HEALTHCARE WHITE PAPER

A recipe for RHIO success and improved patient care

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Setting the stage

Utilization of best practices, better business processes and electronic health record technology, together, will ultimately transform our healthcare delivery system. The only questions are how and when. This transformation will create greater patient safety, fewer medical errors, and reduced healthcare costs. Technology will also provide patients with greater control of their information, empowering individuals as healthcare consumers.

That is the good news. What is less impressive is the healthcare technology environment that we are operating in today. How big are the technology and information challenges we are dealing with? In a *New York Times* op/ed from May 2004, Newt Gingrich and Patrick Kennedy wrote that:

> …. approximately 20 percent of medical tests are ordered a second time simply because previous results can't be found. Research shows that 30 cents of every dollar spent on healthcare does nothing to make sick people better. That's $7.4 trillion over the next decade for duplicate tests, preventable errors, unnecessary hospitalizations and other waste. Not only do these unnecessary costs contribute to skyrocketing insurance premiums, but the lack of good information makes improvements in quality and efficiency nearly impossible.

Clearly, access to comprehensive patient information is limiting the ability of providers to deliver the highest levels of care and efficiency. But is there any good news on the short-term horizon? The answer, undoubtedly, is yes. In the coming years, Regional Health Information Organizations (RHIOs) will improve care by enabling an interconnected, electronic health information network. And today, solutions already exist to address and overcome the fundamental challenges of patient identification and data linkage.

Transforming healthcare delivery

RHIOs eventually will transform healthcare by providing physicians and other care providers access to clinical information for all patients in a given region – across a decentralized, heterogeneous technology environment including hospitals, clinics, and small practices. But as RHIOs search for a way to prove their value, gain acceptance and get started in today's social, financial, and political climate, they must demonstrate incremental progress as they move along this path towards a complete, accurate, real-time data exchange.

Identifying and linking medical records throughout the region based on demographic matching (e.g., name, address, date of birth) is a logical first step. This approach, commonly using enterprise master person index (EMPI) technology in the US, is already successfully deployed in various segments of the healthcare delivery system in the US and Canada. It matches and aggregates medical records and information across participating systems without requiring either existing (e.g., SSN) or new (e.g., national health number) common identifiers to locate and match patient information. The sophisticated algorithms – tuned to the system's geographic population and adapted to the available information – are a necessary component for data linkage and ultimate exchange in a RHIO. In today's hot button privacy environment where a new, front-page case of identity theft emerges every week, this is a major advantage versus methods that require and potentially expose these key identifiers. But guarding privacy is only one concern. In addition, patient identification technology must be:

- Accurate – relying on probabilistic matching capabilities
- On demand – providing real-time or batch capabilities depending on the technology capabilities of individual providers in the system
- Non-invasive – operating independently of existing systems and infrastructures
- Scalable – supporting real-time searching of databases containing tens of millions of patients
- Easy to implement – deploying in weeks, not years
- Adaptable – adding new sources of information quickly and easily

To highlight the impact patient identification and data linkage can have, let us turn our attention to how a chronic-care patient interacts with healthcare providers today, and how a RHIO could improve the quality of care he receives.

Meet David Smith – a hypothetical patient

In June of 2003, David Smith, an athletic middle-aged male, suffered a serious injury in a car accident. The injury prevents him from physical exertion and eventually leads to his diagnosis of clinical depression, contributing to hypertension and weight gain of over fifty pounds.

To overcome his ailments, David bounces around the healthcare system. He sees a physical therapist to rebuild his strength and coordination. He sees a psychologist and therapist to overcome his depression. He also sees his internist on a weekly basis for his hypertension and weight loss program, and has begun to investigate the option of surgery to enhance his mobility since back and leg injuries

limit his movement. A case manager and dietitian also are included in his healthcare portfolio.

