Combine and Conquer: Computing from a Single Database

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Information technology promises to simplify medical management. In practice, large provider organizations often must grapple with multiple systems that are unable to communicate with each other.

At The Ohio State University Medical Center (OSUMC), over 30 separate systems stored information about its 2,200 staff physicians and 15,000 referring physicians. Merging all of these data into a single database, the Centralized Provider Database (CPD) with appropriate quality controls dramatically improved physician communications and reduced billing errors and delays. Now approaching its 10-year anniversary, the application continues to deliver outstanding results.

Seeking a simpler solution

The growing and widespread application of information technology to the business, clinical, and communication needs of healthcare organizations has created a new problem: Disparate depositories of information. The problem is compounded by regulatory requirements that dictate how the information may be shared.

Conversely, an increasing emphasis on communication among referral sources necessitates the sharing of information across systems in order to ensure that such communication is adequate and timely.

In recognition of these factors, in 2001 we undertook a systematic evaluation of various data depositories in a large health system with 1,700 practicing physicians. Our goal was to leverage this information to meet the business needs of the health system and improve the timeliness and accuracy of physician communication.

We designed and implemented a database and a corresponding operational process that met our requirements, and one year after implementation, statistics showed us that it was an unqualified success.

Now, several years later, it remains one of the few single fully-integrated master databases for physicians and referring physicians in the United States. Our experience concurs with recommendations in current literature: systems that communicate are an important means of reducing error frequency.¹

The increase in the number of physician specialties, and the subsequent rise of referrals, also argues for systems integration because it results in greater reliability and timeliness in handling communications among referring physicians. This in turn improves continuity of care.²

Among the problems we faced in 2001 before systems integration:

• Over 30 silos (disparate data processing systems) contained physician data. Each system was independent, unable to communicate electronically with any other system. No single system contained all the information.
• Errors such as unknown physicians, duplicate records, misspellings, missing billing numbers, and multiple wrong addresses were common.
• Many people maintained these systems, but no single person bore responsibility for verifying and updating a complete set of physician information.
• Data updates and changes in one system were not shared with other systems.
• Clinicians or billing staff could not submit new data or corrections.
• Quality assurances or checks and balances to ensure that information remained up-to-date did not exist.
• No method existed for permanently correcting inaccurate data.
Claims were held, due to missing billing numbers or inaccurate data, until someone from the billing office manually corrected them, delaying billings and accounts receivable.

The goal was clear: create a single, accurate, current, complete, and easily accessible source of physician information. The challenges were varied. Some were technical, such as determining the proper architecture to join systems and disseminate updates to feeder systems.

Others challenges involved end-users, including determining a method for clinicians to provide updates without introducing errors, and creating a means of allowing any user to view non-confidential information. The final challenge was political; we wanted our staff to buy in to the final solution to avoid "turf wars" over data sharing. We encouraged staff to actively contribute their valuable experience and opinions to the design process.

On the path to integration

Implementing a full-scale integration was more than anyone was ready to attempt. The question became: What is a faster, less expensive way to achieve the benefits of an integrated system?

- Claims were held, due to missing billing numbers or inaccurate data, until someone from the billing office manually corrected them, delaying billings and accounts receivable.

To answer this question, OSUMC formed a multidisciplinary task force that included representation from the medical staff, information systems, communications, credentialing, physician relations, medical information management, physician practice plans, affiliate hospitals, and finance.

Its charge was to develop a system to improve communication between OSUMC physicians and its referring physicians. To accomplish this charge, the task force must create:

1. A single, user-friendly system that was accessible on the medical center's intranet

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**Figure 1**

Central Physician Database Information Flow

**Information Feeders**
- Medical Information Management (SoftMed)
- Credentialing
  - Attending
  - Courtesy
  - Medical Staff
  - Trainees
- Physician Relations
- Document Imaging (OSU Campus)
- Admitting/Registration
- Feedback from patients
- Medical Center Intranet ("OneSource")
- Feedback from departments and patients

**Information Processing:**
- Interface Engine
- EGate (SUN/SeeBeyond)
- CPD Staff validates and enters into CPD
- Temporary area in CPD database

**Information Users:**
- Registration
- UB92 Bill
- Scheduling
- 1500 Bill
- Fax Server
- Autofax reports, letters
- End Ancillary Systems:
  - + Cardiovascular
  - + Call Center
  - + Cerner & Marketing
  - + Education CBL
  - + Emergency Response
  - + Emergency Dept
  - + Gen Clin Research Ctr
  - + Pharmacy
  - + Radiology
  - + Transplant
- Other ODBC Homegrown Database
- Web page with physician information
- Allows patients to select physicians
- Allows physicians to lookup medical staff information
- Information Warehouse Quality Assurance/Down Time Systems etc.
2. Methods for ensuring that its information was accurate

No existing system (either commercial or in-house) would satisfy OSUMC’s myriad needs: billing, referrals, credentialing, ancillary result reporting, communication to referring physicians, and the health system switchboard.

