



The Business Case for an
Emergency Department Information System:
T SystemEV

A ROI White Paper

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August 2011

Executive Summary

Healthcare spending in the U.S. was 17.5 percent of the GDP in 2010 and is expected to rise to 20 percent by 2020 unless drastic reform occurs. Hospitals must cut costs and streamline operations to survive. However, to thrive in today's challenging economy, they also need to consistently improve quality of care while at the same time protecting reimbursement. In order to do this, hospitals must comply with government regulations to maximize reimbursement, take advantage of incentive programs to create new revenue opportunities, and continually improve patient flow to increase capacity. Optimizing emergency department (ED) operations is essential as 45 percent of a hospital's revenue comes from the ED directly or from admissions through the ED.

Unfortunately manual processes make it difficult for hospitals to significantly improve the quality of care they provide and optimize reimbursement. One of the challenges is enforcing charting standards. Another issue is that it is difficult to stay current on best practices and industry regulations. Lack of access to patient charts also makes it hard to improve processes that promote better patient flow.

T-System commissioned Hobson & Company, a firm that specializes in discovering the key business benefits driving the adoption of new and emerging technologies, to better understand and validate the value created by its T SystemEV® solution. Hobson & Company's research demonstrates that T SystemEV addresses many of the key challenges faced by hospitals and providers through four primary sources of value: optimized revenue capture, reduced cost of care, increased operational efficiencies and improved quality of care/patient safety. For example, a sample facility with an annual patient volume of 45,000 and a year-one investment of \$410,000 would realize \$499,500 annual incremental facility revenue and \$367,000 annual incremental provider revenue if lower billing codes were reduced by 10 percent and higher billing codes increased by 10 percent. Also highlighted is the fact that T SystemEV reduces the number of charts that require rework from 25 percent to 5 percent and the time spent per chart from 30 to 7.5 minutes, resulting in \$117,500 annual productivity improvement for the sample facility.

This white paper addresses the overall value of T SystemEV. Revenue from the key value sources (which cover eight specific benefits) of T SystemEV adds up to an annualized value of \$2.2 million, delivering a 6:1 return on investment (ROI) for the sample facility noted above.

A compelling case is also made for T SystemEV over a leading enterprise vendor. The comparative analysis illustrates how T SystemEV's payback period is a quick 5.5 months, compared to 77.6 months for the enterprise offering. The three-year ROI value is 513 percent for T SystemEV compared to only 8 percent for the enterprise vendor. **On average, T SystemEV delivers twice the value at one-third of the cost of a leading enterprise vendor.**

In summary, with the right partner in the ED, hospitals can not only address many of their biggest pain points, but also greatly maximize their revenue. The ROI analysis discussed in this white paper reveals that T SystemEV has proven value that far outweighs the cost of the solution.

Key Challenges Facing Hospitals and Providers

After interviewing Medical Directors, Nursing Managers and CFOs at several hospitals nationwide, four key business challenges were universally identified.

Challenge 1: Lost revenue due to inaccurate and incomplete charting

While facilities may have a standardized charting process, interviewees frequently mentioned that charting quality depends on the individual physicians and nurses. Facilities train clinicians on charting standards, but it can be difficult to enforce these standards in a manual system, especially when some physicians and nurses work once a week or once a month at a facility. The clinicians interviewed also expressed frustration that the patient chart must be shared among the physician, nurse, clerk and others, so it is not always available when it is needed. If the physician or nurse can't find the chart, he or she may later forget to document something. When the necessary documentation charges incurred during a patient's visit are down-coded or not billed at all, the facility and providers lose revenue.

Challenge 2: Overcrowding

Emergency department visits increased 30 percent between 1998 and 2008, despite the fact that the number of EDs is decreasing. ED capacity issues will become a growing problem as 78 million baby boomers turn 75 by 2030 and more Americans become insured as a result of health reform changes. Hospitals must become more efficient and streamline patient flow to meet the growing demand for emergency care.

Challenge 3: Significant costs associated with inefficient processes

Dictation/transcription expenses and costs associated with lost time that was spent searching for patient charts are unavoidable in a manual system. Patient tracking can also be a challenging, inefficient process when patient records are not standardized or updated in real time.

