MCHB/EMSC Webcast

Telemedicine and EMSC: Current Applications

December 5, 2006

DAN KAVANAUGH: Good afternoon. My name is Dan Kavanaugh and I'm the senior program manager for the Maternal and Child Health Bureau's emergency medical services for children program. Thank you for attending this afternoon's webcast on "Telemedicine and EMSC: Current Applications".

Before we get into the presentation I have some technical information I want to provide for those who are viewing. First of all, the slides will appear in the central window and should advance automatically. The slide changes are synchronized with the speaker's presentations. You do not need to do anything to advance the slides. You may need to adjust the timing of the slide changes to match the audio by using the slide delay control at the top of the messaging window.

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Eastern Time to 2:00 p.m. Eastern Time for the speakers. We encourage you to submit questions at any time during the broadcast and they'll be relayed to the speakers during the question and answer time.

On the left of the interface is the video window. You can adjust the volume of the audio using the volume control slider which you can access by clicking on the loudspeaker icon. Those who wanted accessibility features will see text captioning under the video window.

The interface will close automatically at the end of the presentation and you can fill out an online evaluation. Your responses help us to plan future broadcasts in this series and improve our technical support. I would like to go ahead and introduce our two speakers for the afternoon.

Our first speaker is Dr. Jim Marcin. Dr. Marcin is associate professor of pediatrics and pediatric critical care medicine at the University of California Davis working in the pediatric intensive care unit at Children's Hospital and the director of the UC Davis telemedicine program. He is a major professor in the graduate group in epidemiology at UC Davis and has written many articles. His expertise in research interests including emergency medicine. Telemedicine, decision support and quality of care measures. He has acquired more than $1 million in grant and gift funding to implement and study telemedicine in rural and underserved emergency departments, clinics and inpatient Wards. With these grants he's research the impact of telemedicine on the quality of care delivered to children all over northern California.

Our second presenter will be Dr. Rifat Latifi. He's professor of clinical surgery at the University of Arizona in Tucson and director of Arizona telemedicine and telepresence program at the University Medical Center and associate director of Arizona telemedicine program where he leads telesurgery and international affairs for this program. He's written on surgical nutrition and metabolism. Laparoscopic surgery and telemedicine and serves on several boards. He has many international collaborations and the developments of educational programs including electronic libraries in underdeveloped countries and rural America. He's the project leader for ER link Tucson. The first EMS telemedicine system in the country. He spends his time between Arizona, Kosovo and I want to make the note here that after Dr. Marcin's presentation we'll have Dr. Latifi's. We've had technical difficulties with his slides. Those slides will be posted on the archive once this broadcast is archived. They can be printed down from the archive. That archive will be up for two years. Without further adieu I want to present Dr. Marcin, our first presenter.

JIM MARCIN: Hi, I'm Jim Marcin, the director of the pediatric telemedicine program at the University of California Davis in Sacramento, California. For the first part of this webcast I'm going to discuss telemedicine, what it is, why it's growing in popularity, and how it can be incorporated in EMS-C to increase access, reduce disparities and hopefully improve the quality of care we provide to acutely ill and injured children. In particular I'm going to speak to you and describe our experiences with the use of telemedicine in rural underserved emergency departments to help assist providers in the acute management of medical diseases.

Dr. Latifi will follow and describe how he and others at the University of Arizona use telemedicine in the treatment of trauma and other acute surgical diseases.

The general principle as to why it's an attractive means of healthcare delivery in your model is with telemedicine care can be both regionalized which improves the efficiency and quality of care and at the same time expertise can literally be available on any street corner. We know that regionalization of trauma centers results in improved quality of care. This is also true for pediatric emergency medicine and intensive care. If an acutely injured child press to a clinic or emergency department without pediatric specialty services, what then? Telemedicine can be part of the solution to this problem. Many believe, myself included, that telemedicine will become integral in the way we practice medicine in the future. Currently telemedicine exists in all 50 states and its use is increasing at a rate of 30% to 50% per year. There are many reasons including the fact that there is improved quality and lower cost of equipment. Improved quality and lower cost of telecommunications and increased opportunities for funding. It not only relates to funding supporting research investigations into the utility and impact of telemedicine like the office for the advancement of telemedicine, AHRQ or NIH but other agencies ear marking money for telemedicine because they believe it will improve patient quality of care. This past October the Department of rural development under the auspices of the U.S. Department of Agriculture awarded over $25 million for distance learning and telemedicine projects across the United States. Similarly this year the FCC will spend $1 million to

support building of broadband networks for telemedicine. Other reasons why it's increasing include favorable changes in re imbursement.

