

# HOW THE UNIVERSITY OF MICHIGAN HEALTH SYSTEM FINDS OPPORTUNITY IN HIPAA

## ABSTRACT

*The University of Michigan Health System has dealt with some difficult challenges as a healthcare entity covered by the HIPAA Transaction and Code Sets regulation. It has processed electronic healthcare transactions for several years and faced major system changes to meet the standards. A capital investment in system upgrades and new purchases was inevitable. The organization invested in a systems infrastructure that provides for real-time application integration, which lays the foundation for real-time eligibility and claims processing where health plan systems can communicate with healthcare provider systems.*

COLLEEN EBEL

**B**ackground  
 The University of Michigan Health System (UMHS), composed of its Hospitals and Health Centers (UMHHC), Medical School, health plan—Mcare—and a collection of joint ventures with other healthcare providers within its Michigan Health Corp. (MHC), is facing significant institutional change driven by

new legislation. As a result of being a healthcare provider or health plan, UMHS is a covered entity as defined by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and required to follow the standards it includes.

In 1998, under Title II and Administrative Simplification of HIPAA, healthcare electronic data interchange standards were written and published, then finalized in August 2000.

## KEYWORDS

*HIPAA Transactions and Code Sets Insurance eligibility  
 Healthcare claims Application integration Real-time Electronic data interchange (EDI)*

Known as the HIPAA Transactions and Code Sets standards, they were intended to unite the healthcare industry in matters of electronic file format and content for common healthcare transactions such as eligibility inquiries and replies, claims submissions and claims remittance advice. Any health plan, clearinghouse or healthcare provider who exchanges these common transaction types electronically must make changes to their systems and processes to meet the new healthcare EDI standards for format and content. The deadline for compliance to the transaction and code standards was October 16, 2003.

Many believe that these standards, over time, will drive out inefficiencies and reduce administrative costs of transaction processing. Furthermore, many expected that entities that use manual and paper healthcare transactions would be encouraged to electronically process those transactions.

For UMHS, direct data entry of claims submissions and eligibility inquiries into payer computer systems dates back to the late 1970s and early 1980s. This method was considered automated because it was faster than mailing paper claims and making phone calls. But over time, direct data entry could not acceptably handle the volume of patients seen by UMHS. It made greater strides in automation in the late 1980s and early 1990s, electronically exchanging batched eligibility and claims information with payers that agreed to accept that information.

In 1993, UMHS submitted its first batch of electronic eligibility inquiries to a major payer and received a batch of electronic responses. The response file was interrogated by a computer program, and the information populated the screens of UMHS' patient management system. In a matter of hours, the batch process performed what would have taken a week for a team of UMHS staff to perform. Over the ensuing 10 years, UMHS developed many complicated technical batch processes for insurance eligibility and claims processing. It worked through the uphill battles of understanding the precise data format required by their major payers, and the unique connection and data transfer method needed to exchange the files. UMHS pursued these electronic ventures to avoid claims processing delays caused by insurance ineligibility and to reduce the overall revenue and payment cycle time.

The HIPAA Transaction and Code Set standards were expected to yield cost savings in the billions of dollars industry wide. The standards became the business case for other parts of the HIPAA regulation, such as the privacy and security regulations, the implementation of which are

expected to mean incremental work and expenses for healthcare entities. But healthcare providers such as UMHS, which already had gained tremendous efficiencies moving to electronic transaction processing in the 1990s, were less certain about how they would make a business case for implementing HIPAA-compliant transaction and code sets. With four unique batch-based electronic insurance eligibility technical processes and 13 independent billing operations, UMHS anticipated it would be required to make a major capital investment to modify or replace these processes it had developed, purchased and customized over the previous decade.

### Seeking Significant Motivation

The transaction and code standards motivated UMHS to evaluate its current electronic transaction processing environment. While the current technical processes were clearly an improvement from the manual and paper processes they replaced, there were opportunities to improve on technical and architectural designs through the use of new technology, hindsight and a regulated industry standard. Many of the original technical processes required human intervention to either trigger them or to follow-up and assure successful completion.

