

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Telemedicine: Reducing Trauma in Evaluating Abuse

Sunshine Arnold and Debra Esernio-Jenssen

Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/55070>

1. Introduction

The increases in child abuse reporting and shortage of medical experts in the child abuse field have fueled the need to implement telemedicine programs that provide timely expert examinations to children. Also driving this need is that some of the highest rates of child abuse and neglect occur in rural areas [1]. Without the access to trained practitioners children may not receive complete or accurate examinations. This inexperience may possibly lead to misdiagnosis, unnecessary treatment, incomplete care and follow up, and ultimately may leave the child at risk for further maltreatment. When a qualified medical practitioner is located a great distance from where the child resides or a child travels hours for an examination this is a burden to an already traumatized child. As well, the investigative professionals from law enforcement and child protective services are also inconvenienced, as they are likely to be responsible for transporting the child to the site for evaluation. In addition, the exam may be delayed for a period of time due to the travel involved leaving child protective services, law enforcement, and ultimately a child waiting in limbo for a safety decision.

2. Florida's child protection team telemedicine network

In 1998, Children's Medical Services (CMS) in Florida implemented a real-time telemedicine project, linking "hub" sites with "remote" or satellite service locations such as public health departments and child advocacy centers (Figure 1). The purpose of this telemedicine network was to improve access for children suspected to be victimized who resided in rural areas to the Child Protection Team medical evaluations. The telemedicine network facilitates child abuse assessments via telecommunications technology. Hub sites are comprehensive medical facilities with a wide range of medical and multidisciplinary staff while remote sites are limited in diversity and medical expertise in evaluating suspected cases of child abuse. Medical providers located at hub

sites have the expertise needed to evaluate this population. The physician, physician assistant, or Advanced Registered Nurse Practitioner, the medical provider of record, is located at the hub site while a registered nurse and social worker engage with the child at the remote site during the medical evaluation. Computer integration allows for the storage of images taken by either the hub or remote site. A telemedicine exam follows the same general protocol as a traditional face-to-face medical examination provided by the Child Protection Team. Thus, the medical evaluation includes the child's birth, past and current medical, developmental, and family history, an assessment of the child's behavior and social risk factors and obtaining photographs; all the components of a comprehensive abuse assessment. Examinations are utilized to assess physical abuse, sexual abuse, and medical neglect cases.

