Use of the electronic healthcare record (EHR) in pre-hospital care has grown quickly, as evidenced by a 2011 survey of 200 cities by The Journal of Emergency Medical Services, which revealed that 86% of respondents were using electronic patient care records. In its 2011-2013 Strategic Plan, the New York City Fire Department (FDNY) expressed a present intent to develop an electronic pre-hospital care report ("ePCR," as it is referred to in the plan) to be used by ambulance crews in its Bureau of Emergency Medical Services (EMS), who will generate the reports on handheld devices. The wording of the plan suggests that, initially, the ePCR data would be able to be transmitted in real time to EMS Command and FDNYS Office of Medical Affairs. Ultimately, according to the plan, "this pre-hospital medical data will be transmitted to the receiving hospitals before EMS units arrive." Emergency department and risk management professionals may anticipate challenges during transition to this method of reporting. The Strategic Plan is silent as to how the transmission to hospitals is anticipated to occur (i.e., there is no overt reference to linking the electronic PCRs to the various hospitals’ EHRs, which vary and are largely commercial, proprietary systems). Also not directly addressed in the plan is any potential mandate requiring voluntary ambulances under EMS dispatch to employ the electronic system ultimately developed. The ePCR, according to the plan, would also link to a master patient tracking system for use during mass casualty incidents. The department currently uses a scannable report which can be transmitted electronically from EMS and fire stations to FDNY headquarters at the end of a shift.

Paramedics and emergency medical technicians in New York are required to author a Pre-Hospital Care Report (PCR) for every patient they encounter. Manual entry of patient data has become increasingly laborious as medical progress has made the provision of more advanced care possible outside the confines of the hospital. Electronic means of conveying medical information was initially used in the hospital setting. The movement toward electronic healthcare records was spurred on by the passage of the Health Insurance Portability and Accountability Act of 1996 (HIPAA). Under the “Administrative Simplification” provisions of the Act, covered entities (such as hospitals and medical practices) are required to use HIPAA-standardized code sets and electronic transactions for healthcare billing purposes. From there, use of electronic records expanded to more clinically-oriented areas, such as medical orders and lab results. EHRs have now grown to include nearly every aspect of hospital service. In 2009, President Obama signed the American Recovery and Reinvestment Act that included the Health Information Technology for Economic and Clinical Health Act (HITECH Act). Its objective is to further promote the adoption of health information technology to improve decision-making and patient clinical outcomes. The federal government has provided incentives to use EHRs, and disincentives not to. For example, providers not meaningfully using EHRs by 2018 will lose five percent of Medicare reimbursement. Particularly in the hospital context, EHRs are fast becoming standard. Now, pre-hospital emergency medical providers in the U.S and around the world have also begun recording and relaying medical data from the field in various electronic formats. The market for the electronic pre-hospital care record (PCR) has been born.

Identifiable literature and data specifically oriented toward electronic reporting systems in use by pre-hospital providers is scant at best. Most of the formal research is proprietary, and, as the authors discovered, software vendors are unwilling to share it. Articles in periodicals are generally anecdotal, most lacking true scientific process to quantify or qualify the use of electronic PCRs by ambulance personnel. An early exception is a small study conducted in Singapore in 2001, in which three ambulances were outfitted with mobile reporting systems and a wireless link to the busiest ED in the area. The manually-entered PCR and diagnostic data, such as EKGs and vital signs, were transmitted to the hospital from the field. The study concluded that the time to complete the report was reduced from an average of seven minutes and seven seconds (for the old, handwritten report) to ninety-four seconds for the electronic report. (The article reporting the study provides no qualitative comparison between the data entered in handwritten reports with that provided in the electronic reports.) Paramedics’ time spent in the ED reportedly decreased from fifteen to eight minutes, and wait time for critical care patients to be seen in the ED decreased from thirty-five to seventeen minutes when delivered by these specially-equipped ambulances. Clearly, if that degree of quality improvement were anticipated in New York and elsewhere, there would be little room for debate.

As current users of hospital EHRs may already have observed, many of the programs now in use present certain drawbacks to handwritten records. Drop-down menus, check boxes, and auto-population of patient data encourage the user to electronically select or “click on” items that do not properly or precisely convey the treatment rendered or conditions noted. Some of the software is programmed to prevent the user from proceeding to a subsequent documentation screen without first entering data that may not be appropriate to the patient’s gender, age, condition, or...
treatment rendered. Perhaps not surprisingly in the context of electronic reporting of pre-hospital care, the remarkably favorable Singapore experience may not be universal, as comments and reports from other regions employing electronic PCRs seem to be more mixed. For example, paramedics in Australia specifically complained that they were forced to select inapplicable choices from a pre-formatted menu in order to proceed with the rest of the PCR. A study in Canada revealed that the use of electronic ambulance reports resulted in more clerical errors, including in the entry of patient treatment data, as compared with handwritten reports. Auto-population, in which the portable device retrieves and automatically fills in certain patient-specific data collected during a prior encounter (such as name, address, past medical history, allergies, medications, surgical history, advanced directives, private physician, etc.), may not always be the efficient tool intended. If information about a patient has changed, it is incumbent upon the pre-hospital provider to elicit the updated information and affirmatively change it in the record. If he or she simply sees the data-point as conveniently auto-populated, the impetus to confirm potentially important information at each encounter may be reduced. In an observation that may aptly transfer to potential errors in the medical context, a SWAT officer/Paramedic interviewed for this article noted that he would hate to kick down a door to serve a warrant, only to find out that the “address” field that auto-populated into his handheld device had not been properly updated.

