

# The History of The MetroHealth System and Epic: The first 20 years

(prepared for the 20<sup>th</sup> anniversary of the first Epic module go-live in The MetroHealth System)

(Fall 2019)

Prepared by

Peter Greco  
David Kaelber  
Greg Norris



## **The First 5 years (1999-2003):** **Initial Vendor Selection and Ambulatory Implementation**

In early 1995, The MetroHealth System began looking into installing an ambulatory electronic health record (EHR). This included site visits with the major ambulatory EHR vendors at the time. The MetroHealth System Information Services Clinical Systems Director at the time, Charlotte Weaver, RN, wanted to see what a small start-up company in Madison, WI could offer as well. That company was Epic.

But MetroHealth had a hard time connecting with Epic for a software demo. Epic was small but growing rapidly. And did not have the sales staff to meet the demand. In fact, the company was so busy they were not taking on new customers.

Charlotte persisted and was finally able to arrange a meeting for herself on the only day Epic could meet – the Wednesday before Thanksgiving. The busiest travel day of the year, MetroHealth staff voluntarily flew TWICE for a software demo. When the MetroHealth team arrived, MetroHealth folks realized that the whole thing had a been a bait-and-switch – on MetroHealth's part, choreographed by Charlotte.

Epic was expecting only Charlotte Weaver – not an entire team. That is how Charlotte was able to get around the sales moratorium. Everyone sat around a very small table at 5301 Tokay Boulevard in Madison WI. Judy Faulkner, the founder and CEO of Epic was there. The MetroHealth team saw the software and liked it. Three years later, in 1998, The MetroHealth System became the first public/safety net healthcare system to sign an Epic contract.

Large projects like an EHR install can change corporate cultures. The MetroHealth CEO at the time, Mr. Terry White, became very involved in the last 3 - 4 months prior to the vendor selection in 1998. He and the MetroHealth Board Chair at the time, Donna Rego, frequently stated that the decision to network the clinical areas and to install a comprehensive outpatient system was a "bet your hospital decision." Everyone involved in the vendor selection process understood this and felt prepared for a difficult and exciting time. This turned out to be entirely correct, but none of the participants would have guessed at the time what it would mean in the end. The history of the MetroHealth ambulatory EHR install documents the transformation that these large projects can have in changing corporate culture.

Prior to the EHR install, the MetroHealth Information Services Department was traditional in terms of structure, leadership, and culture. It sought active input from clinical and ancillary areas in vendor selection and involved these areas in install decisions. The installs themselves clearly belonged to the Information Services Department, while problems with installs resulting in cost overruns were frequently (often correctly) blamed on the end users. Information Services always interfaced between the users and the vendors. After the installs, the systems clearly also belonged to Information Services. Users were represented on committees and could have significant input. However, all user service requests, whether for the purchase of a major clinical system or for a longer

printer cable, were done by way of a standardized request for service form - the much-maligned blue forms. Service response times were irregular and unpredictable.

At the same time, on the hospital and the physician side, The MetroHealth System was roughly two years into a long-term project intended to move from a traditional hospital top-down administration and faculty department "silos" to a "Grand Alliance." To this end, Mr. White and the department directors had selected Melinda Estes, MD, a young, innovative, and very focused pathologist from the Cleveland Clinic, to be MetroHealth's Chief of Staff. Dr Estes brought with her two energetic medical operations administrators, and quickly recruited Dr. Ben Brouhard, an experienced Cleveland Clinic pediatric nephrology chair with excellent leadership and mentoring skills to be MetroHealth's new Chief of Pediatrics. A few months later, MetroHealth's long-time CFO, Ann Harsh, retired, and was replaced by John Sideras, a young financial administrator with excellent financial and communications skills. He also came to MetroHealth from the Cleveland Clinic.

The Information Services director in charge of clinical systems at the time, Charlotte Weaver, RN, was busy building her own team to support the work that was to come with the new system. She hired Jonathan Sapon, RN, a likable, knowledgeable, and clinically experienced computer professional, to lead the ambulatory EHR implementation project. Shortly after the purchase of the system, and prior to detailed project planning, Jonathan and his wife died tragically in a helicopter crash while vacationing in Hawaii. The MetroHealth System reacted with shock and the extended project team grieved.

Charlotte took over as interim director of the project, the application personnel proceeded with their formal training, and install user / Information Services teams were set up and began analyzing area workflows with the intention of markedly homogenizing flows and transactions for the many involved areas. Concurrently, it became clear that MetroHealth's professional billing system vendor was using the year 2000 problem as leverage to force the purchase of an entirely new and very expensive system upgrade which would require new hardware and a near total re-install. Instead, a decision was made to add Epic's professional billing and managed-care modules to the Epic scheduling and outpatient modules that had just been purchased. This all made good sense, but it brought with it some important problems.

