AHIMA Resources on Patient Identity/Matching

Articles:

Altendorf, Robin L. "Establishment of a Quality Program for the Master Patient Index." AHIMA's 79th National Convention and Exhibit Proceedings, October 2007

This article is focused on quality programs for maintaining the MPI. The article is styled in an instructional flow with introduction, background, MPI importance with tables, MPI solutions including the quality component, method with graphic outlining the quality process and conclusion.

Dimick, Chris. "Exposing Double Identity at Patient Registration" Journal of AHIMA 80, no.11 (November 2009): web extra

This article includes real-life example of how HIM provides feedback loop to Registration and the importance of direct training.

Dooling, Julie, Downing, Kathy. "Ensuring Data Integrity Through a Clean Master Patient Index." Journal of AHIMA 88, no.3 (March 2014): 46-47.

This article highlights the importance of master patient index (MPI) daily maintenance and includes a real life example of how one healthcare organization prioritized record merges using a team approach.

Eramo, Lisa A. "Partnering on Patient Matching: An HIM Committee Helps Steer a RHIO's Patient Index." Journal of AHIMA 83, no.5 (May 2012): 28-30

This article includes real-life example of how important the MPI is to a RHIO or HIO.

Fernandes, Lorraine, O'Connor, Michele. "Future of Patient Identification." Journal of AHIMA 77, no.1 (January 2006): 36-40

This article focuses on interoperability. Sections include matching, unique problems with unique identifiers, the importance of cleaning the data, concerns with privacy, usefulness and logistics, the use of the SSN and challenges of scale and complexity including probabilistic matching and quality data attributes. In addition, it includes a table that shows how variation in attributes can result in false-negative rates.

Landsbach, Grant; Just, Beth Haenke. "Five Risky HIE Practices that Threaten Data Integrity." Journal of AHIMA 84, no.11 (November–December 2013): 40-42

This article highlights five risks in HIE: Relying on weak algorithms, failing to include HIM staff in implementing record-matching algorithms, failure to manage ongoing data integrity, lack of standard interfaces and automated processes and establishment of weak governance processes. It concludes with the importance of data integrity.

Mendoza, Theresa; Kotyk, Steve. "EMPI Links Hospitals to Transform Data Exchange and Research in 17-County North Texas Region." 2011 AHIMA Convention Proceedings, October 2011

This article has real-life experiences and focuses on a regional EMPI and how it aids in research efforts. Sections include matching of patient claims, identifying lag days between admissions, calculation of lost reimbursement, program implementation with graphics and sample case studies related to readmissions.

Wiedemann, Lou Ann. "Will the Real John Smith Please Stand Up?" Journal of AHIMA 88, no.1 (January 2014): 52-53.

This article provides patient identity management tips, highlights the importance of data integrity starting with the patient registration process, discusses popular duplicate myths, and provides duplicate mitigation best practices.

http://bok.ahima.org/doc?oid=301386#.Xd7ZWOhKiUl

This article discusses patient matching and the need for a National Health Safety Identifier. Specifically discusses AHIMA role in advancing MyHealthID campaign.

Practice Briefs:

AHIMA. "Assessing and Improving EHR Data Quality (Updated)." Journal of AHIMA 84, no.2 (March 2013): 48-53 [expanded online version].

"This practice brief discusses the challenges of maintaining quality data in the EHR and offers best practice guidance for ensuring the integrity of the healthcare data" It also covers copy/paste, corrections and amendments and refers readers to the "Amendment Toolkit" listed below.

AHIMA. "Fundamentals for Building a Master Patient Index/Enterprise Master Patient Index (Updated)." Journal of AHIMA (Updated September 2010)

This practice brief includes an appendix "A" with "recommended core data elements for EMPIs". It differentiates between the various algorithms. Note: This brief has been retained for "historical purposes" where percentages may be outdated.

AHIMA. "Integrity of the Healthcare Record: Best Practices for EHR Documentation." Journal of AHIMA 84, no.8 (August 2013): 58-62

This brief "provides guidance for maintaining documentation integrity while using automated EHR functions". It touches on information governance, legal issues such as template documentation challenges, copy/paste, amendments, fraud and abuse, audit integrity and compliance education. It includes 4 appendices; resource list, case studies, steps to prevent fraud and an EHR integrity checklist.