Currently there are more than 30 states that have laws detailing reimbursement for Medicaid and it's reimbursed by Medicare if specific conditions are met. In addition many believe that telemedicine can be part of the solution to the projected physician shortage over the next 15 years which is estimated to be between 85 and 200,000 physicians. Another reason why telemedicine is gaining popularity is healthcare providers are getting over the early doctor hump. It is happening as things have become part of our daily routine in providing care. Lastly and in particular for EMS-C living in a world post 9/11 and Hurricane Katrina we recognize to improve our ability to triage, transport an treat patients in a more organized manner. There is global benefits that augment the current healthcare delivery model. A reductions in the distance barrier for patients in need of specialty consultations. Improvements in overall quality of care related to improved communications between the consultant and primary care provider as well as ongoing education to providers and trainees on both ends of the camera.

There are also many studies that have demonstrated that telemedicine increases patient and remote provider satisfaction. This occurs even if the consultations occur over a short distance. If general, the patients and parents appreciate a specialist’s opinion. Telemedicine can result in the reduction of overall healthcare costs because earlier interventions, improved quality of care all work together to reduce healthcare costs. Lastly, it is believed that telemedicine can increase the efficiency of tertiary senders to allow

people to treat patients in remote locations and only except those in absolute need. As an example of how popular it's become shown is a map with all the locations that UC Davis connects to for out patient and inpatient consultations and distance education. Telemedicine is currently used in a multitude of locations and has been incorporated really in wherever healthcare can be provided. Locations include rural and urban primary care clinics for typical out patient specialty consultations.

Emergency medical services which I'll spend the rest of my time talking about. Rural and emergency hospitals including emergency departments, in-patient Wards and operating rooms. Sub acute and rehabilitation facilities. Prisons, jails, youth authorities, homebound patients and hospice patients and in particular related to pediatric care telemedicine has been used in regional centers, day-care centers and summer camps. Lastly the alternative applications that include services such as video interpreting where an interpreter communicates with the patient, family and providers over videoconference and family links that allow hospitalized children to link up to family members and relatives in other cities and states using videoconferencing equipment. Now the use of telemedicine can occur at any point during what could be called the EMS-C pathway. That is telemedicine can be used in a pre-hospital setting, be it at the scene of an accident or in a physician's clinic to the transport of a patient to the emergency department and if necessary for to the operating room, intensive care unit or in-patient ward. Once the acute injury or illness improved telemedicine can be used for follow-up clinics, psychiatry, rehabilitation or medical/surgical follow-up.

Lastly, several EMS-C networks use telemedicine to provide ongoing education for EMS-C personnel. I'll explain in more detail how we've used telemedicine at the different points along the EMS-C pathway. In the pre-hospital setting telemedicine can be and has been used at the scene of medical emergencies. Portable satellite systems like the ones shown in this slide can be stored in suitcases and be taken to the scene of medical emergencies. This satellite system can be set up as a temporary triage unit. Such units can be used for mass casualty emergencies or those involving hazardous materials or unknown or suspected infective biological agents. The black videoconferencing unit has a built in camera to allow healthcare providers to triage, diagnose and determine what order and where patients should be transported. Newer non-satellite high speed telecommunications such as wireless broadband, cellular technology have also been developed that allow pre-hospital telemedicine to take place without a satellite. The U.S. Military has been at the forefront in the development of such systems. The State of California has run terrorist and national disaster drills that have integrated telemedicine. This is shown during a disaster drill in San Francisco. Telemedicine is being used during medical transports for transporting patients from pre-hospital locations to the emergency department, as well as during interfacility transport. Just as in scene telemedicine it involves satellite technology and cell phone technology such as EBDO or where cell phones are coupled together to provide a band for teleconferencing. The University of Arizona and the State of Arizona have been on the leading edge of transport telemedicine. The use of telemedicine has also increased across the United States over the past several years.