First, the project became much more complex. Second, while the install did not yet have a strict project timeline, it had acquired a strict target date - at the very least the registration and professional billing modules would need to be up and running by mid-1999 in order to beat the Y2K problem. Lastly, the Faculty Billing Office (FBO) was a major exception to the Information Services structure and culture. The FBO clearly owned their professional billing system and was poorly prepared for moving to an integrated system. In addition, they were not initially part of the project and had not participated in the vendor selection process. This put them at a distinct disadvantage with Information Services staff and other users who had at least started an early integration of the participating Information Services staff and other users. In addition, they had missed early exposure to Epic's corporate culture. The FBO still believed in issues lists, customization requests and confrontation at a time when both Information Services and the clinical users

were beginning to embrace notions like open communication with the new vendor, trust, collaboration, and later active friendship.

We do not know exactly when Epic leadership discovered that MetroHealth's installation was floundering, however many at MetroHealth recall being called on very short notice to an emergency meeting concerning the install. Approximately 40 members of Information Services and the user install community were present. Epic had sent its then CFO along with an install specialist named Susan May, and MetroHealth's account representative. Over about two hours, in a very open discussion, the Epic CFO questioned MetroHealth staff about the status of the MetroHealth installation. He stood at a chalkboard and tried to build a workable project timeline. This was not possible. The meeting ended, and Epic staff went home.

Mr. White and Dr. Estes were not present at the meeting, but they responded quickly to its implications. Over a few short weeks, the following changes occurred, in the following generally chronological order:

- Application leaders were named for each of the four modules to be installed.
- Dr. Peter Greco, a primary care physician with excellent programming skills, was assigned 50% to IT and became the co-director of the EHR module.
- Dr. Greg Norris, Associate Chief of Staff for Ambulatory, was designated as lead physician for the overall installation.
- Susan May was "rented" from Epic and became MetroHealth's interim director for the install.
- MetroHealth's CIO resigned and was replaced by Vince Miller, an experienced IT director with excellent communications and leadership skills, and a great sense of humor.
- The director of the Faculty Business Office resigned, and the Faculty Business Office was merged into the MetroHealth System's Finance Department.
- Dr. Estes' angry retort at one of the early restructuring meetings, "The Epic Install is not an IS project, it's everybody's project!" became our mantra.

This aggressive restructuring was remarkably successful. Accomplishments from 1998 through 2002 included:

- A hospital-wide network was installed.
- The Epic registration, scheduling, managed care, and professional billing modules were installed system-wide before the end of the 3<sup>rd</sup> quarter 1999.
- Implementation of Epic's outpatient professional billing modules resulted in an unplanned, but very welcome, large increase in charge capture throughout all ambulatory clinics.
- Information Services no longer had any blue forms. Each area had a designated Information Services response person, who personally responded to users' needs, large or small.
- The Faculty Business Office was no longer a silo.
- MetroHealth's Clinical Systems Director, Charlotte Weaver, resigned to take a position as an executive with the Cerner Corporation, one of Epic's main competitors.

