

LIVE *from* LOMA LINDA

Telemedicine project brings tertiary care center to the field

By Michael Ghim, MD, Jeff Grange, MD, & Jeff Bender, BSN, EMT-P

PHOTO AP/WIDE WORLD/CHRIS CARLSON

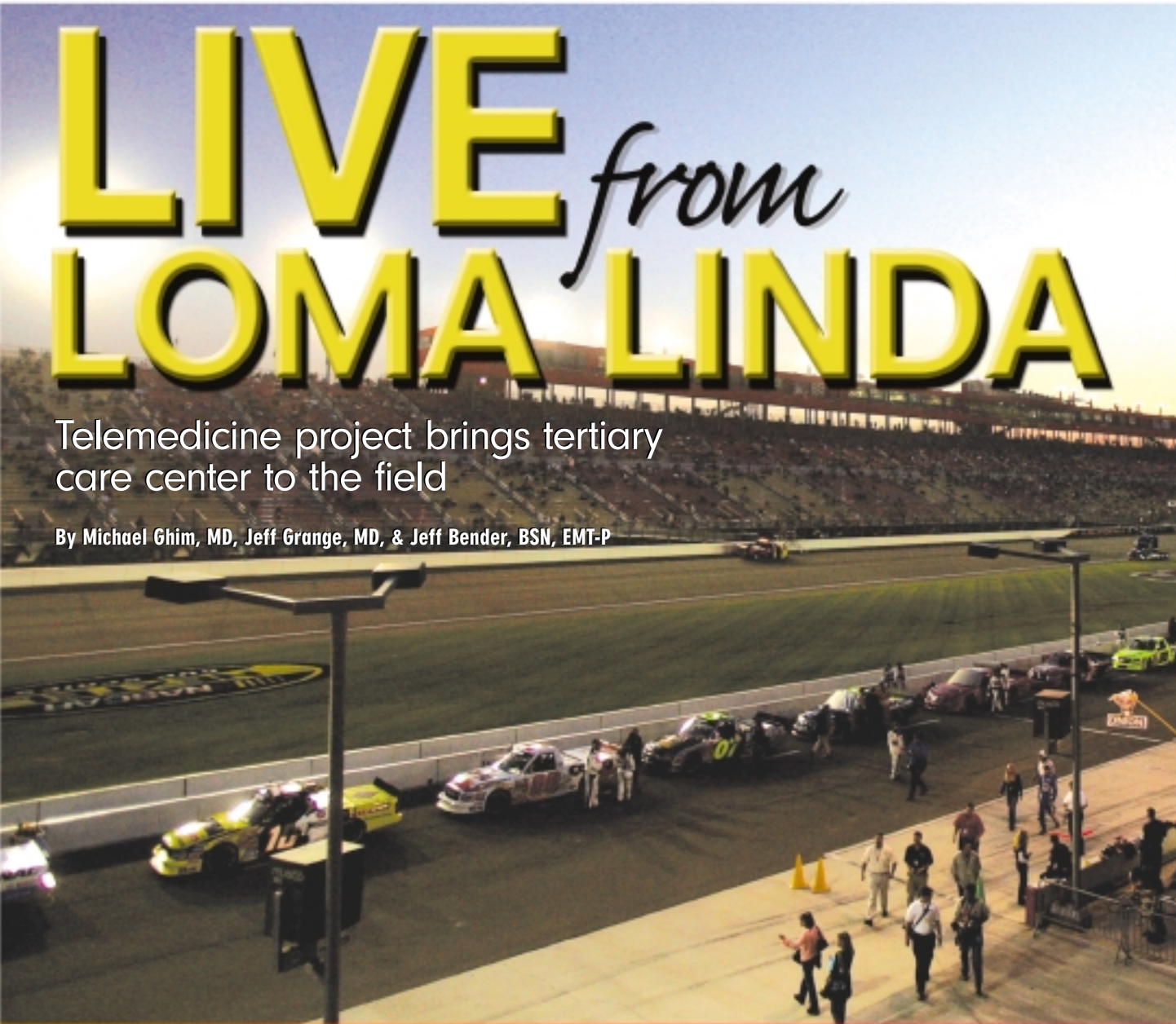


PHOTO JEFF GRANGE

This NASCAR team employee, who suffered two lacerations on the thumb and required diagnostic X-rays in the ED, served as the first real-time video telemedicine case.