The medical center information technology department at UMHS has long been challenged to provide integration services among homegrown, vendor and hybrid applications running in technically diverse environments throughout the organization. UMHS has nearly 400 documented applications, and the technology department supports approximately 270 of them. These applications are running across nine different platform technologies, with production data in about 12 different types of database management systems.

The application for integrating its legacy architecture largely could be described as the widespread use of the file transfer protocol—a standard by default—and a Health Level Seven (HL7) message generating-and-forwarding interface engine—a standard by plan. Neither were capable of providing UMHS with real-time processing and true application integration. Furthermore, the IT department often found itself tracking the whereabouts of data files and reconciling databases intended to contain the same data. Even as the IT department tried to exchange needed data among disparate applications and databases, users had to log into multiple applications to have access to everything they needed. The IT department sought to improve application integration and data currency processes. It was

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looking for an integration strategy that could be applied to more than just HIPAA transaction requirements.

Since the mid-1990s, UMHS has had a series of initiatives to improve patient business operations as payer requirements became more complex, particularly for outpatient care. For the front-end operations, these initiatives focused on automating eligibility and verification processes and on developing and implementing a point-of-service charge capture system for facility and professional charges and payments. The organization then implemented systems and processes for improved PCP referral and plan authorization activities.

Recent efforts have focused on fully centralized registration, a charge editing system that applies payer-specific billing rules and a pre-arrival clinic business workflow system. These efforts have resulted in integrated business functionality across several information systems to move data and support front-end processes, including scheduling, patient management, managed care, charge capture, charge editing, facility billing and professional billing systems.

Matt Plachta, director of business and operations support services for ambulatory care at UMHHC, hopes to someday use the HIPAA Transaction Sets to share real-time data between payer and provider to support front-end business processes and more efficiently meet payer requirements. He envisions a day when patients call UMHHC for an appointment and provide their names, insurance plans and contract numbers to a scheduler. The scheduler enters the information into the scheduling system, which contacts payers' systems and obtains enrollment and registration information that the provider needs and propagates it into all of the provider's systems. This type of real-time interchange could be expanded to benefit coverage, co-pay, plan authorizations and others.

The ultimate vision is real-time charge-payment processing. For example, a patient would generate a charge for an office visit as the patient leaves a clinic. The charge sails through the editing and billing systems, and a claim is sent to the payer in a matter of seconds. The clean claim clears the payer system edits and is adjudicated. The payer system electronically notifies the provider system and deposits the payment in the provider's bank account, all in a matter of minutes. The administrative costs that could be eliminated on the provider and payer side are staggering.

The vision was compelling. The opportunity for a new technical strategy provided another carrot. And the federal government provided the stick. So in August 2000, when

the HIPAA Transaction and Code Sets Rules were finalized, UMHS was poised for significant change.

**The Importance of Real-time**

Most people have an idea of what real-time processing and its complement—batch processing—are. A real-time process makes updated data available for use by another system or user instantaneously. A real-time process typically accomplishes this objective by updating and making data available one record at a time. A batch process accumulates many update records that need to be applied to a database and then processes the updates all at once. In a batch process, there are time lapses between when a system learns about record updates and when those updates are actually applied. The time lapse is usually known, scheduled and accepted as part of the business process.

The trade-off between real-time and batch processing has historically been volume and system performance.

Most legacy system architectures are hampered by response-time problems when they process a high volume of record updates at the same time that end users are accessing databases. As a result, IT people and business users determine what updates users can do without during the course of their daily use, and they typically apply updates in a batch process after hours when the system has more capacity to apply them.

This process needs to change in healthcare because user demand for round-the-clock system access competes with batch processes that run during the early morning hours. Business processes demand more current data. Real-time processing that occurs all day any day becomes the order of the day.

**Application Integration Explained**

Any programmer worth his or her weight in salt can write a real-time database update as well as a batch database update. As processing power on servers and large host environments increase exponentially, couldn't programmers simply convert their applications from batch updates to real-time?

Unfortunately it isn't that simple. Consider the 270 applications that UMHS uses, sharing data across nine different platform technologies, with data in 12 different types of database management systems. A programmer may be able to change a batch process to a real-time process within his or her own technical sphere, but converting a process that spans disparate technical environments from

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batch to real-time is a different challenge altogether. Enter the need for application integration technology.