- Jim Schlesinger, then Controller with MetroHealth's Finance Department, took over as MetroHealth's Clinical Systems Director.
- After completing the initial phase of MetroHealth's install successfully, Susan May returned to her home in Massachusetts and when last heard from was continuing to find plenty of work fixing failing system installs.
- After a very successful pilot in the pediatric department, which went live on 7/19/1999, the Epic ambulatory EHR module was installed successfully, one clinical area at a time over six weeks each through the end of 2002. The install was completed on time and under-budget.
  - This install also included the Emergency Department. Importantly, Epic at the time did not yet have an ED module. Therefore, Dr. Greco, with the help of our super-users in the Emergency Department, built one. This was the genesis of MetroHealth's leadership in emergency medicine in the Epic Community. Over many years, Dr. Jonathan Siff, one of our long-time ED attendings, has become one of the central members of the Epic user community.
  - In 2000, Greg Norris told Epic that Peter Greco had created a tool that would transform documentation forever. Greg and Peter traveled to Epic in Madison, WI to show Epic staff how it worked. Everyone met at Tokay in the Farm conference room and MetroHealth demonstrated the SmartForm Peter Greco had built, in part to give the Emergency Department physicians a more point and click form of documentation. It was a very cool SmartForm that used SmartLists to create the tool. Although eventually this functionality retired at MetroHealth, the SmartForm idea became the basis for the NoteWriter functionality built by Epic and now used by the Epic community throughout the world.
  - In 2001 and 2002, Jonathan D'Souza and Chris Alban from the Epic corporation made multiple trips to MetroHealth to discuss how we should build an ED module in Epic. MetroHealth began using Epic's ambulatory module in the Emergency Department long before ASAP (Epic's Emergency Department specialty module) was completed. MetroHealth heavily influenced the development but did not go live on ASAP for a number of years.
  - Jon Siff was central to those efforts; He continues to play a key role in the ASAP Advisory Council there, and is now on the Epic Physician Advisory Council Advisory Board.
- Dr. Estes resigned to take a leadership position back at the Cleveland Clinic. Dr. Brouhard, MetroHealth's former Pediatric Chair, and the lead physician of MetroHealth's EHR pilot, became MetroHealth's new Chief of Staff.
- Members of MetroHealth's implementation team have close friends and contacts at Epic, and most of the MetroHealth installation team are very active members of the various Epic User Groups.
- MetroHealth visitors at the time who were knowledgeable about EHRs, on-site Epic employees, and providers at User Groups frequently comment that our EHR "worked best." This had to do with the excellence of the Epic software, MetroHealth's structured install, and especially with screen after screen of

automated input forms, order sets, and data links, fast accurate interfaces, and useful, adaptable custom reports. All of this was a direct result of the excellence of Dr. Peter Greco and Kim Gleine, MetroHealth's lead analyst.

There are any number of lessons in this story:

- It is critical to stress the importance of strong, vibrant, and visible project support by senior administration, nursing, and physician leadership. In MetroHealth's case, MetroHealth had this throughout and never would have succeeded without it.
- Mr. White, MetroHealth's then CEO, was correct in saying these large installs are "bet your hospital" propositions. It would be foolish to proceed with an EHR project without strong support from senior leadership.
  - For MetroHealth, strong, vibrant, and visible support was not enough. MetroHealth floundered and MetroHealth's leadership turned both the entire Information Services Department and the Faculty Billing Office on their ears, burnt down silos, and forever changed both areas' cultures. More usual verbs such as "restructure" do not capture what happened.
  - Corollary 1: Even very broken installs can be fixed, and fixed quickly, but it takes very strong leadership, very clear vision, and plenty of courage.
  - Corollary 2: Large, important projects like an EHR install can change corporate cultures. Completely reshaping Information Services and the Faculty Business Office were hardly project goals yet ended up being clear deliverables.
- Dr. Estes' mantra "The Epic install is not an IS project, it's everybody's project!" can be repackaged to fit many large technology installations. Its central message is a critical success factor.
- Non-traditional relationships with vendors are both possible and useful.
  - MetroHealth's EHR vendor, Epic, had an unusual corporate culture, which stressed quality, trust, long-term partnerships, mutual financial success, and innovative high-quality clinical care. MetroHealth sensed this during the vendor selection process and gave it some weight. In retrospect, MetroHealth should have markedly increased the weight given to these issues. Mutual trust and bilateral belief in mutual financial success are particularly important. MetroHealth needs to succeed long-term because MetroHealth is the only hospital system in Cuyahoga County that guarantees high quality health care for all county inhabitants regardless of ability to pay. MetroHealth needs Epic to succeed long-term because high quality clinical software enables MetroHealth's mission, and MetroHealth has neither the desire nor the financial resources to repeat an EHR system implementation.
- While ROI calculations are an important part of any large system purchase, successful large installs reshape their areas so much that they are inherently inaccurate. In this case, MetroHealth never knew about the very large ambulatory charge capture problem that was unwittingly fixed. The EHR implementation paid for itself far quicker than initial return on investment calculations ever could have predicted.

- In the early literature about EHR, Computer Physician Order Entry (CPOE), and the various quality improvement initiatives of the time, much was written about the potential of intelligent alerts, warnings, and filters. MetroHealth was very active in the use of these features. However, MetroHealth discovered that these features are only a very minor cog in the total healthcare quality improvement and medical error reduction potential that large integrated EHR systems offer. Legible, transmittable notes, immediate access to all test results, CPOE, and having the record available anywhere, system-wide all clearly trumped clinical decision support.
  - MetroHealth was a pioneer in the description and treatment of clinical alert fatigue, one of the results of poor clinical decision support tools.
  - One of the greatest early benefits of MetroHealth's ambulatory EHR installation was the ability to transcend the physical barriers that previously interfered with coordination of care among various providers, and between providers and ancillary departments. Where in the past the primary care physician might have had difficulty retrieving a consultation report or lab report, now the report could be forwarded to his/her electronic inbox as soon as it is available. It became typical for the ordering physician to receive results of laboratory tests and radiology studies on the same day that they were ordered. Also, the use of shared problem lists and shared medication lists, provided everyone involved in the patient's care with a more complete picture of the patient's problems and treatment.
- Being a team member on a successful large project like this is enormously fulfilling personally and professionally.