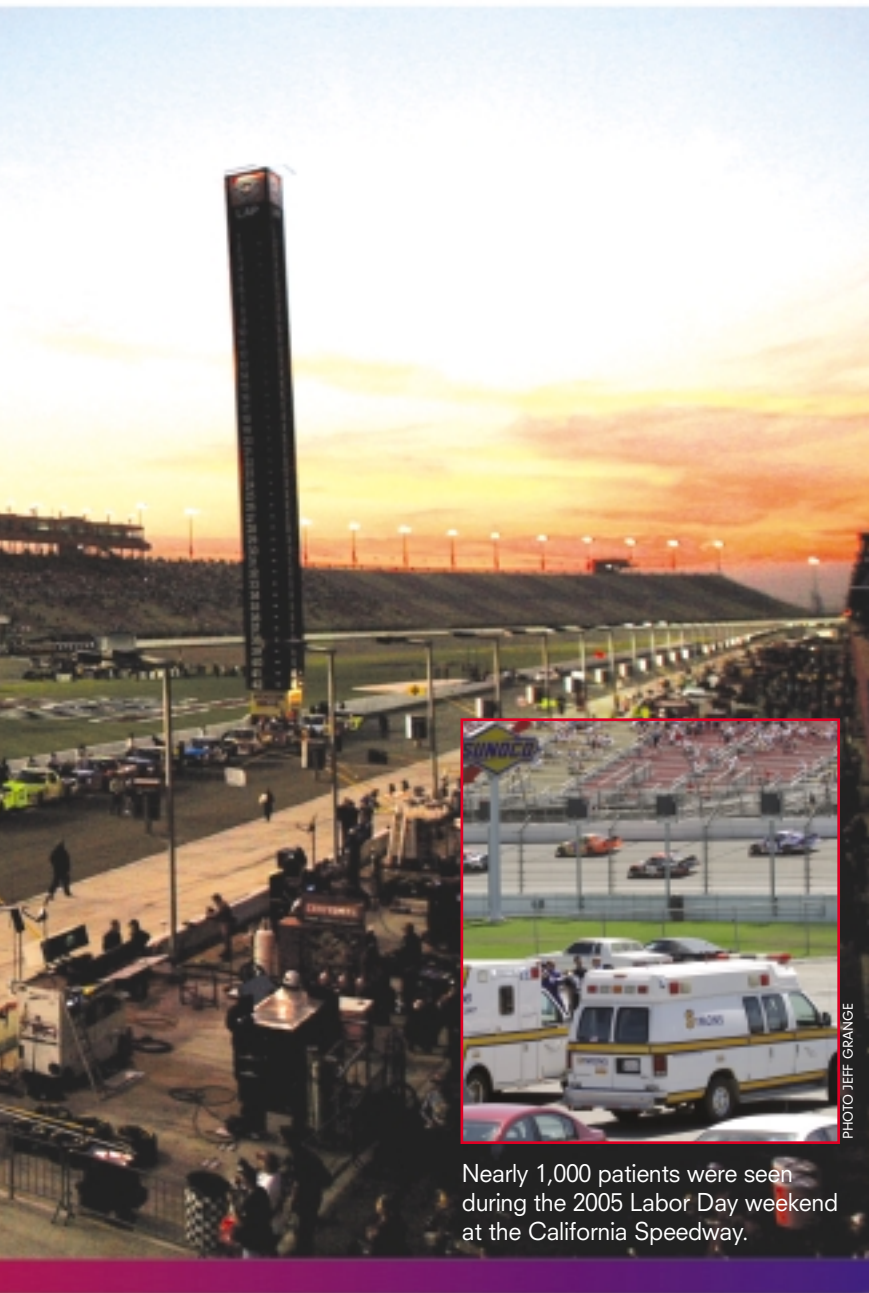
More than 250,000 spectators filled the California Speedway for the NASCAR Nextel race during Labor Day weekend in 2005, making it the highest attended sporting event in California. The event itself employs thousands more, not including the race drivers and supporting teams. Because of the large crowds and predictable trauma at such locations, on-site EMS must always be at its best.

However, during large-scale events, it can be difficult to determine which individuals definitely require extended services. Transports that end up being costly and unnecessary for patients may be avoided in some cases with additional resources—such as telemedicine.

Background

Telemedicine has been used since the late 1980s to bring health care to individuals in remote locations. Although such obvious modalities as telephones and fax machines have been used to transmit simple documents and information, more advanced communications technology has been increasingly used to transmit photographs, video, radiographic images, ECGs and real-time examination findings (e.g., vital signs, lab results and even cardiac auscultation) from the point of current patient care to other experts across town and around the world.

In a precursor to modern telemedicine, the military has used satellites to



Nearly 1,000 patients were seen during the 2005 Labor Day weekend at the California Speedway.



Research Center), which is a part of the Department of Defense and Loma Linda (Calif.) University Medical Center.⁶

Our original project was started two years ago and aimed to create the ability to get the expertise of a tertiary care center “anytime, anywhere” during both times of disaster and daily EMS operations. Although California probably has more disasters than anywhere else in the country, it’s still difficult to schedule our next disaster to test new technologies. However, because we know when many of our mass gatherings, such as large concerts and NASCAR races, will take place, we decided that such an event would be the ideal time and place to test our telemedicine project in the field with real patients. We expected hundreds of patients during the event with complaints similar to what’s typically seen during actual disasters.

EMS at the Speedway

For any Sunday NASCAR race, approximately 12–13 ALS units are on-site.⁷ Approximately 100 staff work during a typical NASCAR weekend, treating about 1,000 patients. Dispatching and 9-1-1 calls are handled on site.

During the 2005 Labor Day race, we had 13 ALS ambulances (from Symons Emergency Specialties) on site and seven first aid stations open. The first aid stations were staffed with emergency medicine nurses, paramedics and EMTs. Two of the stations (one in the grandstands and one in the infield) had a higher level of care and were staffed with emergency physicians who had the capability to suture wounds, take care of kidney stones, write prescriptions, etc.