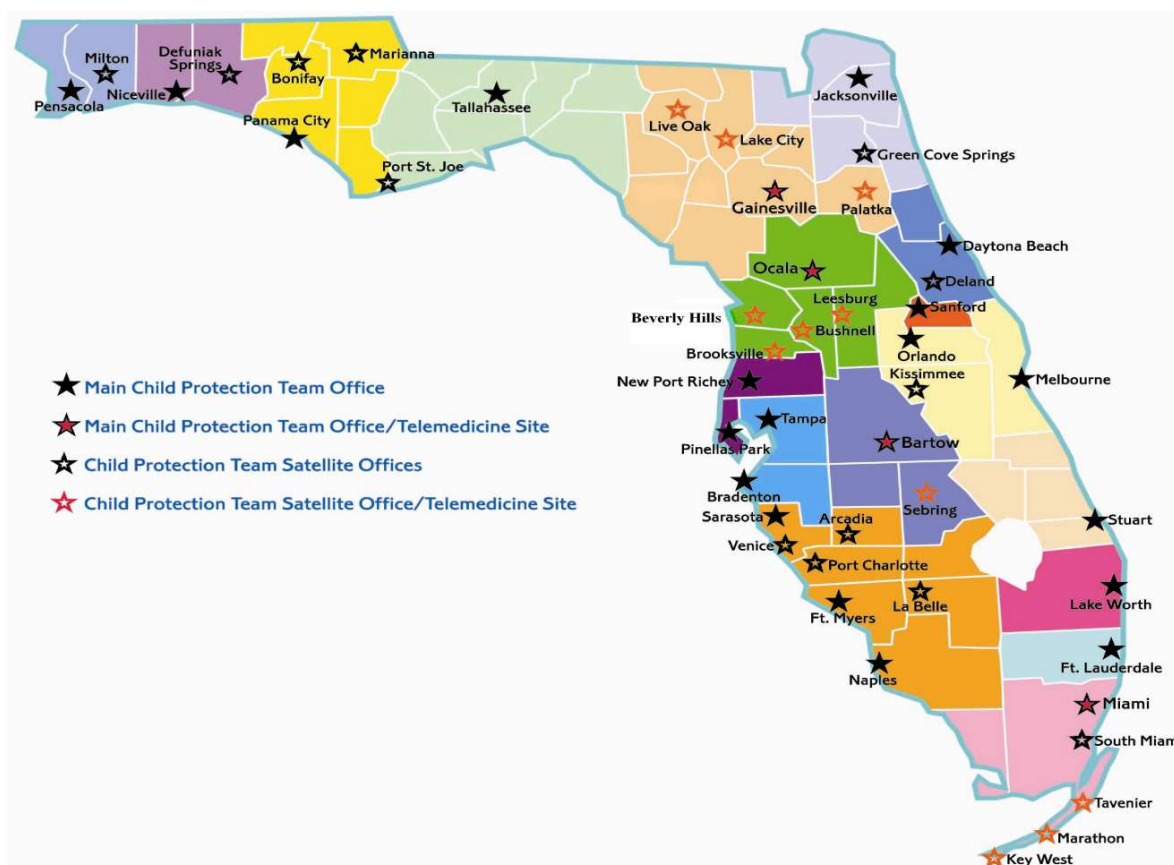


Figure 1. Florida Child Protection Team Map noting Main “Hub” Sites and telemedicine sites

The Child Protection Team (CPT) program at the University of Florida is a medically directed, multidisciplinary program based on the idea that child abuse and neglect involve complex issues and require the expertise of many professionals to protect children. It is one of twenty-four legislatively mandated teams of its kind throughout the state of Florida. The University of Florida Child Protection Team (UFCPT) is unique in that it serves a twelve county area in North Central Florida working in coordination with multiple community partners and localized Child Advocacy Centers (CAC) to provide CPT services in child-friendly settings. Established within the University of Florida College of Medicine, Department of Pediatrics

and headquartered in Gainesville, the team has the privilege of serving children and families in Alachua, Bradford, Citrus, Columbia, Dixie, Gilchrist, Hernando, and Hamilton, Lafayette, Levy, Suwannee, and Union counties. Expert medical consultation and evaluations can occur in four different clinic settings throughout the twelve counties on a given day. This is made possible through the utilization of telemedicine examinations at two of the sites; Citrus and Hernando counties. During 2011, the UF Child Protection Team provided over 300 medical exams by telemedicine; January through July 31, 2012, the Team has already provided over 250 exams via telemedicine. This medical component is supported and enhanced by psychosocial assessments, psychological evaluations, forensic interviews, expert court testimony, multidisciplinary case staffing, and coordination of services which assist community agencies in diagnosis and treatment planning.

3. Applications of telemedicine in child abuse

In addition to using telemedicine for real-time child medical evaluations, the technology can also be useful for peer review and consultation. Several Child Protection Teams in Florida also use the technology to conduct quarterly peer review of complex cases among the child abuse experts at various sites. The providers are able to present cases, share images of physical findings and participate in discussion simultaneously without delay. While these peer reviews are conducted in real-time, another application known as store and forward consultations, involves the transmission of still images from a practitioner to a data storage device which can then be retrieved by the expert medical professional and reviewed at a later time. The expert can then view the images remotely to give his/her opinion.

Live telemedicine consultations are another option for remote providers to access child abuse experts at a distance. Providers at remote sites where a patient presents with an allegation of abuse can connect with experts at a tertiary care center agreeing to provide the consultation. Live consultations have shown to reduce cost in other types of medical conditions by reducing the number of patients taken by aeromedical transport to larger medical centers [2]. The use of live consultation in sexual abuse examinations has been shown to improve a rural provider's accuracy in terms of findings and the completeness of the examination [3]. Berkowitz has suggested telemedicine could even be utilized to address underreporting of child abuse by children's primary care providers [4]. Primary care providers would be able to consult on a case with a child abuse expert prior to making a report to their state central register. Physicians may feel more comfortable consulting with an expert before reporting as some fear their suspicion may be wrong.