## **The second 5 years (2004 – 2008): Expanded Implementation and Initial Optimization**

- Most of the MetroHealth installation team were still in their positions, and spent time cleaning up install leftovers, setting up permanent system maintenance flows, optimizing the EHR in literally thousands of ways, and setting up initial system governance.
  - Early clinical system governance had consisted of meetings between Ms. Gleine and Drs. Greco and Norris. While highly efficient and quick, all three felt a strong need to involve more of our users in clinical system governance. MetroHealth therefore established a clinical system prioritization committee, which included many super-users from throughout MetroHealth ambulatory clinics.
- MetroHealth also felt a strong need to proceed with an inpatient install, but there was no capital available for it.
  - MetroHealth was not as late with this as it might now seem. Peter Greco and Greg Norris were sitting in a “What’s New in EpicCare Inpatient” demo at the Epic User Group Meeting in 2003 or 2004, and hearing a developer happily announce that they had added the ability to easily cancel an inpatient admission of a patient admitted in error. This is likely an uncommon occurrence in the Epic test hospital, but it seemed likely to be a common occurrence at MetroHealth.
- In 2006-7 Vince Miller, then CIO, succeeded in getting capital for two big projects:
  - Regular device renewal and maintenance. Prior to this, our renewal and maintenance had been project based.
  - EpicCare Inpatient
- Another installation team was created with Joan McFaul of IS administration as project lead. The rest of the Information Services Epic team grew slightly and was heavily involved.
- What was new for MetroHealth’s inpatient Epic implementation was the need for heavy nursing and pharmacy involvement. Very happily, Jane Fusilero, the then CNO, and Jay Kuhn, the Pharmacy Director, were totally supportive of this and contributed high-quality support from both of those camps. This was the period in which Deirdre Faranda, RN, our first Director of Nursing Informatics, was brought onboard. Mr. Kuhn set aside three highly skilled pharmacy analysts and a supervisor for the project.
- Epic had suggested that MetroHealth put the entire installation team in one place. MetroHealth’s CEO, John Sideras, and Ms. Fusilero, CNO, agreed, providing us with an entire vacant inpatient floor. It is hard to overstate how useful it was for everyone involved in the install to be working adjacent to each other on the same floor.
- The other thing that was clearly different for the inpatient install was the interest and involvement of all the clinical departments. When MetroHealth had gone live in ambulatory clinics, most of the initial interest had come from primary care and the Emergency Department. Now, the installation team had active involvement



from all the clinical departments, including a good number of walk-on super-users interested in inpatient.

- By this time, Vince Miller, the CIO, had retired, and Jim Schlesinger took over in his place, Dr. Norris had retired from clinical care and Information Services leadership, but came back to help build the inpatient order sets. Dr. David Kaelber, a MetroHealth Med-Peds resident, was off at Harvard doing a medical informatics fellowship. He was scheduled to come back to MetroHealth to become MetroHealth's first CMIO. At this point, Ms. McFaul left to take on a new position elsewhere, and along with the order sets, Dr. Norris took on the project lead until David returned from his fellowship. Happily, all went well, and the go-live was a big success. Concurrently, David became MetroHealth's first CMIO.

Some significant lessons from the inpatient EHR installation and some clear future direction at that time included:

- All the clinical departments who had had experience with the ambulatory EHR were onboard, engaged, and did well with the inpatient EHR installation. We neglected to notice that there were some areas, predominantly inpatient, who were unfamiliar with the Epic EHR software. They had a much harder time with the transition, and MetroHealth did a poor job initially with Anesthesia. Happily, MetroHealth was able to fix that promptly.
- MetroHealth prided itself for years on its ability to run the Epic EHR software with a miniscule staff, which was attributed to a very small number of highly skilled and very flexible staff. After the installation of the Epic EHR in the inpatient setting, it was clear that MetroHealth needed more people and more formal direction and organization.
- MetroHealth spent too little time working on the Epic EHR as a tool for clinical research.
- MetroHealth had an excellent reputation in the Epic community but was not at all active in the academic medical informatics community, had not pursued HIMMS certification, nor won a Davies Award.
- So, alongside all the necessary optimization work, MetroHealth had new things to do.