Challenge 4: Lower quality of care due to: i) a lack of a standardized charting process to meet government regulations, and ii) the inability to support process improvements to improve the patient experience

The way a patient visit is documented evolves frequently with constantly changing government regulations. A lack of a standardized charting system makes it difficult to ensure compliance with those regulations. Moreover, without a standardized charting system, hospitals are not easily able to demonstrate key performance indicators that can help them boost revenue through pay-for-performance programs. Additionally, patient length of stay is increased when a documentation system is inefficient, thus decreasing patient satisfaction scores and negatively influencing a hospital's reputation.

Key Sources of Value

Hobson & Company found that the value of T SystemEV is immediate and significant. This analysis focuses solely on the top eight bottom-line benefits that were universally mentioned or agreed to by the T SystemEV clients who were interviewed for this study.

Based on interviews with both clinical and business leaders at a number of U.S. hospitals, the value of T SystemEV falls under four main categories:

- Optimized Revenue Capture
- Reduced Cost of Care
- Increased Operational Efficiencies
- Improved Quality of Care/Patient Safety

Each value area can be further broken down into a set of specific benefits. A sample of the benefits for each is summarized below and will be fully explained and supported in the following section.

VALUE	SPECIFIC BENEFITS
Optimized Revenue Capture	<ul style="list-style-type: none">• Improves support for facility charge levels• Improves professional fee billing• Improves infusion charge capture
Reduced Cost of Care	<ul style="list-style-type: none">• Eliminates dictation/transcription expense
Increased Operational Efficiencies	<ul style="list-style-type: none">• Streamlines coding and charge capture
Improved Quality of Care/Patient Safety	<ul style="list-style-type: none">• Reduces turnaround time (TAT) for radiology and lab results to ultimately increase capacity• Improves patient satisfaction scores to enhance the hospital's reputation and ultimately increase market share• Improves compliance with core measures and PQRS

FIGURE 1: VALUE AND SPECIFIC BENEFITS

The following ROI example illustrates the potential value of an ED information system for a sample facility with a year-one investment of \$410,000 and the following operational statistics:

PATIENT POPULATION INPUTS	VALUE
Annual patient volume	45,000
Length of stay for discharged patients (minutes)	265
Length of stay for admitted patients (minutes)	350
Revenue per discharged patient	\$600
Revenue per admitted patient	\$5,000
% of patients that are discharged*	70%
% of patients that are admitted*	25%
RADIOLOGY AND LAB INPUTS	VALUE
Infusions down-coded to IV pushes per month	500
% of patients that require imaging only	20%
% of patients that require labs only	30%
% of patients that require imaging and labs	20%
CHARTING INPUTS	VALUE
Annual cost of dictation/ transcription	\$270,000
% of all charts that are incomplete**	25%
Coder time to rework incomplete charts (minutes)	30

FACILITY UTILIZATION	VALUE
CPT Code 99281 (% of APV)	4%
CPT Code 99282	26%
CPT Code 99283	42%
CPT Code 99284	27%
CPT Code 99285	1%
CPT Code 99291/99292	0%
	100%

PROVIDER UTILIZATION	VALUE
Level 1 (% of APV)	8%
Level 2	22%
Level 3	25%
Level 4	17%
Level 5	23%
Critical Care	5%
	100%

*Does not total 100% because excludes LWBS, transfers, AMA, observation status, etc.

**Incomplete charts are illegible, don't contain an order sheet, are missing nursing documentation, etc.

Value Source 1: Optimized Revenue Capture

- **Improves support for facility charge levels and professional fee billing.** T SystemEV standardizes charting and includes threshold leveling, a points-based facility level calculation, automated procedure charge capture and ICD-9 mapping. Charting standards can be enforced by configuring the system to require certain information before charts can be closed. Clinicians can chart simultaneously, allowing charting to be done in real time and increasing accuracy and completeness. On the facility side, T SystemEV provides nursing documentation feedback regarding missing information needed to complete the chart, linking directly to the area of the chart that needs to be addressed. On the provider side, T SystemEV provides feedback regarding the level the chart is billing at and what additional information is needed (if any) to bill the chart at the appropriate level. The CPOE order sheets help physicians document all the necessary interventions. All of these factors improve the quality of charts to reduce down-coded and lost charges, thereby increasing revenue.