AHIMA. "Limiting the Use of the Social Security Number in Healthcare." Journal of AHIMA 82, no.6 (June 2011): 52-56

"This practice brief outlines the importance of accurate patient identification. It also provides guidance on limiting the use of the SSN in patient identification practices and outlines the unique identifier option".

AHIMA. "Managing the Integrity of Patient Identity in Health Information Exchange (Updated)." Journal of AHIMA 85, no.5 (May 2014): 60-65.

"This practice brief explores the complexity of patient identification integrity, including how organizations can manage patient identification systems from front end data capture to back end quality control as an ongoing process and carry local quality operations into health information exchange efforts."

AHIMA. "Reconciling and Managing EMPIs (Updated)." Journal of AHIMA 81, no.4 (April 2010): 52-57

This brief "outlines the process for effective MPI management, including how to reconcile two MPIs. It also outlines staff roles and responsibilities for MPI management and conversions".

http://bok.ahima.org/PdfView?oid=302718

AHIMA's Request to Congress in 2019. Advocating for Congress to omit the 1999 language in the fiscal year 2020 appropriations legislation to empower HHS to work with industry to advance a nationwide patient matching strategy". This passed in the House and is now headed for the Senate later in 2019.   AHIMA has advocated for this since 1999.

Dooling, J. et. al. "Survey: Patient Matching Problems Routine in Healthcare". *Journal of AHIMA, January 6th, 2016.* http://bok.ahima.org/doc?oid=301643#.XTX_O-hKhnI

In order to learn more about AHIMA members' experience with patient matching as it relates to linking patient records, this article describes the survey results answered by 815 participants using 12 different EHR systems. Five key survey findings are reviewed. The authors of the survey said it shows the need to measure, monitor, and inform the marketplace of the need to better match patients to their specific health information. The survey responses illustrate the importance of information governance encompassing patient matching.

Dimick, Chris. "Exposing Double Identity at Patient Registration" *Journal of AHIMA* 80, no.11 (November 2009): web extra.

This article discusses double identity at patient registration and providing feedback to registration through direct training specific case study included.

AHIMA Work Group. "Best Practices for Patient Matching at Patient Registration" *Journal of AHIMA* 87, no.10 (October 2016): 74-81.From <http://bok.ahima.org/doc?oid=301906#.XRDo--hKhnI>

This Practice Brief provides best practices for accurate patient matching from the time the patient first contacts a healthcare organization until the organization confirms an accurate patient match. When

enacted and enforced, these practices will empower the registrar while improving data quality and patient safety.

 http://library.ahima.org/doc?oid=107768#.XeavlehKiUk
AHIMA Advocacy and Policy Team. "AHIMA Lends Expertise to ONC Patient Matching Initiative" *Journal of AHIMA* 86, no.10 (October 2015): 18-19.HIMA lends expertise to ONC patient matching initiative.

Toolkits:

AHIMA. Amendments in the Electronic Health Record Toolkit. (2012)

"This toolkit is designed to provide guidance to HIM professionals when addressing the amendment functionality in an EHR. For the purpose of this toolkit the authors have made the assumption that electronic signatures are used in the EHR. This toolkit defines the term amendments to include addendums, corrections, and deletions."

AHIMA. Health Information Management Staff Transformation Toolkit. (2012)
"This toolkit is designed to support and guide HIM professionals. It outlines how information management will change and how HIM professionals and their departments can prepare for this transformation. Transformation gap analysis, skills assessment, functions assessment and other training tools will assist the staff transformation in the HIM Department".

AHIMA. Information Integrity in the Electronic Health Record Toolkit. (2012)

This practice brief "explores best practices to ensure information integrity in the course of using and managing an EHR system, whether fully electronic or in a hybrid state, and covers practices for multiple processes from capturing information all the way through the continuum to sharing information" It also includes a section on managing the MPI.

White Paper/Reports:

Lusk, Katherine, et al. "Patient Matching in Health Information Exchanges". Perspectives in Health Information Management, December, 2014.

This white paper provides a historical perspective on patient matching in the US and discusses how patient matching errors pose significant safety and prevents health information exchange. The authors call for primary and secondary data elements, the use of industry-recognized data definitions, elimination of free text except for name, and separate data entry for data elements to address nationwide patient matching issues.