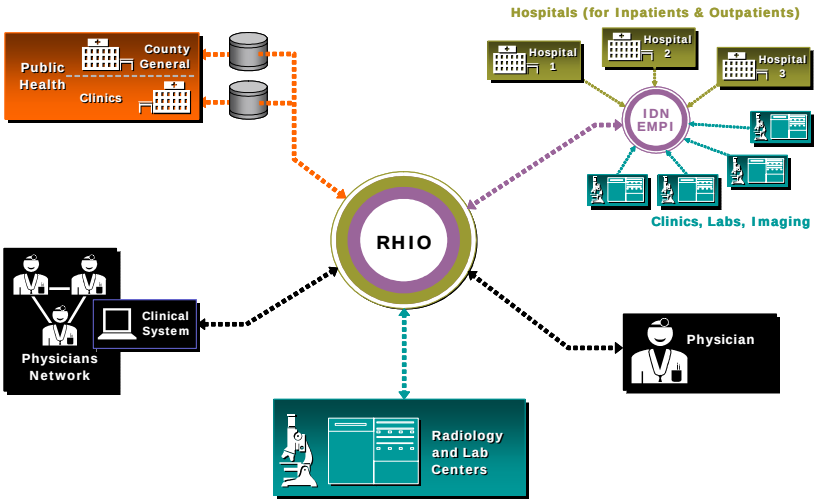
In the course of a typical month, David has over a dozen visits that involve six different care providers. But even though David lives in a large Midwestern city that has above average use of healthcare technology, none of his medical records are easy to locate or link, resulting in wasted time at physician's offices, sub-optimal care and unnecessary and painful medical testing. Further, he is at risk for adverse drug interactions due to his multiple medications prescribed by various practitioners.

Are patients and historians one in the same?

Our current healthcare environment largely forces each patient to be his or her own historian unless all their care is contained within one network. It can also cause critical delays in care while physicians wait for data to be sent from other clinicians or for the results of new, but redundant tests to become available.

One of the drivers behind RHIOs is enabling healthcare providers to identify and locate patient data quickly and accurately. While not eliminating all of the challenges in David's scenario, the accurate identification and location of patient information across his healthcare team would go a significant way toward enhancing the quality of his care. No longer would each practitioner need to depend on David's memory of his past visits or wait for faxes or snail mail with his past history – this information would be available and updated each time he visited a participating physician. *Figure 1*, below, provides a pictorial that highlights how a RHIO could locate and identify David's information across multiple providers.

Figure 1: Linking and identifying David's patient information in a heterogeneous environment



With the introduction of a RHIO, David's care providers will be able to search across all of the participants in the RHIO to determine where David has previously received care. Scenarios like this will enable RHIOs to build initial success stories. Optionally, the RHIO might also keep the dates of care and type of visit. From this crucial step the inquirer can then request the medical data based on the technology of the data holder. A few RHIOs may even store the clinical data in a central repository.

RHIO success – Patient identification is one of the foundational elements

RHIO success will not come without challenges. There are a number of technical barriers to patient identification in a RHIO environment, including:

Non-standardized data – There is a large variation in what data is collected in healthcare environments today. For example, some systems might contain a single address while others contain a home and business address. Format variation is also a challenge (e.g., MMDDYYYY vs. YYMMDD, M/F vs.1/2, middle name vs. middle initial). In addition, existing identifiers like social security or driver's license numbers are present in some systems, but not in others, or are sporadically captured.

Scale – RHIO technology will need to scale as participation increases (a system must be able to go from 50,000 records to 10 million+ records).

Performance – Real-time responses will be required along with low latency (e.g., a new record added to the system must be searchable immediately).

Accuracy – The system must support a low false positive rate. That is, the matches or potential matches that are presented as the result of a query must represent the correct individual.

Information governance – The technology environment must provide for security control (e.g., who sees what data, by facility, and by what attribute), encryption and flexible data stewardship.

Fortunately, technology does not have to create another obstacle for RHIOs. In fact, the right technology approach to identifying and locating patient information can help overcome all of the barriers discussed above.