## **The second 10 years (2009 – 2019): Enterprise Commitment, Optimization, and Additional Value Realization**

On the heels of MetroHealth’s inpatient Epic implementation, The MetroHealth System started to recognize 5-year initial go-live anniversaries with the Epic corporation to celebrate the unique partnership between The MetroHealth System and Epic. The 10-year anniversary was held in the fall of 2009 with Judy Faulkner (founder and CEO of Epic) in attendance. Greg Norris had left The MetroHealth System and went to work at Epic. Among other activities, he created and lead the Epic Classics program, recognizing there was a need to identify the best Epic Physician Advisory Council presentations and have them repeated and available to a wider audience.

Once Epic EHR software had been deployed in the ambulatory, emergency department, and inpatient settings at MetroHealth, the overwhelming majority of MetroHealth clinical staff used the Epic EHR to take care of the majority of MetroHealth patients all the time. Staff could focus less time on implementing additional Epic EHR modules and more time on optimizing and creating value from the EHR tool. 2009 also marked the signing of the American Recovery and Reinvestment Act, with its HITECH provisions, with committed tens of billions of dollars to using EHRs in meaningful ways as defined by the Office of the National Coordinator of Health Information Technology. Additionally, Epic EHR functionality was moving beyond simply replacing paper-based work flows.

In 2011, MetroHealth implemented Epic’s health information exchange model (CareEverywhere) to begin electronically exchanging clinical data from other healthcare systems with and without the Epic EHR in real time. This year also marked the system-wide deployment of Epic’s personal health record module (MyChart) allowing patients to directly interact with the EHR. By the end of 2012, MyChart became the largest user group of the Epic EHR within The MetroHealth System, significantly surpassing physicians, nurses, and other users of the MetroHealth Epic EHR. Electronic prescribing of medications directly to ambulatory pharmacies was also implemented in 2011. CareEverywhere, MyChart, and e-prescribing do not have effective non-electronic counterparts and so these tools started to fundamentally change the way healthcare was provided for MetroHealth patients.

In 2012, the MetroHealth Board of Director passed a resolution committing to an Epic enterprise strategy such that Epic EHR solutions would be preferred over other third-party health information technology solutions if the Epic EHR solution met MetroHealth’s need in that area. Based on this resolution, MetroHealth signed an enterprise contract with Epic and adopted a “core vendor” strategy (it is generally better to get “more products” from a “core vendor” than fewer products from many vendors. The total cost of ownership should be lower over the long-term with a core vendor strategy). This strategic commitment to a core vendor, “Epic first” strategy led the way to MetroHealth “Ventures” project where The MetroHealth System bundled several different Epic EHR modules together including operating room, anesthesia, lab, hospital billing, and admission, discharge, and transfer (ADT) modules. The Ventures project spanned 2012-2014. In the fall of 2014, The

MetroHealth System and Epic corporation celebrated their 15<sup>th</sup> anniversary since the initial go-live with the Epic EHR, with Judy Faulkner once again in attendance.

This decade (2009-2019) also marked a significant increase in academic informatics activities in The MetroHealth System building on the Epic EHR foundation. In 2009, Judy Faulkner provided MetroHealth with a \$150,000 grant to start a 2-year clinical informatics fellowship program with the goal to train physicians to become Epic builders. The strategy behind this initiative was to help Epic determine how to scale, throughout the Epic customer base, a way to have at least one physician builder at each customer site, based on the outstanding success of having a physician builder (Dr. Peter Greco) within The MetroHealth System. Two clinical informatics fellows (Dr. Tom Swales and Dr. Kristen Palcisco) were trained through this initiative from 2009-2011. Learnings from this program became the impetus for the Epic Physician Builder program that now trains hundreds of physicians per year. The MetroHealth System also leveraged this experience to develop an ACGME accredited Clinical Informatics Fellowship and Certificates in Health Informatics and MS and PhD programs in Biomedical and Health Informatics in conjunction with Case Western Reserve University.

In addition to training programs related to Epic and informatics generally, catalyzed by MetroHealth's Epic implementation, MetroHealth also began to exploit its Epic investment for research purposes. Over this decade, millions of dollars of external research funding, scores of abstracts, and dozens of peer-reviewed publications are all directly attributable to MetroHealth's investment in the Epic EHR. Most of this research has been focused on either 1) using all the data in the MetroHealth EHR for new clinical discoveries and/or 2) using the MetroHealth Epic implementation as a "living laboratory" to study how an EHR can be used to improve care.