There are several reasons why telemedicine in the emergency department makes a lot of sense. First there is substantial data to demonstrate that emergency departments and non-Children's Hospitals are less prepared with regards to equipment, training and experience when it comes to treating acutely ill and injured children. The recent CDC report released in February of this year reported that 40% of emergency departments in the U.S. lacked 24/7 access to pediatricians let alone pediatric specialist. The Institute of Medicine's report on the future of emergency care released June of this year highlighted in therapy add trick report that despite the fact that children make up 27% of all ED visits only 6% of EDs in the U.S. have all the necessary equipment for pediatric emergencies. Telemedicine has been shown in several cities to be both feasible and practical in the emergency department. There has been a few more studies that have compared in-person ED visits with telemedicine ED visits including studies by John Brennan from New Jersey and David Ellis from New York. Both of these studies have demonstrated that ED visits using telemedicine result in nearly identical diagnostic accuracy and treatment plans when compared to in-person visits.

Again, several ED programs exist across the United States including the one depicted on the left side of the slide here where a doctor from the University of Vermont provides a trauma consultation to a rural emergency department in Vermont. Successful programs have been those that fill a specific need and have true commitments from both remote and referring sites and include support from both physicians and hospital administration. Here at UC Davis we have developed, with the help from a grant from EMS-C a telemedicine network to nine rural underserved emergency departments. The purpose of the network is

to provide these departments with 24/7 consultation access to our pediatric emergency medicine physicians and critical care physicians. We have been studying the impact of telemedicine on several outcomes including quality of care measured by chart review by two pediatric emergency physicians using an implicit review instrument. Medication errors measured by two pediatric pharmacists who review the blinded charts using a standardized medication collection form. Referring provider satisfaction, parent satisfaction and transfer appropriateness. We plant to compare these measures between the patients that receive telemedicine consultations to similar patients that receive either telephone consultations or no consultations for match control emergency departments of similar size that do not have telemedicine. This is an example of a wall-mounted telemedicine unit in a rural emergency department. There is a small black camera on top. A flat screen monitor beneath. The unit is mounted on a C-arm that pulls out from the wall and adjusted up or down. Specialists can move the camera including zooming in and out. This is another example of a wall-mounted unit in a rural emergency department.

A third example of a wall-mounted unit in a rural emergency department. For trauma purpose either telemedicine units are ceiling mounted. The units can also be pole mounted and be mobile. The unit on the left is a pole-mounted unit in another one of the rural emergency departments and is wireless with the UPS battery mounted near the bottom. On the right is a mobile wireless unit that we have in our pediatric intensive care unit. We have a headset attached to this unit for better audio and patient confidentiality. We also have PC-based units with high-end webcams mounted on the top of the flat screen computer monitor so we can do consultation from workstations in our pediatric ICU

and the emergency department. Three doctors have home units that allow us to connect to rural emergency departments when the attending physician is busy. Personally I've done several such consultations from home during the daytime and nighttime using a videoconferencing unit connected to my home television. This is an example of recorded video clip taken during a resuscitation of a child brought in by EMS to an outside emergency department who was found down and pulseless of home.
The child died of SIDS. We obtained consent to show this video.

>> Can you see the monitor now?

>> Wait a minute. It's at the head of the bed, okay.

>> Okay, hold CPR for a minute.

>> Stop CPR.

>> If you want to resume CPR you can. This would not be a bad time to call the code. Is her mom around somewhere? Is her family around?

>> I told the parents where we were about ten minutes ago and told them her heart activity stopped.

>> Now wouldn't be a bad time to bring that in and can be there when you say it's enough and they can kind of hold her right away and stuff.

>> Great idea. The dad has been here for most of it. I'll call him. Okay.

>> To date we have done more than 40 consultations on acutely ill and injured pediatric patients in rural emergency departments including one last night. A 10-year-old girl came in with new on set EKA. Because of bad weather flying was not an option and it was going to take 3 1/2 hours for our pediatric critical care transport team to get there. In the meantime the rural emergency department was unable to get I.V. access and were in the process of calling a surgeon in from home which would take at least 20 minutes. Our physician over telemedicine was able to assist in the placement of a central line. He was then able to oversee the management for the 3 1/2 hours it took for our transport team to arrive.

