



**Achieving Patient Identity Integrity in Health Information  
Organizations**

**A White Paper by the  
HIMSS Patient Identity Integrity Work Group**

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## Introduction

Traditional patient record matching usually occurs within a single organization or a group of organizations under common governance. The multi-organizational nature of HIOs introduces organizational diversity, complexity, and governance challenges that need to be addressed so that HIOs can consistently identify patients in an accurate manner. This paper highlights some of these challenges and discusses recommendations to help achieve patient identity integrity.

Patient identity integrity is the accuracy and completeness of data attached to or associated with an individual patient. Patient identity integrity is characterized by the correctness of the pairing or linking of all existing records of that individual within and across information systems, thereby enabling patient record matching.<sup>1</sup>

In December 2009, the HIMSS Patient Identity Integrity Work Group (PI Integrity WG) released a seminal white paper on patient identity integrity and patient record matching (“2009 HIMSS White Paper”).<sup>2</sup> While the 2009 HIMSS White Paper addressed a wide variety of issues related to patient identity integrity and patient record matching, including standards, interfaces, algorithms, unique identifiers, business processes, data accuracy, data quality, training and medical devices, the PI Integrity WG determined that supplemental material was necessary to highlight special issues and considerations in the field of patient identity integrity as these relate to health information organizations (HIOs).

## Definitions

The following terms are used throughout this paper:

**HIO** - a Health Information Organization oversees and governs the exchange of electronic health information among healthcare entities.

**HIE** - Health Information Exchange is the electronic exchange of health information that occurs among two or more healthcare entities.

**EMPI** - Enterprise Master Patient Index is software that is used to maintain consistent, accurate, and current patient data within an HIO’s database. The EMPI links or associates essential health information across diverse care settings.

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<sup>1</sup> This definition of “patient identity integrity” is from “Appendix E: Glossary of Terms” of the 2009 HIMSS White Paper.

<sup>2</sup> See *Patient Identity Integrity: A White Paper by the HIMSS Patient Identity Integrity Work Group*, <http://www.himss.org/patient-identity-integrity-white-paper?ItemNumber=27998> (December 2009).

## Organizational Diversity, Complexity and Governance<sup>3</sup>

While consistently identifying patients to achieve accurate patient record matching is hard enough within a single practice, clinic, hospital, or an integrated delivery network (IDN), the challenges multiply within an HIO and its multiple participants (i.e., organizations and entities). As such, it is critical that the HIO's administration understands and funds the business process requirements of the HIO in order to achieve sustainability and maintain patient identity integrity.

### Challenges and Recommended Solutions for Organizational Diversity, Complexity, and Governance

The following subsection discusses challenges and potential solutions for organizational diversity, complexity, and governance of an HIO. As HIOs continue to grow in terms of their patient populations, these challenges become all the more complex.

1. **Challenge No. 1: HIOs are Challenged with Maintaining Data Accuracy and Quality:** A key challenge for the HIO is to maintain data accuracy and data quality in its EMPI (or equivalent software). However, this is largely dependent on the accuracy and quality of the data being received by the HIO. As such, the role of the HIO is one of governance and oversight, and the criteria for patient identity integrity should be based on the HIO's data governance rules, established data quality rules, and thresholds. The following text provides guidance on how to achieve these objectives.
  - a. **Establish Guidelines for Data Stewardship and Data Governance with Quantifiable Expectations and Performance Standards:** Each HIO participant organization should make a formal commitment to accurate patient identification, such as by way of an agreement with the HIO. HIOs should also establish guidelines for data stewardship and data governance with quantifiable expectations and performance standards in order to decrease the number of duplicate patient records in their healthcare information systems.
  - b. **Monitor the Data Quality of the EMPI:** The HIO should monitor the data quality of its EMPI. The monitoring efforts include two activities: (i) the use of key performance indicators to define and measure the quality of patient identification and patient matching activities, and (ii) notification to its business partners of transactions that are not in compliance with the HIO's data governance and data standards, or of poor or inconsistent data being sent by the HIO's

