Tripler Pediatrics T-Med

Background and Statement of the Problem

Tripler has been the pediatric referral center for military and military family members in the Pacific for more than forty years. A "forward presence of at least 100,000 solders" is a key element in the National Military Strategy. Children with chronic illness now complicate the ability of forward positioned medical assets to provide dependent care. The most common, chronic disease of childhood is asthma, affecting at least 7% of the population or as many as five thousand dependent children across the Pacific. It is the most common discharge diagnosis for children across the DoD and represents an enormous cost burden to the Military Health Care System. Specialists in general pediatrics caring for children across the Pacific Rim look to the subspecialists at Tripler for assistance in caring for their critically ill, and chronically ill patients, such as those with complex and unresponsive asthma. Often because of the difficulty in coordinating care of these patients with appropriate pediatric subspecialists, the pediatricians in the referring center will evacuate the patient by air to Tripler for evaluation unnecessarily.

Research Questions and hypothesis

Mission Statement

To develop a Internet consultation network for pediatricians caring for military family members across the Pacific Rim which allows rapid access for pediatricians to pediatric subspecialists, avoids the cost and inconvenience of unnecessary air evacuation from the Western Pacific and provides opportunity for medical education for pediatric residents training at Tripler. To use the care of children with asthma as a model to demonstrate the effectiveness and cost-efficiency of this approach.

Project Description (proposed solution)

The Electronic Children's Hospital of the Pacific (ECHP) would be a system for consultation of military family members similar to that which already exists for the Pacific Island Health Care Program. An important difference is that the specialty trained pediatrician would use digital equipment to prepare and present the case electronically to pediatric subspecialists at Tripler. For example, a child who poses a diagnostic or management dilemma to the referring pediatrician would be entered into the electronic system. The physician would log onto the Department's Consultation home page through the Internet. A summary of the patient's course with key "essential" elements, would be posted on the consult page using a set of pull-down menus in a Windows environment. (Key facets of the data could be entered as a form into a database which tracks the demographics of the consult process.) Key additional information in the form of digital images of the child or of radiographs can be attached to the file. Additionally, wave files which capture auscultated breath sounds or sounds of the child's respirations could also be included. Finally, short video clips which capture the child ambulating or other aspects of the child's care. Children with asthma are an ideal test population, and the following cases serve as an example.

During the summer of 1997, two children were referred for consultation with a pediatric pulmonologist from the western Pacific because of poorly managed asthma. We had attempted to discuss their cases by phone and electronic mail, but were unable to determine the reason for the difficulty of their asthma management. It took only a single day of reviewing their history to determine that the problem in the management of their asthma was poor technique with the meter-dose inhaler medications.

If the ECHP was in place, the physician could have submitted a consultation through the electronic system. The consult home-page will be screened several times a day by the pediatric Chief Resident or Nursing Case Manager, who reviews the case and contacts the appropriate pediatric specialist. In the case of the child with asthma, the resident would review the case with the pediatric pulmonologist including the digital image of the child's radiograph as well as an image of the child's spirometry. An additional video clip of the child using his or her meter-dose inhaler. In this case, essential elements would include: specific history (consistent with the MilCAP outpatient clinical pathway), description of the physical examination including in some cases a digital sound file of chest auscultation, a digital chest radiograph, spirometry in all children older than 6 years and a video clip of patient technique with meter-dose inhaler and peak-flow meter.

Using this system, the pediatrician receives an rapid response and recommendations for his or her patient. The consultant is able to make recommendations which are based on more objective clinical data. The resident is still involved in the consultative process, and benefits from the exposure to the patient. The patient is managed with the recommendations of a pediatric subspecialist without ever having to leave their home. Finally, the service member is able to remain on duty and is not distracted by having a family member evacuated to Oahu or by having to accompany the child.

Technical Approach

Field test systems will be established at three sites: Guam, Yokosuka and Seoul. Each system will include a personal computer, a video and still digital camera, a flat-bed scanner, printer, digital oto-ophthalmoscope, digital stethoscope and spirometer. (In many cases, the hardware is already in place and would require very little additional equipment purchase as this project could work off of already existing projects.) The existing Tripler Pediatric Internet Web Page will be updated with access to a consultation page. Data entry on this page will be entered into the MilCAP Access 97® database for statistical analysis and outcome tracking. Patient data, digital image and sound files will be kept on the system.

