Examining the value of electronic health records on labor and delivery

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OBJECTIVE: The objective of the study was to evaluate the impact of an electronic health record (EHR) on documentation completeness and patient care in a labor and delivery unit.

STUDY DESIGN: We conducted a pre- and postintervention study to compare documentation quality and workflow before and after EHR implementation. Documentation was compared using χ^2 and Fisher's exact tests. Objective observers measured workflow activities across all shifts before and after EHR implementation and activities were compared using Kruskal-Wallis tests and analysis of covariance.

RESULTS: Paper admission records were significantly more likely to miss key clinical information such as chief complaints (contractions, membrane status, bleeding, fetal movement, 10-64% vs 2-5%; $P < .0001$) and prenatal laboratory results and history (Varicella, group B Streptococcus, human immunodeficiency virus, 26-66% vs 1-16%, $P < .0001$). Both direct patient care and computer activities increased after EHR implementation (2 vs 12 and 12 vs 17 activities/shift, respectively, $P < .0001$).

CONCLUSION: The introduction of an obstetric EHR improved documentation completeness without reducing direct patient care.

Key words: health record systems, obstetrics, quality assurance, quality of health care, safety

Cite this article as: Eden KB, Messina R, Li H, et al. Examining the value of electronic health records on labor and delivery. Am J Obstet Gynecol 2008;199:307.e1-307.e9.

In recent years, the Institute of Medicine, Leapfrog initiative, and others have promoted information technology (IT) as a key strategy to promote safety, prevent medical errors, and reduce adverse events.[1] The electronic health record (EHR), in particular, has the potential to promote patient safety by improving the legibility, comprehensiveness, and organization of patient notes and promoting communication among clinicians.[2-4] In addition EHRs with embedded clinical decision support can significantly improve access to and compliance with clinical care guidelines, reduce redundant test ordering, and ease data sharing.[5-7]

The introduction of EHRs is believed to reduce risk and liability for obstetric providers.[8-13] EHR adoption in obstetrics has lagged behind other clinical specialties, and there is little research on the impact of EHRs in fast-paced specialties like obstetrics.[14] Recent high-profile events such as Cedar Sinai abandonment of a $34 million computerized physician order entry project have caused many to wonder about the true value and costs of IT adoption.[15-19] We conducted a pre- and postintervention study to evaluate the impact of an EHR on documentation completeness and patient care in a fast-paced labor and delivery unit.

Materials and Methods

Study design and setting

This study was conducted at Oregon Health and Science University (OHSU), a busy metropolitan 450-bed university hospital in Portland, OR. The labor and delivery unit offers the full spectrum of obstetric care ranging from certified nurse midwifery, family medicine, general obstetrics/gynecology and high-risk perinatology care with birthing practices ranging from water births to cesarean deliveries. The study was conducted as part of a larger federally funded study examining the value of integrated records to improving patient safety and quality (Agency for Health Quality and Research Grant 1 R01 HS15321-03), and the creators of this EHR did not have competing financial interests.

Documentation quality and comprehensiveness was examined comparing 250 consecutively dated paper-based (6 months prior to the EHR implementation, December 2004 to January 2005) and 250 consecutively dated electronic labor and delivery admission notes (more than 1 year after implementation, December 2006 to January 2007) using predefined criteria. Admission notes for all women whose admission resulted in delivery were eligible for inclusion in this study. This population was chosen to reduce the heterogeneity of clinical conditions and to focus on the nature of the documentation itself. The

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Presented at the 28th Annual Meeting of the Society for Maternal-Fetal Medicine, Dallas, TX, Jan. 28 through Feb. 2, 2008.

Received March 1, 2008; revised June 12, 2008; accepted July 2, 2008.