[AHIMA HIE Practice Council. (2012). Ensuring Data Integrity In HIE](#)

This white paper focuses on patient and data integrity, especially in the HIE environment. "Patient identity integrity is the accuracy, quality, and completeness of demographic data attached to or associated with an individual patient. This includes the accuracy and quality of the data as it relates to the individual, as well as the correctness of the linking or matching of all existing records for that individual within and across information systems. There are tremendous potential benefits and cost savings within the healthcare industry contingent on accurate patient identification and interoperability. Participation in an HIE can also provide increased efficiency in the delivery of healthcare by permitting access to more complete and timely information regarding individual patients".

[AHIMA/HIMSS Trends in Health Information Exchange Organizational Staffing. (2012). HIE Staffing Model Environmental Scan](#)

"The Healthcare Information and Management Systems Society (HIMSS) and the American Health Information Management Association (AHIMA) formed a collaborative workgroup to analyze job opportunities and skill sets required in the HIO setting. This analysis aims to identify current environment staffing models, emerging staffing models and required skill sets to support these organizations. The results of this analysis will serve those who are seeking employment focused on data exchange or HIE activities, including those exploring opportunities in education, training and certification to enhance their knowledge and skills in this area".

External Sources:

https://www.ecri.org/Resources/HIT/Patient%20ID/Patient_Identification_Toolkit_final.pdf

This toolkit reviews current evidence in order to make safe practice recommendations detailing how health IT can facilitate patient identification. Because patient identification issues are multifactorial, the workgroup focused on health IT strategies to mitigate those frequently reported patient misidentification issues. Recognizing that no single solution will be sufficient and that a multifaceted approach is essential, recommendations are divided into two main areas: (1) attributes and (2) technology. Focus is on three key questions (the prevalence, causes, and effective interventions for reducing misidentification. This body of work is led by a patient identification workgroup, chaired by Hardeep Singh, MD, MPH, from the Michael E. DeBakey VA Medical Center and Baylor College of Medicine

https://www.congress.gov/bill/114th-congress/house-bill/34/text

This November 25, 2016 document is text of the 21st Century Cures Act. H.R. 34

https://www.justassociates.com/application/files/1414/9134/1517/PIIWhitePaper.pdf

This paper discusses each variable at a high level and its impact on PI Integrity. Due to the complexity of detail, this paper does not provide an in-depth discussion of each variable; rather it seeks to offer sufficient understanding to provide professionals with a sound basis for planning and decision-making. References are cited in the document for those seeking more in-depth information, along with a select bibliography at the end. Barriers and specific recommendations are discussed in each section. There are data charts and additional sources in appendixes.

https://www.rand.org/content/dam/rand/pubs/monographs/2008/RAND_MG753.pdf

This report discusses correctly linking patients to their health data - a vital step in quality health care. The two primary approaches to this linking are the unique patient identifier (UPI) and statistical matching based on multiple personal attributes, such as name, address, and Social Security number (SSN). Lacking a UPI, most of the U.S. health care system uses statistical matching methods. There are important health, efficiency, security, and safety reasons for moving the country away from the inherent uncertainties of statistical approaches and toward a UPI for health care. In this monograph, they compare the linking alternatives on the basis of errors, cost, privacy and information security, and political considerations. Also discussed- operational efficiency, ease of implementation, and some implications for improved health care.

https://www.healthit.gov/sites/default/files/patient_identification_matching_final_report.pdf

Driven by concerns for patient safety in the event of mismatched or unmatched records and the national imperative to improve population health and lower costs through care coordination, this initiative studied both technical and human processes, seeking improvements to patient identification and matching that could be quickly implemented and lead to near-term improvements in matching rates. This report includes appendices that include a literature review and best practices for data quality.

https://www.securetechalliance.org/resources/pdf/smart-cards-and-biomertics-healthcare_051112.pdf

This white paper was developed by the Smart Card Alliance Healthcare Council to: • Provide an overview of smart card and biometric technologies; • Discuss the key considerations for selecting biometric and smart card technology for identity verification; and • Describe the benefits of combining smart cards and biometrics for identity applications.

https://verato.com/resources/

This is an information sheet from Verato on referential matching.

https://www.imprivata.com/patient-misidentification https://security.imprivata.com/2016-national-patient-misidentification-report-ar.html?chnl=ImpEmWeb

Use the first link to get to a variety of resources on patient identification. Second link is for the 2016 report. This report focuses on where, when, and how misidentification can occur in a healthcare organization. Discusses the clinical impact of patient misidentification and how patient misidentification can financially impact healthcare organizations.

https://connectingmichigan.net/wp-content/uploads/2016/05/Adam-Culbertson-Patient-Matching-on-FHIR-4s.pdf