Live, simultaneously transmitted telemedicine exams are preferable compared to the store and forward application. While both methods accomplish the goal of having a child's injuries evaluated by an expert in the field of child abuse live examinations allow the medical provider access to information that can not be captured by a still image. During the live telemedicine evaluation the medical provider is able to observe the child's body language, interact with the child, observe the child's reactions to the physical examination, and is able to ask additional questions of the child and/or non offending caregiver if needed.

Although Florida was the first state to use telemedicine, child abuse professionals throughout the United States have utilized this technology. The Southwest Alabama Abuse Network, Support for Health Involved Professionals in Children's Safety Centers (SHIPS) network, The University of Utah Child Advocacy Centers, and University of California-Davis also rely on the application of telemedicine to provide assessments and conduct reviews in child abuse cases [5]. These and other programs utilize the various telemedicine applications described previously and have had positive results [5].

4. Establishing a telemedicine program

4.1. Equipment

Telemedicine requires very specific equipment, software, and network capability. The UFCPT's current network is Secure Integrated Services Digital Network operating at 384kbps transmission speed. A Tandberg Intern was previously used and the Polycom Practitioner Cart is now located at the remote sites (Figure 2 and 3). The hub site also requires a Polycom Practitioner Cart with integrated computer and software. Second Opinion Professional is the current software being used. An AMD General Exam Camera with 50X magnification and a Welch-Allyn or Leisgang colposcope is used to capture physical findings. The Florida Department of Health Information Technology personnel provide technical support to the CPT Telemedicine program statewide. Consultation with IT support familiar with telemedicine should be initiated in the very early stages of planning.

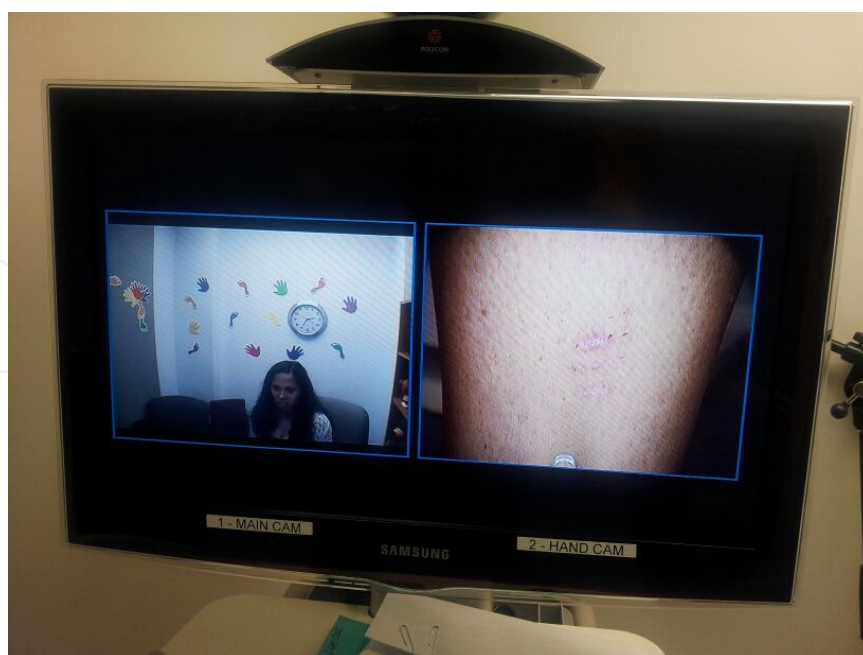


Figure 2. Polycom Practitioner Cart with side-by-side simultaneous view of hub site provider (left) and injury being captured (right) by AMD General Exam Camera with 50x magnification.

