

Can “Perfect Prehospital Information” Eliminate False Activations in STEMI, Stroke, and Other Acute Syndromes?

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\$3 billion in uncompensated Emergency Medical Services—that is, care provided to patients by prehospital personnel but that will not be reimbursed due to documentation errors or omissions¹—coupled with avoidable costs tied to inappropriate activation of emergency resources in ambulances and hospitals, represents a measurable *but addressable* risk to public health and homeland security. As Accountable Care graduates from buzzword to bona fide in pursuit of the so-called Triple Aim—*better health, better care, lower cost*—to EMS, the emergence of concepts like Community Paramedicine / Mobile Integrated Health asks ambulance operators to benchmark against quality metrics that justify the expense of their services. Do prehospital efforts facilitate care, patient throughput or healthcare quality? (If so, how frequently and to what degree?) Do readmission avoidance, post-discharge follow-up, and patient tracking improve the flow from prehospital to in-hospital to post-hospital contexts? We talk much about data, but few bother to ask a contrarian question so essential to critical assessment of our discipline: ***Why should EMS agencies care?***

My colleague Bruce Graham, who spent eight years as an EMS Director, has noted with force and eloquence that “an EMS agency [does] not make a dime more or less if the hospital does or does not pull the trigger on a cath team. Plain and simple...I get nothing from what the hospital does. And if the hospital doesn’t like what I do, their answer is to go for tighter controls. This was one of the points of the ACA and the creation of ACOs: to work together to share the savings.” How much time and money are spent triggering a catheterization lab in preparation for an incoming STEMI? Might access to “perfect” prehospital data, offered in real-time, change those numbers? If so, would the savings justify an investment in technology to provide such information? ***What value will more, better, faster data offer EMS agencies?***

Consider electronic patient care reports, the tools I know best because my firm produces an award-winning one. They are not diagnostic systems; they collect, store, and move information inputted or imported from clinicians, devices and data repositories. Troubling statistics emerge when practitioners rely too heavily on automation to make clinical decisions despite the “open secret” that medical devices produce incomplete or incorrect data. But we are entering an era reminiscent of the film *Wall-E*, as we seek a middle ground between the manual, traditional, laborious ways that make it challenging to track and use information, and the Holy Grail of artificial intelligence when we truly trust the machines that are becoming like appendages.

Bruce points out to training as the critical bridge from a manual system to one that is powered by technology. But too much technology can make people dependent, as we have seen with medicine to cars to televisions. Digital tools are just that—tools. Technology also represents progress, and the ability to compare, contrast, connect, and analyze at Big Data and micro levels—instantly—and to observe trends that heretofore would have been missed. But they do not, and are not meant to, replace the “medical device” that is the emergency service providers. And if EMS agencies lack understanding of how data need to come together

¹ Hagen T. The Value of EMS. *EMS World*. 1 Sept 2012.

to paint a picture, all we get are noise and toys. For example: when examining a patient with a cardiac condition, the ability to obtain a 12-lead for STEMI assessment is critical. Without a comparative baseline, however—that is, a review of the current strip in light of any previously captured ones—crews are hard-pressed to deduce whether they are investigating something serious as opposed to a quirk of the individual body. I have seen crews in places like Pittsburgh ignore alerts from their monitor-defibrillators because, as they said: “The patient has had a funky heartbeat for years, but we know he’s not having a heart attack.” **Access to the patient’s clinical history—to put the current incident and care in context—is vital to accountable, informed care.**² This is true whether the patient is suspected of STEMI, stroke, diabetic or allergic event, seizure, and most complex syndromes. Without context, many clinical conditions look alike.

Our ability to improve health, wellness, and safety exceeds what we previously only imagined, and patient care reporting is a core component of this toolkit (which is why I am in the business). The Accountable Care model has spurred a motivation to align clinical, operational, and financial efficiencies, so EMS has a once-in-a-generation chance to centralize its role in facilitating cost-efficient processes. It will help to start by considering **(a)** the risk to the patient, **(b)** the liability to every provider along the healthcare value chain, from prehospital to ED to nursing to physician, and **(c)** the cost to the healthcare facility if “bad data” were to activate unnecessary processes and erode the core of a longitudinal record that will follow the patient over time. At a rising number of healthcare institutions, complex codes like stroke and STEMI are being called from the field with authorization to bypass the ED, speeding time to treatment while relieving congestion and overcrowding. But how reliable are the data being used to call those codes, and how good are the providers calling them at distinguishing between accurate and false readings? Validating “good data” into the record is essential, even though it may be pooh-poohed as part of the prehospital professional’s job. Making workflows better, faster, easier and more cost-effective is job of the ePCR firm.