Reducing the lower billing codes by 10 percent and increasing the higher codes by 10 percent for the facility and providers results in \$499,500 incremental facility revenue and \$367,000 incremental provider revenue.

Impact for sample facility:

\$499,500 annual incremental facility revenue
\$367,000 annual incremental provider revenue

"The accuracy of charting is better since nurses can chart along with physicians."

- Nursing Manager

"We've seen a 17% improvement in professional fee billing overall with T-System."

- Medical Director

- **Improves infusion charge capture.** T SystemEV records start and stop times for infusions. The system can be configured to require this information before charts can be closed as an extra check. By training nurses to chart infusions with T SystemEV, facilities have dramatically reduced the number of infusions that are down-coded to the IV pushes (or not billed at all in some cases), increasing revenue significantly.

"6,000-12,000 infusion coding errors per year before T-System and now it's a couple to 300 per year."

- Client Results 2005-2011

Decreasing the infusions that are down-coded to IV pushes per year by 162 (from 500 to 338) results in \$123,000 incremental revenue.

Impact for sample facility:

\$123,000 annual incremental revenue

Value Source 2: Reduced Cost of Care

- **Eliminates dictation/transcription expense.** T SystemEV eliminates this cost and provides T-Sheets at no charge as a backup documentation method in the event of a power outage or other interruption. Assuming a \$6 cost per dictated/transcribed chart results in \$270,000 cost savings for the facility.

Impact for sample facility: \$270,000 annual cost savings

Value Source 3: Increased Operational Efficiencies

- **Streamlines coding and charge capture.** Electronic charts make the billing process easier for both clinicians and coders. Information can be required before charts can be locked, and feedback is provided when charts are incomplete. Billing charts is easier for coders since charts are standardized, easily readable and highlighted with relevant information. Electronic charts can also be reviewed in real time, and missing information can be added to charts before patients and clinicians leave the emergency department.

"25 percent of charts were incomplete before T-System, and now it's 5 percent. It took 30 minutes to rework charts before, and it takes 5-10 minutes now."

- Client Results 2005-2011

T SystemEV reduces the number of charts that require rework from 25 percent to 5 percent of total charts and the time spent per chart from 30 to 7.5 minutes for the sample facility. This results in an \$117,500 productivity improvement.

Impact for sample facility:
\$117,500 annual productivity improvement

Value Source 4: Improved Quality of Care/ Patient Safety

- **Reduces turnaround time (TAT) for radiology and lab results to ultimately increase capacity.** The most dramatic place where hospitals have been able to reduce length of stay is in the TAT on radiology and lab results. T SystemEV's CPOE module enables physicians to place orders at the bedside and automatically send them to radiology and the lab. Radiology and the lab have viewing privileges (e.g., transportation requirements, patient status, etc.) in T SystemEV so they can complete orders as quickly as possible. Order status and results display on the tracking board to help staff effectively manage the order process and patient stays.

Assuming a very conservative 5-minute reduction in the TAT of "imaging only" results, 2.5 minutes for "labs only" results and 5 minutes for "imaging and labs" equals a \$319,000 increase in incremental revenue due to increased capacity. Since the facility does not draw blood at triage, the time savings for lab results is less than for imaging results.

"T-System's CPOE alone has knocked 20-25 minutes off our length of stay. Every order (lab, radiology, meds) comes through CPOE."

- Medical Director

Impact for sample facility:
\$319,000 annual incremental revenue

- **Improves patient satisfaction scores to enhance the hospital's reputation and ultimately increase market share.** Easy access to patient charts in real time is critical to effectively manage patients during their ED visit and post-discharge. T SystemEV's tracking board allows hospitals to visualize patients in the waiting room to help support process improvement aimed at reducing left-without-being-seen (LWBS) rates, wait time, door-to-doctor time and other important ED metrics. Improved access to charts also allows hospitals to start making nursing follow-up calls to select patients (e.g., LWBS patients, patients with positive culture results, etc.).