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<sup>3</sup> The [2009 HIMSS Patient Identity Integrity White Paper](#) did not have a section on governance *per se*, but did address some governance issues in the section on Business Process. The Business Process section focused on the processes of intake and patient management, and observed that “poor processes cannot be offset by the best of technology.”<sup>3</sup> Practices that lead to poor patient record matching included a lack of consistency in approach, poor training and tools, and lack of organizational commitment. Among the recommendations, the 2009 HIMSS Patient Identity Integrity White Paper suggested that projects have executive level support and organizations develop data stewardship and data governance guidelines (for example, owners should be responsible for the quality of their own data).

business partners to the HIO. The notification should be automated whenever possible.

- c. **Develop Consistent Processes for Correcting Demographic Data:** The HIO should have in its policies and procedures, at minimum, the following items for developing consistent processes for correcting demographic data:
    - i. Who can initiate a correction in the HIO's EMPI or the source system
    - ii. What notifications are required, by whom, and to whom
    - iii. Within what time frame the correction should be made; and
    - iv. Mechanisms to correct any patient record matching errors that are transmitted to "downstream" clinical automated systems through the HIO from each HIO participant.
  - d. **Identify Problem Areas and Monitor Performance of Patient Record Matching Initiatives:** The HIO and each HIO participant organization should establish a data governance committee of multiple stakeholders to identify problem areas and monitor the performance of patient record matching initiatives. This group should establish data definitions, standard formats, and processes to increase consistency and ensure complete and accurate data capture for all required fields.
  - e. **Examine and Test Each System Interface:** Health information management ("HIM") and information technology ("IT") staff within HIOs, should examine each system interface with reasonable tests to ensure accurate patient record matching. The individual healthcare organizations should establish internal review and acceptance criteria, utilize performance metrics<sup>4</sup>, perform baseline and continuous assessments of the accuracy of patient record matching activities, and provide performance feedback to appropriate staff.
  - f. **Catalog and Maintain Default Values Used by Each Participating System:** Each organization has a default set of values when that item is unknown (e.g. naming conventions such as baby boy, trauma patient, etc.). It is important to catalog and maintain these values to make the exchange of information clear and accurate.
  - g. **Explore Additional Means for Patient Identification by Keeping Current with Evolving Technology and Best Practices.** HIOs should continue to explore additional means for patient identification and accurate patient record matching by keeping current with evolving technology and best practices.
2. **Challenge No. 2: HIOs Need to Maintain High Data Integrity of Records:** Records are generally owned by the organizations that created the records, rather than the HIO. In order to maintain a high degree of data integrity, HIOs need to have the ability to inquire

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<sup>4</sup> See the Key Performance Indicators section in the HIMSS Patient Identity Integrity Toolkit (<http://www.himss.org/library/healthcare-privacy-security/patient-identity>).

with the organization about questions regarding patient records, as appropriate. The following text provides guidance on how to achieve this objective.

