Development approach to an enterprise-wide medication reconciliation tool in a free-standing pediatric hospital with commercial best-of-breed systems

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Abstract

Medication reconciliation is essential to providing a safer patient environment during transitions of care in the clinical setting. Current solutions include a mixed-bag of paper and electronic processes. Best-of-breed health information systems architecture poses a specific challenge to organizations that have limited software development resources. Using readily available service-oriented technology, a prototype for an integrated medication reconciliation tool is developed for use in an academic pediatric hospital with commercial systems.

Introduction

Medication reconciliation is an important patient safety activity during each clinical encounter. Errors arising from hand-off miscommunications during patient transitions across care settings are among the major source of adverse patient safety events.

Children’s Health System (CHS) in Birmingham, AL currently employ several paper-based and electronic-based medication reconciliation methods, each process serving a particular service area without any workflow coordination from the patient’s perspective. With six clinical applications serving different domains of care, developing a cross-departmental medication reconciliation process will be difficult without automating certain elements of the process.

Solution

The key requirements for standardizing the medication reconciliation process include the ability to standardize the medication history intake, avoid redundant data entry, produce medication reconciliation forms on the fly during patient hand-offs, and seamlessly integrate this function into the nursing and physician workflow before and during the planned computerized physician order entry implementation.

Using an extension application of its CPOE application, CHS used web-services to embed the medication reconciliation tool into the CPOE’s user interface. The tool was linked to a common drug database, to standardize the medication data entries, as well to the pharmacy database, for viewing current medications. The plan was to have the same web-service become available to our other commercial clinical applications.

Developing this solution using a Service Oriented Architecture (SOA) has illustrated an efficient, flexible strategy for integrating our many systems. This provided us with the ability to quickly produce a medication reconciliation solution using centralized logic components to access data directly from our separate pharmacy, clinical documentation, and custom data systems.

This architecture provides many long-term advantages:
1.) The data access web services can be easily modified to retrieve data from other systems, vendors, or eventually our central repository.
2.) The data access and logic components are reusable in any client that can call a web service. At a minimum, CHS will use these web services both in our CPOE GUI and within a clinician portal page.
3.) Especially important for organizations with limited development resources, this strategy provides a common development strategy that is vendor agnostic.

Prototype

Web Services developed to produce the Medication Reconciliation prototype include:
- Retrieve a Drug Formulary list from First Data Bank
- Retrieve the Patient’s Allergy List from McKesson Pharmacy
- Retrieve the Patient’s Current Meds from McKesson Pharmacy
- Retrieve and Create Reconciliation Snapshots from Oracle Database
- Retrieve a Reconciliation history from Oracle Database
- Retrieve and Modify Home Medications from Oracle Database