Anyway, back to the data on the slide. An interim analysis demonstrated that telemedicine consultations when compared to telephone consultations have translated the higher quality of care as measured by implicit review. Significantly higher satisfaction of care. Significantly higher consult satisfaction and no differences in transport frequency. Some doctors working in the rural emergency departments never use the telemedicine equipment while others really like it and use it not only on critically ill children but for moderately ill children they call for second opinions. These are some of the interim data. Quality of care was scored by pediatric emergency medicine physician experts on a 7

point scale. In this table one can see that the reviewers scored the rural physicians plans for disposition and follow up an average of 6.0 on charts where telemedicine were done compared to 5.7. Overall quality of care was scored 5.4 for charts with telemedicine consultations versus 5.2 for non-telemedicine consultations.

Another question that we asked the reviewers was the question of validity which was would you want this doctor caring for your child? As you can see, the reviewer scored this question a 5.2 for telemedicine consultations versus a 5.0 for non-telemedicine consultations. None of these comparisons were statistically significant. Shown here is the graph of the parent satisfaction. Telemedicine consultations are in purple. The measures included in the parents' score were courtesy of the remote nurses and physicians. Skills of the referring physician, explanation of what was being done for their child. Overall quality of care, and their overall experience in the emergency department. For all measures parents ranked their satisfaction with telemedicine consultations higher when compared to non-telemedicine consultations which included telephone consultations and no consultations at all.

Shown here in the graph is a referring provider satisfaction. Again, telemedicine consultations are in purple and here telephone consultations only are in yellow. The measures include the referring provider consult experience, assistance of telemedicine versus telephone consultations in a medical management of the patient and the referring provider's impressions that the clinical skills of the UC Davis specialist. With all measures higher marks for telemedicine consultations compared to telephone consultations. In this

graph we show the referring provider's impression of whether the telemedicine consultation versus telephone consultation resulted in additional diagnostic studies, additional medications administered and if it resulted in a change in the patient's disposition. They become more involved with the care of a patient with the telemedicine and change the ER's doctor's planned position of care. We don't know if it results in better care of the patient but our impression is that it does.

To briefly complete the EMS-C pathway that an acutely injured or ill child might take we provide critical care consultations for children in remote inpatient Wards and ICUs. We've published the ICU data and demonstrated that the consultations result in good quality of care and result in high parent satisfaction. We also have a new program to provide pediatric Wards without pediatric specialists the capability to obtain pediatric consultation such as cardiology, infectious disease and so on. In conclusion, what I hope that you get from this first part of this webcast is that the use of telemedicine is increasing and will become an integral part of the way we deliver care in the future. It can assist at any time from continuing education to the scene of natural disasters, during patient transports. In emergency department, ICUs, operating room as well as for physical and mental health follow-up.

Lastly, UC Davis and others have established successful emergency department telemedicine programs and hope to disseminate this tool to help achieve some of the goals of the EMS-C including decreasing barriers to access, reducing disparities in care and improving the quality of care provided to acutely ill and injured children.

RIFAT LATIFI: Good afternoon and greetings from Tucson, Arizona from the University of Arizona in Tucson. What I will discuss for next few minutes here with you and share our experience will be a telepresence for rural trauma and critical care and do we really think it's ready for prime time. You obviously think that I will say yes, otherwise I wouldn't be here. So we think clearly it is ready for prime time.

This is the view of the university medical center in Tucson, Arizona. We are the only trauma center in Tucson -- in southern Arizona. We look approximately after 5,000 patients a year. This is the Arizona telemedicine network. It is one of the best programs in the country and in the world for that matter. And it is affiliated with many institutions and disciplines as I will show you in the next few slides. This was basically created to put telemedicine and technology where life is difficult be it in the desert. Be it on a mountain and remote areas of Arizona or in jail or any other places where life is just simply difficult. It started by Dr. Weinstein. You can see it on the slide it says robotic telepathology. He founded it in 1996 and we're celebrating ten years of a very successful program of telemedicine.

We have realtime video as well as distance education. Here is some of the affiliates that we have so far. This is actually getting bigger and bigger almost weekly, if not more often. We do at the University of Arizona telemedicine is applied to all the clinical disciplines from anesthesia all the way down to the wound management and surgery and so on and most recently we've added trauma or teletrauma. Let's start with some facts here. Only

about 23% or 25% of the population resides in the United States in rural America. However, 56.9% of deaths from motor vehicle crashes happen in this population. It shows how prevalent and how deadly could potentially be if you get into a car crash or sustain a major trauma. It is thought that approximately 40% of deaths could have been prevented if we have a trauma system and good trauma care overall. If you live in Lubbock, Texas you're 600 times more likely to motor vehicle crashes than if you lived in Manhattan. As a result, the rural trauma care is really sort of lacks the proper care that needs to be given to patients because of the low volume centers.

