Hendricks Regional Health automates and improves key processes with Lotus Domino-based solutions

Hendricks Regional Health is a non-profit health system with a medical staff of 250 physicians in more than 45 specialties. Four locations include a full-service, 160-bed hospital in Danville and three convenient medical centers in Avon, Plainfield and Brownsburg. Patients receive compassionate, personal care from highly trained staff using the same sophisticated medical technology found in larger hospitals. Hendricks Regional Health consistently scores above national averages for patient safety and quality.

Overview

- ***Challenge***
  Manual, paper-based processes for managing the hospital's on-call system and documenting emergency runs bringing patients to the hospital were cumbersome, inefficient and error-prone
- ***Solution***
  With help from IBM Business Partner ITM Associates, the hospital developed automated Patient Run Form and On-Call applications based on IBM® Lotus Notes® and Lotus® Domino® software
- ***Key Benefits***
  - *Automated forms capture more accurate data while simplifying the work of emergency responders*
  - *Electronic data supports hospital reporting to improve emergency management*
  - *Online on-call system handles more calls and provides advance information for doctors and speedier help for callers*
  - *System improves accountability, quality control and internal communications*

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Lotus® software

The hospital has grown quickly in recent years, with information technology playing an increasingly important role. The hospital has converted from paper-based to electronic medical records, and in 2002 it switched from Microsoft® Outlook® and Exchange to IBM Lotus Notes and Domino for its messaging and collaboration.

Recently, two sets of needs cried out for IT support: the Patient Run Form that documents emergency runs bringing patients to the hospital, and the on-call system that links doctors to urgent off-hours calls from people seeking medical advice.

Paper forms make record-keeping a painful proposition

Hendricks Regional Health sponsors several fire departments in two counties that deliver patients to the hospital along with other area hospitals. An emergency room physician provides medical oversight and oversees the emergency medical technicians (EMTs) and paramedics who staff these services, though they are not employees of the hospital.

The Patient Run Form is used to capture data about each emergency run, including patient information and medical data. It also includes details about the run itself—incident number, patient pickup and delivery locations, for example—and timing of key checkpoints. Although the EMTs communicate the critical medical information to the emergency room staff when they arrive at the hospital, the main purpose of the Patient Run Form is to document emergency care that was provided prior to arrival at the hospital for the hospital's records.

EMTs had been filling out a triplicate, single-page paper form by hand to record information for each run. The form was too small to handle the amount of information required, so EMTs had to squeeze their entries into the margins, filling every bit of space. Some of the data points EMTs wanted to capture had no corresponding field on the form, forcing them either to leave the data out or place it in an unstructured narrative section.

Typically, the bottom copy of the form, pale and hard to read, was what the EMT handed over to the hospital. If the patient was delivered to another hospital, this copy would have to be mailed back to the Hendricks Hospital so it would have a record of the run. After delivering a patient, the EMTs would go back to their fire departments and re-enter all the data electronically as inputs to state reporting metrics pertinent to public health and financing.

Solution Components

Software

- IBM Lotus® Domino®
- IBM Lotus Notes®
- IBM Lotus Sametime®

Clearly, this system left a lot to be desired. There was no way to transmit data on the form to the emergency room ahead of the patient's arrival. Hard-to-read, handwritten information and missing data caused constant problems. Duplicate data entry opened the door to additional error and data conflicts, and the data on hard-copy forms was not readily available for analysis.

System redesign brings Patient Run Form into the electronic age

Kim Kiefer, the application development supervisor for Hendricks Regional Health, was asked to redesign and automate the Patient Run Form system at the point the hospital decided to start doing its own reporting on the data. This effort was guided by several objectives.

First, the data had to be submitted electronically. There had to be a way to capture the correct information in a readable format, and as independent

data points to support reporting functions. The EMTs had to be able to enter the data online as they were caring for the patient, and dual data entry had to be eliminated. Some memory or scratch notes would be required for fast note-taking of vital signs and other critical information until this data could be entered into the proper fields on the form. To accommodate field situations in remote areas without cell phone or wireless signals, the populated forms also had to be able to reside intact on a laptop until it came within signal reach. Finally, the solution had to be as low-cost as possible to fit the hospital's limited budget.

IBM Lotus Notes and Domino with PDF meet the requirements

Kiefer began by redesigning the data input form. She then enlisted the help of IBM Business Partner ITM Associates and opted to build the new Patient Run Form system on that company's PDF inFusion eForms product. A Web-based solution, PDF inFusion eForms collects and displays data on PDF forms, then stores the PDFs in a Lotus Domino database. Users enter data into Lotus Notes and the data is permanently merged with the PDF form, enabling the form to be stored and transmitted as a stand-alone document.

The new form can run independently of a Lotus Domino server, giving EMTs the flexibility of filling out the form offline and then submitting it later via any Internet connection. EMTs use a rugged Panasonic Toughbook for data entry, a laptop that can be wiped down and is hardy enough to survive the field conditions.

Building on the hospital's existing Lotus Domino foundation enabled it to absorb a lot of the costs of the new system. Additionally, Kiefer did much of the programming for the new data input form herself, which also helped to lower costs.

Electronic forms support ease of use and hospital reporting requirements

The new Patient Run Form system is now being rolled out to the county fire stations as they are able to purchase the laptops and integrate them into their operations. Users appreciate no longer having to write information into small spaces by hand, and being able to capture neatly all the data points wanted.

