



## Digital ER Paediatric Response Chart Created



A well-known paper-based medical chart used by paediatric emergency personnel across America is undergoing a 21st century boost in an collaborative effort between Virginia Tech's College of Engineering, Roanoke-based Carilion Clinic Children's Hospital, and the physician who created the original method some 25 years ago.

The Broselow Paediatric Emergency Tape -- otherwise known as the Broselow Tape -- has been a staple of ERs and child trauma units for nearly three decades. Created by Hickory, N.C.-based physician James Broselow, the Broselow Tape is a long, durable tape measure used on a child during a medical emergency. Using a color coded-format, it provides specific medical instructions -- amounts of medicines to dispense or level of shock voltage to emit from a defibrillator, for instance -- to medical caregivers based on the height and then subsequent weight of the child.

This information now will be displayed on a large LCD monitor within emergency rooms, for all personnel to see.

"We are converting the existing Broselow Tape into an electronic format to improve resuscitation team communications and patient safety," said Andre A. Muelenaer Jr., an associate professor of paediatrics at the Virginia Tech Carilion School of Medicine, adjunct professor at Virginia Tech-Wake Forrest University School of Biomedical Engineering and Science, and director of the Paediatric Medical Device Institute, located in Roanoke, Va.

Additional displayed information will include medicines administered to the patient, including the time of administration and the next scheduled allotment. In the instance of burns, an automated calculation of the affected surface area will be displayed, along with automated calculation of fluid resuscitation. A click of a mouse/remote control can move responders from one screen to another. The software running the newly-dubbed eBroselow software program runs on LabVIEW, owned by National Instruments. Known as TEAM Broselow, the method is being tested at various hospitals, including facilities in Roanoke, Va., Austin, Texas, and Winston-Salem, N.C., and will be fine tuned as additional input comes in from doctors, nurses and other medical personnel, said Muelenaer.

Many of the new features already include input from medical personnel around the country, Muelenaer said. One example: The ability to track by barcode-scan the exact types and amounts of medicine administered to the patient. "The idea is to give multiple people access to the same info, on a big screen," said Al Wicks, an associate professor of mechanical engineering at Virginia Tech, who serves on the Paediatric Medical Device Institute's leadership team with Muelenaer.

Much of the work to digitize the Broselow Tape for display on LCD televisions was completed by Carlos Guevara, a Virginia Tech master's student in mechanical engineering from El Salvador who recently became an

American citizen. Emergency medical personnel still will rely on the physical laminated tape to determine the child's care-need level, before utilising the digital display version.

"Doing this was a rather simple task," said Guevara. "The challenges arose in an attempt to take advantage of current technology in order to develop a much more enhanced device, such as using the available drug concentration information to calculate volume to administer once a drug has been scanned."

The idea for a digital version of the Broselow Tape came two-fold, hundreds of miles apart. In Hickory, Broselow was working with a collaborator on a Web-based adaptation as far back as three years ago. Meanwhile, more than a year ago, Stacy Steans, a paediatric physician at Roanoke's Carilion Clinic Children's Hospital, had his own epiphany about converting the paper-based data to a wireless format displayed on a monitor. Eventually, Steans and Muelenaer at Carilion, the Virginia Tech College of Engineering and Broselow himself all came together to work on the process.

"We showed them what we had developed and they showed us what they had developed," said Broselow, who developed the tape after moving from a private practice set-up to emergency room, and seeing the need for large medical teams to have set standards for child emergency care response. "The initial content on the large screen was a combination of what their thinking was and the content information we had."

Funding for the project came from the Childress Institute for Paediatric Trauma. Rural hospitals, such as those located throughout Southwest Virginia, could benefit most from the software device, more so than urban hospitals with high-capita populations of children. "There are not as many children, so there are not as many cases," he said.

The tape itself is designed for children 12-years-old or younger, and having a maximum weight of roughly 80 pounds. Separately, Broselow and his company are continuing work on several digital formats for emergency rooms of all types and additional user formats such as iPhone applications and several publications, plus additional emergency response needs such as wounds sustained from chemical weapons.

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