursing home residents, especially regarding the UTI. Bret Flynn, MD, MPH assistant professor of geriatric medicine at JABSOM, presented material of falls in the elderly, with consequences and avoidance.

The most amusing and still very educational contribution was Francis Pien MD, MPH retired chief of infectious disease at JABSOM, as he discussed bronchitis and use of antibiotics. He pointed out that the use of antibiotics is vastly overdone in the office management of upper respiratory illnesses. He was followed by the equally entertaining Wallace Mathews Jr. MD, clinical professor pediatrics at JABSOM, who discussed asthma. The disease may be mild intermittent, severe persistent or chronic. He emphasized that if the usual medications are not working, get help! Do not add increasing amounts of what is not working. He noted that asthma can be a chronic lung disease and it is on the rise, especially in Hawaii. Last on the program was Raul Rudoy MD, chairman department of pediatrics at JABSOM who presented vaccines and preventable disease. His figures demonstrated the efficacy of pneumococcal polysaccharide and influenza vaccines. Specific recommendations were offered for age and frequency of administration. A very rewarding session.

In summary, the 148th annual meeting of the Hawaii Medical Association was an excellent occasion to gain medical education hours, a marvelous opportunity to meet and socialize with friends old and new, a chance to meet and talk with Governor Lingle as well as the President-elect of the American Medical Association, and even to learn something new in medical care, and current pharmaceuticals. Many more of our members should have exercised that option.
Integrated Ecohealth in the School of Medicine

Bruce A. Wilcox PhD, Chair/Professor, Division of Ecology and Health
John A. Burns School of Medicine

Achieving the John A. Burns School of Medicine’s vision to become the U.S.’s best medical school that addresses the needs of Asia-Pacific region has involved a number of initiatives, in addition to the construction of a new campus in Kaka’ako. Among these has been the establishment of a new research and education unit that links environmental resources and health, particularly as mediated by the unique socio-cultural and natural environments of the Pacific Island ecosystems. First established as the Division of Ecology and Health, the program currently is being integrated with the newly reorganized Department of Tropical Medicine and Microbiology and the Asia-Pacific Institute for Tropical Medicine and Infectious Disease (APITMID). Since its founding in 2001, the ‘Ecohealth’ program has focused on community health by using a participatory action research (PAR) approach, conducting and promoting research and curriculum development based on integration of ecological and health sciences, and contributing core faculty for APITMID’s Pacific Center for Infectious Disease Ecology. In addition, the program has developed and leads an international consortium that fosters ecohealth research and curriculum development in medical and other professional schools. Finally, the consortium has initiated a new international peer reviewed journal, “EcoHealth”, (www.ecohealth.net) published by Springer LLC, New York.

An early achievement of the consortium and a predecessor organization, the International Society for Ecosystem Health, has been the establishment of a working group, Ecosystem Health in Professional Curricula. Participants represented institutions in Canada, Australia, as well as the U.S. whose goal was to engage in international, interdisciplinary dialogue, and share information and experiences in developing ecohealth curricula within medical, public health, and veterinary schools. The deliberations of the working group will soon appear in a special issue of “EcoHealth” (Vol. 1, Issue 3 (Dec. 2004) included an article titled “Integrating ecohealth into a medical school curriculum: a vision of the future at the University of Hawaii John A. Burns School of Medicine” by this author and Dr. Richard Kasuya. Plans and early achievements in integrating ecohealth in JABSOM’s medical curriculum are reported.

The imperative for incorporating ecohealth within the curricula for the health professions is derived from four major areas of concern. These include the effects of global change on human health in general; the interrelated dynamics involving changes in human population and movement, pathogens, parasites, and pollutants; the interaction of health with the environment and economic development; and, the need for a better understanding and management of these related ecosystem and human health challenges across local, regional and global scales.

‘Ecohealth’ encompasses the transdisciplinary concepts and problem-solving required to address the above issues that prompt researchers and educators in human and animal medicine, public health, and the ecological sciences to work collaboratively (Wilcox et al., 2004). As the article describes, the medical literature, analysis of JABSOM’s evolving curriculum, as well as work with colleagues participating in the Ecosystem Health in the Professional Curriculum project advocate strongly the need for incorporating ecohealth in medical training.