The authors of this article solicited information and opinions from paramedics and emergency department physicians in the U.S., but outside the New York metropolitan area, who are already working with electronic PCRs, and also from software vendors whose market may include New York (and could even include FDNY/EMS). Physicians were asked how they receive electronic PCRs, and in what timeframe. Paramedics were asked which software they use, what options they have for providing reports to the emergency department staffs, and in what timeframe they must provide the reports. Vendors were asked about features and functions offered in their products, studies conducted in the formation of the products, and feedback from the market.

Physicians responded that they still often received verbal reports, either directly from the paramedics or, third hand, from triage nurses. Many said that they did welcome information from the paramedics in whatever form, but did not rely on it to guide their evaluation and care of the patients. Some physicians cited inconsistency in the receipt of any report, at all, despite the transition to electronic reports, as the PCR systems were still not linked to the hospitals’ EHR networks. The general consensus among ED physicians seemed to be that the move to electronic ambulance reports was not making a difference to them. Some physicians noted that they still rarely received a printed report during the treatment period, as the electronic reports often remained unavailable until after the patient had left the department.

Paramedics are using various platforms to record patient data, including laptops and tablets. Almost all use a “ruggedized” form of hardware (such as the Panasonic Toughbook®) to withstand the rigors of field exposure, some even complying with a military specification. There is no industry standard. In some cases, pre-hospital providers have used personal data assistants (PDAs), but they are generally reported to be inadequate, as much of the documentation requires a larger display, more powerful processor, and either a keyboard or easily-accessed touch screen. Without feedback from every ambulance service using electronic reporting programs, it is not possible to determine which software is the most popular, and an inquiry of that scale is outside the scope of this article.

The paramedics interviewed who currently generate their PCRs electronically reported that they are not linked to the hospitals’ EHR networks, but they make best efforts to leave a copy of the completed PCR with the ED staff before departing. They indicate that they are sometimes unable to do so in light of subsequent emergency calls to which they must respond prior to completing the report. Official policy in many ambulance services strongly encourages the crews to provide the complete PCR to the ED before leaving, but does not mandate it, or provides exceptions. Some services have created a truncated form of electronic report that the crew may complete and submit quickly, relating the most vital information, until they are able to furnish the complete report. The most common modes of delivery of the electronic PCRs to the EDs are 1) by connection of the paramedic’s portable device directly to a printer in the ED, or 2) faxing the report to the ED at some later time. One EMS service in New York State indicated that it allows its staff to deliver the printed PCR by the end of their twenty-four hour shift. One supervisor described an electronic tracking system in place that identifies, from headquarters, all incomplete PCRs and their authors so that pressure can be applied to enforce swift production of the belated reports. An EMS medical director outside New York noted that he encourages crews to provide timely electronic PCRs, but that enforcement is difficult, as punishment for lateness in generating reports may cause further delays if discipline affects staffing levels.

Software vendors advertise their systems as the solution to illegible documentation, delayed PCR delivery, billing and coding difficulties, audit compliance, regulatory compliance, quality assurance assessments, and convenient storage and sharing of files. One variable over which the vendor has no control is the end user. According to some vendors, the benefits described depend on the proper use of the software to its fullest potential. Software features do not appear to vary greatly. Most provide similar functions. Nearly every vendor contacted indicated that their software development did not rely upon scientific studies of human nature, user interfaces, learning curves, or other standard product development approaches. Rather, they suggested that
they received input and advice from end-users (EMS personnel) about what they wanted, and molded their software to deliver what the users sought, and in the way the users expected the device to accomplish the task. Two of the vendors advised that they do possess proprietary data gleaned from studies they conducted, but were unwilling to discuss any of it. Most of the vendors confirmed that the two most common ways of submitting electronic PCRs to hospitals was by fax and by connecting to a hospital printer in the ED. Both methods were noted to enable delivery of the reports within moments of the patient’s arrival at the ED. Some vendors reported that their products had the capability to transmit patient data to hospitals while the ambulances were en route, as long as reliable wireless data networks were available. However, this requires the receiving hospitals to possess the relevant software link for their EHR networks to receive the data, which apparently is not common. Most of the vendors indicated that PCR wireless “network crashes” do not present a significant threat, as their systems will always function off-line until a wireless source or docking station is located, thus the providers will never be prevented from entering their documentation.

