Best Use of Information Systems in the Perianesthesia Setting: Measuring Outcomes, Impacting Quality...Making A Difference in Patient Care

Denise O’Bien, DNP(c), RN, ACNS-BC, CPAN, CAPA, FAAN
Perianesthesia Clinical Nurse Specialist
University of Michigan Health System, Ann Arbor, USA

ICPAN Conference, Toronto, 2011
Objectives

• Identify the role of the perianesthesia nurse in design and use of information systems in the perianesthesia environment.

• Describe patient outcomes for perianesthesia care.

• Discuss use of perianesthesia information systems data mining to identify quality issues and measure patient outcomes.
The computer is ubiquitous in the perianesthesia environment...

...But does it enhance or diminish perianesthesia nursing care?
• Do you have an electronic health record in your facility?

• Are you using online nursing clinical documentation in your PACU setting?

• Is OR nursing documentation online?

• Is Anesthesia documentation online?

• Would you recommend your application to others working in the perianesthesia setting?
OVERVIEW OF HEALTH IT & THE EHR
Comprehensive Health IT System

- Encompasses clinical documentation, health information, results management, order-entry management, clinical decision support, electronic communication and connectivity, patient support, administration processes, reporting and disease surveillance
The Electronic Health Record (EHR) is a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting.

- Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports.
Ideal Characteristics of EHR

• Information should be able to be continuously updated
• Data used anonymously for statistical reporting for quality improvement, *outcome reporting*, resource management, public health communicable disease surveillance
• Ability to exchange records between different electronic health records systems ("interoperability") facilitates coordination of healthcare delivery in non-affiliated healthcare facilities
WHAT ARE THE BENEFITS?
Benefit to Patient & Nurse

• The promise of Information Technology
  – Safety
  – Effectiveness
  – Patient-family centeredness
  – Timeliness
  – Efficiency
  – Equity
  – Global connectedness
Value Added

• Data “gold mine”

• Standardized terminology

• Using clinical information documentation to create the evidence
WHAT ARE THE BARRIERS?
Barriers

• Lack of standardized nomenclature
• Nurses not at “the table” when IT decisions are made
• Applications insensitive to real-life workflow issues
• Addition of IT - stressor
• Majority of nurses lack IT skills
“Too many nurses still think of IT as computerizing existing processes, and not as a means to transform their practice through use of evidence (ie, data). Nurses’ relationship to IT is not unlike their relationship to research in previous decades.”

McBride (2005)
Types of Unintended Adverse Consequences

• More or new work for clinicians
• Unfavorable workflow issues
• Never-ending demands for system changes
• Problems related to paper persistence
• Untoward changes in communication patterns and practices
Types of Unintended Adverse Consequences

- Negative emotions
- Generation of new kinds of errors
- Unexpected and unintended changes in institutional power structure
- Overdependence on technology

Dilemmas, Tetralemmas, Reimagining the Electronic Health Record

Olga Petrovskaya, BScN, RN; Marjorie McIntyre, PhD, RN; Carol McDonald, PhD, RN

With the transition from paper-based to computer-based records, nursing practice shifts to computerized documentation of care in the electronic health record (EHR). Viewed not only as an electronic document, but as an instrument of modern economic and technological ideology that serves organizational goals of cost-efficiency, the EHR can be perceived as creating a dilemma for a patient-centered nursing practice. Viewing the EHR as relying solely on the use of standardized languages begets a number of questions and furthers the dilemma for nurses. Through a discussion that draws on the Indian tradition of the tetralemma, authors transcend the EHR/nursing dilemma. **Key words:** categorization, dichotomy, dilemma, electronic health record, standardized nursing languages, technology, tetralemma
“Collaboration between nurses and information technology specialists working on the implementation of the EHR is essential to address these concerns. Perhaps even more important is the need for many more nurses to become information technology specialists themselves, and for all nurses to become familiar with information technology.”
• “This suggestion relies, however, on the caveat that those nurses developing and evaluating information technology for nursing practice also value practice informed by nurse patient relationships based on caring in the sociopolitical context.