There is support among medical educators, health scientists and practitioners of the need for interdisciplinary training to address health and disease in a larger societal or environmental context. This interest is in tandem with an increased integration of health concepts and issues of societal well-being. Since the first explicit use of an ecological model in medicine, Koch’s Germ Theory that relates host and agent via the environment, there has been a continuous evolution of health models toward an ecological perspective that places humans in an ecosystem context (Van Leeuwen et al., 1999). Added has been the consideration of global and regional ecosystem degradation and its impacts on human well-being (McMichael, 2001). This expansion of the health model has increased research and elucidation that links ecosystem and human health.

Given the need and opportunity at JABSOM, and particularly the unique cultural and ecological circumstances of the region, there are four areas that are integral to an ecohealth curriculum.

- **Community Health** links family health, local culture, and ecological health that combines elements of environmental health and natural resources management. A participatory, action-oriented model is used to address root causes of health problems.

- **Ecosystems and Health** addresses the unique character of Hawaiian culture and communities that stem from traditional cultural values and perceptions related to, among other things, the traditional ahupua’a (system of land division and resource management).

- **Human Ecology, Traditional Knowledge and Health** encompasses contemporary health issues based on the rich heritage of traditional Hawaiian healing knowledge and practice, as well as indigenous health and natural resource management systems in general.

- **Global Environmental Change and Human Health** considers the effects of global environmental change on human health in the Asia-Pacific region, with a particular focus on Hawaii and other Pacific Islands.
Given JABSOM’s structure and educational philosophy, the strategy for enhancing the curriculum employing ecohealth will involve a longitudinal, integrative approach that spans the four-year curricular experience and includes a variety of required and elective educational opportunities. Introduction of structural changes into the curriculum will require approval by a curriculum committee. Some changes have been approved and are underway, such as a new Basic Science Foundation course, that includes an introductory ecohealth component.

In addition, the JABSOM curriculum, Problem Based Learning (PBL) and the case tutorial setting, provides an opportunity for introducing ecohealth concepts into selected cases as well. This strategy allows for integration into materials with related clinical, basic science, behavioral and population issues.

While independent study via PBL and large-group didactic sessions are key components of the curriculum at JABSOM, actual community-based experiences are critical for students to see the practicality and meaningfulness of ecohealth. The Ecohealth program thus mentors and supports first-year students interested in meeting their research and community medicine objectives.

In summary, as ecology and health are inseparably linked. A progressive and meaningful medical education requires integration in medical training of biological ecology as it relates to humans as an organism. This provides students the conceptual and factual foundation for understanding the relationship between the human health and the environment. This is most meaningfully understood using an ecosystem approach that examines the cross-scale interplay -- from individual organisms to the total biotic–abiotic environmental complex (biosphere) -- of environmental stressors and resources, and interspecies interactions. This perspective aligns with the positive concept of health (World Health Organization 1986) now generally accepted, though not always sufficiently stressed in medical curricula.

The interrelated set of ideas, models, concepts, theories, and principles at the interface of ecology and health will facilitate understanding not only of disease etiology but also define health. This understanding is essential for all health advocates.

References
Bruce A. Wilcox and Richard T. Kasuya. 2004 (in press). Integrating ecohealth into a medical school curriculum: a vision of the future at the University of Hawaii John A. Burns School of Medicine. EcoHealth Vol. 1, No. 3 (Supplement).

HAWAII MEDICAL JOURNAL, VOL. 63, OCTOBER 2004
One of the challenges of cancer therapy is to increase the selectivity of anticancer treatments. Conventional chemotherapies are usually non specific, leading to undesirable toxic effects on normal cells. Therefore, an area of active research in cancer pharmacology is the investigation of the molecular processes critical for tumor growth and metastasis that could be specifically targeted in cancer treatment. In recent years, there have been amazing developments in this area, with the discovery of novel anticancer treatments that target specific cell signaling pathways, such as Herceptin (Trastuzumab), a monoclonal antibody against the Her-2 tyrosine kinase, and Gleevec (Imatinib Mesylate), an inhibitor of the BCR-ABL tyrosine kinase. Continuous advances in cancer biology and cell signaling have revealed new molecular pathways that are important in the development and progression of cancer. The diacylglycerol signaling pathways is one of these.