One example of the financial, operational, and clinical risk associated with bad data is seen in the rate of “false positive” catheterizing lab activations. (Note: It is worth further investigation to understand why these rates vary so widely across the country, whether due to matters of policy, medical direction, technology, or training.) Rokos et al. (2010) found that, “recent surveillance of ‘unnecessary’ cath Lab activations...by ED physicians demonstrated a 5% rate from a single-center experience (n = 249 activations) in Virginia and a 6% rate across 14 hospitals (n = 2,213 activations) in a North Carolina STEMI system.” In Los Angeles and Orange County, false cath lab activation rates were 20% and 23% respectively.³ According to the Contra Costa Emergency Medical Services (CCEMS), a false-positive occurs “when a paramedic tells the STEMI Center that a STEMI has been detected on the 12-lead ECG, but upon arrival at the hospital it is determined that the patient’s 12-lead does not show a STEMI. Most of these patients do not need the urgent availability of the catheterization lab.”⁴ According to the *Journal of the AMA*, “The frequency of false-positive cardiac catheterization laboratory activation for suspected STEMI is relatively common in community practice, depending on the definition of false-positive.”⁵ Unfortunately, false cath lab activation is an expensive error: Patricia Frost, Director of CCEMS, has published that in 2013, **Contra Costa County hospitals experienced 25-41% false activation of their cath labs, at a cost of \$5000 per incident.**

Another example is stroke identification in the field. In 2014, *JEMS* published an article on differentiating between Bell’s palsy and stroke-related facial paralysis. Loomis and Mullin offered practical instructions—“When assessing a patient with acute facial weakness: 1) Talk to the patient; 2) Examine the muscles in the upper and lower face; and 3) Look for associated signs and symptoms...”—but provided no context for comparison to the patient’s baseline. Such a vacuum approach led Ramanujam et al. (2008) to challenge the reliability of decision-making by field crews, as they correctly identified stroke less than 50% of the time.⁶ **Technology can improve this rate immediately, but context is the key:** Until the recent advent of health information exchanges and master data management files, it was infeasible to sift through historical patient data to obtain relevant history quickly enough to do so at the patient’s bedside. New data technologies,—combined with telemedicine and novel care models like Community Paramedicine and Mobile Integrated Health—can save time and money *while* extending care to the bedside. Harnessing “perfect information” in the field, at the station, and at the ED will lower expenses by enabling tailored, informed medical direction.

² O’Donnell D, Mancera M, Savory E, Christopher S, Roupf S, Schafer J. “The Availability of Prior ECGs Improves Paramedic Accuracy in Identifying STEMIs.” Poster by Indiana University School of Medicine at the 2014 NAEMSP Annual Meeting. Accessed online 16 Apr 2015 < <http://www.naemsp.org/Documents/2014%20Annual%20Meeting%20Handouts/E-POSTERS%20145-153%20Combined.pdf> >

³ Rokos, IC, French WJ, Mattu A, Nichol G, Farkouh ME, Reiffel J, Stone GW. “Appropriate Cardiac Cath Lab activation: Optimizing electrocardiogram interpretation and clinical decision-making for acute ST-elevation myocardial infarction.” *American Heart Journal*. December 2010. 160(6):995-1003.

⁴ Contra Costa County Emergency Medical Services Agency. “Contra Costa 60 Day STEMI System Review: A Great Launch with Challenges Ahead.” Accessed 15 Jan 2015. < http://cchealth.org/ems/pdf/stemi_1st_60days.pdf >

⁵ Larson, DM et al. “ ‘False-positive’ cardiac catheterization laboratory activation among patients with suspected ST-segment elevation myocardial infarction.” *Journal of the American Medical Association*. 2007 Dec 19. 298(23):2754-60.

⁶ Ramanujam P, Guluma KZ, Castillo EM, Chacon M, Jensen MB, Patel E, Linnick W, and Dunford JV. “Accuracy of Stroke Recognition by Emergency Medical Dispatchers and Paramedics—San Diego Experience.” *Prehospital Emergency Care*. (2008) 12(3):307-313.