• The technology/caring dilemma threaded through many discussions of nursing informatics can only benefit from disruption—through people who value multiple sources of nursing knowledge and through philosophical frameworks such as the tetralemma, that help us move beyond dichotomous positions.”

Petrovskaya, McIntyre & McDonald (2009)
Consider substituting “nurses” for “physicians” in the following recent perspective from NEJM

Can Electronic Clinical Documentation Help Prevent Diagnostic Errors?

Gordon D. Schiff, M.D., and David W. Bates, M.D.

The United States is about to invest nearly $50 billion in health information technology (HIT) in an attempt to push the country to a tipping point with respect to the adoption of computerized records, which are many questions about it persist. For example, can it be leveraged to improve quality without adversely affecting clinicians’ efficiency? Will the quality of electronic notes be better than that of paper notes, or will it be degraded by the widening physicians from the patient, discouraging independent data gathering and assessment, and perpetuating errors. But we envision a redesigned documentation function that anticipates new approaches to improving diagno-
• “Although clinical documentation plays a central role in EHRs and occupies a substantial proportion of physicians’ time, documentation practices have largely been dictated by billing and legal requirements. Yet the primary role of documentation should be to clearly describe and communicate what is going on with the patient.”

Schiff & Bates (2010)
“Clinicians need to take back ownership of the medical record as a tool for improving patient care; such a move could have many benefits, including reducing the frequency of diagnostic errors. External requirements for EHRs should be minimized, and physicians, members of their support staff, and patients should be engaged in reengineering documentation, with the goal of building a more distributed, reliable, and content-rich yet succinct and efficient system.”

Schiff & Bates (2010)
Where is Nursing in the Electronic Health Care Record?

Beverly MITCHELL, Olga PETROVSKAYA, Marjorie MCINTYRE and Noreen FRISCH

University of Victoria, School of Nursing, Victoria, BC, Canada

Abstract. The authors explore the possibilities for documenting professional nursing practice in an electronic health record. Recognizing that there are a variety of approaches to electronic documentation, the intent of this discussion is to generate a general rather than a particular approach to this issue. Nurses themselves must determine the ways in which professional nursing care will be captured in the electronic systems used in their facilities. Questions that arise from nursing include: How can nurses balance generalized care and protocol management with the need for documentation of each individual’s nursing needs and particular experiences? How can the goals of nursing care be incorporated into the record? How can nursing actions/interventions be clearly communicated to all members of the health care team? In what ways can an electronic record document collaboration with the client to determine individualized outcomes of care and treatment? In considering these questions a number of issues arise: the selection of standardized languages to be used in the records, the title of the record, the tension between coding and text, the accessibility and transferability of the record, the ability to retrieve data on nursing outcomes through data mining techniques, ownership of the record, and privacy/security of the information stored. Although the paper will make no attempt to answer these questions it will draw on relevant journal articles to provide a context for this pivotal change in that way we account for health care practice.

Keywords. EHR, health and well-being, standardized language, health outcomes
CONSIDERATIONS IN THE PERIANESTHESIA CARE SETTING
• Perianesthesia nursing involvement in the design and use of information systems can support patient care, minimize workflow disruption, and encourage best practice.

• Developing and optimizing applications has multiple benefits.
“Information systems designed to capture nurse process and outcomes variables are essential to nurses having the data to make a convincing case that nurses ensure patient safety and high quality care.”