In addition to the ALS units and first aid stations, a dedicated helicopter (from Mercy Air) was on site during the event for both on-track and off-track incidents. We also had eight ALS “mini ambulances,” six BLS golf cart teams, three grandstand rovers, three dedicated dispatchers and six emergency physicians.

send images of patients in disaster situations, such as the 1985 Mexico City earthquake, the 1988 Armenian earthquake and the Virgin Islands in the aftermath of Hurricane Hugo in 1990.¹ On a smaller scale, primary care physicians have used telemedicine to obtain specialty care consultations, such as with dermatology or otolaryngology. Other uses include providing services to extremely rural environments, prisons or long-term-care patients with diabetes or hypertension.²

One step further

Previous studies and literature reviews suggest that telemedicine consultations with specialists may prevent unneces-

sary transports or provide earlier, improved medical care at a facility with fewer resources than a hospital.³⁻⁵ One such study showed that the use of EMS telemedicine “could result in an approximately 15% decrease in ambulance transports.”⁴

With research on our side, we developed a telemedicine project as part of a larger project known as the DISCOVERIES Project (an acronym for Demonstrating Innovative Solutions to Care for Others Via Electronic Real-time Information and Emergency Services). This project was funded by the United States Congress in partnership with TATRC (Telemedicine and Advanced Technology

The premier patient

As expected, nearly a thousand patients were seen during the weekend at several aid stations, including the Infield Care Center, for acute, potentially hazardous symptoms or situations (e.g., chest pain, heat illnesses, MVC-related trauma and other traumas), as well as minor complaints. Some of these patients had complaints or medical findings suggestive of injuries or conditions that require further diagnostic testing or treatment—needs that must be met in an emergency department (ED) or as an inpatient.

On Sept. 3, 2005, we had our first telemedicine case. A NASCAR team employee suffered a crush injury to his thumb and was evaluated by medical personnel at the Infield Care Center. To assess the need for immediate ED care via patient transport, we transmitted the patient's medical information from the California Speedway to an emergency medicine physician consultant at the Loma Linda University Medical Center.

Specifically, we transmitted streamed real-time video as well as images from a handheld exam camera (using a Polycom Practitioner Cart with VSX 7000 camera via a T1 line), and the emergency medicine physician consultant received the patient's complaint, vital signs and visual images of the injuries (via a VSX 7000 camera in the consultation room at LLUMC ED). The consultant was able to see (with excellent clarity) two lacerations on the thumb, which created concern for a possible open phalangeal fracture requiring diagnostic X-rays. Thus, the recommendation was made to transport the patient to the ED.

In review of other literature on telemedicine, we believe this is the first instance in which real-time video telemedicine was used at a mass gathering event. Although not part of a formal study, this result demonstrates the possibility of obtaining real-time consultation for patients at a mass gathering event or other EMS incidents, which may contribute to expedited medical care. We plan to do structured research of our project and results in the near future.

Conclusion

Mass gathering events can be considered “scheduled disasters” and are often staffed by crews that may not have the complete resources necessary to care for certain patients. Having the ability to consult with a physician is another method of telemedicine and may be an important application in prehospital medical care in the future. This technology opens an arena with vast economical and medical consequences, which will require further study to assess for efficacy and cost effectiveness. JEMS

Michael Ghim, MD, is an EMS fellow at Loma Linda University Medical Center (LLUMC).

Jeff Grange, MD, is the EMS director at LLUMC and medical director for the California Speedway.

Jeff Bender, RN, is a coordinator for the DISCOVERIES Project at LLUMC.

Acknowledgements: *The authors thank the IS resources involved in this effort under the DISCOVERIES project: Chuck Mitchell, Aaron Pratt, Les Morton and Sai Duvvuri.*

References

1. Garshnek V, Burkle FM Jr: “Applications of telemedicine and telecommunications to disaster medicine: historical and future perspectives.” *Journal of the American Medical Informatics Association.* 6(1):26–37, 1999.
2. Hersh W, Helfand M, Wallace J, et al: “Clinical outcomes resulting from telemedicine interventions: A systematic review.” *BMC Medical Informatics and Decision Making.* 1(5):Epub, 2001.
3. Roine R, Ohinmaa A, Hailey D: “Assessing telemedicine: A systematic review of the literature.” *Canadian Medical Association Journal.* 165(6):765–771, 2001.
4. Haskins PA, Ellis DG, Mayrose J: “Predicted utilization of emergency medical services telemedicine in decreasing ambulance transports.” *Prehospital Emergency Care.* 6(4):445–448, 2002.
5. Grange JT, Baumann GW, Vaezazizi R: “On-site physicians reduce ambulance transports at mass gatherings.” *Prehospital Emergency Care.* 7(3):322–326, 2003.
6. The Telemedicine and Advanced Technology Research Center (TATRC). www.tatrc.org
7. Grange JT, Baumann GW: “The California 500: Medical care at a NASCAR Winston Cup race.” *Prehospital Emergency Care.* 6(3):315–318, 2002.