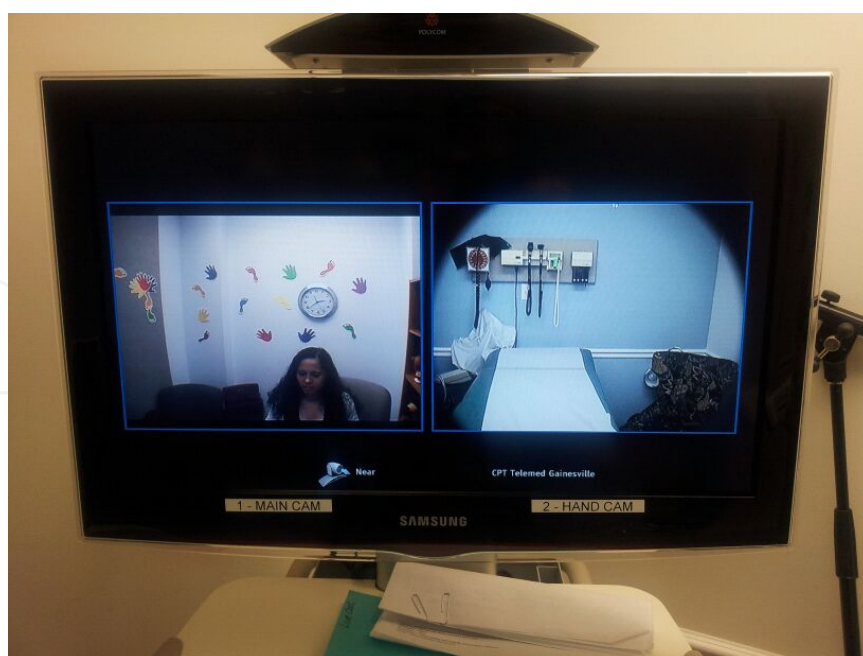


Figure 3. Side-by-side view of both hub site (left) and remote site (right).

4.2. Community support

In establishing a telemedicine program several key partners should be involved in this process outside of the obvious medical staffing needs. The pilot telemedicine project in Florida found that a key to successful establishment of a telemedicine program is a complete understanding and “buy-in” from the local agencies. An essential part of the planning process is involving these professionals early through a community meeting. This group should include, but is not limited to, hub site medical personnel, local child protective services personnel, local law enforcement investigating crimes involving children, state or district attorney involved in prosecution, local health department and hospital personnel, and the local Child Advocacy Center. The community meeting should explore the benefits of telemedicine to the children being served and the professionals involved in the investigative process. The local community members can assist in identifying viable remote site locations in the area and those best located to serve the greatest number of children. Early on, it is expected that this introduction of technology may meet with some reluctance. Providing documentation of successful programs and caregiver and victim testimonials are often helpful in allaying concerns.

4.3. Staffing needs

The performance of a telemedicine exam requires a minimum of two medical professionals who have specific child abuse training and training in conducting telemedicine examinations; the medical provider of record (physician, physician assistant, or ARNP) and a registered nurse. The University of Florida Child Protection Team also has a social worker present during the medical evaluation. This individual has usually already conducted a thorough forensic interview with the child prior to the medical examination unless due to the child’s young age/

development this was not feasible. The social worker's presence during the exam helps to make the child comfortable and also provides continuity for the child while at the clinic or Child Advocacy Center. In addition, the social worker operates the hand held camera that captures the images in order to allow the registered nurse to act as the medical provider's "hands" during the examination. All images and video are available to the medical provider simultaneously. All personnel located at the remote site act under the direction of the medical provider. The history provided to the social worker is relayed to the medical provider via telephone before the exam begins. Prior to the child's examination the registered nurse will explain to the child and family how the exam will be conducted and provide an opportunity for questions to be asked. Families and the child most often want to be reassured that the examination is confidential and cannot be observed by an outside party. The personnel explain that the examination is conducted over secure telecommunications lines and that only the examiner at the hub site is being transmitted the encounter. The child and caregiver are shown the telemedicine equipment and explained that the utilization of the equipment avoids lengthy travel and provide them access to an expert more easily. The child's medical history is gathered from the caregiver accompanying the child to the appointment, if available. The caregiver is asked to leave the room when the examiner obtains history from the child specific to the alleged abuse. Following the medical history, the child is asked whom if any of the individuals that accompanied them to the appointment would they prefer to remain with them during the medical examination. The UFCPT program has found that often with adolescents they prefer to be examined alone.