Complaint calls are easier to handle when patient charts can be pulled up instantly, which ultimately reduces the call handling time. As a result of these efforts, patient satisfaction scores have gone up and eventually lead to increased capacity and greater market share.

"Once you have a platform like T-System in place to do quick triage and watch the department as a whole, it's a great advantage."

- Medical Director

A modest 1-percent increase in annual patient volume is attributed to T SystemEV's ability to improve patient satisfaction, which leads to \$376,000 in additional revenue.

Impact for sample facility:
\$376,000 annual incremental revenue

- **Improves compliance with core measures and PQRS.** The paramount concern in healthcare is improving quality, and T SystemEV helps facilities do so by meeting core measures and PQRS. The CPOE feature available within T SystemEV includes more than 40 standard order sets that can be customized and modified in response to new science or changes in CMS regulations. CPOE allows orders to be initiated at the bedside so care can be started quickly (e.g., ordering pain medication, X-rays, etc.). CPOE order sets are arranged horizontally, which makes it easier for physicians to chart while interacting with patients. Core measures and PQRS are built into T SystemEV to serve as reminders for physicians. The ability to follow the latest quality initiatives enables facilities and providers to take advantage of pay-for-performance programs, which can be a lucrative revenue source.

A 1-percent improvement in facility revenue and a 5-percent improvement in provider revenue is assumed for a pay-for-performance program for the sample facility. This amounts to \$33,000 in additional facility revenue and \$81,500 in additional provider revenue.

"Everyone is waking up to PQRS. It's going to be financially driven, and T-System positions us well."

- Medical Director

Impact for sample facility:
\$33,000 annual incremental facility revenue
\$81,500 annual incremental provider revenue

Overall Value

For the sample facility, the eight benefits add up to an annualized value of \$2.2 million to deliver a 6:1 return on investment (ROI). The facility's \$410,000 total cost of ownership (TCO) in year one generates a positive return in **5.5 months**. The three-year net present value (NPV) and ROI are strong at **\$3.3 million** and **513 percent**, respectively. The key financial metrics for the sample facility were calculated by standard methods and are shown below. The NPV calculation assumes a 10 percent cost of capital.

FINANCIAL METRIC	3-YEAR VALUE
Payback	5.5 months
NPV	\$3,270,000
ROI	6:1 (513%)

FIGURE 2: TABULAR DISPLAY OF KEY FINANCIAL METRICS

Figure 3 below shows the extent to which each value driver contributes to the total value of T SystemEV. For the sample facility, "Optimized Revenue Capture" and "Improved Quality of Care/Patient Safety" drive the majority of the value (82 percent). Figure 4 illustrates the value that each product contributes to the total value.

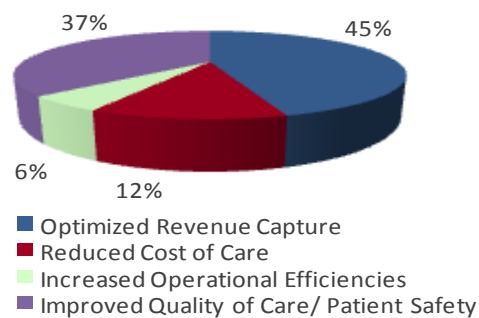


FIGURE 3: PIE CHART DISPLAY OF VALUE DRIVERS

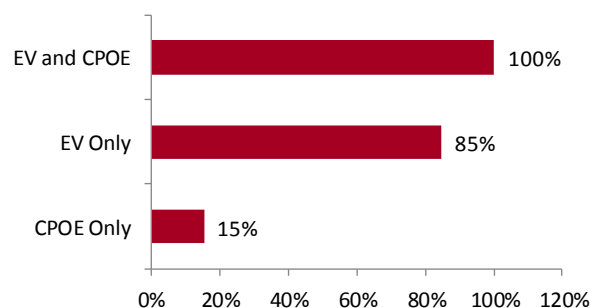


FIGURE 4: BAR CHART DISPLAY OF VALUE DELIVERY BY PRODUCT

Comparative Analysis

Many facilities considering a best-of-breed solution like T SystemEV need to know how it compares to a specific enterprise vendor that they have in other hospital departments. This analysis leverages facility input for a leading enterprise offering since several interviewees had direct experience with both the enterprise solution and T SystemEV.