Diacylglycerol signaling molecules: the PKC family

Diacylglycerol is a major lipid second messenger in the cell, produced by the action of phospholipase enzymes. One of the most prominent families of intracellular diacylglycerol targets is protein kinase C (PKC) (Figure 1), a group of serine/threonine kinases that transduces diacylglycerol into a wide variety of signals influencing cell proliferation, differentiation and survival.

The biology of PKC and its role in disease has been extensively studied using the phorbol esters as pharmacological probes. Phorbol esters are a group of natural products that behave as structural mimetics of diacylglycerol in the cell and as such, they bind and activate PKC. The discovery that a subset of phorbol esters are potent tumor promoters has provided the first link between PKC and cancer. Further studies have revealed other functions for PKC, and it is now clear that PKC not only participates in tumor promotion but also in tumor progression and metastasis.

The rationale of PKC as a molecular target in cancer therapy is further supported by the fact that PKC also plays a role in chemoresistance, either by affecting the susceptibility of cancer cells to drugs causing cell death by apoptosis, or by participating in the detoxification of chemotherapeutic drugs by modulating multi-drug transporters. Thus, modulation of PKC isoforms can serve as an adjuvant therapy to make cells more sensitive to the cytotoxic effects of standard chemotherapeutic treatments. In fact, most of the current clinical trials to evaluate PKC modulators are examining these drugs as potential adjuvant agents.

Chemotherapeutic drugs that target PKC

The prototype of the PKC activator with antitumor activity is bryostatin 1, a natural product that, like the phorbol esters, is a structural analog of diacylglycerol (Figure 1). Bryostatin 1 was first discovered as a result of its antileukemic properties in vitro. Despite the promising initial activity, bryostatin 1 has shown a very modest effect as a chemotherapeutic drug. Nevertheless, it appears to be useful as an adjuvant by enhancing the effect of various standard chemotherapeutic agents, such as cisplatin, vincristine, and paclitaxel.

In addition to bryostatin 1, three other drugs that target PKC have been, or are still being, evaluated in clinical trials for treatment of cancer (for more information go to http://www.clinicaltrials.gov/). These include sanfingol, staurosorpine and LY317615. Sanfingol, a lipid derivative that binds PKC, has been shown to potentiate the cytotoxicity induced by chemotherapeutic drugs like ara-C and fenretinide. Sanfingol appears to modulate other targets in addition to PKC, however, there is currently no active clinical trial to evaluate this drug in cancer therapy. The staurosorpine derivatives UCN-01 and PKC412 are currently being tested in clinical trials as single agents or in combination with standard chemotherapy. Although staurosorpine was originally described as a PKC inhibitor, we now know that it can bind other kinases and it is uncertain whether the potential anticancer effects of the staurosorpine derivatives are due to modulation of PKC exclusively. Finally, LY317615 is a selective inhibitor of PKCα with antiangiogenic activity. This compound is currently being tested in phase I and II clinical trials in the treatment of gliomas and lymphomas.

A novel approach for targeting PKC in cancer therapy is the use of antisense oligonucleotides. ISIS3521 - also known as Affinitak and LY90003 - is an antisense inhibitor of PKCα. ISIS3521 has been evaluated in clinical trials in combination with paclitaxel and cisplatin for the treatment of non-small cell lung carcinoma. Unfortunately, the trial did not show any clinical benefit. It is important to note that PKCα levels were not measured during the trial; therefore, it is still unknown whether the negative results were a consequence of a poor drug or the wrong target selected.

Non-PKC targets of diacylglycerol: chimaerins, Munc13, PKD and RasGRP

For many years, the effects of diacylglycerol, the tumor promoting phorbol esters and the bryostatins were thought to be mediated solely by PKC. We now know that PKC is not the sole target, as four...
additional families of diacylglycerol targets have been recently discovered: the chimaerins, the Munc13 proteins, the PKD kinases and the RasGRP family (Figure 1).18 One emerging question is whether these non-PKC receptors could also contribute to carcinogenesis and tumor progression, and therefore, could be potential therapeutic targets in cancer. Our laboratory at the Cancer Research Center of Hawaii is addressing this question for RasGRP.