4.4. The medical evaluation

The child abuse medical evaluation includes a complete physical examination. Height and weight are measured and if the child is 2 years old or younger, a head circumference is obtained. The child's face is photographed for identification. Afterwards, in older children and adolescents, the nurse proceeds to examine the child from the head to the feet. The nurse will comment on body and oral hygiene and any unusual odors in addition to cutaneous manifestations of abuse. In younger children, examination of the heart and lungs may precede eye and ear examination due to the child's inherent fear and stranger anxiety. Any noted marks, scars, or bruises are identified, measured and photographed. If there are allegations of sexual abuse, then a thorough anogenital exam is also performed. Depending on the age of the child, various positions are used to view the anogenital area. For younger females, frog leg supine position is often used to view the genitalia. Labial separation and/or traction are used to examine the urethra, hymen, fossa navicularis, and posterior fourchette. The knee-chest supine or lateral decubitus positions may be used to view the anus. Boys may be examined in similar positions. Adolescent females are often examined in the lithotomy position. When hymenal injury is detected, to confirm the findings, the nurse can run the hymenal edge with a cotton swab or position the child into knee chest prone, which enables the best view of the posterior hymen. Photographs of the anogenital exam are also obtained, especially any pertinent findings. For acute sexual assaults a forensic evidence kit is completed and given to the accompanying law enforcement officer. Site-specific cultures and/or nucleic acid amplification tests, or any other laboratory tests are obtained as per CPT protocol. The medical provider may determine that

additional testing or dispensing of medication is necessary. Any child suspected to have sustained serious injuries is referred to the nearest Pediatric Emergency Department.

4.5. Legal consideration

For the other medical specialties utilizing telemedicine, when the examination is completed and the hub and remote sites disconnect the encounter has also ended. However, for child abuse cases when the medical provider's assessment reveals abuse, there may be criminal and civil court action. Some skepticism about the quality of the photographs that would ultimately need to be presented as evidence in court has been voiced from time to time. To date, since the Florida program's inception in 1998, there have been no legal challenges in court to the thousands of telemedicine images captured by Florida Child Protection Teams. The CPT telemedicine examinations and photos have been utilized hundreds of times in successful criminal prosecutions and dependency trials.

5. Case study

A 4 11/12 year old male was evaluated on 2/18/2011 via telemedicine for concerns of physical abuse due to multiple bruises. This was the fourth time in 17 months that Child Protective Services (CPS) referred him for concerns of physical abuse. There were multiple prior reports for this family including verified reports for family violence and physical injury. The child resided with his mother, four half-siblings and his stepfather. His mother reported that his older sibling (age 10) caused the injuries. The child did not disclose the true etiology of his injuries until this visit when he reported that he was punched, kicked, beaten, and dragged by his mother's paramour and hit by his mother. Physical examination revealed over 40 bruises on multiple body planes. According to a systematic review of bruising in childhood, bruises concerning for physical abuse include those located away from bony prominences, are located on the face, back, buttocks and abdomen, and are multiple occurring in clusters [6]. Please note the following images were taken using the previous Tandberg Intern. UFCPT began using the Polycom Practitioner Cart August 2012 and images for a case study were not yet available. There is much improved quality of the still images captured using the new equipment

After a thorough law enforcement investigation, his sibling disclosed that he and this child were instructed by their mother to lie and state that the injuries resulted from fights between them. Additionally, it was revealed that this child was specifically targeted by his mother. She beat him, burned him with cigarette lighters, cut his hands, locked him outside their home in the cold and rain, and forced him to remain in a dark closet for hours. In June 2012, his mother pled guilty to 9 felonies, including six counts of child abuse. She was sentenced to 20 years. His stepfather pled guilty to 4 felonies, including one count of child abuse. He was sentenced to 5 years.

Prior to the criminal case, a Dependency Trial successfully terminated the mother and stepfather's parental rights to each of their children. The telemedicine images were accepted into evidence and were an invaluable component of the child abuse medical professional's expert testimony.

