

DEVELOPMENT OF A STATEWIDE MARYLAND PEDIATRIC TELEMEDICINE SYSTEM TO IMPROVE INTERHOSPITAL TRANSFER OF PEDIATRIC EMERGENCY PATIENTS

DESCRIPTION OF PROJECT

The goal of this proposal is to introduce interactive telemedicine enabled videoconferencing with secure data transfer and storage as an improved, state of the art model for pediatric patient transfer from outlying hospitals in Baltimore city and throughout the state of Maryland to a tertiary care Pediatric Emergency Department (PED).

We hypothesize that the telemedicine network will improve quality of care because patients who are transferred from a referring or outlying hospital Emergency Department (ED) to the tertiary care PED using telemedicine enabled communication will have fewer duplicate diagnostic tests and improved diagnostic accuracy compared to patients who are transferred using the conventional phone/FAX based communication. We also hypothesize that the telemedicine network lead to cost savings by leading to an overall decrease in patient length of stay in the emergency department, expediting the time to definitive diagnosis and decision by the treating physician, and by prevent unwarranted transfers.

EVIDENCE

Patient medical information is often incomplete, inadequate or even lost during the conventional phone/FAX/hand carry records based transfer process, thereby leading to unnecessary duplication of tests The published rate of duplicated tests in inter-hospital transfer of pediatric patients is >20% [1]. Children are a vulnerable population and young children < 5 years of age transferred from outlying hospital emergency departments (ED) to tertiary care Pediatric Emergency Departments (PED) are particularly at risk for unnecessary duplication of diagnostic tests including X-rays, CT scans and invasive tests such as blood draws, urinary catheterizations, etc. **Thus there is a compelling need for a safe, secure, on-demand, interactive, real-time visual and verbal telecommunication system with secure data transfer and storage in the pediatric emergency department setting.**

The use of telemedicine has not been widely employed in pediatric emergency medicine. However, communication by telemedicine enabled voice and video systems has been proven effective in a variety of clinical venues including sexual abuse examinations [2-4], teleradiology on inter-hospital transfers [5], stroke management [5], diagnostic accuracy in pediatric burn patients [7], application of telehealth in cardiopulmonary physical therapy [8] and on rural trauma care [9]. These studies concluded that telemedicine is an effective way of improving the quality of patient care and increasing patient/parent satisfaction [10-11].

IMPACT AND COST SAVINGS

The proposed telemedicine system will have a positive impact on healthcare in Maryland.

1. **Improve the quality of care and patient safety by:**
 - Minimizing the time to definitive care of transferred patients
 - Reducing the exposure of patients to repeated invasive procedures including radiation
 - Improving the accuracy of initial diagnosis.
 - Improving patient/parent satisfaction.
2. **Reduce the healthcare costs (to hospitals, patients and health system) by**
 - Minimizing the length of stay in the emergency department.
 - Reducing the costs of repeating the tests
 - Reduce the number of unwarranted transfers