The RasGRP family is a particularly attractive therapeutic target in cancer because its modulator Ras, a molecule that is implicated in a significant fraction of human malignancies. Our early work has contributed to the characterization of RasGRP as a high affinity target for the tumor promoting phorbol esters, and we recently described that one of the RasGRP members -RasGRP1- functions as a receptor for the phorbol esters in epidermal keratinocytes, which are the target cells for tumor promotion in skin.17,18 Studies from other laboratories have also linked RasGRP1 with cancer. Recent data has identified RasGRP1 as a potential leukemia oncogene based on the results from retroviral inserional mutagenesis.19

Conclusions
The pivotal role of diacylglycerol pathways in cell proliferation, differentiation, and apoptosis, provides the rationale for exploiting diacylglycerol receptors as potential therapeutic targets in cancer. Treatments that modulate PKC, the major intracellular diacylglycerol receptor, have been evaluated in clinical trials for the treatment of several malignancies. Bryostatin 1 is the typical PKC modulator that continues to be evaluated as adjuvant of standard chemotherapeutic drugs. The fact that diacylglycerol, phorbol esters and bryostatin 1 can also modulate non-PKC diacylglycerol targets raises the question as to the role of the non-PKC receptors in cancer. The recently discovered properties of the RasGRP as a phorbol ester receptor, Ras activator, and potential oncogene, make this family an attractive novel target for selective intervention. Further studies in the area of diacylglycerol signaling should provide insights into the role of each diacylglycerol receptor in cancer that may eventually lead to the development of novel targeted therapies with enhanced effectiveness and reduced toxicity.

References

See “CRCH References” p. 321
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Now this is downright scary. A particle as small as a grain of rice is currently on the market, and can be implanted in products, animals or humans to establish identification or monitor inventory. Called RFID's (radio frequency identification capsules) a company called Applied Digital Solutions expects that RFID's will replace credit cards, medical bracelets and even keys. The possibilities are endless. Medically, the potential to tag drugs, records, track pharmaceuticals and even patients can be of great value. However so far, privacy cannot be managed. They already are in use to allow drivers to pass through toll booths; libraries in San Francisco plan to use RFID's to allow patrons to retrieve books themselves; entomologists tag insects to study behavior; the federal government implanted 10 million RFID's in salmon to study spawning and in Oklahoma a Wal-Mart store sold Lipfinity lipsticks tagged with RFID's (they were instructed to cease and desist). Now, a program called VeriKid has been launched in Mexico and Brazil to allow parents to implant RFID's in their offspring. If you act now, you can save $50 off the $200 list price if you preregister to get chiped at 4ership.com. Usually the implant is between elbow and shoulder on the right arm. Somehow I don't think a fine will be forming to get chipified.

"We Are Losing Money Each Flight. Increase The Volume!"

Hawaii has an inter-island emergency air transport service, but only at the generous participation of the owner Andrew Kluger, the CEO Hawaii Air Ambulance has an exclusive agreement to serve the state regardless of the patient's ability to pay, but in the last seven years, only two years have gained a profit, totaling about $225,000. Mr. Kluger has shown his determination to continue the service by purchasing a Cessna 414A to add to the fleet following the February crash of an aircraft going into Hilo at night in heavy weather. Most of the company's revenue comes from Medicaid and Medicare, and from out of state patients. People think they are a state agency and don't have to pay, so the company is trying to collect from about 400 clients with outstanding indebtedness. "We lose money on at least ½ of our flights," Kluger stated. Governor Lingle authorized the release of $1 million in July to assist air ambulances, but it went to aid helicopters, not inter-island transport. The state has refused to provide any subsidy to keep the service going, and uses the same excuse that "if the state started subsidizing the service, air ambulances would come out of the woodwork," according to Department of Health manager of emergency services Donna Maiava. The truth is obvious, as long as Hawaii Air Ambulance is willing to operate at a loss, the Legislature and the DOH will look the other way.

Progress Was Okay Once, But They've Gone Too Far.

The military has developed infrared technology which affords much improved night vision for troops, weapons use and reconnaissance, as well as vehicles and even aircraft. Now Lexus, Cadillac and Hummer are using the same technology to allow drivers who want to be really safe, to add that option on their new vehicles. Some projects system a small picture on the windshield that gives the motorist a much better view of what is coming down the road. What a fantastic addition to help my wife "back seat" drive after dark.

Medical Liability - Teach It In Medical School.