Limited experience, staff is basically on a revolving door and subsequently they lack trauma emergency care, continuous medical education, lacks specialists such as trauma surgeons, vascular surgeons and orthopedic surgeons for critical care and so on. As a result, patient involved in motor vehicle crashes in rural America have twice the rate of mortality than those in urban settings. So where do we stand worldwide with teletrauma and telemedicine for injured and critical patients? Frankly, nowhere. And the real question comes how come we are not -- we don't have programs like this everywhere? We have communication technology, we have telemedicine and we know how to do it. What is wrong then? Well, it's very simple. Telemedicine and telepresence from 9 to 5 does not work when it comes to trauma and emergency. It just simply is not enough. You have to have 24 hours of telemedicine programs in order to really be successful and help patients in need. So then what do we need to do? Well, first we need to be creative. We need personal involvement. We need to get out of our current comfort zone and embrace

technological advances as well as recognize distance education is here to stay and we need to embrace and work with it.

Other most important element in my mind is the community involvement which really is crucial in this area. It's already well established that we need to intervene in the first golden hour for trauma and critical care. Injured patients, especially in the injuries that happen due the traumas. Often time it's not possible to intervene. There is nonetheless we think this needs to be changed. So how can we change this? Well, we need to intervene in the golden minutes. We have successfully established a program which I will tell you about here in Arizona where we actually intervene in these first minutes of -- after the injury, not in some golden hour. In other words, what we need to do is have expertise of trauma centers available and accessible to small hospital ERs in rural regions 24 hours a day, 7 days a week through virtual trauma presence. One such program is southern Arizona teletrauma program.

There is a cartoon of it that I'll talk to you about a little later. Let me just review a couple of technologies that are available nowadays. Digital ambulances to monitor patient transport. From the options that we have interhospital telemedicine and telepresence networks we have SAT is the southern Arizona program. Monitored patient transport we have a program called ER Tucson link and obviously the other programs such as the mobile telemedicine systems for disaster medical admissions so on and so forth. At 13 months pilot project in southern Arizona started in November of 2004 and ended in January 2006. This was with the Douglas hospital, which is the most southeastern corner of Arizona and

it is approximately 120 miles from here. We created what we call command and control center and this is connected directly to the emergency room in Douglas, Arizona. For the first 13 months we had 21 patients and we managed them. Five of them had life-saving interventions. 14 were accepted for transfer. One we were unable to accept because both neurosurgeons were operating doing emergencies. Five unnecessary transports were prevented. Two were discharged to home and three were treated at Douglas.

Let me go through some cases that we had. This is the first case that we managed over the telemedicine for trauma. An 18-month-old baby was brought to southern Arizona medical center in Douglas, three hours after a motor vehicle crash with three fatalities. Severe head injuries, fractures of her leg, both tib, fib and left femur fracture. In coma in a grave state. Hypoxic with saturations in the 70s. Hypertensive in the 50s. Blood pressure, systolic blood pressure in 50s. Severe acidosis and bled to a hemoglobin of 5.8. We were able to help the physician who was on call that day in Douglas and as you can see here advised to intubate her. You can see clearly the attempt to get the I.V. access on this patient. Once she was intubated as you can see the chest tube, the endotrachall tube is in the lung. Most of her right lung was not being ventilated. We were able to see this and advise the physician to put the ET tube back. Decompress the stomach. There was a bubble there and with help there was significant improvement in the systolic blood pressure and saturations. This is a picture of her now as you can see here we actually had to -- once she was transported via helicopter I.V. access was lost again and we had to get access to the bone interoseous access or I.V. fluid and do a ligation of the femoral vein in here. This is one of the fractures that she had. One of the many injuries she had. So we

had a series of interventions on this patient from the intubation the patient tokable to evaluate chest rising and after intubation. We positioned the ET tube from the right main bronkis. Obtained from a vein or axial access. Resuscitated, gave her blood. Suction, so on and so forth. The myriad of interventions that helped the physician to really save this kid's life.

