

Partnerships

Letter from the Operational Medical Director

This year marks the continued development and execution of three major advances at the Richmond Ambulance Authority: 1) use of an advanced, very early therapeutic hypothermia protocol for cardiac arrest victims with regionalized specialty post-resuscitation center care; 2) continued evolution of our medical safety program that is patterned after our nation's highly successful air transportation system model; 3) ongoing work with Richmond Fire and Emergency Services and the Division of Emergency Communications (DEC) on further enhancing operational efficiency of our EMS system.

Post-Resuscitation Care In February 2008, the Richmond Ambulance Authority (RAA) began administering 2 liters of cold saline intravenously as soon as possible, often during ongoing resuscitation. In the first year, our average patient's heart starts beating again and a blood pressure returns after the patient has only 500 ml of the iced saline. With relatively short delivery times to Virginia Commonwealth University's (VCU) Emergency Department (ED), the patient's temperature decreases to approximately 95 °F upon ED arrival, at which time approximately 1,500 ml of iced saline have been infused. VCU is one of only a handful of medical centers in the nation that has an advanced post-resuscitation hypothermia program and almost six years of experience in applying this treatment to a large number of cardiac arrest survivors. VCU uses a highly effective intravascular device to further cool the patient shortly after ED arrival, allowing the brain to reach the "target" temperature in the low 90 °F range within 30-60 minutes after ED arrival instead of the 4-6 hours required using less expensive techniques such as cooling blankets and other external devices. VCU's intensive care unit staff apply continuous brain wave (electroencephalographic or EEG) monitoring during the entire therapeutic hypothermia period to guide management. VCU staff use sophisticated clinical pathways and order sets to provide goal-directed, post-resuscitation care throughout the first 24-48 hours.

Our Richmond Ambulance Authority therapeutic hypothermia program followed by sophisticated post-resuscitation care is now allowing us to discharge over 40% of these aggressively cooled out-of-hospital cardiac arrest patients neurologically intact from the hospital alive. Data from this RAA/VCU partnership were presented nationally at the Institutes of Medicine and the American Heart Association Scientific Sessions last fall. Since then, there have been stories in the Richmond Times Dispatch and, most recently, filming by a national Public Broadcasting System (PBS) crew that will be aired on an episode of the TV series "NOVA" this summer featuring Richmond as the state-of-the-art post-resuscitation program in the nation. Medical Safety Program The Institutes of Medicine published a landmark study approximately 10 years ago concluding that in-hospital medical treatment errors account for 40-80,000 deaths nationally. This startling finding has sparked a major initiative to focus on preventing and mitigating the consequences of simple human error in hospitals throughout the United States. Many of the concepts that are being applied to in-hospital safety are patterned after the air transportation approach, using improved methods of communication, checklists, and backup systems.

RAA's clinical program is applying these safety principles to pre-hospital care successfully. A number of changes have already occurred in our operations, encouraging and rewarding self-reporting of near-misses as well as incidents. The result is that we are seeing increased emphasis on safety focusing on systems issues rather than blaming individuals for simple human errors. The goal is to create better systems and care processes that ideally avoid simple human errors, or at least prevent them from causing patient harm. The key to re-engineering our care is that we learn from near-miss events and make necessary changes in our protocols and processes. Enhancing Operational Efficiency in Partnership with Richmond Fire and DECA series of monthly steering committee meetings have been held in partnership with Richmond Fire and Emergency Services and DEC, as well as more frequent data workgroup meetings, looking at opportunities to share data and re-engineer a more efficient way of delivering high quality, cost-effective emergency care to our citizens. A major breakthrough has just occurred as a result of this work, for the first time allowing us to account for ALL time intervals from the time an emergency call is answered at DEC until the units are back in service. This is an accomplishment that has been achieved by only a small percentage of EMS systems throughout the world, and is positioning Richmond to explore innovative new strategies of advanced system status management. Although we are still in the analysis phase, the spirit of co-operation and shared vision amongst agencies has been nothing short of fantastic, and we are poised to explore some truly breathtaking new ideas in the science of emergency medical dispatch. More to come as this year progresses!

In summary, this has been an incredible year of progress for RAA, and we continue to offer our patients a better chance to survive catastrophic illness and injury than ever before!

The "Bonn Project" & "Spatial Analysis"

RAA has partnered with researchers from the University of Bonn (Germany) to explore potential EMS uses for GIS (geographical information systems) data. A series of interns from Germany have lived and worked with RAA staffs while teaching them ways to merge database records from many different sources (census data, crime statistics, public health records, EMS response and billing data, geographical attributes, First Responder records, hospital treatment data, etc.) into a format which makes it possible to view the information on maps—a technique called spatial representation.

Using spatial representation, the Authority is often able to see patterns that would not ordinarily be apparent by simply viewing data in tables and graphs. This is extremely valuable when pursuing research issues, allowing the examination of different variables in different ways to look for correlations between them. When a point of interest appears on the map, the underlying databases providing the information for the maps can be opened with the click of a "mouse", revealing the data beneath, which enhances an understanding of the issues being explored.

Spatial representation has also become a primary tool in the "demand analysis" process used by the Authority to develop the "system status plan" for Richmond. A system status plan tells dispatchers where to most effectively place their available EMS resources at any particular moment in time, but especially as those resources decrease. Demand analysis looks at historical response data to predict the future distribution of call volume within the City. By analyzing this data, the RAA can place units in positions to best respond to the demand for emergency and non-emergency service in a timely manner. This ensures equal EMS access and service in all segments of the City, an important component of a "public utility model" EMS system like the Richmond Ambulance Authority. RAA depends on the efficiency of demand analysis and system status management to achieve the efficiencies necessary to make the public utility model function successfully.

Spatial analysis and representation also enhances the ability of the Medical Director and his staff to monitor the effectiveness of field treatment, dispatch procedures, and the incidence of clinical events through the system. For example, all geographical cardiac arrest locations in the City can be shown on one map as points or symbols. The size and color of these points can indicate how long it took EMS to respond, or how many events may have occurred at the same location. By assigning those points where the response time standard was exceeded the color of red, it becomes easy to tell which areas are taking too long to for the EMS response and whether there are any patterns to these responses. Exploring clinical issues with GIS software is an exciting new application of technology to EMS issues, and represents just a portion of the benefits the Richmond Ambulance Authority expects to derive from their collaborative relationship with the University of Bonn.