- a. **Institute a Participation Agreement:** The participation agreement between the healthcare organizations and the HIO should permit the HIO to follow-up with the organization that submitted the data in case there are questions in regard to certain patient records. The participation agreement should identify the responsibilities and limitations of the HIO, as well as those of the downstream recipients of the data.
3. **Challenge No. 3: Source Data from Healthcare Organizations are Inconsistent and Often Conflicting:** Data which the HIO receives often comes from multiple, simultaneous sources. It is usually not possible to discern which data are accurate. Even data that appears to be more recent may not be the most accurate data.<sup>5</sup> Moreover, there may be overlapping patient records that need to be rectified and known errors need to be corrected at the source. Patient records should be rectified even when the source data is ambiguous or when the records are linked from multiple data sources. The following text provides guidance on how to achieve these objectives.
- a. **Establish Policies for Demographic (or other) Data of a Patient:** HIO policies and procedures should establish which demographic data will be collected, and in what format. All demographic or other data for a patient, whether historical or current, should be correctly associated with the same patient and potentially should be made available for matching purposes.
  - b. **Rectify Overlaps:** Any record overlaps (also known as “linkages” or “crossovers”) should be corrected to help facilitate accurate patient record matching.
  - c. **Correct Known Errors at the Source:** The HIO should ensure that any known errors are corrected at the source (i.e., the participating organization that originally submitted the data to the HIO) to enable optimal performance of EMPI patient record matching algorithms and accurate patient record matching.
4. **Challenge No. 4: Tools, Business Rules, Policies, and Training Regimens May be Different across HIO Participants:** Each HIO participant may use different tools, business rules, policies, and training regimens, all of which may have an impact on the collection and transmission of data to the HIO from HIO participants. Additionally, the data that an HIO receives typically comes from multiple sources, leading to inconsistent and sometimes conflicting source data. This lack of uniformity may result in erroneously

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<sup>5</sup> Multiple demographic (or other) data elements correctly associated with the same patient help to build a more useful patient record. The purpose of the EMPI is to enable accurate matching of patient records, not to necessarily to be the authoritative source of demographic (or other) information.

linked records, duplicate records,<sup>6</sup> record overlays,<sup>7</sup> as well as other situations in which records must be remediated to determine whether the records represent the same person or not and whether the linked records should be merged.<sup>8</sup> The following text provides guidance on how to achieve this objective of uniformity.

- a. **Implement Consistent Tools, Business Rules, Policies, and Training Regimens across HIO Participants with a Participation Agreement:** The HIO and the HIO participants should set forth the appropriate policies for use, security, quantity, quality, and treatment of data to be used for demographic record matching purposes. This information could be made a part of a participant agreement (such as an annex or appendix to the agreement). The agreement should also include specific information on the tools, business rules, policies, and training regimens to be used by HIO participants, all of which may have an impact on the collection or transmission of data to the HIO.
- 5. Challenge No. 5: False Positive and False Negative EMPI Matching Errors Can Multiply:** Patient record matching is generally carried out by EMPI systems that use algorithmic matching for identifying potential matches of patient records based on the available data. As HIOs scale upward in terms of the number of EMPI matches it performs, the number false positives and false negatives can grow considerably.<sup>9</sup> Any false positive (*i.e.*, information for two *different* people that appears to be a patient record match representing the same individual) may result in an overlaid record, which creates the potential for serious harm to the patient. False negative errors (*i.e.*, information for the same person that appears to not be a patient record match) must be remediated as well. Manually addressing these types of errors as well as resolving or correcting indeterminate matches can be very labor-intensive. The following text provides guidance on how to mitigate false positive and false negative EMPI matching errors.
- a. **Establish Patient Record Matching Policies – Mitigate False Positives and False Negatives:** The HIO should establish a robust data governance framework and strict patient record matching policies. The data governance framework

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<sup>6</sup> According to AHIMA, a “duplicate” occurs when more than one entry or file exists for the same person in a single facility-level master patient index (“MPI”). “This causes one patient to have two different medical records within the same facility.” See

[http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_044000.hcsp?dDocName=bok1\\_044000](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_044000.hcsp?dDocName=bok1_044000).

<sup>6</sup> See [https://www.healthit.gov/sites/default/files/master\\_data\\_management\\_final.pdf](https://www.healthit.gov/sites/default/files/master_data_management_final.pdf).

<sup>7</sup> According to AHIMA, an “overlay” occurs when there is one master patient index (“MPI”) entry or file for more than one person (*i.e.*, two people erroneously sharing the same identifier). “Overlaid records are frequently caused when patient access staff select another patient’s record during a scheduling or registration event. Sometimes interfaces cause the error if the receiving system lacks a robust patient record-matching program and “overlays” another patient’s record from that inbound interface transaction. On occasion, overlays are caused by an incorrect merge of two records that belong to two different people.” See

[http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_044000.hcsp?dDocName=bok1\\_044000](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_044000.hcsp?dDocName=bok1_044000).