Aiken, April 2004, AONE
Perianesthesia Electronic Documentation

- The ideal perianesthesia electronic clinical documentation application - does it exist?
  - Intuitive
  - Easy to learn, easy to use
  - Physiologic monitor capture
  - Avoids redundant documentation
  - Minimal workflow disruption
## Table 1. Types of CDSS With Descriptions and Perianesthesia Exemplars

<table>
<thead>
<tr>
<th>Type</th>
<th>Benefits</th>
<th>Perianesthesia Exemplar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation forms and templates</td>
<td>Directs provider to complete required data fields using standardized responses</td>
<td>Preoperative admission form</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structured history and physical form</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drop-down list in charting flow sheets for nurse response to patient report of pain</td>
</tr>
<tr>
<td>Relevant data presentation</td>
<td>Can organize and present sometimes disparate and complex data into simpler formats</td>
<td>Electronic perioperative schedule display with status alerts using colors, symbols, and on-screen alerts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summary profile of perianesthesia unit efficiency with indicators of average length of stay and acuity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summary view of pertinent perioperative and anesthetic information used at hand-off report</td>
</tr>
<tr>
<td>Order creation facilitators</td>
<td>Standardization of order parameters and suggested information such as dosing parameters</td>
<td>Pre-anesthetic anxiolytic order set based on weight, procedure, and level of anxiety</td>
</tr>
<tr>
<td>Time-based checking and protocol/pathway support</td>
<td>Guides implementation of sometimes complex protocols</td>
<td>Pediatric airway emergency protocol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malignant hyperthermia pathway with alerts and reminders as to what care should be prioritized and the visual location of vital supplies</td>
</tr>
<tr>
<td>Reference information and guidance</td>
<td>Provides needed and requested reference information to clinicians and patients</td>
<td>Auto-calculation of pediatric dosing of emergency intubation medications based on recorded weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presentation of “normals” for arterial blood gas results with symbols alerting the nurse to a value that is outside normal limits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web or “info button” link to national guideline or standard related to perioperative hyperthermia for a patient with a temperature below a set parameter</td>
</tr>
</tbody>
</table>

Data from Osheroff et al. 8
Practical Thoughts

- Workspace & supporting the nurse-patient interaction
- Ownership through participation in design & testing
- Awareness of the impact on workflow & communications
- Computerized systems are not electronic versions of current paper documents

Prepare for Success

• Team approach
• Look for early adopters - use as superusers
• Look for slow adaptors - is it a training issue, application issue, computer use issue, lack of knowledge issue?
• Buy-in at all levels of leadership - talk it up!
DATA MINING FOR QUALITY & OUTCOMES
Data Rich Healthcare

“Healthcare has always been data-rich. As more healthcare data are captured and stored electronically, the need for new methods to derive information from large, multifaceted data sets has become more apparent.”

Data Mining Defined

• *Data mining is defined as “the semiautomatic exploration and analysis of large quantities of data in order to discover meaningful patterns and rules.”*  
  Berry & Linhoff (1997)

• Identification of meaningful patterns in data has always been an integral part of scientific discovery  
  – Patterns are necessary for the construction of scientific hypotheses and causal models  
  Brossette (1998)

• *Key step in the process known as Knowledge Discovery in Databases (KDD)*
Data Mining or KDD?

• KDD and data mining are often used synonymously; there is a difference

• Knowledge discovery is a process
  – Data selection
  – Data preprocessing
  – Data transformation
  – Data mining
  – Interpretation
  – Evaluation

• Data mining is the actual application of the algorithms to the data set.

“Data mining is a newer generation approach to data analysis and knowledge discovery that has grown out of the need to derive meaningful information from the massive amounts of high-dimensional data that have been produced and stored over the past decade.”

• Data generated during delivery of actual patient care are rich in clinical detail

Prather (2000)

“Data sets that reflect real-world patients’ experiences and responses can provide valuable insights for clinical knowledge development.”

“Data mining as a method for data analysis in nursing research can contribute to the discovery of causal factors and demonstrate outcome effectiveness. It is a technology that can turn massive amounts of raw data into useful information that can improve clinical practice.”

Benefit in Practice

• Mining data from perianesthesia clinical information systems can identify quality issues and improve patient outcomes.