Following that we had many more cases and you see on this one the upper part of the slide this is on the left chest from the gentleman. We were able to evaluate. This gentleman here was advertised to us as a scale of 15 but within minutes after we were looking at him and examined him over that network it was established that he is actually -- his scale was five and he was immediately intubated following which within about an hour or 45 minutes he was in the operating table having -- operated on his brain and evacuating his huge subdural hematoma. Here is another case that we were able to assess, as you can see, it is a gunshot wound to the neck and certainly has expanding hematoma. That will compromise his airway very shortly. We advised the physician to intubate this patient and transfer him immediately to us at which point we found out that he had transected his jugular vein but he lived and did very well.

This is another case. A soft tissue infection or flesh eating bacteria infection of the arm. This particular patient refused to come to the hospital the day before and he was still refusing the next day. She wanted some antibiotics and wanted to go back home. The physician actually invited me to see her and talk to her directly, which I did and convinced the patient to actually return to come to see us immediately. Needless to say, she came in

full blown multiple organ system failure or septic shock. She had five organ failures by the time she arrived from the liver to kidney and so on and she underwent many operations and we were eventually able to save her arm. Certainly saved her life but we were able to save her arm. Now that she has a functioning arm.

This is one of the patients that we were able to manage was a gunshot wound to the chest in Douglas. The physician actually who was looking after this patient was not very happy with my decision to keep the patient there and sent the patient to Phoenix, Arizona without really calling me back and it was unnecessary transfer because the patient went to Phoenix, got a chest X-ray, was told it was normal and sent back home. You can see here on this x-ray what we like about this system I can see the vital signs directly. His saturation 99% and blood pressure as you can see is 133/68. He's in great shape. Chest x-ray was totally normal. Resuscitation can be done via telemedicine. We need creativity. Expertise needs to be used if one has them. Most of us do have this kind of expertise. There are a couple of questions we had to resolve in our program. Is it acceptable by referring hospitals? Is it acceptable by trauma and emergency docks and the concept of big brothers watching had to be resolved. All of these actually were very well taken care of. The refer physicians and hospitals have certainly embraced the concept and embraced the concept. Our trauma Docs and emergency Docs certainly like it and they longer fear that big brother is watching as we all understand we're here to take care of patients and whatever we do is going to be the beneficiary will be the patient themselves but we'll feel much better if we do good things for patients. As a result, the university medical center, the program now has -- is expanding to eight other centers and this program actually was

funded by Blue Cross and Blue Shield insurance company that have been partnered with our hospital in creating these programs. Now we are going to put telemedicine units for trauma and emergency care in all regional hospitals that we get patients to our telemedicine -- to our trauma center in Tucson. This is how it is going to look. As of right now we still have Douglas only. However, other places are on board and hopefully activated before New Year's Eve.

Another program that we have is the patient transport or ER Tucson link program. This is very innovative program where we will look after the patients from the moment he or she gets into the car crash or any trauma to the moment they come to our trauma room. This will be through the video access and data access and voice access from the ambulances. The ambulances actually have cameras that will show the sites or the scene of the accident or whatever that may happen. So as you can see in this slide, this is what we will get into the care point or the emergency room so you can see the physician talking to physician or paramedics or whoever and this unit is going to be inside the ambulances. You can see the camera here on this particular one. You can see the camera on top of the ambulances. This will actually show the status of the scene what is happening. You can find more about this on EMS telemedicine.com. We think it represents the first operational EMS telemedicine system in the country and we'll send still and video images and monitoring vision and all the data from moving ambulances to the ER link.

Here just kind of to dissect this, these are inside the ambulance, monitors and cameras connected which is then connected to a radio. Within Tucson itself the radio is located

throughout the city to provide high speed digital wireless communications in moving ambulances. Inside the ED we have a care point, as you can see here workstations, they receive and display medical information and images and store call-in information. I mentioned to you just a little bit, a couple minutes ago they have cameras. It is important for us to see the scene of the car crash or the scene of the accident or whatever had happened so we can get an idea as to the mechanism and the significance of the mechanism of injury and so on. The uniqueness of this program is really crucial, I think, because what it does, it has one team which is Tucson transportation department, Tucson fire department and Tucson is only one level trauma center. The issue of the big brother watching, we tested it with the paramedics by taking here up in the ambulance. We're about six miles away from our telemedicine center and watched the paramedics intubateing the patient. Right between the cords you can see it is a perfect view. No more doubt if the patient is being intubated properly or not. Used in simulation for healthcare providers as an education tool has been another element that we sort of resolved, the big brother watching. Now we are friends with paramedics and the only goal we have is to look after the patients and not really be judgmental.