This slide deck presentation provides background on patient matching, challenges to matching, metrics for algorithm performance, and current work with FHIR and matching.

https://www.justassociates.com/application/files/8014/9124/7591/HFM_August_2009_Children_Dallas_cost_of_duplicates.pdf

This is a case study written by Katherine Lusk. The focus is the migration from one EHR to another and the impact of duplicate records.

https://www.healthit.gov/sites/default/files/hie-interoperability/nationwide-interoperability-roadmap-final-version-1.0.pdf

This is a roadmap informed by nationwide stakeholders to coordinate our collective efforts around health IT interoperability. It describes the policy and technical actions needed to realize a seamless data system.

https://www.healthit.gov/sites/default/files/ptmatchwhitepaper.pdf

This white paper was developed by Venesco LLC, the Office of the National Coordinator (ONC) contractor that facilitated the Patient Matching Community of Practice (CoP) during 2014-2015 and worked closely with the CoP membership to derive best practices and useful insights and suggestions that will hopefully be valuable in improving the accuracy of patient matching.

https://sequoiaproject.org/wp-content/uploads/2018/06/The-Sequoia-Project-Framework-for-Patient-Identity-Management-v31.pdf

This is a Sequoia Project report- it highlights new insights and recommendations to improve patient matching nationally across different organizations, disparate technologies, and networks.

- Rand report attached
- ONC Final Report attached
- HIMSS report attached
- Patient secure Imprivata attached
- ECRI attached
- GAO attached
- Verato attached

https://www.healthcaredive.com/news/no-single-solution-to-patient-matching-challenge-gao-says/546147/

This brief discusses no single solution to patient matching challenge. U.S. Government Accountability Office (GAO) report to Congress link is imbedded https://www.gao.gov/assets/700/696426.pdf-Approaches and Challenges to Electronically Matching Patients' Records across Providers

External Sources-Studies, blogs, limited access articles

https://www.healthit.gov/sites/default/files/patient-matching-white-paper-final-2.pdf
This paper was developed to review the theoretical, experimental, and operational approaches of matching patients to their health records. In particular, we focus on HIOs and the privacy and security risks and benefits, ease of use, effectiveness, and scalability challenges of various patient matching approaches. Dimitropoulos, Linda. *Perspectives on Patient Matching: Approaches, Findings, and Challenges*. RTI International, June 2009
https://firstmonday.org/ojs/index.php/ojphi
Duncan, Jeffrey, Wu Xu, Scott P Narus, Stephen Clyde, Barry Nangle, Sid Thornton, and Julio Facelli. "A Focus Area Maturity Model for a Statewide Master Person Index." *Online Journal of Public Health Informatics* 5, no. 2 (2013): 210. doi:10.5210/ojphi.v5i2.4669.

https://www.healthit.gov/sites/default/files/patient-matching-white-paper-final-2.pdf
Privacy and Security Solutions for Interoperable Health Information Exchange-This is a study discusses the perspectives on patient matching-approaches, findings, and challenges.

https://europepmc.org/abstract/med/19964258
Frisch, P, S Miodownik, P Booth, P Carragee, and M Dowling. "Patient Centric Identification and Association." *Conference Proceedings: ... Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Conference* 2009 (2009): 1722–1725. doi:10.1109/IEMBS.2009.5333558.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3146983/
Gamble, Kate Huvane. "Identity Crisis. The Push to Share Data Electronically--Both inside and outside of the Hospital Walls--Is Forcing Patient Identification to the Forefront." *Healthcare Informatics: The Business Magazine for Information and Communication Systems* 27, no. 1 (January 2010): 22, 24, 26.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3615806/
A comparative review is presented of available technologies suitable for automatic reading of patient identification bracelet tags. Existing technologies' backgrounds, characteristics, advantages and disadvantages, are described in relation to their possible use by public health care centers with budgetary limitations.
Hain, Paul D, B Joers, M Rush, J Slayton, P Throop, S Hoagg, L Allen, J Grantham, and J K Deshpande. "An Intervention to Decrease Patient Identification Band Errors in a Children's Hospital." *Quality & Safety in Health Care* 19, no. 3 (June 2010): 244–247. doi:10.1136/qshc.2008.030288.