An article in Quality and Safety in Health Care compared seven years of malpractice claims in Florida, Indiana and Maryland. Over 96% of physicians who had been sued came from schools whose graduates had a higher than average number of suits filed against them. New institutions and public universities produced doctors who are more at risk. There appeared to be no common denominator, but researchers theorized that some schools may offer a poorer quality of clinical education, or (more likely) may draw from less-qualified students. As has been reported, medicine is not the career choice it once was, and the number of applicants to medical schools is decreasing.


The National Board of Medical Examiners and the Federation of State Medical Boards have collaborated to establish an additional step to the licensing process. In an attempt to evaluate bedside manner and clinical skills, an addition to part two of the exam will require students to see 10 patients (actually actors) and spend 15 minutes with each. Supposedly, the test will determine their ability to establish communication, gather information and plan examination and diagnosis. Scoring method is still a secret. The test is actually a resurrection of the old exam some of us geezers took 40 years ago, which was discontinued in 1964. The AMA and the American Medical Students Association are in opposition claiming it is redundant, and that medical schools already provide this training during third and fourth years of medical school. The addition will increase $975 more onto the already substantial $1500 exam fee. The licensing people ignored complaints and have stated that the new clinical skills test is here to stay as a matter of "patient safety."

Some Doctors Must Learn To Leave Bad Enough Alone.

At the June meeting of the AMA House of Delegates, South Carolina surgeon J. Chris Hawk offered a resolution to refuse care to plaintiffs' attorneys involved in malpractice litigation. The media were delighted to give the issue nationwide attention with letters pouring into USA Today and other papers abusing the medical profession. Doctors were accused of greed, duplicity, deceit and hypocrisy, to mention a few adjectives. Typically, no paper or TV outlet bothered to mention that the resolution was greeted with hooting and outrage by other delegates, and was soundly defeated. So thank you, Dr. Hawk, for making us all look like petty, self interested jerks.

Parenting Is Hazardous The Second Time Around.

The Gerontologist surveyed 3260 grandparents in the USA and found that 60% are involved in managing grandchildren. 5.3% are full time caregivers, 23% manage children from 1 to 9 hours/week, and 31% manage their offspring from 10 to 30 hours/week. The significance of this is that Harvard University researchers found a 57% greater risk of heart disease among grandparents who care for their grandchildren. Moreover, more grandparents are living with their families, suggesting more babysitting duties. Between 1990 and 2000, the Census showed an increase of 30% in the number of children living with grandparents. The experts hypothesize that stress is a major factor, and grandparents may have less time to care for themselves; get check-ups, enough sleep or enough exercise. In any case, we should try to let granny live her own life, and make parenting a one-time life duty.

It's The Food, Stupid!

According to the Center for Disease Control and Prevention, Americans are eating more than they did 30 years ago. In studying the eating habits of people ages 20 to 74 when compared to 1971, the CDC found that women consume 22% more calories (1542 up to 1877) while men increased 7% (2450 up to 2618). The major increase is in simple carbohydrate consumption, especially salty snacks, soft drinks, pizza, as well as eating out more often. The data were collected in personal interviews in which subjects were asked to recall everything they had eaten in the previous 24 hours. According to Barry Popkin, M.D. Professor of Public Health at Univ. of North Carolina School of Medicine, it takes only 3500 extra calories spread over 10 days to add a pound. Of course, obesity is a complex issue, and other factors, such as life style, make a difference, so let's stop at Krispy Kreme and talk it over.

As Chicken Little Said...

According to Tom Ridge, director of Homeland Security, we are a "nation in danger," so in some east coast areas he raised the color coding threat level to bright orange. However, the rest of us are in serious danger from some other threats closer to home, more real and imminent. For example, the ever-alert Los Angeles City Council is considering a ban on the use of Silly String in public; a compact disc is being reissued. John Kerry's prep school rock band, the Electras; and most frightening, auditions are underway for a new "Partridge Family." What color alert would be appropriate - magenta? taupe? ecru? lilac? beige?

ADDENDA

- In Glasgow, Scotland, a man tried to siphon diesel fuel from a parked RV. Unfortunately, he placed the hose in the septic outflow and suffered GI upset after sucking in "fuel."

Aloha and keep the faith - rfs

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