HIMSS Analytics

HIMSS Analytics Stage 7 Case Study

The MetroHealth System

Profile

The MetroHealth System consists of one acute care hospital and 17 ambulatory sites with nearly 500 attending physicians, close to 400 physicians in training, 1,200 nurses and 6,500 total employees. On an annual basis The MetroHealth System records about 1,000,000 ambulatory visits, more than 100,000 emergency department visits (Level 1 Trauma Center), and approximately 28,000 inpatient admissions. The MetroHealth System is a teaching affiliate of Case Western Reserve University School of Medicine and is the essential (public) healthcare system in northeast Ohio.

The Challenge

The MetroHealth System was the first essential (public) healthcare system in the U.S. to install the Epic electronic health record, beginning in the outpatient setting in 1999. We wanted to continue our leadership in the implementation, adoption, and innovative use of health information systems and our commitment to health information technology as one of the keys to becoming a successful healthcare system of the future. Achieving HIMSS Analytics EMR Adoption Model^{sm} Stage 7 status in our ambulatory settings facilitated the expansion of our health information exchange to the Social Security Administration and the Veterans Administration and helped us standardize and streamline ambulatory work flows. Achieving HIMSS Analytics EMR Adoption Model^{sm} Stage 7 status in our hospital facilitated real-time/near real-time scanning and elimination of paper processes to achieve a “paperless” healthcare system, enhanced bar-code medication administration, and closed loop pharmacy medication preparation, among other quality, efficiency, and patient safety activities.

As an academic healthcare system, we also saw achieving HIMSS Analytics EMR Adoption Model^{sm} Stage 7 recognition as a critical foundation for additional teaching and research opportunities. Preparing our case value studies forced us to evaluate the impact of some of our electronic health record innovation to date. It also helped us set up systems to further innovate in the future as we adapt to a rapidly changing healthcare environment.

Implementation Overview

A multidisciplinary team of administrative, operational, clinical, and technical staff began planning for our electronic health record implementation in the mid-1990s. We became the first essential (public) healthcare system to install Epic in the ambulatory setting beginning in 1999, and we have progressed over the past 15 years to achieve HIMSS Analytics EMR Adoption Model ^{sm} Stage 7 status. Between 1999 and 2002, we installed Epic’s outpatient scheduling, registration, billing and clinical care (documentation and ordering) modules in all of our ambulatory sites. In 2004, we installed Epic’s emergency department module. In 2009, we installed Epic’s inpatient pharmacy system and converted to Epic in all of our inpatient clinical care areas. In 2011, we turned on Epic’s health information exchange, personal health record, and e-prescribing. In 2013 we implemented bar code medication administration. In 2014, we transitioned to Epic in our operating rooms and for anesthesiology and laboratory information system.

"Because we were an early adopter of electronic health records in 1999, our 15-years to full HIMSS Stage 7 implementation has closely followed Epic's development of new electronic health record modules."
– David Kaelber, MD, PhD, MPH, CMIO and Vice-President of Health Informatics and Patient Engagement

Resulting Value / ROI

Ambulatory Areas

Depression Screening – implemented 9-question Patient Health Questionnaire (standardized depression screening tool) in all primary care sites to screen for depression. Increased depression screening by 15 fold and diagnoses of depression by 23%. (K Palcisco, DC Kaelber, R Cebul, and L Stokes. Using Electronic Health Record (EHR) Tools to Improve the Screening and Recognition of Depression. American Medical Informatics Association Annual Symposium. Washington DC. 2013. [Abstract Presentation])

Immunizations – implemented immunization decision support for all pediatric immunizations (our work in this area has been designated by the Epic Corporation as a "clinical program" standard), as well as developed automated messaging system to notify parents/guardians of adolescents due for immunizations, resulting in a 25% increase in adolescent immunizations. (D Bar-Shain, M Stager, A Runkle, J Leon, and DC Kaelber. Direct Messaging to Parents/Guardians to Improve Adolescent Immunizations. Journal of Adolescent Health. 2015. [Accepted])