Two of numerous examples of this research include *Underdiagnosis of Hypertension in Children and Adolescents* published in JAMA and recognized by the American Heart Association as one of the top ten breakthroughs in all of cardiovascular medication in the year it was published, and *Electronic Health Records and Quality of Diabetes Care*, published in the New England Journal of Medicine.

MetroHealth also installed Epic's research module in 2014 as part of the Ventures project to catalyze the use of Epic for prospective clinical trials. In addition to using Epic for research within The MetroHealth System, MetroHealth was also involved in helping Epic think about Epic for research from a "big data" perspective. Starting In 2009, David Kaelber proposed at the Epic Research Advisory Council meeting the concept of "Research Everywhere." Research Everywhere encompassed both the technical and non-technical aspects of sharing data among Epic customers for research, analogous to how CareEverywhere encompassed the technical and non-technical aspects of sharing data for clinical care. Although the name Research Everywhere was not adopted, the idea of Research Everywhere lead to the development of Epic's Aggregate Data Program and then the Cosmos Data Network, which has the potential to become the largest clinical data set ever available for research.

One of the keys to MetroHealth's success over this decade was the strategic development of a clinical informatics team. The team grew from ~1 FTE split between Dr. Greco and Dr. Kaelber to ~40 staff, including primarily additional practicing physician informaticists, new nurse informaticists, and the end user training and support moving from Information Services. This team performed several key functions in helping to implement and optimize the use of the Epic EHR including strategic guidance, specific project leadership, technology consultations, focused tactical support, training, and key liaison between Information Services and end users. During this decade The MetroHealth System also strategically aligned to track and benchmark its EHR implementation and use it with external health information technology standards.

In 2013, The MetroHealth System became the first public/safety-net healthcare system with Epic to be designated "Stage 6" by the Healthcare Information and Management Systems Society's (HIMSS) Electronic Medical Record Adoption Model (EMRAM) in its inpatient and ambulatory settings.

In 2014, MetroHealth became the first public/safety-net healthcare system with Epic (second with any EHR vendor) to reach HIMSS EMRAM "Stage 7" (highest stage). HIMSS EMRAM measure EHR adoption and use.

In 2015 MetroHealth became the first public/safety-net healthcare system to win a HIMSS enterprise Davies' award for value realization of its EHR. A highlight of this presentation was demonstrating that historically The MetroHealth System has a net return of ~\$20 million dollars in the 5 years leading up to the Davies Award submission. The MetroHealth System typically achieves at least an additional \$5-\$10 million in net revenue annually.

In 2017, The MetroHealth System became the first public/safety-net healthcare system with the Epic EHR and 12<sup>th</sup> healthcare system in the world to recertify at HIMSS Stage 7 in all its hospitals and ambulatory clinics.

In 2018, MetroHealth was recognized by the KLAS ARCH collaborative as being in the top 3% of all healthcare systems in terms of end-user self-reported experience using their EHR.

By the end of the decade The MetroHealth System was externally benchmarked as being in the top 1% of all healthcare systems in the US (and world) in terms of its electronic health record implementation, use, usability, and value achievement.

The first 20-years together has been a remarkable journey for The MetroHealth System and Epic. Both organizations have evolved significantly during these two decades during a dynamic health care environment nationally and locally with the passage of the American Recovery and Reinvestment Act spurring EHR development and adoption and the Affordable Care Act and other registration significantly changing the focus of healthcare delivery. Through all this, The MetroHealth System and Epic have forged a tight relationship, unlike any other MetroHealth vendor. The special relationship has been mutually beneficial with MetroHealth contributing in numerous ways to Epic software and

the larger Epic community and Epic software serving as the foundation upon which MetroHealth is helping to lead the way in patient center, efficient, and high value health for all our patients. We can only dream of how our continued partnership will grow for our mutual benefit and more importantly, the benefit of our patients, in the decades to come.

