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Design and Implementation of an Urban/Rural Telehealth Network for the Evaluation of Abused Children:

Implications for Global Primary Care Applications

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Abstract

To meet the increasing need for rapid medical evaluation of allegations of child abuse in rural areas and the paucity of trained professionals to provide these evaluations, a model telemedicine network was designed and implemented initially in the State of Florida, USA. The utilization of various types of equipment, transmission modes, and electronic peripherals, will be discussed, as well as utilization of physician extenders for assessment. The expansion of this system for other medical uses will be summarized. Experiences in replication of the model in a southern Alabama rural county will be detailed.

Keywords:

Child Abuse, Telehealth, Rural, Primary Care

Introduction

The immediate and accurate assessment of alleged abuse or neglect is critical to enable child protection staff to make valid and timely child safety and placement decisions. It is the primary mission of any child protection system to make a determination if abuse or neglect has occurred and if there is an immediate threat to the child. When the child protection system fails, the result can be the serious injury or death of a vulnerable child.[1] In Florida, Child Protection Teams (CPT's) are created under the authority of Florida Statutes 39.303 and are defined as medically directed multi-disciplinary teams of professionals available to assist in the immediate assessment of suspected abuse or neglect of children.

Reports of abuse and neglect to the Florida Abuse Hotline Information System (FAHIS) increased from 122,115 in state fiscal year 97-98 to 164,916 in state fiscal year 99-00, an increase of 35%. In 1999, the Florida Legislature placed additional responsibilities on the CPT's. At the CPT, all reports must be reviewed by either a board-certified pediatrician; a licensed physician working under the direction of a board-certified pediatrician; an advanced register nurse practitioner; a physician assistant, or a registered nurse to determine whether a face-to-face medical evaluation is necessary.

These increased responsibilities have intensified the tremendous demand of working in the discipline of child abuse and neglect. This workload combined with delivering services in a large and geographically and culturally diverse state such as Florida, coupled with an increase in the number of child abuse and neglect reports requiring medical evaluation, make recruitment and retention of medical experts in child abuse and neglect a challenge. Even with increased understanding and an ever-increasing knowledge base, child abuse and neglect continues to be a burden for many medical practitioners. Child abuse cases are time consuming, since they involve calling child protective services and dealing with local authorities, not to mention the probability of being called to testify in court at a later date. For these reason, and others, many medical staff consider child abuse and neglect work to be outside their scope of practice. Few areas of pediatrics and family practice generate as much emotion as child abuse and neglect.[2]

As of March 1, 2000, Florida had 81 board-certified pediatricians or family practitioners and 24 Advanced Registered Nurse Practitioners (ARNP's) working for CPT's. Efforts to attract qualified physicians and ARNP's who are trained to work in this critical field are ongoing. Each year the recruitment and attrition rates for physicians and ARNP's remains approximately equal. The majority of these physicians and ARNP's are located in the more populous regions of the state leaving large geographic areas with limited access to child abuse and neglect expertise.[3]

Materials and Methods

The conceptual stage for this real-time telemedicine network

(June 1998) included exploration by a CPT telemedicine team (comprised of engineers, program staff, University of Florida personnel, and the CPT statewide medical director) of the existing technologies and infrastructures that could support deployment of real-time evaluations.[4] This included a comparison of H.320, H.323, and H.324 standards compliant equipment and a comparison of the transport facilities including dedicated leased lines, Integrated Services Digital Network (ISDN) lines, Plain Old Telephone Service (POTS) lines, and wireless technologies. In August 1998, engineers hosted a Telemedicine Seminar that provided all members of the CPT telemedicine team the opportunity to inspect a wide variety of videoconferencing solutions used for telemedicine.

The unit selected included a rolling cart that allowed use in multiple locations. A personal computer was integrated into the cart (the codec operates independent of a personal computer) and has been outfitted with a video capture card and electronic medical record software for recording data and capturing digital images.

The engineering team decided to build a parallel network to compare the leased line modality (using the SUNCOM backbone which is the State of Florida's telecommunications network) with ISDN lines (a non-SUNCOM offering) using H.320 standards compliant equipment to see which better suited the high quality demand of this medical application where the goal of the encounter is to achieve diagnosis. The other transport and/or equipment options were ruled out due to high expense, untested technology with perceived interoperability problems, or poor video quality. Following nationally recognized standards; we chose to use a transmission speed of 384 kbps. This speed is consistent, whether using ISDN (3 BRI ISDN lines bonded) or dedicated leased lines (using one-quarter of a full T-1; fractional T-1 is not available). We are utilizing ADTRAN CSU/DSU's for the dedicated leased lines. The NT-1 devices are built in to the telemedicine units when ISDN interface is requested.

The electronic equipment includes video monitors, microphones, hand-held cameras, cameras in fixed mountings, and a colposcope.