There is just another picture, another view of this. Again you can basically use simulation technology, too, for education purposes throughout your network. It takes manpower, this is Mike, our engineer and this is one of our residents who now actually is in trauma and critical care fellowship. Vermont experience showed 61% of cases trauma surgeon felt that teletrauma improved patients care while the referring doctors felt it was the case in 83% of the cases and easy to use at t least on their system. One other question that we

just sort of have to really think about these is sustainable programs and safety and I sort of -- the acceptance of healthcare providers and is it worth it? In our 21 patients that we had as you saw from the data, 24% of the cases we think that we saved their lives and in 24% of other cases we actually did not need to bring the patients to our program which is a significant number of patients. Yes, I think it's worth it a lot. And has been very safe so far as well as it's quite sustainable and the referring provider loves it. I did not bring up telemedicine for disaster because this is a huge topic and probably a topic on its own for another webcast. And hopefully we'll do that at some point. But certainly telemedicine and satellite access can be used for any of these disasters that you can see on the screen.

We have other issues in our program. We certainly look after about 1.5 million population. A lot of those patients come from northern Mexico or south of us here and we hope that eventually our southern Arizona telemedicine program will expand all the way in SENORA and along the border for education programs as well as simply helping those physicians take care of their patients. Limitation to our teletrauma program is ethical. Reimbursement issue is an important one. Legal issue is important. Referral pattern we have learned that, that now it's in pretty good shape and the physician's behavior as well as community involvement. Let me address two of them. The ethical part I think is it's unethical for anyone in any ER, any emergency room in the world to die because they were not -- they did not have access to a specialist. So I think -- so we certainly need to do it. Legal issues, a lot of people are concerned about that. I think it is going to be -- it is going to help us with the legal system because we'll have at least physician who is looking after the patient

with a specialist looking over their shoulders and we certainly will have much better documentation and state-of-the-art care.

In conclusion, telepresence can be performed successfully and safely using telemedicine principle when guided by specialists and transformed care from golden hour to golden minutes. This is pictures from Douglas, Arizona. You need to be dedicated. You need to visit them and work with them on a daily basis and make sure they're educated. These are nurses looking after this program and certainly this particular program is well and alive and functioning and is very successful because of the nursing staff. I personally got involved in telemedicine in other areas such as creating a telemedicine program in Kosovo. We have created an international hospital. This book has become a classic on establishing telemedicine in developing countries and the result of this program that I have established. I will be remiss if I did not thank those who make this possible. Dr. Porter, the trauma director of our program. Michele is our manager. Eileen is the vice president for pre-operative care. Mike Holcomb is our engineer and Dan is our coordinator and knows everyone in Arizona. Let me just conclude that it was a pleasure for me to be here but I'll conclude with this slide.

There are no more excuses for any trauma or critically ill patient to die in any emergency room in the United States or anywhere else, for that matter. Just because there was no trauma surgeon or critical care specialist on site to help with the resuscitation. There is no longer an excuse for that. No question this program will prevent trauma and critical illness-

related preventable deaths. I thank you very much and I will be very happy to have -- to answer any questions. I guess I'll do that over the phone. Thank you.

DAN KAVANAUGH: Thank you very much. And we do have a lot of questions. We probably won't be able to get to all of them but we will try to get answers to those questions archived and we'll get Dr. Marcin and Dr. Latifi to provide written responses that can be archived. But let me throw out a few questions and we have a little over five minutes left. This is either to either Dr. Marcin or Dr. Latifi. What are the major startup costs that you have found involved in establishing a telemedicine program?

>> This is Jim Marcin and I can briefly mention that and Dr. Latifi can speak to that. There is -- it's a fairly significant. I guess you could get by with just the components of the videoconferencing units which can range in low quality to high quality from several hundred to several thousand and you could use the Internet for telecommunications. That would be a low-cost solution. If you talk about the personnel, technical people. Administrative time and support it is a fairly big cost. It is better done, I think, at an institutional commitment level that there is people dedicated with salary support than trying to just buy the videoconferencing units and deploy them at the sites.