The task force analyzed the 30 plus data silos that either supplied or utilized information, and then designed the Centralized Provider Database (CPD), a relational data store scaled to OSUMC’s requirements.

For both security and flexibility, the CPD comprises several components:

- A single relational database built on Microsoft SQL Server.
- A password-secured hospital Web site for searching physician information and submitting changes. It uses LDAP for authentication purposes.
- An application used by the CPD staff to verify and enter data. Departments such as medical information management and physician relations can also view data for analyses. Each login is assigned to a user group granting it access to specific functions. Only the system administrator has access to all functions.
- An Internet Web site, which allows anyone to look up physicians on the OSUMC medical staff

![Figure 2: Central Physician Database Information Flow](image)

![Figure 3: Dollars Holding Due to Physician Errors First 2 Week Period of the Year](image)
Proving the Benefits of a Hospitalist Program

You chose to implement a hospitalist program because of the benefits it would provide to your facility, primary care physicians and patients. For example, in 2002, JAMA indicated in “The Hospitalist Movement Five Years Later” that the average savings for hospitals with inpatient medicine programs is 13 percent with LOS reduction of 17 percent. In addition, a hospitalist program provides seemingly intangible benefits such as: providing care to unassigned patients, increasing consistency of care, decreasing errors, complications, morbidity, mortality and readmission rates, and improving scores on quality measures.

Is your hospitalist program accomplishing goals?
How are you measuring your program? Are you able to prove return on investment or plan for future expansion? Are you able to show how the above benefits are actually being realized? Hospitalist practices are consistently inconsistent in how they are run. This makes it nearly impossible to compare against any standards for benchmarking. EMRs, at facilities who use them, do not capture nor manipulate the data necessary to illustrate the output of a hospitalist practice.

How to measure success
Ingenious Med, an inpatient software specialist, provides hospitalist and inpatient groups with information and tools to help manage their practice, optimize physician performance and demonstrate quality of care. IM tools work alone or with EMRs to help maximize and prove the benefits of an inpatient practice.

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IM Business Intelligence, part of the larger set of tools IM provides, allows practices to generate business reports such as above, to aid in stakeholder reporting. Snapshots of practice performance allow management to track bills according to service performed by each physician, review actual and average LOS, identify over and under-performers, and detail total encounters per physician, total charges billed, average admits per day per physician and the practice’s or site’s daily census -- all at the click of a button. Additional tools provide procedures logs, physician productivity, patient demographics, CPT reports, referring physicians and more.

Can Ingenious Med help you? Founded in 1999 by hospitalist Dr. Steven Liu, Ingenious Med created a web-based electronic rounding application that reduces paperwork, increases revenue by $30-$40K per physician and proves hospitalist value to partners. Over 500 facilities benefit from our easy PQRT, communications, business intelligence and charge capture tools.

Emory Proves Hospitalist ROI

Emory Healthcare
Emory Section of Hospital Medicine
80+ hospitalists
7 hospitals in Atlanta, GA metro

Using Ingenious Med software, Emory has maximized and proven the following benefits:

- Increased charges captured by 8-17%
- Improved collection rates by 3-5%
- Decreased denial rates by 4-7%
- Decreased denied charge write-off rate by 12-17%
- Reduced charge lag to 2 days
- Increased physician to biller ratio from 3 to 1 -- to 20 to 1

This ultimately allowed their hospitalists to prove value to Emory and increase that value by:

- Increasing # of locations from 3 to 7
- Increasing # of hospitalists from 10 to 80+

“IM Practice Manager” allows us the flexibility to expand multiple sites while maintaining the same integrated billing infrastructure with little or no additional overhead.”

- Bryce T. Silyman, MHA
  Operations Administrator
  Emory Hospital Medicine

Go online to www.ProveHospitalistValue.com to get more information on how Ingenious Med tools and services can help your organization.
by name, specialty, area of clinical expertise, hospital, location, or gender. This website is used primarily by referring physicians and by patients seeking physicians, and can be seen online at http://www.osumedcenter.edu.

- A variety of check and match applications that “scrub” data for potential errors, including information received by the medical staff credentialing department.
- A user interface engine that collects data changes in real-time, formats it (HL7 protocol), and sends it to clinical, financial, and ancillary systems.
- A series of reports that uncovers discrepancies in the data.

The CPD database includes a broad range of information about providers, affiliation, address, credentials, education, billing numbers, communication preferences (e.g., fax or mail), suspensions, and audit and activity logs. The interface pages allow users to update information. Changes are automatically detected, formatted, and posted.

Data integrity is maintained by a CPD team specially tasked to handle routine day-to-day maintenance. The team consists of one full-time employee and two part-time staff, who work under the guidance of the physician relations and information systems departments.

Their responsibilities include monitoring user Web feedback, physician-related billing rejections, and manual override reports from both main and ancillary systems. Start-up and implementation costs were quite minimal: one dedicated programmer for one year and one data-input person.

