

Vanderbilt Medical Center

Nashville, Tennessee

IT Case Study

Electronic patient information system for high-acuity care

Nimesh Patel, Director, Perioperative Informatics and Computing

Vanderbilt Medical Center

June 3, 2009

Electronic patient information system for high-acuity care

Introduction

Vanderbilt Medical Center (VMC) is recognized as one of the USA's leading private academic medical center. The entire perioperative care team collaborated in the engineering, design and development of an easy-to-use, comprehensive electronic patient information system specialized for high-acuity care, which has been in use at VMC since 2002. Together with the IT team, the team of clinicians embarked on the development of the solution in 1995 and as each feature and area of functionality was complete it was deployed. The system grew initially from a preadmission patient evaluation module to a complete perioperative solution addressing all areas of clinical care for all providers. By 2002 the system was completed and deployed across all 7 VMC OR suites. The system is also now commercially available from Acuitec and is marketed as VPIMS (Vigilant Perioperative Information Management System).

Using VPIMS, Vanderbilt Medical Center has been able to:

- 1) Improve the quality and safety of patient care,
- 2) Improve financial margins with greater staff and resource efficiency and
- 3) Enhance compliance with federal regulations and other national standards including SCIP (Surgical Care Improvement Project) and the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO).

This case study will highlight these improvements and provide validation of results achieved. Additionally, to meet the requirements for Modern Healthcare IT Case Study evaluation, this paper will address the following criteria statements:

- *Description of the health information technology or system adopted, including cost, manpower and other resources needed.*
- *Evidence of how the health information technology or system is being used to improve patient care or patient care delivery.*
- *Strategy for seeking funding for the health information technology or system adopted from the American Recovery and Reinvestment Act of 2009, commonly known as the economic stimulus bill.*

Description

System Adopted

Vanderbilt Medical Center adopted the VPIMS (Vigilant Perioperative Information Management System) over a decade ago. The system was developed out of a need to address the issue of patient care efficiency and consistent high quality.

Initially, they evaluated existing commercial healthcare information applications, but found none that suitably addressed all aspects of the complex environment associated with the perioperative care cycle. The requirements were for a system that collected data on the entire continuum of care, from patient history to post surgery discharge and was user-friendly for busy clinicians. Finding nothing suitable on the market that provided a comprehensive solution, they decided to create their own.

VMC wanted to create a system that achieved the highest level of safety throughout the entire surgical experience and began to collect data to compare the effects of different medications and treatment practices on patients.

By identifying and standardizing best practices for patient care, the clinicians strived to improve not only patient care but also increase operating suite efficiency. With the surgical suite representing the largest source of revenue in the hospital while also being the largest cost center, technologies that improve management in the operation room have the potential to dramatically improve hospital financial margins.

Anesthesiologists, nurses and surgeons each wanted more convenient access to patient data than what was available in paper form. Having simultaneous access would be best since multiple providers need this information in different locations simultaneously. In addition, anesthesiologists often simultaneously manage multiple patients which made it impossible to closely monitor all patients. VMC concluded that a method to capture patient data electronically and remotely monitor patients offered the opportunity to improve care processes in every step of the acute care process.

VMC then began to create its new electronic patient information system – in its first release, VPIMS allowed anesthesiologists to digitally record all patient information during the preoperative evaluation. This initial system eliminated paper records at patient intake and the associated rework and delays often caused by records being unavailable or incorrect on the day of surgery. This had an immediate impact on efficiency and made data available well ahead of time to the clinicians to adequately plan for the patient. At the same time, day of surgery cancellations and delays were reduced significantly. The structured forms allowed for fast and efficient evaluations even by new users. Also, integrated preoperative testing algorithms dramatically reduced the costs associated with unnecessary testing and also eliminated delays due to missing tests.

Since that early implementation, the system has expanded from its original patient evaluation module into a comprehensive solution, which is what is today known as VPIMS. VPIMS supports the entire continuum of surgical care and patient monitoring for VMC– from scheduling to post operative CQI. As a clinician-designed solution, VMC notes VPIMS has an extraordinarily high level of adoption as compared to other IT systems deployed in similar facilities.