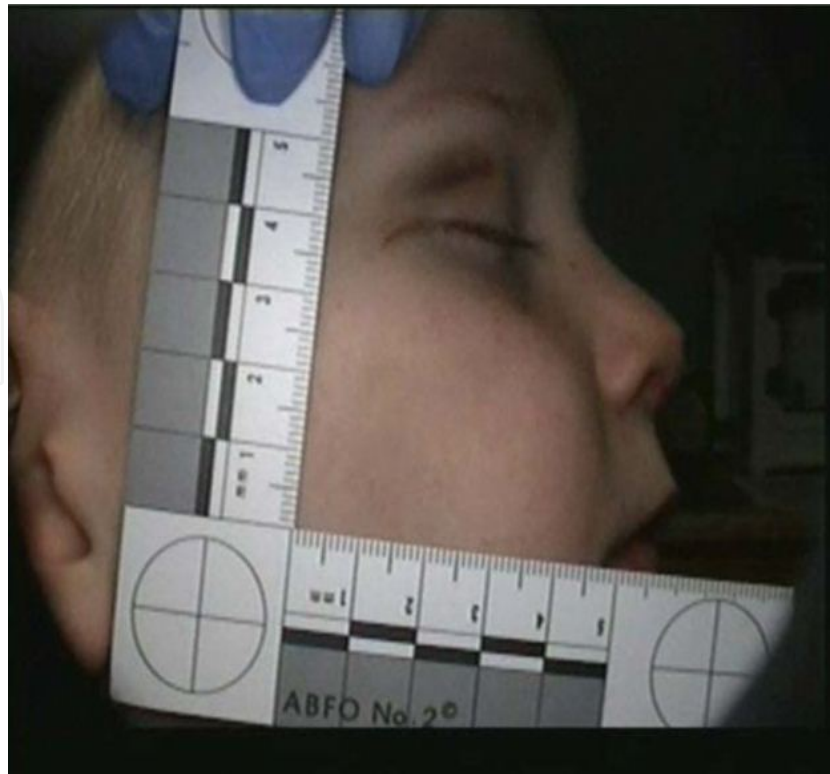


Figure 4. Multiple bruises and abrasions are noted on the forehead, eye, cheek, chin and neck

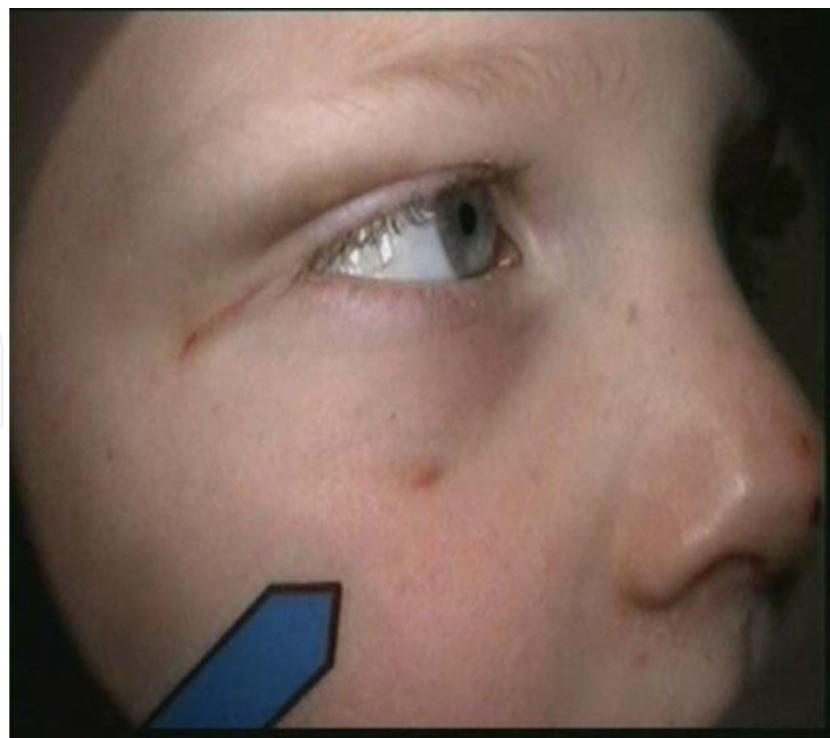


Figure 5. Multiple bruises and abrasions are noted on the forehead, eye, cheek, chin and neck



Figure 6. Multiple bruises and abrasions are noted on the forehead, eye, cheek, chin and neck



Figure 7. Multiple bruises and abrasions are noted on the forehead, eye, cheek, chin and neck



Figure 8. Large lower abdominal bruises are evident. An abdominal CT obtained 4 days later was reported as normal.



Figure 9. Extensive bruising is noted on his back.



Figure 10. Extensive bruising is noted on his back.



Figure 11. The child did not have any bruises on his anterior legs, the typical location for bruising in an active child his age.