https://www.ncbi.nlm.nih.gov/pubmed/20031263
This study evaluates the frequency and accuracy of health care workers verifying patient identity before performing common tasks. Wide variation exists among health care workers verifying patient identity before performing everyday tasks. Education, process changes, and technology are needed to improve the frequency and accuracy of patient identification.
Henneman, Philip L, Donald L Fisher, Elizabeth A Henneman, Tuan A Pham, Megan M Campbell, and Brian H Nathanson. "Patient Identification Errors Are Common in a Simulated Setting." *Annals of*

Emergency Medicine 55, no. 6 (June 2010): 503–509. doi:10.1016/j.annemergmed.2009.11.017.

https://pdfs.semanticscholar.org/34cf/15acfb625cd0669c482cf301da003608e72e.pdf
Using observation, eye tracking, and clinical simulation with embedded errors, we studied the impact of bar-code verification on error identification and recovery during medication administration. Data supported that bar-code verification may reduce but does not eliminate patient identification (ID) and medication errors during clinical simulation of medication administration.
Henneman, Philip L, Jenna L Marquard, Donald L Fisher, Justin Bleil, Brendan Walsh, Justin P Henneman, Fidela S Blank, Ann Marie Higgins, Brian H Nathanson, and Elizabeth A Henneman. "Bar-Code verification. Reducing but Not Eliminating Medication Errors." *The Journal of Nursing Administration* 42, no. 12 (December 2012): 562–566. doi:10.1097/NNA.0b013e318274b545.

https://www.ecri.org/Resources/Whitepapers_and_reports/PSO%20Deep%20Dives/Deep%20Dive_PT_ID_2016_exec%20summary.pdf
For its fifth Deep Dive analysis of a patient safety topic, ECRI Institute PSO selected patient identification. Safe patient care starts with delivering the intended interventions to the right person. Yet, the risk of wrong-patient errors is ever-present for the multitude of patient encounters occurring daily in healthcare settings. Many patient identification mistakes are caught before care is provided, but reports submitted to ECRI Institute PSO illustrate that others do reach the patient, sometimes with potentially fatal consequences. In addition to their potential to cause serious harm, patient identification errors are particularly troublesome for a number of other reasons. The report discusses how patient identification errors could be prevented.

https://thehealthcareblog.com/blog/2016/01/23/the-patient-centered-health-record/

This links to a 55-minute video discusses the patient centered record.

https://medcitynews.com/2013/02/how-can-unique-patient-identifiers-help-meet-patient-care-objectives/
Short article/blog on UPI.

https://www.sciencedirect.com/science/article/abs/pii/S1386505610001747
This study describes the function of Medical Record Search Engines (MRSEs), using pseudonymisation of patients' identity. The MRSE will be able to retrieve and to provide upon an MD's request all the available information concerning a patient who has been hospitalized in different hospitals without ever having access to the patient's identity. The drawback of this system is that the medical practitioner then has to read all of the information and to create his own synthesis and eventually to reject extra data.
Quantin, Catherine, David-Olivier Jaquet-Chiffelle, Gouenou Coatrieux, Eric Benzenine, and François-André Allaert. "Medical Record Search Engines, Using Pseudonymised Patient Identity: An Alternative to Centralised Medical Records." *International Journal of Medical Informatics* 80, no. 2 (February 2011): e6–e11. doi:10.1016/j.ijmedinf.2010.10.003.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3782605/
This study introduces the concept, benefits, and general architecture for acquiring, storing, and displaying digital photographs along with medical imaging examinations. It discusses a specific implementation built around an Android-based system for simultaneously acquiring digital photographs along with portable radiographs. By an innovative application of radiofrequency identification technology to radiographic cassettes, the system is able to maintain a tight relationship between these

photographs and the radiographs within the picture archiving and communications system (PACS) environment. It includes a cost analysis demonstrating the economic feasibility of this technology. The architecture naturally integrates with patient identification methods, and also addressed patient privacy issues.Ramamurthy, Senthil, Pamela Bhatti, Chesnal D Arepalli, Mohamed Salama, James M Provenzale, and Srini Tridandapani. "Integrating Patient Digital Photographs with Medical Imaging Examinations." *Journal of Digital Imaging* 26, no. 5 (October 2013): 875–885. doi:10.1007/s10278-013-9579-6.

https://www.ncbi.nlm.nih.gov/pubmed/23521447
The purposes of this study were to survey in 40 countries the availability and use of unique patient identification numbers for radiologic examinations to facilitate radiation exposure tracking and to address plans for nationwide use of PACS networks and regulations in support of tracking.
Rehani, Madan M, and Theocharis Berris. "Radiation Exposure Tracking: Survey of Unique Patient Identification Number in 40 Countries." *AJR. American Journal of Roentgenology* 200, no. 4 (April 2013): 776–779. doi:10.2214/AJR.12.10246.

