**Core Case Study: Children’s Return on Investment**

**Cover Page**

**Applicant Organization:** Children’s Medical Center Dallas  
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**Core Item:** Children’s Return on Investment

### Hospital National Patient Safety Goals (NPSG)

- Improve accuracy of patient identification. [X]  
- Improve the effectiveness of communication among caregivers. [X]  
- Improve the safety of using medications. [X]  
- Reduce the risk of healthcare associated infections. [X]  
- Identify safety risks inherent in the patient population. [X]  
- Prevent wrong site, wrong patient, wrong person surgery. [X]

### National Priorities Partnership (NPP) Goals

- Engage patients and families in managing health and making decisions about care. [X]  
- Improve health of the population. [X]  
- Ensure patients receive well-coordinated care across all providers, settings and levels of care. [X]  
- Safety: improve liability and eliminate errors wherever and whenever possible. [X]  
- Compassionate palliative and end-of-life care.  
- Remove waste and achieve effective, affordable care. [X]

### Executive Summary

Children’s Medical Center Dallas (Children’s) has realized a positive Return on Investment (ROI) of $48.62M with the implementation of its Electronic Health Record (EHR) system. To succeed at the EHR implementation, Children’s approached it as an operations-driven performance improvement initiative that required buy-in from all stakeholders within the organization. The organization developed Key Performance Indicators (KPIs), established an oversight committee and assigned owners to ensure organizational success. The organization achieved results above and beyond its goal by decreasing time in Accounts Receivable (A/R) from 55 days to 32 days in 2011 (a 58 percent decrease—the goal was 10 percent), reducing delinquent medical records from 21 percent to one percent (goal was <15 percent), and increasing insurance coverage verification from 75 percent to 96 percent (the goal was 90 percent). With the EHR implementation, the organization expected to positively impact the bottom line by gaining operational efficiencies, cost savings and increased charge captures—all of which came to fruition very quickly. The EHR has exceeded the initial expectations of Children’s leadership and has positioned the organization to pay back the total capital and operational outlay by 2016.
Background Knowledge
Children’s serves the fourth largest metropolitan area in the U.S., and has the highest projected pediatric population growth expected over the next 20 years. Between 2000 and 2010, the population of Dallas County alone increased over 20 percent to nearly 2.4 million people.¹

Children’s is a learning hospital that is also designated as the only Level 1 Pediatric Trauma Center in North Texas. The organization provides complex care to a geographically diverse, growing population from all over the world. In addition, Children’s partners with the University of Texas Southwestern Medical Center (UT Southwestern) and Parkland Memorial Hospital. With a three-campus physical footprint spanning 200+ acres, Children’s operates two full-service inpatient hospitals, licensed for 595 beds (of which 100 are intensive-care beds), 54 specialty care clinics, and six pediatric primary-care physician offices/medical homes. More than 2,100 medical staff members and more than 5,000 full-time employees (FTEs) support the various locations.

Children’s EHR implementation was essential to improving the quality of care delivery and patient safety, meeting population growth demands, and complying with continuing complex regulatory requirements.

Local Problem Being Addressed and Intended Improvement
The organization’s history with the EHR began in the 1990s with the ability to review lab results and scanned images, perform Admission/Discharge/Transfer (ADT) functions, and pharmacy integration. Ultimately, Children’s transitioned to a top-tiered EHR vendor platform in 2002. But the organization’s departments acted in silos, with each area customizing the existing EHR to fit its own unique business and clinical care needs. Though internal operations were efficient, the inconsistency in EHR design and use between departments impacted coordination of care and clinical communication.

Previously, patient billing was accomplished through a Software as a Service (SaaS) system with feeds from multiple clinical applications. This structure created inefficiencies, requiring significant manual charge entry work and resulting in a days in A/R average of 55+ days (not to mention late charges incurred). The disparate systems and need for manual intervention limited the organization’s ability to tie documentation directly to charges.