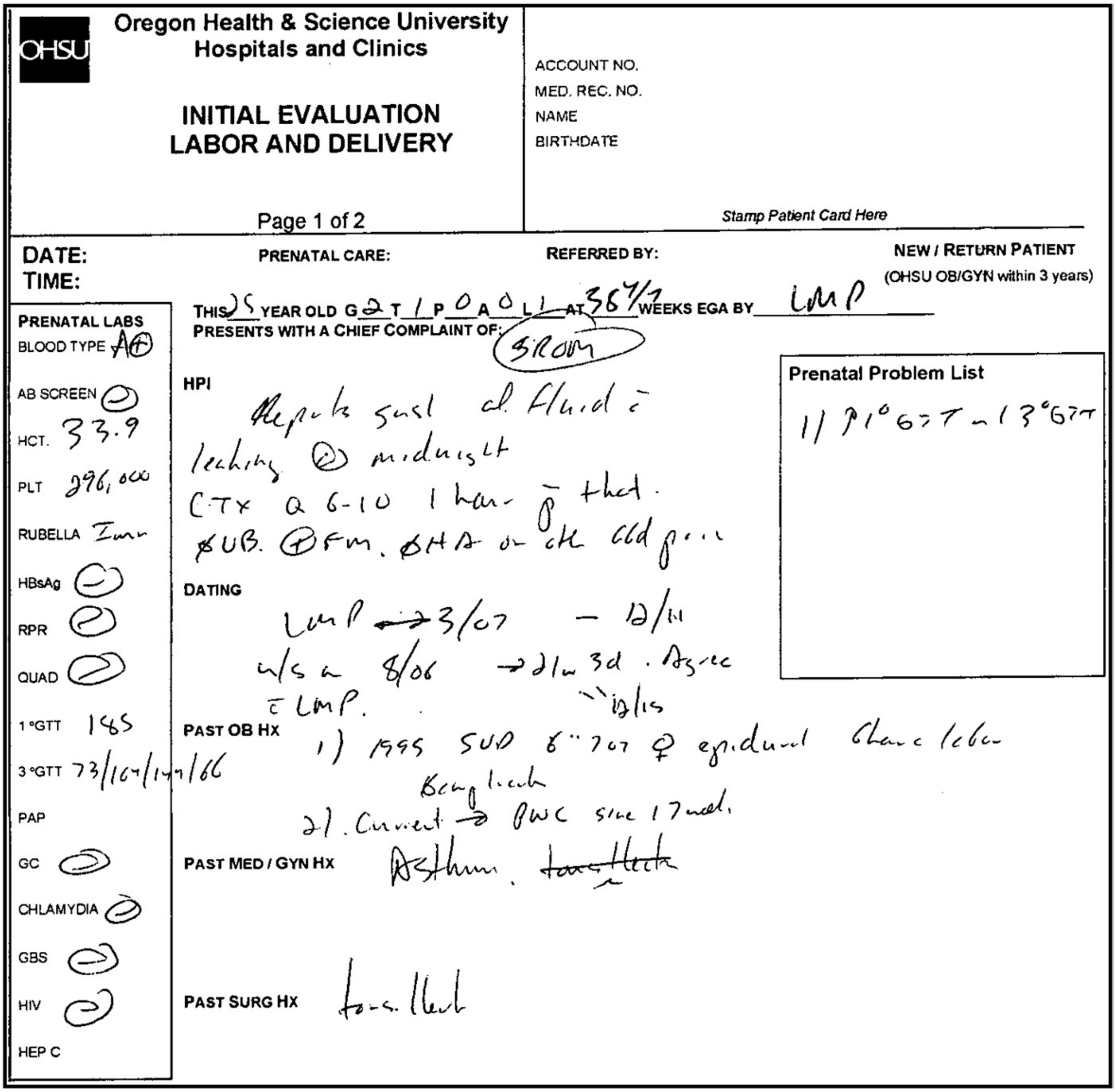
Reprints not available from the authors.

This study was supported by Agency for Health Quality and Research Grant 1 R01 HS15321-03.

0002-9378/$34.00

doi: 10.1016/j.ajog.2008.07.004

FIGURE 1
Example portion of paper admission note


Oregon Health & Science University
Hospitals and Clinics

INITIAL EVALUATION
LABOR AND DELIVERY

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ACCOUNT NO.
MED. REC. NO.
NAME
BIRTHDATE

Stamp Patient Card Here

DATE:
TIME:
PRENATAL CARE:
REFERRED BY:
NEW / RETURN PATIENT (OHSU OB/GYN within 3 years)

THIS 25 YEAR OLD G 2 T 1 P 0 A 0 L 1 AT 36 1/7 WEEKS EGA BY LMP
PRESENTS WITH A CHIEF COMPLAINT OF: SROM

PRENATAL LABS
BLOOD TYPE A+
AB SCREEN
HCT. 33.9
PLT 296,000
RUBELLA
HBsAg
RPR
QUAD
1°GTT 185
3°GTT 73/164/149/66
PAP
GC
CHLAMYDIA
GBS
HIV
HEP C

HPI
DATING
PAST OB HX
PAST MED / GYN HX
PAST SURG HX

Prenatal Problem List

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OHSU Institutional Review Board (#2771 and #1078) approved this study.

Baseline (preintervention): paper-based admissions notes

Prior to implementation of the EHR, all obstetric patient care was documented on paper. Documentation took place either during or after the patient encounter and admission chief complaint(s), history of present illness, pregnancy complication(s), past medical, surgical family and social histories, and medications were handwritten onto an admission form (Figure 1).

Intervention: STORC-EHR

The state obstetric and pediatric research collaboration (STORC) was built by OHSU obstetric providers for their own practice, and its underlying data framework was based on National Institute of Child Health and Human Development Maternal Fetal Medicine Units Network data fields. The STORC-EHR is a complete obstetric charting tool used for both inpatient and outpatient documentation of all