



Effect of Computerized Physician Order Entry on Nurses and Nurses' Work

Willa Fields, RN, DNSc, FHIMSS
San Diego State University

Jennifer Jacoby, RN, MSN
Sharp Memorial Hospital

Sandra McCullough, RN, BSN
Sharp HealthCare

Funding Source: Sharp HealthCare Foundation and San Diego State University Foundation

Genesis of Study

Research opportunities exist everywhere!



Focus of CPOE Research

- Patient safety and adverse drug events¹⁻³
- Practitioner performance⁴
- Unintended consequences⁵⁻⁸
- Direct and indirect nursing times⁹
- Nurse physician collaboration¹⁰⁻¹²

Results: Inconclusive

The Evidence

- Systematic review of effect of HIT on quality¹⁴
 - Increased adherence to guidelines
 - Enhanced surveillance and monitoring
 - Decreased medication errors
- Limited research on the effect of CPOE on work and role of nursing
 - Negative consequences to nurse-physician collaboration¹¹⁻¹²



Significance of Study

- CPOE holds the promise for safer, more effective and efficient patient care
- 2009 American Recovery and Reinvestment Act incentivizing healthcare to implement information technology
- Imperative to understand the effect of CPOE on the work and role of nurses to aid in system design, implementation, and user support



Purpose of Study

To capture the effect of CPOE on:

- Nurse-physician relationships
- Nurse collaboration with other disciplines
- Nursing workflow



Sharp Memorial Hospital

- Part of Sharp HealthCare, 2007 Malcolm Baldrige National Quality Award
- Magnet-designated
- 334 acute-care beds
 - 48 ICU beds
- 17,500 annual admissions
- 1,200 RNs
- 1,100 physicians
 - ~400 active





CPOE Implementation

- “Big Bang” system implementation January 20, 2008
 - Existing Radiology, Order Entry, Pharmacy, ED , and documentation systems converted
 - CPOE strongly encouraged
- Physician “design team” created and approved build of ~200 order sets prior to go-live
- “High-use” physicians received 3 hours of mandated training
- Physicians placed over 1 million orders in calendar year 2008
- Current CPOE compliance rate 85%
- Medical Executive Committee mandated CPOE beginning June 1, 2009 for physicians with >200 orders/month



Research Overview

- Exploratory qualitative research design
- Approved by San Diego State University and Sharp HealthCare Institutional Review Boards
- Semi-structured interviews conducted by Principle Investigator
- Interviews digitally recorded and transcribed
- Each investigator conducted independent standard content analyses¹⁵
 - Analyses integrated by consensus



Potential Participants

- Those with first hand knowledge and experiences with CPOE
 - Registered nurse or physician
 - Practicing at Sharp Memorial Hospital before, during, and after CPOE implementation



Recruitment Strategies

- Email from Chief Nursing Officer
- Signs posted in units and medical staff lounges
- Presentation at meetings
 - Staff meetings
 - Medical Executive Committee meeting
- Volunteers given consent letter with study description (no signature required)

Interview Schedule

- How would you describe the success of CPOE at Sharp Memorial Hospital?
- How did the CPOE implementation compare to what was planned?
- How has your role in order management changed since CPOE was implemented?
- How has your role with other disciplines/departments (nursing, physicians, pharmacists, laboratory, radiology, dietary) changed with CPOE?



Interview Schedule

- In your opinion, what impact has CPOE had on patient care? Nursing workflow? Workflow in general?
- How have your communication patterns changed since CPOE with nurses, physicians, pharmacists, clerks, others?
- How has CPOE affected your workload?
- Do you have anything else you'd like to share with me?



Results



Demographics

- 28 nurses (data saturation)
 - 4 to 10 months post CPOE implementation
 - Nurse for 1 to 43 years (M=18.68, SD=11.54)
 - Nurse at Sharp Memorial for 1 to 30 years (M=10.32, SD=7.99)
- 5 physicians
 - No data saturation
 - Transcriptions not analyzed



Themes

- Nursing Process/Critical Thinking
- Relationships/Communication
- Operational (workflow/workload)



Nursing Process: The Big Picture

- Critical Thinking

- “You’re more focused on not ‘What is this?’, but you’re focused on ‘Is this the right test?’ ... it’s allowed the nurses to be a more intelligent participant in their patient’s care.”
- “...nurses need to know their patients inside and out now. Because if a physician orders a new medication they have to realize ‘Yes, my patient has congestive heart failure, I needed that Lasix.’ Where as if they would have ordered Lasix on a patient that had no failure, then they’d be like ‘I think you put that on the wrong patient.’ “
- “The nurse really has taken to heart the responsibility of the patient advocate for safe patient care, that the nurse must know everything about the patient.”



Relationships/Communication

- No major changes with other nurses, pharmacy, laboratory, radiology or dietary.
- Mixed results with physicians
 - “... we were struggling and they [physicians] were struggling. So I think we could struggle together and help each other get through it, there was definitely camaraderie”
 - “It’s a lot more collegial atmosphere in the workplace right now.”
 - “The problem comes when the physician is off site and he’s entering orders remotely. I think you lose that camaraderie and that we’re both here for the patient thing.”
 - “We don’t always get to round with them, we do miss them [physicians].”
 - “I had to physically go seek them [physicians] and let them know how important it was for me to touch bases with them on a daily basis regarding their patients.”



Operational

- Rounding
 - “So what we’ve encouraged is for the nurse to actually round with the physician, talk about what’s going on, the disease process in the patient, what the plan is for the day, and then the physician may say, ‘Oh, and I wrote orders for this, this, and that.’ So when they [orders] pop up in the computer they’ll go, ‘Oh yeah, I already talked to Dr. so and so about those orders, I already know those orders are good to go.’”