One method of conveying the PCR to the hospital involves transmitting the individual data points so that they appear directly in the hospital’s EHR, but achieving that capability is complicated. The majority of hospital EHRs use a communications protocol called Health Level Seven (HL7™). However, as HL7 is adapted in different ways for use by the different proprietary software systems to which various healthcare systems subscribe, one hospital’s EHR generally cannot communicate effectively with another. Some electronic PCR vendors offer the customer the opportunity to “build a bridge” between the electronic PCR system and the hospital-based EHR, enabling the importation of specific data points. This capability is in its infancy and, according to some vendors, is still difficult and expensive.

As with all methods of sharing protected healthcare information, the advent of electronic PCRs implicates HIPAA and state law confidentiality requirements. Data has to be encrypted and access restricted and tracked. Use of a wireless infrastructure to transmit pre-hospital care information (such as that seemingly anticipated by FDNY as part of its Strategic Plan to develop ePCRs that “ultimately” will communicate with the hospitals) seems to require universality in the ability of hospitals to read encrypted information transmitted by EMS (which may require hospitals to maintain separate data networks to receive ePCRs, or otherwise build the necessary bridges to their existing EHR networks).

Vendors indicate that electronic PCR software is more compatible with current coding requirements for billing than handwritten PCRs, which generally necessitate manual review and data entry by medical coders after the fact. The various types and the categories of pre-hospital care and procedures, and the corresponding standardized codes, are built into the software programs, such that the data required for efficient billing and successful reimbursement are easily identified.

Other advantages mentioned by vendors are in the areas of auditing and quality assurance. Electronic PCRs provide the benefit of rapid retrieval of records with common elements, such as injuries, medical problems, or treatment provided. EMS providers can review records to determine whether care is being provided consistently to patients with similar clinical issues. Hospitals may provide clinical feedback to EMS and/or ambulance crews via electronic communication so that lessons can be learned and outcomes improved. Auditors may also ensure that EMS staff is adhering to protocols governing patient care and transportation.

Conclusion

Electronically-generated PCRs are more legible and, if wirelessly linked to receiving hospitals, can convey vital information before the patient arrives. All of the advantages are contingent upon a seamless network of electronic communication and proper implementation of the systems by all users. The majority of available electronic PCR products, however, are not seamless in current practice, as impediments presented in the interface with the wide variety of hospital-based EHR systems prevent them from working to their apparent potential. For now, from the hospitals’ perspective, the major distinction is that electronic PCRs are printed, rather than handwritten, and may provide helpful standardized codes not found in written reports. The future seems bright in the realm of electronic pre-hospital care reporting, but without industry-wide agreements on communication conventions and best practices to maximize their efficacy, the ultimate goal of seamless, advance communication of pre-hospital patient data from ambulance crews to EDs may be difficult to achieve.


Electronic Patient Care Report (ePCR): The Department is developing an electronic Patient Care Report to replace the written documents currently in use by EMS and Certified First Responder personnel. So far, FDNY has successfully developed a scannable record that can be transmitted at the end of a tour from the EMS station or firehouse to FDNY Headquarters. In the next phase, the Department plans to develop a handheld electronic device for entering patient medical data in the field in real time. These devices will allow users to upload and transmit data from the field directly to FDNY’s Office of Medical Affairs and EMS Command to strengthen oversight of patient care. Most importantly, this will enable EMS to integrate these electronic medical records with its existing data sources (CAD, automated external defibrillators, computerized telemetry) to create a complete pre-hospital medical record. Ultimately, this pre-hospital medical data will be
transmitted to the receiving hospitals before EMS units arrive. This will ensure the complete integration of patient information, thereby improving continuity of care and patient outcomes.

Patient Tracking System: EMS is developing a computerized system to electronically track the location and movement of patients from initial contact with FDNY personnel to transport and admission to the hospital. This portable device will electronically transfer patient data to the FDOC, OMA and EMS Command and be linked to the ePCR database. Given the increasing threat of terrorism and ever-present threat of natural disasters, this is an essential tool for managing multiple-casualty incidents.

Id.

FDNY’s Office of Public Information did not respond to your authors’ request for further details or information about the Strategic Plan, including about the current stage of development of the ePCR system.

Id.


The HITECH Act portions of the American Recovery and Reinvestment Act (ARRA) are contained within Title XIII of Division A (pp. 112 – 165) and Title IV of Division B (pp. 353-398), American Recovery and Reinvestment Act of 2009, Public Law 111-5, 123 Stat.115, et seq.


Turken has successfully litigated before the Appellate Division of the New York State Supreme Court, and briefed and argued appeals before the Appellate Division of the New York State Supreme Court and the U.S. Court of Appeals for the 2nd Circuit. He has been a member of AHRMNY for about 20 years.

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June 18-22 is Healthcare Risk Management Week. This year’s theme, “Getting to Zero™ through the Power of One” raises awareness about the critical role risk management and patient safety professionals play in helping to eliminate preventable serious safety events.

Please be sure to visit the American Society for Healthcare Risk Management’s website http://www.ashrm.org where you can download a copy of the complimentary toolkit: “5 Steps to Safe and Trusted Healthcare”, order HRM professional gifts, join a new eGroup and attend webinar to learn how one children’s hospital reduced serious events by nearly 80% and how you can too.