**It's integrated, but is it right?**

One of our primary concerns was allowing the users to input corrections and update the data without introducing errors.

In a large and rapidly growing organization such as OSUMC, departments must be able to add new physician names and edit existing physician data. Therefore, the CPD includes a simple and intuitive intranet page that allows any internal user to look up, add, or edit existing physician information.

All additions and changes are written to a temporary area of the database until they can be verified. This verification process ensures data integrity and helps build people’s trust in the accuracy of the data they are accessing. The CPD staff receives all updates, verifies the data with the physician’s office, and then submits the verified data to the CPD, all within 24 hours.

To ensure that credentialing details are always current, the CPD has a direct connection to the CACTUS® credentialing system. The CPD pulls the assigned entity, affiliation information, and services from CACTUS®, Users may also view OSUMC physicians’ complete set of privileges in the CPD.

Data discrepancies continue to be expunged by the CPD report generator. Reports can be generated weekly, monthly or on demand. For example, viewing all addresses as a whole allows the CPD team to find minor errors in clinic names and other typographical inconsistencies in the data.

The physician relations department uses a series of reports and extracts from the CPD to examine the data as a whole, and to copy it into Microsoft Excel for analysis.

**Physician communication**

One of OSUMC’s major goals in creating the CPD was to facilitate communication between in-house and referring physicians. Such communication must comply with HIPAA privacy regulations. Consequently, procedures compliant with HIPAA were built into the CPD from the beginning.

When patients register at OSUMC hospitals, they are asked if the hospital may release information regarding their stay to their referring and primary care physicians. If they answer no to one or both questions, their respective physicians do not receive information about that stay.

On the other hand, if the patient agrees, the physician receives his or her patient’s results either by mail or fax, depending on the physician’s preference. Before physicians can receive a CPD “auto-fax”, they must sign a confidentiality agreement, which states that:

- Their CPD account profile is appropriate and securely stored within our database
- They are set up to receive and store confidential patient information by fax at their office

This confidentiality agreement is stored electronically and permanently in the CPD office. All faxing is done with a direct interface to the hospital’s fax server and an elaborate tracking and balancing process has been built into the system to guarantee delivery and resend as necessary. Any complete fax failure is treated as an opportunity to validate the physician's data.

**Time and money**

OSUMC’s communication with referring physicians improved steadily since the CPD was implemented. Returned or undeliverable mail has been virtually eliminated.

Although only anecdotal information is available about high error rates in the past, the most recent error rate was a negligible 1.2 percent. (The department of physician relations determines error rate twice a year by counting returns on selected, widespread, high-volume physician mailings.)

Notifications that were once handled by mail, such as radiology reports and discharge instructions, are now auto-faxed as soon as the physician electronically authenticates
the report in OSUMC’s clinical information system.

The CPD automatically faxes a notification to referring and primary care physicians when a patient is seen in the emergency department, admitted, or discharged.

While the task force knew that the CPD's ability to track billing numbers would improve accounts receivable, the financial rewards have been even greater than OSUMC originally anticipated.

From January 2001 to January 2002, after the CPD went live, there was an 86 percent decrease in number of cases holding — which translated to $14 million in billings.

The 2007 HIPAA mandate to use the National Provider ID (NPI) was significantly eased by the creation of this application. Due to a variety of mass mailings and the incorporation of the NPEES download file available in early Fall 2007, OSUMC has been able to collect 100 percent of referring physician identifiers. This is now a requirement for any new physician being entered into the system.

The CPD staff receives a daily report of any registration that contains an unknown physician or billing number, which is corrected the same day, eliminating billing delays. This report averages one or two physicians daily, usually due to incomplete data captured from the patient.

The little database engine that could

The previous piecemeal implementation of information technology at OSUMC, as in most organizations, left the health system with numerous isolated programs and a seemingly overwhelming challenge.

Instead of an expensive and time-consuming full-scale integration, we found a solution that could be created and implemented at low cost in less than a year. Creating a single database with Web-based interfaces not only solved the original problem of improving communication with physicians, and thereby improving patient care, it also dramatically improved the bottom line.

Further because of the CPD’s solid infrastructure, OSUMC has been able to add modules, which might have otherwise been additional data silos. In 2005, OSUMC added a module to track medical director information, including storage of financial and time-keeping data as well as scanned signed contracts and documentation.

In 2007, a complete outreach module was implemented to provide outreach staff with a tool to track visits to referring physicians. This module allows outreach staff to perform customized visits and run retroactive reports to determine visit success rates.

Most recently, we established a dynamic link to the CACTUS® credentialing system that permits anyone in the institution to view specific clinical practitioner privileges in the CPD with dates, conditions and details. Because the ability to add modules to capture additional data elements to the CPD is simple, we have virtually eliminated the need for data silos at OSUMC.

Nearly 10 years after inception, the CPD concept remains simple: one database. And although the CPD reality is multifaceted, its overarching strength is also simple: it facilitates the OSUMC’s ability to improve its business, its communication and ultimately people’s lives.

References