In the end, the provider community was not satisfied with the tool. Children’s reached the breaking point when changes and updates required extensive testing and it became clear that, going forward, the status quo was not acceptable. Children’s was faced with a decision point: either completely rework the EHR with the current vendor or start over. After a months-long analysis which included 17 different data points and four external site visits, Children’s made the decision to move to another vendor platform that would singularly enable the organization to streamline business processes and billing (e.g., reduce the time accounts were in A/R), improve clinical workflows, and enhance the patient experience through operational efficiencies.

Design and Implementation
In 2007, Children’s selected the Epic EHR System to begin a multi-year implementation process that would be completed by 2010. The project scope was significant because it involved migrating from one vendor system to another and evaluating and improving Children’s business processes across operational areas.

Executive oversight was accomplished through a defined governance structure with direct reporting to the Performance Improvement Committee (See Table 1 for committees and responsibilities). The Committee members were actively engaged in the project; which included approving KPIs (these were identified/developed by operational leadership), designing the process and participating with implementation.

Table 1

<table>
<thead>
<tr>
<th>Committee</th>
<th>Responsibility</th>
<th>Led by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Improvement Committee</td>
<td>Project oversight, approves organizational goals (KPIs) and assigns ownership of responsibilities</td>
<td>Senior Leadership from operations, clinical and medical staff</td>
</tr>
<tr>
<td>Operational Leadership Workgroup</td>
<td>Reports to Performance Improvement Committee, ensures organizational workflows are evaluated and maintains constant focus on performance improvement</td>
<td>Senior Directors and Directors</td>
</tr>
<tr>
<td>Revenue Management</td>
<td>Evaluates financial workflows from pre-registration through billing</td>
<td>Senior Director, Financial Services</td>
</tr>
<tr>
<td>Operational Leadership Workgroup</td>
<td>Ensures alignment across organizational boundaries</td>
<td>Operational leaders, medical staff, Information Services team members</td>
</tr>
</tbody>
</table>

KPIs were chosen to measure organizational goals, which included realizing a positive return on investment and improvements in clinical care delivery. A baseline was established with measurement starting at three months and continuing to six, 12 months and beyond. With these goals guiding Children’s, the organization developed the following KPIs. (See Table 2.)

Table 2

<table>
<thead>
<tr>
<th>Key Performance Indicators (KPIs)</th>
<th>Committee</th>
<th>Pre-Epic</th>
<th>KPI Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Billing—Decrease days in A/R by 10%</td>
<td>Revenue</td>
<td>55 days</td>
<td>50 days</td>
</tr>
<tr>
<td>Registration—Increase verification of coverage by 15%</td>
<td>Revenue</td>
<td>75%</td>
<td>90%</td>
</tr>
<tr>
<td>Enterprise Master Patient Index—No increase in duplicate medical record numbers</td>
<td>Revenue</td>
<td>0.14%</td>
<td>No Increase</td>
</tr>
<tr>
<td>Scheduling—Increase Ambulatory open access by 10%</td>
<td>Revenue</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>Ambulatory—Provide PCP documentation within three days of visit</td>
<td>PI</td>
<td>8 days</td>
<td>3 days</td>
</tr>
<tr>
<td>Health Information Management—Decrease delinquent medical records</td>
<td>PI</td>
<td>21%</td>
<td>&lt;15%</td>
</tr>
<tr>
<td>Emergency Services—Decrease length of stay in Emergency Department</td>
<td>PI</td>
<td>297 minutes</td>
<td>&lt;180 minutes</td>
</tr>
<tr>
<td>Inpatient—Improve consultation report documentation</td>
<td>PI</td>
<td>46%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Implementation included automating orders and results and integrating patient monitoring devices, as well as creating easy and consistent access to radiology, pharmacy and clinical documentation across care settings.

Computerized Provider Order Entry (CPOE) was a significant component of implementation in that it fundamentally altered historical provider workflows. In addition, dozens of business and clinical applications (upstream and downstream) required Epic integration to achieve success for organizational KPIs.