This technology enables programmers to send data from their application to an application in an entirely different environment in real-time fashion. The receiving application can be programmed to receive the data and update its local database, or display it in a window for an awaiting user, in real-time. There's no overnight waiting for data file transfers, conversions and batch updates. The programmers on either end only need to agree to use a standard for content and format of the information exchanged. Does that sound familiar?

It should. As mentioned earlier, the HIPAA Transaction and Code Sets standards require the use of common healthcare information content and format among healthcare trading partners. Although application integration is not a part of those requirements, the two combined make it possible to consider the real-time exchange of healthcare information between healthcare providers and health plans. The depth of change that could result in healthcare might be akin to the changes wrought in the way banking customers handle their transactions or make credit or debit card purchases today, compared with 20 years ago. With this in mind, UMHS found its opportunity in HIPAA.

While a capital investment by UMHS was inevitable, there were many technical pathways to achieving compliance with HIPAA standards. One approach considered was to purchase a software product known as a "mapper," which would simply read legacy-formatted transactions and map, or reformat, them to the new HIPAA standard. Many believed that this approach was the most economical and had the least impact on legacy transaction systems.

If the standards simply meant rearranging the information within a transaction, the purchase of a mapper might have been an acceptable approach for UMHS. However, the HIPAA standards also required the addition of data elements, so that would affect legacy systems anyway. Furthermore, there were other elements of the standards, such as transmission security and non-repudiation, that needed to be addressed by any new solution. So in addition to a mapping function, UMHS needed to revisit its payer data transmission mechanisms.

The use of a clearinghouse as an enterprise HIPAA compliance solution was never seriously considered because of the large volumes anticipated—approximately 8,000 to 12,000 eligibility inquiries and approximately

10,000 to 12,000 claims submitted per day. Transaction fees would have been too costly.

### The Strategy

To create the possibility of achieving its real-time information exchange vision and to address the HIPAA standards, UMHS invested in a new application integration strategy. The solution set consisted of data transformation and routing intelligence tools, messaging and queuing technology, and full EDI capabilities. The technology was not HIPAA-specific, but provided tools for technicians to map transactions to HIPAA-compliant formats. The EDI capabilities of this solution included sending and receiving protocols that met HIPAA requirements for non-

repudiation. Routing intelligence enabled the application of complex business rules to support eligibility and claims processing workflow, as well as complex transaction routing. Over time, UMHS and its trading partners could achieve real-time business-to-business communication.

The vision of real-time transaction processing among disparate enterprise-wide applications within UMHS and with external trading partners was an important motivator for UMHS. But the first step on its agenda after the initial investment was to meet the HIPAA transaction requirements before the enforcement date of October 16, 2003. While that enforcement date was subsequently relaxed, UMHS, in November 2002, was not counting on any more extensions, nor could it predict that CMS would approve a contingency plan.

In April 2003, UMHS put its first HIPAA compliant transaction process into production. Using newly acquired middleware and mapping products to develop a new insurance eligibility process, UMHS now sends approximately 3,000 HIPAA 270 transactions (eligibility requests) to Blue Cross and Blue Shield of Michigan each day. If all goes as designed, they receive a 271 transaction (eligibility reply) back from the plan for every 270 inquiry transaction sent. The reply is interrogated and, if eligibility is confirmed, the reply is sent to the UMHS patient management system to update the patient record. If the reply is ineligible, it is sent to a workflow system that prompts UMHS registration and insurance verification staff to investigate and seek ways to resolve the ineligibility issue before the patient's appointment. The technical changes that were made resolved the HIPAA TCS compliance for one of the four batch-based insurance eligibility processes that UMHS had to address.

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As a result of the change, UMHS' registration and insurance verification staff have experienced mixed results in business process improvement. Their eligibility inquiries now can reach a larger network of health plans because of the HIPAA compliance progress made by the state Blues plan. However, the information that they receive in the 271 eligibility response file actually contains less information than what they received before, making it harder to resolve eligibility issues.