## Appendix I – Timeline of MetroHealth-Epic Achievements

<b>Year</b>	<b>Accomplishment</b>
1999	Epic Cadence (Scheduling) Functionality Live
1999	Epic Cogito (Reporting) Functionality Live
1999	Epic Health Informatics Management (HIM) Functionality Live
1999	Epic Resolute (Professional Billing) Functionality Live
1999	Epic Tapestry (Population Management) Functionality Live
1999	Epic Clarity Extract, Transform, Load (ETL) Functionality Live
1999	EpicCare Ambulatory Functionality Live
2000	Epic EpicWeb Functionality Live
2004	ASAP (Emergency Department) Functionality Live
2005	Epic for Hospital Outpatient Departments (HODs) Live
2009	EpicCare Inpatient - ICU Live
2009	EpicCare Inpatient Functionality Live
2009	Epic Beacon (Cancer Care) Functionality Live
2009	Epic Willow (Pharmacy) Inpatient Functionality Live
2009	EpicCare Inpatient Computerized Physician Order Entry (CPOE) Functionality Live
2009	Epic Supported Clinical Informatics Fellowship
2010	Epic Care Everywhere (Health Information Exchange) Functionality Live
2011	Epic Customer Relationship Manager (CRM)/Call Management Functionality Live
2011	Epic Nurse Triage Functionality Live
2011	Epic MyChart Functionality Live
2011	<b>Dr. Greco Wins Inaugural PACademy</b>
2011	Epic Attention Deficit Hyperactivity Disorder Medication Daisy Chain Functionality Live
2012	<b>MetroHealth signs Epic Enterprise contract</b>
2012	Epic Health Maintenance for Pediatric Immunizations Live
2013	<b>MetroHealth Extends Epic to the Cleveland Public School District</b>
2013	Epic Radar Executive Dashboards Live
2013	Epic Welcome Patient Kiosk Functionality Live
2013	Epic EpicCare Link Functionality Live
2013	Epic Prelude (Registration) Functionality Live
2013	HIMSS Stage 6 for Inpatient and Ambulatory
2014	<b>MetroHealth Extends Epic to the Jail</b>
2014	<b>MetroHealth Creates the Enrollment Outreach Mobile Unit</b>
2014	Epic OpTime OR Management System Functionality Live
2014	Epic Anesthesia Functionality Live
2014	Epic Grand Central (Patient Flow) Functionality Live

2014	Epic Resolute (Hospital Billing) Functionality Live
2014	Epic Beaker (Pathology) Functionality Live
2014	Epic Pediatric Wellness Registry Functionality Live
2014	Most Wired Hospital Award
2014	HIMSS Stage 7 for Inpatient and Ambulatory Initial Certification
2015	MetroHealth Helps Start Epic's Physician Advisory Council Advisory Board
2015	Epic Kaleidoscope (Ophthalmology) Functionality Live
2015	Epic Caboodle (Enterprise Data Warehouse (EDW)) Functionality Live
2015	Epic Haiku/Canto (SmartPhone/Tablet) Functionality Live
2015	Most Wired Hospital Award
2015	HIMSS Enterprise Davies Award
2016	Epic Lucy (patient-controlled person health record) Functionality Live
2016	Most Wired Hospital Award
2017	Spry Personal Concierge Clinic Opens
2017	Dr. Bar Shain Wins PACademy
2017	Epic Predictive Analytics Functionality Live
2017	Epic Stork (Obstetrics) Functionality Live
2017	Epic Healthy Planet (Population Health) Functionality Live
2017	Most Wired Hospital Award
2017	HIMSS Stage 7 for Inpatient and Ambulatory Recertification
2018	First Organization to Submit to Epic's Cosmos Database
2018	Epic Clinical Case Management Functionality Live
2018	Epic Health Effectiveness Data and Information Set (HEDIS) Measures Functionality Live
2018	Epic Infection Control Functionality Live
2018	Epic Rover (Nurse Handheld) Functionality Live
2018	Cum Laude Honor Roll
2018	KLAS Arch Collaborative (Electronic Health Record End User Experience - Top 10 Epic Customer)
2018	Most Wired Hospital Award
2019	MetroHealth Extends Mobile Mammography
2019	Creation of Physician Advisory Council (PAC) Mentorship Program
2019	Most Wired Hospital Award
2019	Most Wired Ambulatory Award
2019	Summa Cum Laude Honor Roll

## **Appendix 2 - MetroHealth Impacts to Epic** **(MetroHealth is 1 of approximately 400 Epic customers)**

### MetroHealth Impacts to Epic

#### *Case Studies/Presentations*

- 3 Success at Seven Articles (59 total articles)
- 6 Clinical and Financial Programs (185 total program from 121 customers)
- 6 presentations designated as Epic Classics designation (166 total)
- 112 presentations between 2007 and 2019 at Epic User Group (UGM) or eXpert Group (XGM) meetings

success at  
**SEVEN**



EPIC Classics

#### *Leadership*

##### Participation in Advisory/Steering Boards

- Aggregate Data Program Steering Board
- All Pediatrics Steering Board
- ASAP Steering board
- CareEverywhere Governing Council
- Cosmos Steering Board
- Cosmos User Group
- MyChart Steering Board
- Pathology Steering Board
- Physician's Advisory Council
- Physician's Advisory Council Advisory Board
- Primary Care Pediatrics Steering Board