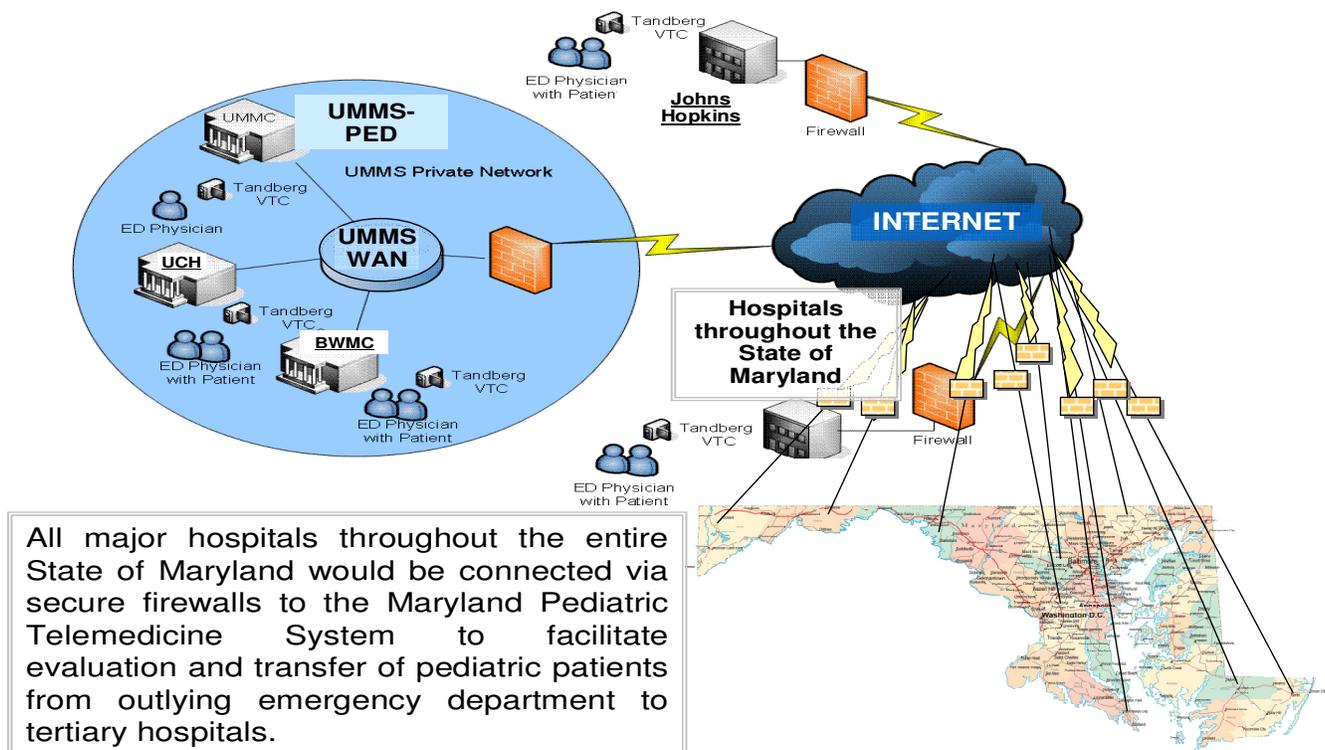
EASE OF IMPLEMENTATION

The implementation of a statewide Maryland Pediatric Telemedicine System is very straightforward and preliminary ground work has already been done at UMMC (Univ of Maryland Medical Center) to facilitate the development of this system. The UMMS – OBGYN department has an established Video Conferencing infrastructure that connects to several outreach community centers, allowing to conference securely.

All the necessary training of equipment and 24 hour per day/7 days a week support is provided by the Tandberg IT support staff. The support for infrastructure and connection issues will be dealt by the respective IT departments at the outlying hospitals.

To ensure that the communication and data transfer is secure, the computers are password protected and the information is encrypted. The data are transmitted using secure web access via the network cloud and through multiple levels of security and firewalls within the UMMS system and at each outlying site as depicted schematically in Figure 1 below.

Figure 1. Schematic the Maryland Pediatric Telemedicine System using Tandberg VTC secure web access technology for data transfer through multiple levels of security protocols and firewalls within the UMMS system and at each outlying hospital throughout the State of Maryland.



Steps in implementation

1. Work out the details with the administration and information technology (IT) department of each hospital
2. Purchase and installation of equipment (including hardware and software)
3. Training of personnel at each hospital – using both onsite and online training modules
4. Ongoing IT support

Approximate Costs

1. Video conferencing equipment at each outlying emergency department site will be approximately for desktop setup (\$10,000-\$14,000) and for mobile unit (\$35,000-45,000). (A statewide network may result in a better cost from the vendor).

(Package includes hardware, software, installation and limited warranty and initial onsite training for physicians and staff at each site).

2. **Human resources include –**

- Director/Coordinator (20% time and effort ~\$50,000/year) for overall administration and supervision of the system
- Research assistant (~50% time and effort ~ \$26,000/year) for compilation and analysis of patient transfer data to demonstrate and validate cost savings and improved quality for use of telemedicine).
- IT support at each site (\$0) each hospital already provides 24 hours a day and 7 days a week IT support.

Approximate time to implement

Preliminary groundwork has already been done to establish a telemedicine network. Sites within UMMS network (Upper Chesapeake Medical center, Baltimore Washington Medical Center) and several outlying hospitals (Franklin Square Hospital, Good Samaritan Hospital) can be set up immediately and implemented as soon as the human subjects institutional review board (IRB) approval is obtained.