As an academic teaching facility, Children’s collaborated with Parkland Memorial Hospital and the UT Southwestern to ensure that a seamless process existed for clinicians working in different environments. This “campus-wide collaboration” allowed the organizations to take advantage of design sessions held by others, shortening the design phase of the project and promoting a consistent look-and-feel for clinicians and trainees who rotate through each organization. This collaboration and consistency is believed to contribute to the margin of patient safety.
**How was Health IT Utilized?**

As a result, Children’s leveraged health information technology to improve patient care, contribute to a patient-centered model of care and positively impact the following significant areas:

**Pre-registration**—Prior to the EHR, insurance was verified in 75 percent of cases in advance of service delivery. The labor-intensive process was cobbled together, requiring telephone calls, web searches and faxing. The post-implementation process is streamlined and completely electronic, and the verification rate has soared to 96 percent.

**Accounts Receivable**—Prior to Epic implementation, the pre-registration process was cobbled together between disparate systems, phone calls, web searches and faxing with 75 percent of insurance verified prior to arrival. By streamlining this process, insurance is verified prior to arrival 96 percent of the time. Now Children’s uses Revenue Capture — Automated billing by tying documentation to charging. Children’s newest endeavor in this area is with structured procedure notes in the ED that assign the CPT 4 code, which automates the bill drop for Emergency Room procedures done at the bed side. Children’s has reduced accounts receivable days from 55 to 34 (a 61 percent reduction, which greatly surpassed the original post-Epic KPI goal of a 10 percent reduction).

Manual charge entry was eliminated for respiratory therapy, anesthesia, cardiology, ED procedures, and Inpatient procedures. A pre-registration workflow redesign streamlined process also created additional efficiency.

These improvements increased cash flow—a result that was positively received by Children’s leadership and board. Children’s continues to reap the financial benefits of health information technology through improved operational performance.

**Documentation**—Structured templates and Dragon Naturally Speaking Medical Enterprise Edition have improved ambulatory record completion from 8 to 3 days. Standardization of Inpatient Consult data capture improved report completion from 46 percent to 86 percent.

**Medication Administration**—Utilizing Epic and Omnicell pharmacy medication management tools, Children’s launched a just-in-time medication delivery initiative, resulting in nearly $2 million a year in cost savings. More detail can be located in the Children’s Supply Chain Management-Pharmacy Davies case study.

**Patient Engagement**—The Children’s patient portal was developed to enable online access to medical information. Patients can message providers, schedule visits and view lab results in English and in Spanish. Mobile access using an iPhone is also available. The patient portal has disease-specific sites with blogging, targeted educational material, remote care logs and social sharing spaces that provide a support network for patients and families learning to live with chronic or acute diseases.

**Value Derived/Outcomes**

**Hard ROI**—Financial return on investment has significantly surpassed original estimates. Children’s realized a $12.5M savings in staffing reductions through efficiencies gained from the EHR implementation between 2009—2013 (Figure 1). Health Information Management Department staffing levels were reduced by 20 FTEs over two years through attrition and staff transition, resulting in an annual savings of $1.1M. Patient Financial Services increased business process efficiencies with automation as well, reducing staff by 13 full-time employees resulting in a $500K annual savings for the organization. Implementing CPOE allowed the organization to decrease the number of health unit coordinators on the
floor, creating an annual labor cost savings of $600K.

The Nutrition Department used the EHR to design a productivity tool within the dietitian’s workflow. This tool helped provide insight into downtimes that allowed staff to shift to areas where demand for their specialized training and services is higher on an as-needed basis. The tool enabled the Nutrition Department to decrease staff by six full-time employees with annual labor savings of $680K. This productivity tool has been offered to other allied health disciplines.

Figure 1

The FTE per adjusted occupied bed decreased from 11.34 in December 2009 to 10.26 in June 2012. With the aid of technology, Children’s has continued to decrease the cost of health care delivery through increased employee productivity. FTEs were incrementally decreased across the organization (through position transfer and attrition) with technology as the back bone for realizing improved efficiency.

Manual charge entry was eliminated by tying documentation to charging, resulting in a $10.5M savings in respiratory therapy, anesthesia, cardiology, inpatient procedures and the emergency department.