Operational



- Orders

- “In some ways it’s a little easier... it’s right there. You’re notified immediately, you get a little signal up on your list that tells you you have new orders.”
- “I think they [nurses] get a little afraid that the computerized orders aren’t on their patient. At first, it was kind of like ‘How do I know those are for my patient?’ “
- Remote Orders: “If it’s the appropriate physician and the order is appropriate to the patient’s condition and what’s going on with them, I would probably follow the orders. Especially if it flows with what you would expect for a plan of care for that patient.”
- Many concerns voiced about missing orders.

Operational

- Workflow/Workload (mixed)
 - “A lot more charting. Because there’s multi different sites to put information in.”
 - “... a lot of extra phone calls and questions.”
 - “... has slowed me down. And I know it’s supposed to speed things up. I hate the bubbles you have to fill in. I was much better at free texting.”
 - “There is an underlying uneasiness that people are missing things.”
 - “The workload, sometimes you end up spending more time to clarify an order because I think you’re limited with the computer as to what you can write.”
 - “... need to check things more carefully.”
 - “It’s really easy to access the information.”
 - “It is easier to go in immediately and verify all your orders on a new patient.”
 - “But, with the physician orders I feel like I can be at the bedside more.”



Summary

- Nurses' commitment to safe patient care
- Biggest nursing concern: Did I miss anything?
- CPOE impacts workflow for both physicians and nurses



Recommendations

- Training:
 - Set realistic expectations
 - Double your expectations of training time needed
 - Stress need for physician and nurse to regularly round
 - Prepare nurses for how to review the electronic chart; do not just teach the new tasks, teach nursing process and communication in a computerized world
 - Teach physicians not only how to enter orders, but how to manage orders
 - Train physicians to manager orders; not just enter orders
 - Train beyond the computer tasks/skills, include the gestalt of interdisciplinary patient care
- Future Research
 - Similar study one year or longer after implementation



Thank You for Your Time!

Questions?

Willa.fields@sbcglobal.net

References

1. Kaushal, R., & Bates, D. (2001). Chapter 6: Computerized Physician Order Entry (CPOE) with Clinical Decision Support Systems (CDSS). In K.G., Shojania, B.W. Duncan, K.M. McDonald, et al. (Eds.), *Making Health Care Safer: A critical Analysis of Patient Safety Practices. Evidence Report/Technology Assessment No. 43* (Prepared by the University of California at San Francisco-Stanford Evidence-Based Practice Center under Contract No. 290-97-0013), AHRQ Publication No. 01-E058, Rockville, MD: Agency for Healthcare Research and Quality.
2. Koppel, R., Metlay, J., Cohen, A., Abaluck, B., Localio, A. Kimmel, S., et al. (2005). Role of Computerized Physician Order Entry Systems in Facilitating Medication Errors. *Journal of the American Medical Association, 293*(10), 1197-1203.
3. Kuperman, G., Bobb, A., Payne, T., Avery, A., Gandhi, T., Burns, G, et al. (2007). Medication-related Clinical Decision Support in Computerized Provider Order Entry Systems: A Review. *Journal of the American Medical Informatics Association, 14*(1), 29-40.
4. Garg, A., Adhikari, N., McDonald, H., Rosas-Arellano, M., Devereaux, P., Beyene, J., Sam, J., and Haynes, B. (2005). Effects of Computerized Decision Support Systems on Practitioner Performance and Patient Outcomes. *Journal of the American Medical Association, 293*(10), 1223-1238.
5. Ash, J., Sittig, D., Poon, E., Guappone, K., Campbell, E, & Dykstra. (2007). The Extent and Importance of Unintended Consequences Related to Computerized Provider Order Entry. *Journal of the American Medical Informatics Association, 14*(4), 415-423.
6. Harrison, M., Koppel, R., & Bar-Lev, S. (2007). *Journal of the American Medical Informatics Association, 14*(5), 542-549.
7. Sittig, D., Krall, M., & Kaalaas-Sittig, J. (2005). Emotional Aspects of Computer-based Provider Order Entry: A Qualitative Study. *Journal of the American Medical Informatics Association, 12*(5), 561-567.



References

8. Wachter, R. (2006). Expected and Unanticipated Consequences of the Quality and Information Technology Revolutions. *Journal of the American Medical Association*, 295(23), 2780-2783.
9. Choi, W., Park, I., Shin, H., Joo, Y. Kin, Y., Jung, E, et al. (2006). Comparison of Direct and Indirect Nursing-care Times between Physician Order Entry System and Electronic Medical Records. In H. A. Park , P. Murray, & C. Delaney (Eds), *Consumer-Centered Computer-Supported Care for Healthy People* (pp. 288-293. Amsterdam:IOS Press.
10. Pirnejad, H., Niazkhani, Z., van der Sijs, H., Berg, M., & Bal, R. (2008, in press). Impact of a Computerized Physician Order Entry System on Nurse-Physician Collaboration in the Medication Process. *International Journal of Medical Informatics*.
11. Aarts, J., Ash, J., & Berg, M. (2007). Extending the Understanding of Computerized Physician Order Entry: Implications for Professional Collaboration, Workflow, and Quality of Care. *International Journal of Medical Informatics*, 76(S), S4-S13.
12. Popernack, M. (2006). A Critical Change in a Day in the Life of Intensive Care Nurses: Rising to the e-Challenge of an Integrated Clinical Information System. *Critical Care Nurse*, 29(4), 362-375.
13. Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., et al. (2006). Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. *Annals of Internal Medicine*, 144(10), 742-752.
14. Polit, D., & Beck, C. (2008). *Nursing Research*. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.