For example, the HIPAA standard for a 271 eligibility response simply requires that it tell the inquirer whether the patient is eligible for coverage or not. The legacy UMHS eligibility technical processes were able to obtain additional information, such as service code and other coverage. So in some cases, the UMHS staff now must log into the payer insurance verification system to obtain information it had been receiving automatically. UMHS believes that this will improve. Most entities now are focusing on achieving the minimum requirements to meet HIPAA standards, and in time, the information that had been provided through the more mature legacy processes will be included in the new standard response files.

Although the UMHS eligibility verification business process has seen little improvement, the technical process has changed significantly. Beyond the obvious change in the format and content of the transactions, the technical processes have begun an important migration, as some of the automated batch processes were converted to automated real-time processes, resulting in somewhat of a hybrid environment. This hybrid environment appears to be a necessary step UMHS must take before implementing a fully integrated and purely real-time eligibility process with one of its health plan trading partners. But real-time processing in a fully integrated application environment with a trading partner remains one of the important objectives that UMHS wants to achieve.

**A Glimpse Of The Future**

As a result of the new technology, UMHS has the potential to eventually perform real-time eligibility verification during its appointment scheduling process. The intent is to identify insurance coverage issues earlier, providing more time to resolve them before the patient's appointment date. In a prototype environment, the UMHS enterprise-wide scheduling system that is used to schedule patients has been modified to integrate in real time with the HIPAA mapping, message queuing and EDI systems. Here's how it works.

The scheduler obtains minimal health plan information from the patient and enters it into a field on a window in their scheduling system. The scheduling system creates a message from the patient's information and writes it to a messaging queue. The messaging queue is the integration point between the enterprise-wide scheduling system, the HIPAA mapping system, the patient management system, the workflow system and the external health plan trading partner's systems (see Figure 1).

The message is picked up by the HIPAA mapping system, formatted so it is compliant with the HIPAA 270 eligibility inquiry and sent in real time to the appropriate health plan. The health plan's system receives it, acknowledges that it has received it and interrogates the inquiry. The system then responds to the UMHS 270 message with a HIPAA-compliant 271 inquiry reply message. The UMHS EDI system receives the health plan's 271 reply information and returns it to a messaging queue, which is the integration point between all the applications that need the eligibility reply.

Because the message queuing, mapping, EDI and response processes are occurring independently of the enterprise-wide scheduling system, the scheduler can continue to schedule the appointment while awaiting a response. A component of the scheduling system listens for the response coming back in the message queue, but this is invisible to the user. After the eligibility reply is returned to the queue, the scheduling system reads the message, matches the reply to the inquiry and displays the reply for the scheduler. For the process to work, the overall response time for the end user must be less than 30 seconds, which is about the time it takes a scheduler to complete an appointment dialog with a patient.

After receiving the eligibility information, the scheduler would apply business rules based on the response. For example, if the health plan replies that the patient is ineligible, the scheduler might start the secondary coverage eligibility process or help the patient with self-pay arrangements. This saves both the provider and health plan the time and effort of processing a claim after the appointment that is destined for rejection. But more importantly, the patient can be told about payment obligations before the appointment, heading off an unpleasant surprise after it is too late to do anything about it.

The application integration doesn't end there, however. The UMHS patient management system also looks in the message queue for eligibility responses and updates patient