Pharmacy automation connected the EHR to the dispensing application and robotic system (Talyst), resulting in the pharmacy’s ability to change medication cart fills to every two hours with a “just in time” philosophy. The reduction in expired, unused, returned or discontinued (collectively “wasted”) medications created a recurring savings of $2M annually.

Operational costs associated with the archival of paper records, transcription and supplies were decreased incrementally over five years resulting in a total savings of $6.7M. Transcription outsourcing, combined with the expanded deployment of Dragon Medical dictation software and microphones to interested attending physician staff, saved the organization $1.2M annually. Further, storage/archival and routine supply costs have decreased year over year. The positive trends show no signs of change year to date in 2013 (Figure 2).

Figure 2
The EHR vendor offered a program called Good Install that provided incentive dollars if the organization met criteria for support of the EHR. By focusing on the goal of qualifying for this incentive program, Children’s met the vendor requirements, which resulted in rebates of $84K in 2009 and $233K in 2010. In 2011, the organization qualified for a combined incentive program for Good Install and Maintenance, which resulted in rebates of $200K in 2011, and positioned Children’s to meet Good Maintenance criteria with $100K rebated per year from 2012 forward.

A byproduct of the organization’s successful EHR implementation was being awarded Meaningful Use (MU) incentive dollars for Stage 1, Year 1. Children’s received MU incentives in 2011 and 2012 totaling $7.0M for the hospital and $1.2M for the provider community, meaning a total allocation of $8.2M. Estimated cumulative incentives for all Meaningful Use stages through 2018 are $22.5M (Figure 3). The incentive projections, as well as actual monies received are provided by the Children’s finance department.

Pharmacy Medication Administration
Through the utilization of Epic, Omnicell, and Talyst solutions, medication cart fill time was reduced from 12-hour to two hours on average. Children’s saw significant reduction of expired, unused, or wasted medications, resulting in a $2 million a year savings.

Soft ROI—With the EHR implementation, Children’s has benefitted from the following soft returns:

- Improved physician productivity and efficiency with clinical decision support and decision making
- Faster EHR access (from 10 minutes to mere seconds), decreasing non-value add time
- Real-time provider access via web portal allows for “right time, right place” charting for providers
- Operational efficiencies from standardizing the EHR format across Children’s campuses and amongst UT Southwestern, Parkland Memorial Hospital and Children’s

Patient family electronic record access has steadily grown to include more than 12,000 families. Social media has played a large role with disease-specific blogs for information sharing and family-to-family as well as patient-to-patient support networks. Patient families may now directly contact providers and other clinicians electronically and also follow patient response to treatment via private, secure, Children’s-hosted social media. This solution will continue to enhance the patient-family experience and promote a sense of community for patient families, especially those coping with chronic illness.

KPI’s—The EHR implementation enabled the following KPI results:
In addition, Children’s has improved patient care and quality of care delivery and increased business opportunities and processes in the following ways:

- Decreased length of stay in Emergency Department by 30 percent
- Recovered work space for the development of new clinical programs and medical offices
- Reduced medical errors via clinician and evidence-based practice development of clinical decision support tools, as well as real-time, automated drug-drug and drug-food interaction checks as part of the order validation process
- Reduced time between ordering medication and its arrival to the bedside
- Significantly reduced the number of sentinel events

Productivity losses were short-lived, as evidenced by growth in clinic volume, as well as the decrease in
time to complete records from an average of 8 days to less than 3. Children’s outpatient visits grew from 344,817 visits in 2007 to 540,082 visits in 2012—an increase of nearly 200K.

**Figure 4**

**Lessons Learned**

**Executive Support and Involvement:** Children’s EHR deployment would not have been possible without the Performance Improvement Committee (comprised of senior leadership from operations, clinical and medical staff). The committee’s involvement was critical because senior level buy in removed barriers. As an example, some departments had well-honed charge capture processes and efficient documentation within niche systems, so they struggled with supporting the need to change. Senior Leadership’s consistent messaging and support of the organization’s goals eliminated resistance. Publishing the KPIs on a regular basis and celebrating the success of the project reaffirmed belief that this was the right thing to do.