Figure 12. Add caption



Figure 13. Add caption



Figure 14. Three months prior, he was evaluated for large back and flank bruising. There is a large patterned bruise along his spine which appears to have been inflicted from a punch. Once again, the child disclosed that his 10 year old brother hurt him. Figure 14 represents an adult female fist.

6. Future

To our knowledge, no study has evaluated the child and non-offending caregivers' satisfaction with telemedicine for child abuse evaluations. However, child and parent satisfaction with telemedicine utilized by other medical subspecialties has been promising. A self-report questionnaire administered to patients receiving psychological intervention for childhood depression via telemedicine over an 8 week period revealed that the participants and their caregivers had very high satisfaction with the services received and had similar rates of attendance when compared to the control group receiving the same services face-to-face [7]. The authors also noted that due to the children's previous experiences with other forms of technology, they appeared to adapt easily to the use of the equipment used in the study [7]. Satisfaction surveys distributed to burn center physicians, referring MD or RN providers, and patients/family members where teleconsultation was utilized, also revealed that all involved in the process, including the patient and family, felt the encounter was helpful and that they were comfortable with the technology [8]. During an initial review of Florida's program between 1999 and 2000, medical personnel reported that the children had a very high comfort level with the equipment involved [9]. With the ever growing technology present in children and parent's everyday lives, it is likely that there will be both a relatively high comfort level with the equipment and high satisfaction with the overall assessment conducted via telemedicine.

7. Conclusions

Telemedicine has proved to be a very useful method in conducting child abuse assessments to rural areas in the absence of local child abuse experts. The increases in child abuse reporting and lack of experts qualified to medically assess abuse cases further support the use of telemedicine. A variety of applications and uses provides a wide range of possibilities at varying costs that can be adapted by other child welfare programs throughout the world and have been demonstrated nationwide in the U.S. Telemedicine assessments and evidence obtained during the examinations have been successfully used in criminal and civil court without legal challenge. The use of telemedicine in child abuse will ensure accurate diagnosis by an expert, appropriate treatment and follow up, and reduce risk of future maltreatment.

Author details

Sunshine Arnold¹ and Debra Esernio-Jenssen²

1 Team Coordinator of the Child Protection Team, University of Florida, USA

2 Medical Director of the Child Protection Team, Department of Pediatrics, University of Florida, USA

References

- [1] Menard, K. S, & Ruback, R. B. Prevalence and processing of child sexual abuse: a multi-data-set analysis of urban and rural counties. *Law Hum Behav.* (2003). , 27(4), 385-402.
- [2] Tsai, S. H, Kraus, J, Wu, H. R, Chen, W. L, Chiang, M. F, Lu, L. H, Chang, C. E, & Chiu, W. T. The effectiveness of video-telemedicine for screening patients requesting emergency air medical transport (EAMT). *Journal of Trauma* (2007). , 62, 504-511.
- [3] MacLeod KJ, Marcin JP, Boyle C, Miyamoto S, Dimand RJ, Rogers KK. Using telemedicine to improve care delivered to sexually abused children in rural, underserved hospitals. *Pediatrics* (2009). , 123, 223-228.
- [4] Berkowitz, C. D. Child abuse recognition and reporting: supports and resources for changing a paradigm. *Pediatrics* (2008). SS12., 10.
- [5] Alexander, R, & First, K. Telemedicine and child abuse examinations. *Pediatric Annals* October (2009). , 38(10), 574-578.

- [6] Maguire, S, Mann, M. K, Sibert, J, & Kemp, A. Are there patterns of bruising in childhood which are diagnostic or suggestive of abuse? A systematic review. *Arch Dis Child* (2005). , 90, 182-186.
- [7] Nelson, E. L, Barnard, M, & Cain, S. Treating childhood depression over videoconferencing. *Telemedicine Journal and e-health* (2003). , 9(1), 49-55.
- [8] Saffle, J. R, Edelman, L, Theurer, B. S, Morris, S. E, & Cochran, A. C. Telemedicine evaluation of acute burns is accurate and cost-effective. *The Journal of Trauma* (2009). , 67(2), 358-365.
- [9] Pammer, w, Haney, M, Wood, B. M, Brooks, R. G, Morse, K, Hicks, P, Handler, E. G, Rogers, H, & Jennett, P. Use of telehealth technology to extend child protection team services. *Pediatrics* (2001). , 108(3), 584-590.

