Quality Improvement in Vascular Access Care Through the Use of Electronic Health Records

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Abstract

Background: *Hospitalized patients routinely require a form of vascular access, as do an increasing number of patients receiving care in community settings. Ensuring that the best quality of care is delivered to those requiring vascular access is a difficult task to achieve because multiple care providers initiate, assess, and access these devices. Electronic health records (EHRs) are a tool that may be used to aid clinicians in achieving best practices at the point of care and throughout an organization.*

Methods: *We describe how EHR technology can be used to support quality improvement initiatives in vascular access practice and its related research and explore the importance and value of embedding vascular access requirements within EHR technology.*

Results: *EHRs may be a valuable tool for supporting quality improvement efforts in the field of vascular access. Requirements of the clinical specialty such as clinical documentation, reminders and alerts, computerized provider order entry, electronic medication administration, and data extraction can be built into the existing functions of EHRs.*

Conclusions: *Clinicians practicing in this specialty area should consider working with their clinical informatics and information technology departments to identify opportunities within their organizations to improve how the technology can be leveraged to support vascular access care.*

Keywords: *electronic health record, quality improvement, vascular access*

Introduction

Patients admitted to acute care facilities frequently require intravenous (IV) therapy during their hospital stay as a part of their required treatment. It has been documented that more than 20% of the admitted adult patient population requires vascular access,[1] with many organizations far exceeding this number. Within the community care setting, IV therapy is becoming increasingly common, with patients receiving therapy through both peripheral and central vascular access devices. Although IV therapy can be life-saving and is commonplace within an increasing number of health care settings, serious complications can occur; these include infection, occlusion, infiltration, extravasation, and phlebitis.[2] Complications of this sort can potentially increase a patient's length of hospital stay and negatively influence patient outcomes.[3] However, complications related to IV therapy are largely preventable when care involving the best available evidence is provided.[2] A standardized system for delivering, monitoring, and documenting care can mitigate complications and maximize the effectiveness of IV therapy.

Background

In the past decade, there has been renewed interest in improving the quality of care delivered to patients requiring vascular access both in hospital and community settings.[4-6] Organizations such as the Association for Vascular Access, Infusion Nurses Society, Canadian Vascular Access Association, World Congress for Vascular Access, and Registered Nurses'

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http://dx.doi.org/10.1016/j.java.2015.11.004

Association of Ontario (among others) have emerged as groups aiming to improve the quantity, quality, and dissemination of evidence in this specialty area. Guidelines, standards, and several journals specifically dedicated to vascular access research have been produced in greater number in recent years. Regardless, much of the work completed to date in the vascular access domain has not fully addressed the growing role or value of electronic records.

Although names and definitions vary, the term *electronic health record* (EHR) has gained traction as a common term within the health care literature to describe a range of various electronic clinical record technologies that are used to support patient care.[7] Given the increasing use of EHRs in health care and the lack of explicit examination of this form of technology in the vascular access domain, the purpose of this review article is to describe how EHR technology can be used to support quality improvement (QI) initiatives in vascular access practice and its related research and to explore the importance and value of embedding vascular access requirements within current EHR technology.

To date, there is little research or discussion in the academic literature examining how EHR technology can be used to improve care in this specialty area. Therefore vascular access practitioners should examine current EHR technologies and generate recommendations related to maximizing this technology to support future vascular access practice and research.

EHRs

EHRs are defined as repositories of secure, computerized patient-specific information that can be accessed by health care professionals.[8] Functionalities of the EHR include electronic documentation, computerized provider order entry (CPOE), electronic medication administration, and laboratory results.[9] Commonly, EHRs have been implemented in an effort to improve documentation quality, retain clinical data, and to facilitate exchange of information between health care providers. Given the historical reliance on paper-based clinical records, EHRs have been espoused as a necessary evolution within health care for both QI and patient safety considerations.[10]

To facilitate the adoption and uptake of EHRs, many governments have allocated significant resources to support the procurement, implementation, and adoption of the technology. For instance, since 2006 the Canadian federal government has spent roughly $2.1 billion on eHealth initiatives inclusive of EHRs and electronic medical records.[11] In the United States, meaningful use regulations have encouraged health care organizations to install and use EHRs through financial incentives and other adoption campaigns.[12] With the increasing use of EHRs in health care organizations across most areas of Canada, the United States, and other parts of the world, there is great opportunity for the field of vascular access to improve by leveraging this technology.

Although the research on the benefits derived from EHRs remains inconclusive, there is ample evidence suggesting that EHR technology can afford significant clinical and quality benefits, especially within acute care organizations.[13,14] To date, the research literature examining benefits derived from EHR use have typically focused on a number of dependent variables, including (but not limited to) documentation quality/legibility, clinician efficiency, satisfaction of providers, and influence on patients' health outcomes and safety.[15-20] For example, an obvious benefit of typed documentation is legibility. No longer should health care professionals spend time deciphering handwriting and potentially jeopardizing patient safety due to inaccurate interpretations of handwritten documentation by care providers. Additionally with an EHR, multiple clinicians can access the patient record at a single time, individual notes or papers are not misplaced or damaged, and a list of clinicians who have accessed the record can be generated.

Despite these benefits of EHRs, the systems are far from perfect. Much research has been generated during the past decade on how the systems can be further improved to support clinician use and provide the kinds of information necessary to improve clinical care and decision making. However, because these systems are in place in many care settings globally, it is important that their benefits and use be maximized to support all clinical areas, inclusive of vascular access.

How EHR Technology Can Be Used to Support QI Initiatives in Vascular Access Practice and Its Related Research

Historically, the use of technologies like EHRs (and related electronic record technologies) has been conceptualized to help facilitate QI.[21] To date, there is a growing body of evidence suggesting that EHR technology can derive benefits in terms of health care safety and quality.[13,14,22] Regardless, the evidence is far from conclusive because the technology is extremely complex and has the ability to reshape clinical approaches,[23] sometimes in challenging ways.[24] There has also been little examination conducted within the vascular access domain literature, especially around QI using EHR technology. Given the limited amount of scholarly work in this clinical subdomain, it is important to explore what potential EHR technology has within vascular access practice as a mechanism to support ongoing and future QI endeavors.

In the scholarly work that has been completed to date,[4,25-29] the use of EHR technology for the vascular access specialty area has been conceptualized in a few different fashions to support some elements of QI. According to Boaden et al,[30] QI in health care can be conceptualized as both "approaches" and "tools." Typically, because QI initiatives engender change to both approaches (eg, clinical procedures) and the related tools (eg, technology) used within the clinical environment, it is important to explore the topic of QI from this dual perspective. From the approach perspective, two articles[28,31] discussed elements related to the development (or redevelopment) of various clinical guidelines related to vascular access procedures, clinical workflow aspects, and the benefit of ongoing adaptation and changes to support the functionality of the electronic tool. In addition, Levy et al[25] adapted their existing electronic medical record with a new e-charting module to capture vascular access- and transfusion-related documentation.