The formerly one-page form has become three electronic pages that can capture more data elements as well as more data points such as for tracking vital signs over the duration of the run. Newly available functionality supports greater detail while also increasing data accuracy. The online form can step a user through a series of questions with answers guided by pick lists as well as giving room for free text. For example, if the EMT has started an IV, was it on the left or the right arm? What gauge of needle was used? What medication was administered? Questions and pick lists can be customized to include any category of data the hospital wants to collect for reporting and analysis.

Electronic data entry, storage and manipulation enables Hendricks Regional Health to pose and answer questions such as how many heart attacks are being seen, how many patients are coming in with head traumas, how many babies are being born before the mother gets to the hospital and the efficacy of different types of interventions. In a future development phase, data will be automatically forwarded to the firehouse systems, which in turn will upload the data to the state system. At that point, single data entry will serve the reporting needs at all levels.

Managing the on-call system with paper was hard on everyone

A hospital's on-call system plays an important role in ensuring that people who call for advice about urgent medical situations can speak with a doctor as quickly as possible. To meet this need around the clock, the hospital

must maintain doctors' on-call schedules; connect callers quickly to the right doctor; and track when doctors are paged for patient care.

At Hendricks Regional Health, everything the on-call system operators did and had to know was recorded on paper. The operator worked with legal-size forms, ruled with rows and columns marked in half-hour increments, and separate printed schedules showing who was supposed to be on call. If a doctor had to change his schedule, there would be a handwritten note indicating his or her replacement. In this case, the operator would have to find the piece of paper with the appropriate contact information before picking up the phone and manually paging the doctor. If there was ever a question about a doctor not receiving a page, the director of communication had to sift through boxes of handwritten paper files to find the original records.

The legal-size forms were difficult to scan and manage, and often information had to be recorded for which there was no designated space. Operators also had to juggle a lot of reminders in their heads. For example, if a number of calls came in at the same time, the operator would have to jot them down somewhere, and then at the first free moment dial the doctors to tell them they had received pages. This resulted in delayed, erroneous and misplaced calls. Additionally, the operator could provide a doctor with only a phone number to call—no advance information about the patient's problem was provided.

The hospital needed a solution that would make it easier to maintain up-to-the minute schedules; increase data accuracy; get calls to the doctors more quickly and with more information; and facilitate fast logging of call data.

Automated system cures on-call ills

Like the Patient Run Form system, the new on-call scheduling application was built on Lotus Notes and Domino. Doctors' schedules are set up in a Lotus Domino database by the day of the week, with on-call availability start and end times. Each doctor's specialties and contact information is available in the same place, including a list of contact methods ranked by preference. For example, a doctor might wish to be reached via his cell phone first, a page second and his home phone third. A central scheduling person maintains this information for each doctor, and operators retrieve it from the database.

With the online system, operators can find all of the most current information in one place. Information about patient symptoms is entered into the logs and, along with the call-back phone number, can be forwarded to the doctor's text phone or other device for speedy access.

Hospital workers find it easy to maintain up-to-date schedules in the new application, as any changes overwrite prior information. Doctors can update their own schedules or contact the employee in charge of the schedule to request modifications. A schedule can be altered completely if a doctor switches a large block of time with a colleague, and the application includes room for any special instructions in the case of sudden schedule changes. This flexibility supports up-to-the-minute tracking of who is available immediately if an emergency call comes in.

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A particularly nice feature for the operators is automatic paging. Based on a structure query language (SQL) table specifying the particular paging service each doctor uses, the call is dialed straight into a paging service modem and sends the text page and number for him to call. The operator no longer has to pick up a phone to contact the doctor, which cumulatively saves a lot of time, plus detailed text about the call can be sent immediately.

Each page to the doctor is tracked in the system. The doctors are usually paged with all the information needed to call the patient directly so they do not have to go back through the operator to get the call information. Some calls are forwarded as emergencies to pagers right on a hospital floor, for example when a medical unit calls because a patient's blood pressure is rising rapidly. In such a case the doctor is sent straight to the nurses' station and the operator completes the call at the time the doctor is paged.

New on-call system helps improve accountability, quality control and internal communications

The automated on-call system enables the hospital to handle larger volumes of calls with the same level of staffing. Operators can now follow up on calls faster, and pages get to physicians more accurately and with more information. If there is a complaint from a physician about not receiving a page, the communications manager can just get online and check the call record in the database. In this way the system supports accountability, quality control and improved internal communications.

More than 100 Lotus Domino applications span all areas of the hospital

Since Kiefer first came to Hendricks Regional Health seven years ago to manage its user migration from Microsoft Outlook and Exchange to Lotus Notes and Domino, a lot has been accomplished. At this point, the hospital is using more than 100 Lotus Domino applications to support its business and operational needs—from work orders and preventative maintenance controls to dental/vision benefits management and engineering blueprints, as well as performance reviews on all hospital employees.

Currently, Kiefer is working on bringing in IBM Lotus Sametime® instant messaging. Full deployment is planned once log-in capabilities are in place to safeguard the security of patient data shared through instant messages. The hospital has also moved to the Lotus Domino 8 server and will upgrade to Lotus Notes 8 clients soon.

The hospital's Lotus Notes and Domino-based infrastructure is serving it well, but that doesn't mean Kiefer is resting on her laurels. She is always looking for new ways to utilize the Lotus platform's various capabilities.

"I think IBM Lotus provides a very good total package solution," Kiefer says. "With the collaboration and workflow capabilities it has, you can do everything in one place so users don't have to jump from system to system. I'm really looking forward to using some of the new Lotus Notes and Domino 8 capabilities such as making other applications run within the Lotus Notes environment in composite applications."

For more information

For more information on IBM Lotus Notes and Domino, please contact your IBM sales representative or IBM Business Partner, or visit: **ibm.com**/software/lotus.

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