<sup>8</sup> See [https://www.healthit.gov/sites/default/files/master\\_data\\_management\\_final.pdf](https://www.healthit.gov/sites/default/files/master_data_management_final.pdf).

<sup>9</sup> It is important to note that there is a lack of statistical reporting for transaction volumes of data within an HIO needing EMPI patient record matching. The healthcare industry should take steps capture this information and should also define metrics for measuring transaction volume to facilitate such reporting.

should establish thresholds for maximum acceptable rates of false positive and false negative matching errors in the EMPI. When linking records, the HIO should err on the side of caution to mitigate any record overlays which may result from false positive errors. The HIO should also have policies in place to address what happens if a false positive linkage or association is created and identified, and establish notification processes when such matching errors do occur to mitigate any undesirable consequences.

- b. Augment Human Resource Capabilities:** The HIO may augment its staff by using on-site contractors, other outsourced solutions, or by leveraging automated solutions which may reduce the need for labor-intensive operations. Processes should be established to monitor the quality of work performed by staff and the automated systems to ensure accurate patient record matching.

This subsection discussed patient identity integrity challenges and potential solutions for the organizational diversity, complexity, and governance issues facing HIOs. As patient populations and the amount of data continue to grow, the solutions must be able to scale and address an increasingly complex patient matching environment.

## **Conclusion**

An HIO operates at the high end of both scale and complexity. This paper highlighted several challenges that HIOs face and offered guidance to better enable accurate patient matching. Undoubtedly, HIOs will have additional and more complex challenges as they continue to grow.

The HIO should ensure accurate patient record matching through the use of appropriate methods, policies and technology to drive a high degree of accuracy in its patient record matching efforts. Furthermore, the HIO needs to ensure that it uses standard data governance practices, including with respect to how information is created, modified, and formatted in order to facilitate accurate patient record matching.

Finally, HIOs across the healthcare sector should collaboratively work with their constituents to develop uniform data standards in the industry, including a common set of voluntary, consensus-based, and industry-led guidelines, common standards-based identifiers, best practices, methodologies, procedures, and processes, for consistent patient/person identification across organizations.

## **Additional Resources**

- Ensuring Data Integrity in Health Information Exchange, AHIMA, August 2012, [http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_049675.pdf](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_049675.pdf)
- Accelerating Electronic Information Sharing to Improve Quality and Reduce Costs in Health Care, Bipartisan Policy Center, October 2012, [www.bipartisanpolicy.org](http://www.bipartisanpolicy.org)
- Long way from optimal health information exchange, Bill Spooner, Modern Healthcare, June 18, 2012, <http://www.modernhealthcare.com/article/20120618/NEWS/120619986/>
- “The Role of Unique Individual Identifiers in Facilitating Healthcare Interoperability”, Journal of Healthcare Information Management, Spring 2012, Volume 26/Number 2, p. 32-37, <http://www.jhimdigital.org/jhim/spring2012?pg=1#pg1>
- A voluntary Healthcare Identifier System, Elizabeth West, ASTM Standardization News, January/February 2012, p. 22-24, <http://www.astm.org/standardization-news/perspective/the-voluntary-universal-healthcare-identifier-system-jf12.html>
- Master Data Management Within HIE Infrastructures: A Focus on Master Patient Indexing Approaches, Audacious Inquiry, September 2012, [https://www.healthit.gov/sites/default/files/master\\_data\\_management\\_final.pdf](https://www.healthit.gov/sites/default/files/master_data_management_final.pdf)
- A Framework for Cross-Organizational Patient Identity Management, The Sequoia Project, November 2015, <http://sequoiaproject.org/framework-for-cross-organizational-patient-identity-matching/>

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