• Requires
  – Accessible data
  – Skill and tools
  – Defined quality indicators
  – Measurable outcomes
Perianesthesia Data Elements

• Published 2009
• Based on Standards, outcomes
• Specialty catalog within ICNP
• Intent: Standardize the “language” of perianesthesia nursing
• Designed by and for perianesthesia nurses
• PDE is NOT an application – no “plug & play”
Functionality of PDE

• Use of perianesthesia standardized language in the care of your patients
  – Describing observed phenomena consistently

• Improving patient outcomes with a standardized language
  – Outcomes defined, described

• Research with other perianesthesia nurses
  – Offers opportunities to collect data across multiple settings
Identification & Measurement of Patient Outcomes

“For nursing to fully participate in clinical evaluation, clinical research, policy development, and interdisciplinary team work, it is imperative that patient outcomes influenced by nursing care be clearly identified and measured.”

Wilson, Kane & Falkenstein (2008)
• “Measurable nurse-sensitive outcomes are essential for all areas of perianesthesia nursing, including preanesthesia and postanesthesia levels of care.”

Wilson, Kane & Falkenstein (2008)
Outcomes research attempts to establish which treatments work, are cost-effective, and achieve or contribute to a desired outcome.”

• Outcomes
  – Global or end outcomes (health status or patient satisfaction)
  – Intermediate outcomes (assess patient knowledge, attitudes, behaviors or measure wellness care)

• Intermediate outcomes
  – Addressed by nursing interventions
  – Measured to demonstrate value of longitudinal care, patient education, physical & emotional support to the health of individuals, populations

Wilson, Kane & Falkenstein (2008)
Outcomes – PDE 2009

• Patient will have patent airway.
• Patient will have adequate ventilation and oxygenation.
• Patient will have adequate or improved gas exchange.
• The patient will have adequate cardiac perfusion and hemodynamic stability.
• The patient will have optimal cardiovascular function.
Outcomes – PDE 2009

• The patient will have optimal end-organ perfusion.
• Patient will return to baseline sensory function.
• Patient will return to baseline motor function.
• Patient will return to baseline mental status.
• Patient will meet the patient’s needs for relief, ease, and transcendence in the context of physical, psychospiritual, environmental, and sociocultural.
Outcomes – PDE 2009

• Patient will verbalize methods to increase comfort level.
• Patient will have pain score of 4 or less (0-10), or meet patient’s goal.
• Patient will demonstrate and/or verbalize patient’s teaching.
• Patient will demonstrate acceptable level of anxiety.
• Patient will be normothermic.
Outcomes – PDE 2009

• Patient will have optimal fluid balance.
• Patient will have electrolytes within normal limits.
• Patient will return to baseline urinary function.
• Patient will have acceptable nausea postoperative nausea and vomiting control.
• Patient will have intact integument.
Outcomes – PDE 2009

- The patient and/or family/significant other verbalize(s) knowledge of disease process, causes, and management.
- Patient and/or family/significant other demonstrate(s) behaviors required for performance of activities enhancing recovery.
- Patient will be free of injury.
- Patient will have rights protected.
Perianesthesia Outcomes Research

• Where to begin?
  – Identify question to be answered – desired outcome
  – Design query and define query elements
  – Begin simply
  – For internal purposes? External (publication/presentation) purposes?
  – Resources available
Perianesthesia Outcomes Research

• What to do with the results?
  – Identify patient care issues
  – Quantify, prioritize issues needing action
  – Change practice in your setting
  – Provide evidence to support our practice
Perianesthesia Outcomes Research

• Knowledge discovery in perianesthesia care is open, available, waiting to be tapped
• Outcomes research in nursing, particularly perianesthesia nursing, is in its infancy
• As the data accumulates, we must develop the expertise to mine, interpret, and evaluate this data to disseminate knowledge of the influence that perianesthesia nursing has on patient outcomes, quality, and safety
Act as if what you do makes a difference. It does.

William James
Objectives

• Identify the role of the perianesthesia nurse in design and use of information systems in the perianesthesia environment.
• Describe patient outcomes for perianesthesia care.
• Discuss use of perianesthesia information systems data mining to identify quality issues and measure patient outcomes.
QUESTIONS?

dedeo@me.com