Taking a federated approach to patient identification

A federated approach to identifying and locating patient records can overcome the cultural, political and technology hurdles that may stand in the way of RHIOs today. Federated systems rely on a decentralized approach to record management, where information is only accessed

when needed and clinical data is stored only in the site where created. This has significant advantages over a centralized, data warehousing approach, enhancing patient privacy and security. In addition, federated models enable the control of patient information to rest with those generating the data at the local level, where security and privacy are more appropriately managed. *Figure 2*, below, lists many of the advantages offered by a federated data exchange with a sophisticated probabilistic algorithm approach.

Figure 2: The federated advantage

☑	**Instantly and accurately locate and link all the records about patients across the national healthcare network**
☑	**Flexible architecture supports governance & privacy**
☑	**Provide statistical based matching**
☑	**Sharing data without losing their individual identifiers**
☑	**Does not require a national identifier**
☑	**Utilize existing data sharing vehicles**
☑	**Support ongoing real-time or batch updates**
☑	**Provide comprehensive view**
☑	**Security at source and attribute level**
☑	**Respond to requests on demand**
☑	**Scale to population volumes**

At Initiate Systems, we know that no two RHIOs will be exactly the same. Each will make different governance decisions around clinical data and federation or aggregation. But even if a RHIO chooses to create a central repository of clinical data, it must still address the challenge of patient identification that we further describe below. Initiate Systems is capable of empowering different types of RHIO initiatives by enabling patient identification, regardless of governance structure.

Federation – A foundation for flexibility

By enabling the location of patient data in real time from disparate environments, federated approaches are inherently flexible. For example, they do not require all of the healthcare practices involved to have electronic health records.

The enabling technology behind a federated RHIO approach matches candidates and records that are a likely match. The scoring and matching algorithm can be fine-tuned for users carrying out a search based on their roles, which might be either to:

- Return only the “best” matching record above a threshold
- Return the best matching record(s) above a single threshold
- Return the “best” matching record above a single threshold and allow users to do investigation and resolve potential matches below the threshold

Being able to control the mechanism which determines what a search returns is critical. For example, search results made from a physician office could be configured with a high threshold, only returning records that are confident matches. This results in little chance of false-positive matches for searches during routine examinations.

But in an emergency room environment, searches performed by a trauma specialist or surgeon could employ a slightly lower search threshold to reduce the likelihood of a false-negative (e.g., missed match). This maximizes the chance of patient and record identification in order to treat a patient more quickly and improve clinical outcomes. In an ER environment, a single piece of information that might come out of a search could raise a red flag that might save a patient’s life.

Building in this level of flexibility for different types of environments – and putting control in the hands of care givers, will be critical to ensure successful RHIO implementations and use in the field.

Conclusion

Despite the advantages that RHIOs offer, their success is not guaranteed. In fact, as RHIOs have begun to operate, many are realizing that today’s political and cultural environment demands unprecedented levels of accountability.

Given this challenge and the harsh launch climate, how can RHIOs improve their chance for success? Our experience suggests that successfully implementing a federated technology approach to patient identification and data linkage is a logical first step. But from the start, each RHIO must choose the right foundation for their technology environment for patient identification and linking.

The good news is that accurate patient identification and linking serves as a foundation to all healthcare technology initiatives, including data exchange, as well as the broader goal of an electronic health record. By implementing a matching algorithm, RHIOs will be able to provide a rapid, accurate means of patient identification. This will also enable individual users within a RHIO to fine-tune searches based on their roles and permissions, creating greater flexibility and improving patient safety, reducing medical delivery costs and enhancing the overall quality of care provided.

At Initiate Systems, we are passionate about the potential for RHIOs to transform the quality of healthcare in the US. If you are interested in learning more about patient identification's vital role to RHIO success, we would welcome the opportunity to share with you our approach and point you down the road to success.

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