https://www.ncbi.nlm.nih.gov/pubmed/23920806
The efficiency and safety of the new RFID system (UHF band, 953 MHz) were tested in our hospital. We examined whether 1 to 4 persons and medical equipment with IC tags were captured by RFID readers in a laboratory. We next tested whether electric signals produced by RFID could affect medical devices. New radio frequency tags provided extensive patient identification and helped track capital equipment within a laboratory
.Saito, Yuichiro, Ryoji Suzuki, Kota Torikai, Takashi Hasegawa, and Tetsuo Sakamaki. "Efficiency and Safety of New Radiofrequency Identification System in a Hospital." *Studies in Health Technology and Informatics* 192 (2013): 1032.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3631902/
This study looks at the use of barcode scanning at both dispensing and administration phases to reduce the number of medication errors.
T, Higgins, M Heelon, B Siano, L Douglass, P Liebro, B Spath, N Kudler, and G Kerr. "Medication Safety Improves after Implementation of Positive Patient Identification." *Applied Clinical Informatics* 1, no. 3 (2010): 213–220. doi:10.4338/ACI-2010-02-RA-0011.

https://www.ncbi.nlm.nih.gov/pubmed/20952162
To gain insight into the performance of deterministic record linkage (DRL) vs. probabilistic record linkage (PRL) strategies under different conditions by varying the frequency of registration errors and the amount of discriminating power.
Tromp, Miranda, Anita C. Ravelli, Gouke J. Bonsel, Arie Hasman, and Johannes B. Reitsma. "Results from Simulated Data Sets: Probabilistic Record Linkage Outperforms Deterministic Record Linkage." *Journal of Clinical Epidemiology* 64, no. 5 (May 2011): 565–572. doi:10.1016/j.jclinepi.2010.05.008.

https://kclpure.kcl.ac.uk/portal/en/publications/an-agentbased-approach-to-realtime-patient-identification-for-clinical-trials(967c5bf6-4f76-4c55-8ed7-298f39718c10).html
This paper presents the ePCRN-IDEA recruitment system, which utilises an agent-based infrastructure to enable real-time recruitment of patients. In essence, whenever patients enter a clinic, the system compares their details against eligibility criteria, which define the requirements of active clinical trials. Tyson, Gareth, Adel Taweel, Simon Miles, Michael Luck, Tjeerd Van Staa, and Brendan Delaney. "An Agent-Based Approach to Real-Time Patient Identification for Clinical Trials." In *Electronic Healthcare*, edited by Patty Kostkova, Martin Szomszor, and David Fowler, 138–145. Lecture Notes of the Institute

for Computer Sciences, Social Informatics and Telecommunications Engineering 91. Springer Berlin Heidelberg, 2012. http://link.springer.com/chapter/10.1007/978-3-642-29262-0_20.

https://www.ncbi.nlm.nih.gov/pubmed/24340411
This study finds the standardization of ID bands and labels in conjunction with other interventions resulted in a statistical decrease in ID band error rates. This decrease in ID band error rates was maintained over the subsequent 8 months.
Walley, Susan Chu, Stephanie Berger, Yolanda Harris, Gina Gallizzi, and Leslie Hayes. "Decreasing Patient Identification Band Errors by Standardizing Processes." *Hospital Pediatrics* 3, no. 2 (April 1, 2013): 108–117. doi:10.1542/hpeds.2012-0075.

http://doras.dcu.ie/17562/1/WangChapter.pdf
Wang, John, ed. *Information Systems and New Applications in the Service Sector: Models and Methods*. IGI Global, 2010. http://www.igi-global.com/chapter/performance-modeling-analysis-surgery-patient/50241.

https://pennstate.pure.elsevier.com/en/publications/the-adoption-and-implementation-of-rfid-technologies-in-healthcar

This study reviews literature on the use of RFID in healthcare/hospitals following a formal innovation-decision framework. We aim to identify the common applications, potential benefits, barriers, and critical success factors.
Yao, Wen, Chao-Hsien Chu, and Zang Li. "The Adoption and Implementation of RFID Technologies in Healthcare: A Literature Review." *Journal of Medical Systems* 36, no. 6 (December 2012): 3507–3525. doi