Pediatric Hypertension – used Epic electronic health record data to extrapolate isolated finding of underdiagnosed pediatric hypertension to expose system-wide underdiagnosis of hypertension in children and adolescents (designed as one of the top 10 breakthroughs in stroke and cardiovascular medicine by the American Heart Association in 2007) (ML Hanson, PW Gunn, and DC Kaelber. Underdiagnosis of Hypertension in Children and Adolescents. Journal of the American Medical Association. 2007 Aug 22; 298(8):874-9. PMIS:17712071). Implemented clinical decision support to increase the diagnosis of pediatric hypertension by 50%. (D Bar-Shain, K Palcisco, PJ Greco, and DC Kaelber. Using advanced electronic clinical decision support to improve the quality and recognition of abnormal blood pressure values in children. Pediatric Academic Societies Meeting. Washington DC. 2013. [Oral Presentation])

Referral Completion – developed Epic electronic health record based processes to increase the 30-day referral completion rate from ~48% to ~63% throughout The MetroHealth System on all referrals. Resulted in ~6,700 additional visits and ~$1 million in increased net revenue per month throughout The MetroHealth System. (MH Fratantonio, A Masih, M Kauffman, and DC Kaelber. Data to Dollars – Using Electronic Health Records to Complete Referrals. American Medical Informatics Association Annual Symposium. Washington DC. 2013. [Abstract Presentation]).

Hospital

Acinetobacter Outbreak Support – used a suite of Epic electronic health record based tools in support of an Acinetobacter (pathogenic bacteria) outbreak. In conjunction with other efforts, these tools decreased the incidence of Acinetobacter in hospitalized patients by more than 60%. (Recognized by an Association of Medical Directors of Information System award.)

Code Status Reconciliation – one of the first healthcare systems in the U.S. to implement code status reconciliation in our Epic electronic health record at discharge. This tool led to a 50% increase in the use of Do Not Resuscitate - Comfort Care and a 100% increase in the use of Do Not Resuscitate – Comfort Care Arrest – Do Not Intubate status in the transition from the inpatient to the outpatient setting.

Duplicate Labs – implemented several duplicate lab clinical decision support tools that resulted in a 50% decrease in duplicate lab testing and saving of thousands of dollars in expenses annually. (A Noto, P Greco, and DC Kaelber. An analysis of clinical decision support for repetitive urine culturing. American Medical Informatics Association Annual Symposium. Washington DC. 2011. [Poster])

Heparin Errors – after a sentinel event related to a heparin overdose, implemented a suite of Epic electronic health record based tools and redesigned a number of Epic electronic health record processes related to heparin. In the three years since implementing these tools and changes, no heparin errors with patient harm have been identified.

System-wide

Health Information Exchange – The MetroHealth System has conducted health information exchange more than 250,000 times and currently exchanges information thousands of times per day with other systems that have the Epic electronic health record – the Veteran's Administration, and the Social Security Administration. We have shown that when robust health information exchange occurs, upwards of 80% of the time a test is not ordered that otherwise would have been ordered, and approximately 15% of the time, an inpatient admission does not occur that otherwise would have occurred (DC Kaelber, R Waheed, D Einstadter, TE Love, and RD Cebul. Use and Perceived Value of Health Information Exchange – One Public Healthcare System's Experience. Am J Manag Care [Special Health Information Technology issue]. 2013; 19(10 Spec No. 10):SP337-343. PMID:24511888.

Our Epic electronic health record has also generally:

1. Increased research grant funding
2. Attracted and retained trainees and attending physicians
3. Decreased malpractice cases and led to more efficient resolution of malpractice cases
4. Decreased operational costs and increase revenue in numerous way

Lessons Learned

Technical and "Non-Technical" issues – electronic health records are 10-20% about "technical" details/issues and 80-90% about "non-technical" details/issues, which are critical to getting the electronic health records implemented and adopted.

Implementation and Post-Implementation – Although implementing electronic health records is a huge undertaking, implementation is only the "tip of the iceberg." To achieve the full value of these systems, most of the work occurs after the system is live. The staffing, resources and structure is different during the implementation and post-implementation part of the cycle, but do not overlook post-implementation. Once a system is implemented, the post-implementation phase lasts forever.

Informatics – developing an informatics team – made up of clinical staff who understand the technical functioning of the clinical information systems – is one of the keys to successful implementation, adoption and ongoing use of a clinical information system, and seems to be frequently overlooked/undervalued.

"We are proud to be leading the way toward high-quality, patient-centered and technology-enabled care through the use of our electronic health record. HIMSS Stage 7 recognition acknowledges MetroHealth's leadership and commitment to pushing the use of electronic health records for the benefit of our patients, our healthcare system, and all of northeast Ohio."
- David Kaelber, MD, PhD, MPH, CMIO and Vice-President of Health Informatics and Patient Engagement