DoD Coordination

Three sites will be coordinated with Tripler as the center of the consultation network: Guam, Yokosuka and Seoul. While other complex cases will be able to be entered into the consultation site, the primary target population for the initial test phase of this project will be patients with asthma. Many of the pediatric subspecialities at Tripler are only staffed by a single practitioner: endocrinology, rheumatology, developmental, neurology, pulmonology. Thus, Walter Reed Army Medical Center will also have access to select cases so that pediatric subspecialists at Tripler will have the opportunity to review cases with subspecialists at another medical center. The Department of Pediatrics at Tripler will be the central, coordinating site. Note that verbal agreements have been obtained from Tripler Personnel and site coordinators at each of the test sites with written letters of commitment forthcoming.

Methodology

Baseline information will be obtained from each of the sites regarding the number of hospitalizations for asthma based on the common ICD-9 codes for this diagnosis. Similarly, the emergency room visits for asthma will be determined ideally for a year before the program's initiation. Two target populations will be selected initially: children hospitalized for asthma at each of the sites, and children in the outpatient setting considered to be high risk for asthma based on previously published criteria (6). Once consultations have begun, initial screening will also include Pediatric Asthma Quality of Life which will be calculated on each subsequent visit. Patients would be entered into the MilCAP outpatient and educational critical pathways using electronic data entry.

The program will be evaluated six and twelve months after the initiation of the project. Primary outcome variables will be total asthma hospitalizations overall as well as hospitalizations among patients entered into MilCAP Pacific. Emergency room utilization by enrolled patients and improvement of Quality of Life will be additional measurables. One case per week from each of the three distant sites will be the goal for the initial 6 month phase, although it is likely that many additional cases will be entered once the referring pediatricians become familiar with the technology.

Referring pediatricians will be questioned prior to the project about their impressions of the existing consultative options: air evacuation, mail, electronic mail, phone, facsimile. The same practitioners will be queried after the project about the impact on their perception of ease and expediency of consultation as well as their perception of the success of the specific asthma intervention.

Each referred case will be assessed as to the likelihood of the need for air evacuation prior to the establishment of the ECHP. Number of patients spared evacuation and the speed of definitive management and diagnostic suggestions will ne assessed.

The effectiveness of the digital equipment:: stethoscope, spirometer, oto-ophthalmoscope as well as the camera and recorders will be assess by comparing the images and sounds to the findings of the subspecialists for cases which end up referred to Tripler for reasons which could not be avoided by the ECHP. In these cases, the subspecialist will be asked to compare the results of the digital information to what he or she finds upon seeing the patient and an estimate of the reliability of the images will be determined.

Finally, patients of particular educational interest will be presented in the Department's weekly Chief's Rounds and residents will be queried as to their impression of the educational benefit of this patient exposure.

Proposed Project Timeline

Funding approval: May 1999
Develop software and hardware: August 1999
Field Test sites to Guam, Korea, Japan: October 1999
Begin Consult Service/Asthma screening and Intervention: November 1999
Project Appraisal: May 2000
Project Presentation: Abstract Uniformed Services Pediatric Seminar, Honolulu 2000
American Telemedicine Association, Spring 2000
American Thoracic Society, Spring 2000
Project Completion: August 2000

Performance Objectives/Deliverables

Deliverables and Milestones.

Patients with asthma will be followed for at least 12 months.

Overall change in the hospitalization rate will be determined as well as rates of individual enrolled patients. Unscheduled use of outpatient and emergency services will be determined. Changes in patient and parent Quality of Life will be determined. Annual estimates of evacuations avoided, and ultimately monies saved will be determined. Patient contacts will be recorded and workload tallied using existing MEPRS and ADS systems at Tripler and the impact of the ECHP will be determined on the subspecialists workload.

Goals:

- To provide systematic consultation for "at risk" asthma patients in Korea, Guam and Japan
- To determine the essential elements for Web-based consultation in pediatrics
- Develop an Internet "Homepage" Consult service of Pediatric Subspecialists for Military Pediatricians
- Develop a pediatric resident run "service" to supervise and expedite subspecialty consultation
- Develop a system that is easy to access and ultimately aids to avoid unnecessary air evacuation

Objectives:

- Apply standard critical pathways and guidelines to a "at-risk" population of children with asthma
- Utilize digital sound, picture and video images in the assessment of pediatric patients electronically
- Provide enhanced resident educational experience through increased access to patients abroad
- Integrate Internet access with established pediatric asthma (MilCAP) database