**Bounce Back from an Initial Drop in Productivity:** Areas that embraced the technology changes seemed to bounce back to full productivity much more quickly, with the majority of providers being back up to pre-Epic productivity levels within three months. Children’s continues to refine templates, SmartForms, myriad documentation and design elements to meet the needs of clinical workflows and promote time-established principles of usability engineering.

There are still a few providers who contend that the electronic record has negatively impacted productivity. From the time of implementation to present, Children’s stakeholders have observed and verbalized that the attitudes of physician leadership and operational staff – especially those staff who trained as “Epic SuperUsers” (who continue to serve as local unit resources on top of their regular duties) appeared to help compensate for the learning curve of the new technology.

**Measure the Data** – especially the pre-deployment KPIs developed by stakeholders – and avoid benchmarking success against a handful of individuals who are naysayers. Engage project detractors and where appropriate, encourage staff to explore disparaging comments to discover if there are root issues informing the user’s attitude. Many Children’s Super Users reported “converting” an anti-EHR or anti-Epic user by taking the time to learn what was really bothering them. Once that user has opened up a dialogue, pursue the opportunity to provide education or tips to the extent they express a willingness to be helped and have the time for a teachable moment. Raising a user’s perceived self-efficacy can be a powerful force in turning around their entire attitude to a newly-deployed system.

**Maintain Order:** The transition to CPOE from paper orders with many layers of clinical support was a real patient safety concern for the provider community. As a result, clinic go-lives were scheduled
with the heaviest inpatient contingents going live first to allow these communities to practice in a slower environment prior to inpatient. Contracted clinical support was requested and provided for the first month of inpatient CPOE. This level of support was pivotal to maintaining patient safety and provider efficiency. The lesson learned: Children’s could slow down its ambulatory clinic visits, but its ability to control inpatient and emergency department visits was limited.

Financial Considerations
The project was a board-approved capital expense funded with capital dollars resulting in a 10-year total cost of ownership of $186M. Operational costs of $75M and capital costs of $65M (for hardware, software, licensing, builds, and testing) resulted in total implementation costs of $140M. After the three-year implementation (between 2007 and 2010), the organization’s costs were very close to original estimates. In fact, there was a $3M surplus. Of these funds, Children’s allocated $2M to optimizing the use of the EHR.

Annual operational costs, including training, maintenance and staffing, have tracked close to project budget estimates of $9M annually. Good maintenance rebates ease the burden of continued support and provide incentives for Children’s to stay on the latest version. To date, the 10-year cost of ownership is lower than original budget estimates, due in large part to the positive return on investment achieved by tying documentation to charging. However, hardware and desktop device costs were $1M greater than anticipated due to end user demands. This expense was offset by renegotiating vendor contracts and decreasing expenditures in other areas, resulting in virtually no negative financial impact.

Children’s will continue on its current path, optimizing the use of EHR to improve patient safety and solidify the organization’s financial future. The $65M capital outlay will be paid back completely in 2014, and payback of the full implementation costs (Capital & Operating) is projected to be complete by 2016 (figure 5). Operational efficiencies and cost savings surfaced with the stabilization of operational expenditures in 2012.

Clearly, the commitment to “One Patient, One Record” was the right decision.

Figure 5

<table>
<thead>
<tr>
<th>Estimated EHR Savings 2009-2013</th>
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<tbody>
<tr>
<td>Staffing Reductions</td>
</tr>
<tr>
<td>Manual Charge Entry Reductions--</td>
</tr>
<tr>
<td>Tying documentation to charging</td>
</tr>
<tr>
<td>Pharmacy Automation</td>
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<tr>
<td>Supply/Archival/Transcription</td>
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<tr>
<td>Meaningful Use Incentives</td>
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<tr>
<td>Good Install/Good Maintenance</td>
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<tr>
<td>Total Savings (2009-2013)</td>
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