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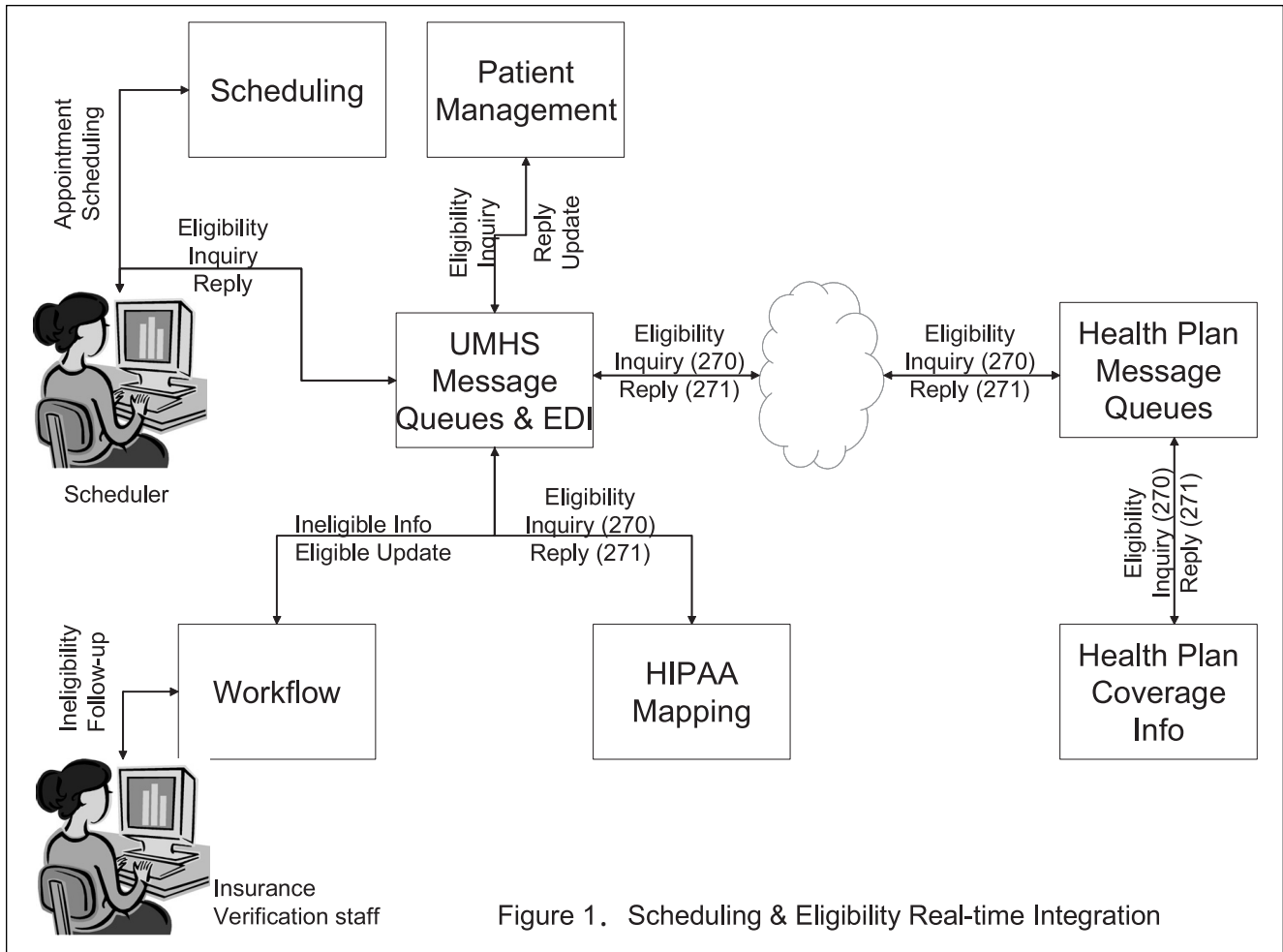


Figure 1. Scheduling & Eligibility Real-time Integration

records with the insurance information. The UMHS workflow system also is a recipient of real-time information, but it only needs ineligibility replies. In this future environment, the UMHS registration and insurance verification staff can resolve eligibility problems using the workflow system and have their results automatically update the UMHS patient management system. The patient management and workflow systems run on distinctly different platforms in technically diverse environments. Many other UMHS business processes use the patient management system, and those processes would benefit from having current patient insurance information.

Most of the real-time scheduling and eligibility integration testing has been performed within the UMHS systems. However, it cannot be true real-time eligibility verification without actually communicating with a health plan trading partner. One of UMHS' major health plan trading partners also is pursuing a real-time environment, and the health system hopes to extend its prototype and test it later in 2004. But for now, the attention of most healthcare entities primarily is on achieving compliance with transaction content and format standards.

