

**Reliance Software Systems**

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**Providence Hospital and Medical Centers**

(a member of the St. John Health System)

**and**

**Reliance Software Systems, Inc.**

**A Preliminary Case Study**

**of**

**Improving Clinical Performance**

**with**

***CDR-Web™***

**December 16, 2002**



Hospitals and health systems today search for software that provides them a straightforward way to increase patient safety, reduce costs and meet compliance efforts. Typically software of this caliber costs well into the millions. Providence Hospital and Medical Centers, a member of the St. John Health System (Providence) has found their solution in a unique partner, Reliance Software Systems (RelWare). RelWare brought *CDR-Web*<sup>™</sup> to Providence three years ago. With the help of Providence's physicians and clinicians, RelWare has created a state of the art, robust application utilizing the best in emerging technologies, and all of this is available for under 1 million dollars.

*CDR-Web* was the first 100% web-based, "very thin client," clinical data repository on the market. Since its inception, RelWare has incorporated full inpatient medication order entry, including chemotherapy orders; web-based document management; configurable user preferences and more. RelWare will announce their version 2.0 release at the 2003 HIMSS conference in San Diego.

Beyond capturing data real-time from ADT, lab, transcription, radiology, pharmacy and other departmental systems *CDR-Web* provides a permanent repository of enterprise clinical information. This allows physicians to easily access and view a comprehensive patient record from a diverse number of clinical data sources. Patient data is immediately available at any clinical PC browser or via wireless using the PocketPC browser.

*CDR-Web* provides Providence with the tools they need to better care for their patients. Features that they find particularly useful are: portal content based on role, messaging, flowsheets, multiple document type submission, configurable templates, and customizable on-line reference. *CDR-Web* is very secure and supports HIPAA standards with 128-bit encryption through SSL, secure login, configurable time outs and complete usage tracking and auditing.

*CDR-Rx*<sup>™</sup>, is the CPOE component of *CDR-Web*. It was designed with the help of the Providence Pharmacy directors and coordinators as well as key physicians. *CDR-Rx* provides an easy mechanism for ordering medications including checking for drug-drug, drug-allergy, drug-food, duplicate therapy and overdose/underdose interactions. Providence sees first hand how *CDR-Rx* reduces medical errors and helps manage the process of care and prescription writing. Among many features, *CDR-Rx* allows physicians to order medications securely with digital signatures and provides reminders for unsigned orders. A significant advantage is that *CDR-Rx* works seamlessly with *CDR-Web*'s data repository for all critical drug-to-lab value interaction checking and ordering based on protocols and clinical pathways.

Dr. Jeffrey Zaks the Vice President of Medical Affairs at Providence has been a very strong advocate of the system. He is thoroughly committed to increasing patient safety. "By making every prescription legible, *CDR-Rx* reduces interpretation to decrease the number of errors." This high level commitment is integral to the success and use of electronic patient records.

The measurable benefits derived from using *CDR-Web* include increased efficiencies for both the hospital and physician offices. Staff efficiency increases, as they are able to browse the patient record and save time in locating lab, order results, dictated reports and more. This allows Providence to improve patient care and operate cost-effectively within their community. For example, the clinical trials staff have increased their average monthly enrollment by 12-15 more patients a month.

There are cost savings generated through reduced chart pulls and ultimately, reduced staffing. An easy to use, web-based application like *CDR-Web* attracts sophisticated physicians by being a comprehensive tool that instantly makes their jobs easier. *CDR-Web* protects Providence's investment in existing departmental systems and infrastructure, by integrating the various systems through the clinical data repository, not replacing them.



Dr. Bruce Kaplan, President of the Medical Staff describes how *CDR-Web* streamlines his day. “*CDR-Web* provides rapid access to lab, X-ray, and dictated reports on a real-time basis to help in decision making for admissions and daily rounding. Furthermore, you can retrieve all archived records for comparison or supportive data immediately, [taking the burden off] the medical records department. You can intuitively build flow sheets via the graphing functionality.”

### Time Savings and Increased Efficiencies

While there are considerable intangible benefits that an electronic medical record product brings to an organization, they are difficult to accurately measure. There are more tangible cost savings that can be measured. Providence and RelWare continue to collect data on the cost/benefits and will continue the study for the life of the application. For example, day-shift vs. off-shift efficiencies have not been measured and will improve calculations for comparison. The following savings are based solely on time-savings and efficiencies by automating essential processes.

Electronic inpatient result reporting = Savings of \$4.17 and 73 minutes per chart pull/result request  
Obtaining results faster is one of the key advantages of a computerized patient record. The increased efficiencies improve practice, decrease length of stay and allow for improved patient care.

Electronic outpatient result reporting = Savings of \$6.10 and 38 minutes per chart pull/result request  
Efficiencies pass through to the medical practices as well.

Electronic pharmacy orders vs. manual orders = Savings of 170 minutes  
The benefits of computerized physician order entry (CPOE) within *CDR-Rx* are substantial when you apply them to the goal of increasing patient safety. Preliminary analysis at Providence points to measurable time-savings. Clinicians at Providence agree that there is a noticeable decrease in medication delivery time to the floor. While there are measurable cost savings for Pharmacy and clinicians, the CPOE process does place a greater time burden on ordering physicians. Conversely, the CPOE process benefits the prescribing process by shifting more of the clinical decision making back to physicians and *CDR-Rx* and away from the pharmacist. The physician sees interactions real-time and is more able to respond appropriately using best clinical practice and applied pathways to improve patient safety.

Reduction of adverse drug reactions = Potential savings of from \$3,900,000 to \$12,700,000 in ADE preventions

There are other clear benefits that CPOE provides. We are all aware that removing human activity from the order process reduces points of error. CPOE overcomes one of the key error conditions: failed communication as a result of illegible orders. CPOE also brings the advantage of potentially reducing adverse drug events (ADE). Experts in healthcare agree that each ADE costs approximately \$4,685 for each affected patient<sup>1</sup>. Research states that ADEs occur at a rate of 2 to 6.5 per 100 admissions<sup>2</sup>. Given this rate, Providence has the potential to save up to \$12,729,145 in annual costs in prevented ADEs<sup>3</sup>.

Tangible cost savings are substantial but there are other costs. There are process and culture changes that must be managed. Physicians recognize that even easy to use CPOE takes more of their time and are reluctant to adopt the process. Providence made a concurrent commitment to improve their network infrastructure, including the addition of 802.11b wireless networking.

Providence demonstrates that there is enormous potential return on prevention of adverse drug events (ADE) with CPOE. Clinicians detect benefits in a number of ways. The most notable cost benefits come from both clinical results at the point of care and through CPOE. Studies at Providence will continue as additional clinical measures are put in place and the product matures. Providence and RelWare are leveraging emerging technology to improve



quality: Their relationship demonstrates best practice of the synergy between clinical needs and information technology.

### References

1. Bates DW, Spell N, Cullen DJ, et al: The costs of adverse drug events in hospitalized patients. JAMA 1997;277:307-311
2. Institute for Safe Medication Practices whitepaper: A Call to Action: Eliminate Handwritten Prescriptions Within 3 Years, 2000. [http://www.ismp.org /msaarticles/whitepaper.html](http://www.ismp.org/msaarticles/whitepaper.html) (11 November 2002).
3. Based upon an average of 41,800 inpatient admits in the last 3 years at Providence.