We implemented a real-time telemedicine pilot project, linking two "hub" Child Protection Teams to distant health care facilities such as hospital emergency rooms, county health departments and child advocacy centers. To our knowledge, this was the first time in the nation that real-time telemedicine has been used in this field. Five sites, including three "remote" sites and two "hub" sites participated in this pilot. The pilot was established in a small number of sites in order to fine-tune the technology for this application as well as to assess what equipment and communications modality worked best in Florida. Since as if a conversation with a monitor was no more unusual than having a conversation with a television set and did not the pilot's inception, five sites have been added to the network and additional sites are planned. Based on the success of the model, it was replicated in a south Alabama county, which allowed us the opportunity to learn strategies for replication in other primary care areas.

The telemedicine network facilitates child abuse and neglect assessments via advanced telecommunications technology between the hub sites and its remote sites. Hub sites are comprehensive medical facilities with a wide range of available medical and multidisciplinary professional staff. Remote sites are smaller medical facilities in rural areas with limited diversity in medical and non-medical expertise. Each hub site is responsible for providing expert levels of medical child abuse assessments to specific remote sites by using the communication infrastructure developed. To assure around the clock coverage by medical experts, each remote site can be linked to the other hub site.

Results

From the equipment standpoint, it has been apparent that our choice of vendors was fortuitous. Little technical support has been required. Small modifications have been accomplished with good technical support. A detailed review will be provided.

Much effort has been made to study the effect of the technology on children. While no child has been fearful of the monitors or cameras, several required orientation to the peripheral devices, which were less familiar to them. It was clear from the beginning that young children interacted with the examiner as if they were in the room together: the equipment was transparent. Little familiarization with the equipment was necessary. As mobility and verbal skills increased, however, so did the need for specific orientation to the various peripherals. This need for specific orientation increased with more complex equipment and with equipment for which the purpose was not obvious.

A trained registered nurse provided an orientation to the equipment and to the process of the examination. Allowing children to touch the equipment and, where possible, participate in the examination by pushing the capture button would alleviate their fear faster than a general description of the equipment's function. Allowing the older children to actually use the equipment on the examiner was also very effective in alleviating any lingering mystery. It is also vital to allow time for the nurse, who will be the examiner's virtual hands, to develop a rapport with the child to create an environment of trust and understanding. For this reason, every attempt has been made to recruit nurses with pediatric experience to participate in this project.

Infants are clearly oblivious to the electronics and relate well to the nurse at the peripheral site as long as the primary caretaker is close by. Older children conducted themselves

seem to find a two-way conversation to be anything unusual. After appropriate orientation, there was no

discernable difference between a live interaction and an electronic interaction.

Older children have voiced concerns that telemedicine images are being broadcast on regular television stations or on closed circuit. They must be assured that the connection is secure and that their pictures can only be seen by a limited number of people. It is vital to make sure that all participants in the videoconference are identified to the patient and that no others are allowed into either site without the child's knowledge. Similarly older children want assurances regarding who will see any pictures taken, especially if intimate parts of the body are to be depicted. We believe that all telemedicine interactions should take place with informed consent to include all possible uses of the images.

The presence of a supportive and well-trained individual at the remote site is essential. This individual should be trained by the staff of the hub site regarding the needs of the telemedicine consultant and the specifics of the evaluation in which they will be participating, and more importantly, in the best methods of making children comfortable with essential procedures. Repeated staff practice with the equipment prior to an actual examination is strongly recommended and is a requirement in our program.

All participating health care providers (both physicians and advanced registered nurse practitioners) have consistently reported satisfaction with the quality of the interactions. However, there were several instances when a child could not be examined because the equipment was not working properly. Problems with the quality of the audio and issues with the communications lines topped the list of problems encountered. The initiation of weekly maintenance calls and the discontinuation of ISDN connectivity between the hub and remote sites have alleviated most of these problems.

The majority of CPT evaluations conducted via telemedicine are non-acute in nature, or scheduled evaluations. With time and experience, the examiners are much more comfortable with the process and equipment, which tends to help the children's comfort level. With experience, the examination time has been cut by 40% over initial evaluations utilizing this technology.

Legal concerns and challenges to the technology and admissibility of evidence have been addressed successfully. An independent evaluation of this program has been begun. The results will be available by December 31, 2000 and will be included in the presentation of this paper.

Because of the success of the original pilot project, a replication has been accomplished in Baldwin county Alabama, linking three sites with the University of South Alabama. Details of this replication will be provided.

Discussion and Conclusions

Results to date have confirmed earlier expectations[5] that telemedicine is an acceptable, accurate, and cost-effective method of extending the expertise of child abuse specialists to rural areas. We have shown that, even in a population of traumatized children, the technology results in highly accurate assessments of allegations of abuse and increases the rapidity of actions necessary to protect the child or to obviate an unnecessary investigation. Patient acceptance is excellent, as is the acceptance of investigative and other legal authorities. The model system is exportable to other geographic areas and often leads to the demand for other consultative uses of installed equipment in participating facilities.

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