Over a period of 6 years and a phased rollout across all VMC facilities, VMC software engineers and clinical professionals created what is today VPIMS. Over this time frame, the cost, including time spent by these engineering, programming, and clinical professionals, is estimated at approximately \$3.5M to \$4.0M. The costs associated with the implementation, training, support and product enhancements over the past 10 years are estimated to be of a similar magnitude.

Evidence

Using VPIMS, Vanderbilt Medical Center has been able to make perioperative documentation instantly available to attending physicians so they can deliver the best possible care. With no changes to workflow and processes they already know, clinicians can complete tasks faster and more accurately electronically allowing them to spend more time attending to their patients.

A unique feature of the software is patient care reminders. VMC saw post surgical infections decrease 67% with the VPIMS system programmed with prompts to administer and re-dose antibiotics on time. The magnitude of outcomes improvements as a result of this process enabled by the VPIMS system could not have been anticipated.

Compliance with guidelines aimed at increasing patient safety and reducing morbidity and mortality is increasingly important. VMC's use of VPIMS enhanced compliance with standard indicators resulting in 100% compliance with care 'handoffs', pre-procedural 'time out', and other critical safety procedures. Using the VPIMS system, compliance with the Surgical Care Improvement Project (SCIP) antibiotic administration improved 300% to allow VMC become 'best in class' in this indicator.

Lastly, using VPIMS 'Patient Tracker' application has improved patient throughput and has consequently brought improvements to VMC's financial margins. Case cancellations dropped significantly and late case starts were dramatically reduced by over 75%. Ultimately, this allows the investment in capital projects and clinical programs that provide even greater patient access to state-of-the-art medical care. VMC's annual

case load has experienced near double-digit growth for several years as a result. The Department of Anesthesiology has experienced a 67% reduction in the average time to complete and submit an anesthesia chart to billing and a 69% decrease in the number of anesthesia charts that need correction or resubmission.

ARRA Strategy

The intent of the ARRA stimulus funding is to provide incentives for the *meaningful use* of healthcare IT to improve patient safety. VMC has clearly demonstrated the benefits to patient safety through their meaningful use of VPIMS for the past 6 years. The costs VMC has incurred with respect to the development, deployment and support of the VPIMS meets the criteria stated below.

Section 4102 of the Stimulus Act also establishes a financial incentive for eligible hospitals that are meaningful EHR users. Below is an excerpt from the Health IT Provisions in The American Recovery and Reinvestment Act of 2009 (ARRA)

Incentives for Hospitals and Health IT

(§4102)

- Incentives under the IPPS for eligible hospitals that are meaningful EHR users; first year available FY2011
- Amount: sum of a base amount (\$2M) added to its discharge related payment, multiplied by its Medicare share
 - Discharge related amount: \$200 for each discharge under the IPPS, for 1,150th through 23,000th discharges
 - Medicare share: Medicare portion of inpatient bed days, adjusted upward for charity care (may not include bad debt)
- Form (lump sum or periodic) to be determined by the Secretary
- Incentive amounts diminish over 4-year period (100%, 75%, 50%, 25% for hospitals starting in 2011, 12, and 13 reporting years); hospitals starting 2014 or 2015 reporting years are treated as if they started in 2013 (*e.g.*, for starts in 2014 reporting year, first-year incentive is at 75%); no incentive for starts after 2015 reporting year

The HIT provisions of ARRA also include \$2 billion in grants to promote interoperability of clinical data repositories or registries, such as ASA's new Anesthesia Quality Institute, Inc. More information is to be provided by the American Society of Anesthesiologists later this year. VMC is a likely beneficiary of this program as their anesthesia clinical data registry is built on the highly interoperable Microsoft.net operating environment and includes over 500,000 anesthesia case records.

Author:

Nimesh Patel

Director, Perioperative Informatics and Computing

Nimesh.patel@vanderbilt.edu

www.mc.vanderbilt.edu

[Acuitec/VPIMS Product Information](#)

Barbara White

bwhite@acuitec.com

www.acuitec.com