Other hospital sites will take from 3-9 months (maximum) to obtain administrative approval, set up IT protocols, and train personnel.

If the statewide network is implemented most hospitals in Maryland will want to be part of this system. This will greatly facilitate obtaining administrative approval from each hospital.

Telemedicine Technology and Equipment

The basic equipment that will be installed at PED and each outlying site ED is a desktop single unit personal computer (Figure 2a) a mobile cart (Figure 2b). Each unit consists of fully integrated high resolution LCD monitor, camera, microphone and speakers. The secure videoconferencing and content sharing will be done using specific software which enables content sharing with high definition video images and real-time two way communication of physician to physician and physician to patient.

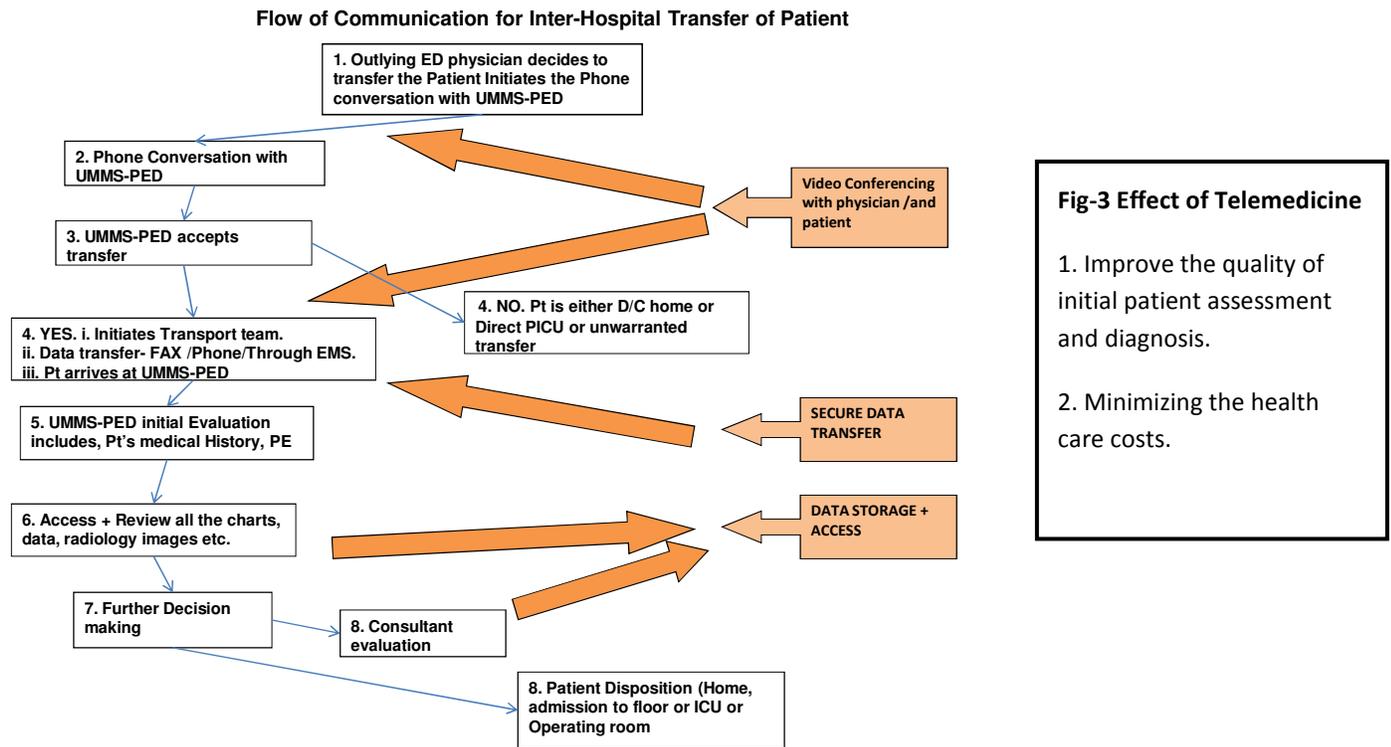
Figure 2. Tandberg EX90 video conferencing desktop unit (2a) Mobile unit (2b).

2a.

2b.



Figure 3. The effect of telemedicine use and impact on quality of patient care and potential cost savings.



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