PACademy Awards (2 of the 7 PACademy awards ever given; recognizes physicians who have contributed greatly to the Epic community)

- Dr. Greco (inaugural recipient)
- Dr. Bar-Shain

#### *New Initiatives and Software Development Contributions*

- Prototype physician builder (Peter Greco) led to the development of Epic's Physician Builder Program; 400+ different organizations have sent a total of 5,250+ physicians, physician assistants, and nurse practitioners to at least one builder class
- Assisted in software development that helped contribute to Epic's NoteWriter functionality (Peter Greco and Greg Norris)
- Assisted in software development that helped contribute to Epic's ASAP (Emergency Medicine) functionality (Peter Greco and Jonathan Siff)
- Suggested "Research Everywhere" (David Kaelber) as an Epic product at the spring 2009 Research Advisory Council meeting which eventually helped lead to Epic's Aggregate Data Program and then the Cosmos data network (potentially largest aggregated EHR data set in the world)
- Epic Physicians Advisory Council Mentorship Program was created by David Bar-Shain and Matthew Tien in 2019, and to date has 123 participants, 71 mentors, 61 mentees, and 60 pairings



## **Appendix 3 – Epic Impacts to MetroHealth (selected)** **(achievements possible because of the Epic platform at MetroHealth)**

### Efficiency

- Since August 2017, MetroHealth has barcode scanned more than 175,000 immunization doses.
- MetroHealth has sent 12.5 million records to other healthcare organizations and has received another 10 million. These exchanges have touched ~800K MetroHealth patients. (~90<sup>th</sup> percentile among Epic customers). ~80% of exchanges led to decreased testing.
- Since 2017, MetroHealth automated processes to help reconcile outside information by automatically adding over 700,000 outside new immunizations (which did not exist locally and appear to be valid), and automatically discarding over 600,000 outside duplicate immunizations.
- ~57% of MetroHealth patients seen in the last 30 days have MyChart (~90<sup>th</sup> %ile among Epic customers; top among public/safety-net Epic customers). 7% of appointments self-scheduled (~90<sup>th</sup> %ile).

### Financial

- Since 1999, charged \$9,212,439,733 for professional billing charges of which \$2,119,161,007 was paid.
- Since 2014, charged \$14,256,067,715 for hospital billing charges of which \$3,840,469,079 was paid.
- ~\$50 million from federal incentive programs (Meaningful Use, PQRI/PQRS, e-prescribing).
- ~\$25 million in value-based incentive payments (Medicare Shared Saving Program).
- ~\$20 million net financial impact from Epic software to MetroHealth annually.
- Millions of dollars in external research funding related to Epic.

### Population Health

- Alerts caused 225% increase in HIV screening and 11% increase in disease detection.
- Alerts caused 2500% increase in hepatitis C virus (HCV) screenings; 560% increase in disease detection.
- Bulk ordering and bulk messaging through MyChart doubled hepatitis C screenings.
- Robo-texting, robo-calling, and MyChart reminders led to 54% increase in adult immunizations.
- 15-fold increase in depression screening; 230% increase in detection.
- Blood pressure control is at the 94<sup>th</sup> %ile nationally.
- Pneumococcal vaccination is at the 92<sup>th</sup> %ile nationally.
- Breast cancer screening is at the 88<sup>th</sup> %ile nationally.
- Doubling recognition of abnormal pediatric blood pressures in Epic.
- 30-fold increase in detection and reporting of vaccine adverse event.
- Eliminating health disparities in diabetes control; saving 17 diabetic limbs amputations.
- Over 600,000 flu vaccines administered resulting in 40,000 cases of flu avoided.
- Top 10% value provider in United States; #1 public/safety-net provider; \$24 million in cost savings.

### Safety/Quality

- 74% reduction in catheter-associated urinary tract infections (CAUTI) per month over 5 years.
- An estimated 13,000 drug-drug warnings and 61,000 drug allergy warnings annually cause providers to stop placing the order they otherwise would have placed.
- Naloxone alert increased naloxone prescriptions by ~250% (from 322 to 8136).
- 1,694,312 or 21% less narcotic pills prescribed between 2017 and 2018.
- 55% decrease of narcotic pills per 100 encounters from peak in 2010 to Dec 2018 (over 4 million fewer narcotic pills prescribed).