>> I agree with that. This is Dr. Latifi. I agree. It tends to be pretty expensive starting from scratch. Once you have telemedicine system, then establishing telemedicine for emergency medicine and trauma and so on becomes rather cheap. I'll give you one example. Transporting our patients from Douglas, Arizona via helicopter to Tucson costs

$28,000. Our units that we bought that we use for telemedicine for trauma and telepresence actually less than $20,000. So if you can save one of those needless transfers you can actually buy the system itself.

>> Thank you. And actually a couple people had this question so I'll kind of combine it and I think it will address both the people that asked. You both described the value of having telemedicine available to facilities to improve the care of children. Could you address any specific concerns or issues related to HIPAA and did your legal departments have any specific concerns or recommendations as you set up your systems such as long distance medical risk, issues, etc.

>> Jim Marcin again. It hasn't been a big issue at all. A lot of the videoconferencing units have encryption modeled in the software. When we use the Internet we set it up over a VPN so there aren't issues regarding HIPAA over the data transmission. Regarding legal issues, and liability insurance, it's been our institution and our legal council's perception, which I agree with, this is providing a higher level of care than it would be over the telephone and so they haven't viewed this as taking on more risk at all. Conversely they've probably seen it as lowering our risk.

>> Dr. Latifi here. Actually, our legal department had reviewed every document that we had put in place for our telepresence and teletrauma program. In addition, all trauma physicians and all physicians that would be involved in the telemedicine program have limited credentialing system placed with these small hospitals. We are very careful not to

record any of these encounters without the permission of the patient and/or the family. So we basically practice medicine at a distance but with the same criteria that we would do in our hospital.

>> Thank you. Another question is how are you, when you're doing a telemedicine consultation, involved in the parental consent process or how is it obtained during a teletrauma or pre-hospital telemed consult or are you involved in that?

>> This is Dr. Latifi. In the case of an emergency at our hospital, we have a law or a policy that we can basically proceed with the operation over the procedure with two physician consent or with the proper documentation. In case that there is a family member and/or a patient can give consent, he or she will do that. In cases of teletrauma we use the same principles. So from -- if the patient is able to give consent for telemedicine he or she will do or the family. Basically nothing changes in practice of medicine except the fact of distance.

>> I agree. California does have a law that you try to get consent prior to telemedicine. A law established as telemedicine was beginning. We do the same as Dr. Latifi.

>> Okay. Another question from Mike in Alaska is, how will emergency department physicians determine which EMS responses they will monitor via EMS telemedicine? With dozens of responses each day would a physician be assigned to monitor the system at all times?

>> Well, this is Rifat again. That's a loaded question. Today we don't monitor all the calls all the time. At least in our emergency room. They will tell us who is coming in and we get chopped information. Most of the time we don't really understand what they're saying. It's a bad radio or connection or a connection that works. The hospitals will probably have to set up protocols and criteria to which ones will be followed entirely. In practice this is not that difficult to really manage that you think you have 10, 15 patients at once. Rarely that happens except for a busy, busy systems. I think what we'll have to do is basically create technology that will be able to drop one and go on to the next call and or hopefully at some point might put them at the same time on the screen. We are involved in technology, we should be able to deal with that.

>> I think we have time for one more question. I'll throw it out to either physician. How is telemedicine physician consultation compensated?

>> I think Jim maybe I'll take this one and you can add. Because we have credentials you can actually dictate the note, which we do. You can send this consultation for reimbursement and usually get reimbursed like you would do any other telemedicine consultation. There is no difference from elective to emergency.

>> It's the same. I would get a consultation as if I were seeing the patient in my emergency department. There are differences between states. There are 32 states that have specific legislation addressing this. So you would have to double-check with your state and private insurance companies.

>> I would like to thank both presenters. Again, we got a lot of questions and we'll follow up with the presenters to get some written responses to the questions we couldn't answer on the webcast. And post those along at the archive site along with Dr. Latifi's slides that we did not have available. I would like to thank both of our presenters and also those who attended and please let your colleagues know that this broadcast will be archived and available for up to two years and fill out the online evaluation. Your responses help us plan future broadcasts in the series and improve our technical support. Thank you very much for attending this webcast.