**Now, Back To Reality**

UMHS would like to apply its new application integration and real-time processing technical solution to the other three eligibility verification processes that it runs. MCare is the UMHS health plan and a trading partner with its hospital. UMHS expected to have a hybrid batch and real-time eligibility verification solution implemented between the hospital systems and MCare in January 2004, exchanging the HPAA 270/271 transaction file formats. That would be a first step toward true real-time exchanges between the hospital and health plan, which it hopes to accomplish after achieving compliance with transaction and code set standards.

With two other major health plan trading partners, UMHS uses the insurance verification systems of the plans to verify eligibility through direct data entry solutions that feed into the payers' systems. As a result, UMHS has no HIPAA standards compliance obligations. But that is no consolation. For these two payers, UMHS can have as many as 6,000 eligibility inquires per day, and because of that high volume, it's not feasible to verify coverage on one patient at a time.

To handle that volume today without user intervention, the IT department at UMHS turned the end-user direct data entry processes into batch processes. It employs user simulation scripts to interact with the health plans' insurance verification applications. It is a daily technical process that verifies insurance for patients who have appointments within the upcoming two weeks.

The script simulates a user logging in and entering data on the screen. When the payer's system returns the response, the script "scrapes" it from the screen and saves it to a file. It then repeats the process for all the insurance eligibility inquires UMHS needs to make that day. This user simulation process results in the creation of a file containing the eligibility replies, which are later loaded into its patient management system. An ineligible response file is also created and loaded into a workflow system. Registration and insurance verification staff subsequently use the workflow system to respond to and resolve ineligible responses before appointments.

One of these user simulation processes will be converted to a pure batch file process in the near future, where the HIPAA TCS 270/271 standard will apply and it will result in an improved technical process. But UMHS does not expect to achieve real-time processing with these two major payers in the near future.

### **Implementing HIPAA Claims Transactions**

While UMHS was prepared to begin submitting HIPAA-compliant 837 claims in October 2003, it took advantage of the CMS contingency plan that enabled healthcare providers, clearinghouses and health plans to continue to process healthcare claims in their legacy formats. The extra time enabled UMHS to do more exhaustive testing and some minor redesign of the plans that they originally rushed through when there was no contingency plan in place.

There are two major billing operations at UMHS that process 8,000 to 12,000 claims per day. These operations are supported by several interdependent technical processes that capture, format, edit and transfer claims data.

In the new billing environment, none of the legacy processes were retired or replaced. UMHS merely added new processes necessary to meet the HIPAA requirements. Within UMHS, claims files remain in their legacy format, so that its systems continue to operate. The new HIPAA TCS 837 format for claims is used only when sending claims data to a payer.

UMHS believes many payers are accepting 837-formatted claims files and reformatting them back to their legacy formats so that their legacy systems can continue to process them. It will take some time before legacy billing systems are modified or replaced so the new transaction standards can be used throughout a covered entity. In the meantime,

UMHS, like many other covered entities, will be supporting more technically complicated billing systems than it had prior to their implementation of HIPAA-compliant transaction processes.

UMHS expected to go live with the HIPAA 837 claim transaction by the end of January 2004 in its enterprise-wide billing systems, using a hybrid batch and real-time claims processing approach. UMHS expected to spend the first quarter of 2004 adjusting to the changes and unexpected claim rejections. It then will turn its attention to achieving compliance with the HIPAA 835 remittance advice transaction. UMHS' major trading partners have been able to continue to send legacy remittance advice files, even in response to UMHS submitting claims in the new HIPAA 837 electronic format. This capability enabled UMHS to focus on making its claims submission processes compliant first and achieving compliance with payment posting processes second, rather than attempting both at the same time.

### **What's After Compliance?**

After these major HIPAA milestones are achieved and UMHS can return business processes to normal operation, the organization will look for opportunities for true application integration and real-time processing so it can achieve improvements in healthcare business processes within the institution. It will look for improvements that can be made in data currency, user productivity, system availability and performance and information security. Much can be done to achieve improvements within the UMHS as it awaits more application integration opportunities with external trading partners.

Making a new technology strategy decision and committing a significant investment took courage. More courage and perseverance will be necessary for UMHS to fully realize its vision.

### **About the Author**

Colleen Ebel is a business analyst for the University of Michigan Health System. She has 20 years experience in IT, including five years in healthcare.