Overall from a comparative point of view, T SystemEV provides notably higher value by enabling accurate, complete and standardized charting to increase revenue capture and drive quality. Numerous T SystemEV features, such as feedback for incomplete charts, start and stop times for infusions, etc. need to be built into the enterprise product if they can be built in at all. Since T SystemEV is a complete out-of-the-box solution that can easily be customized for a specific facility, users are typically taking full advantage of the system in a couple of weeks compared to 18-24 months for the enterprise vendor.

The major total cost of ownership advantage that T SystemEV has over the enterprise vendor is that the content is built into the solution, whereas enterprise users have to develop and maintain their own content – a very costly endeavor. Additionally, the enterprise offering needs to be built, which requires major IT and application support not only for deployment but on an ongoing basis. The one cost that is incurred with T SystemEV but not with the enterprise vendor is the cost of interfacing with the facility’s enterprise system. However, this cost is insignificant compared to the complete system and content build-out cost for the enterprise solution.

Figures 5 and 6 below show the extent to which T SystemEV provides greater value at lower cost compared to the enterprise vendor over 3 and 5 years. Overall, T SystemEV creates approximately twice the value at a third of the cost of a leading enterprise vendor.

FINANCIAL METRIC	T SYSTEMEV	ENTERPRISE VENDOR
Payback	5.5 months	77.6 months
ROI (3-Year Value)	6:1 (513%)	<1:1 (8%)
TCO (3-Year Value)	\$797,110	\$2.2 million

FIGURE 5: TABULAR DISPLAY OF KEY FINANCIAL METRICS, COMPARATIVE

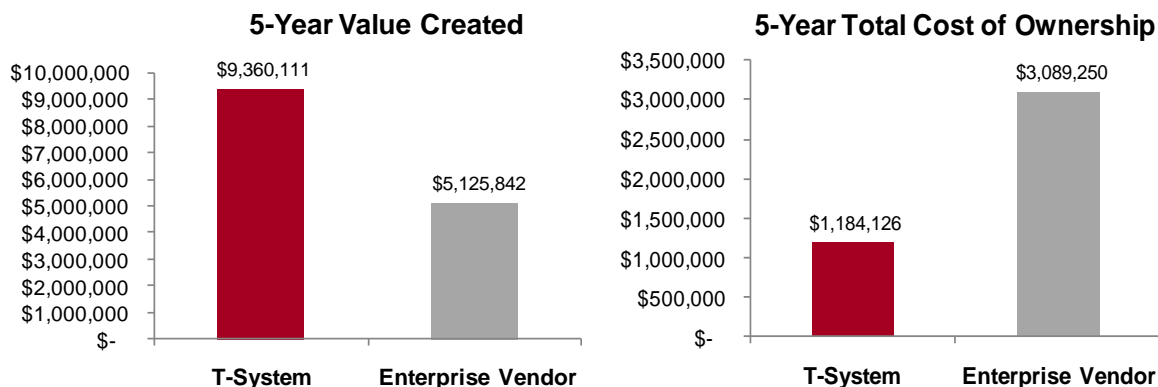


FIGURE 6: BAR CHART DISPLAY OF TOTAL VALUE AND TOTAL COST, COMPARATIVE

About T-System

T-System, Inc. sets the industry standard for clinical, business and IT solutions for emergency medicine, with approximately 40 percent of the nation's emergency departments using T-System solutions. To meet the individual needs of hospitals,

T-System offers both paper and electronic systems. These tools help clinicians provide better patient care, while improving efficiency and the bottom line. Today, more than 1,700 emergency departments rely on T-System's gold-standard content and workflow solutions. For more information, visit www.tsystem.com.

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About Hobson & Company

Hobson & Company helps early stage technology vendors and purchasers uncover, quantify and validate the key sources of value driving the adoption of new and emerging technologies. Our focus on robust validation has helped many technology purchasers more objectively evaluate the underlying business case of a new technology, while better understanding which vendors best deliver against the key value drivers. Our well researched, yet easy-to-use ROI and TCO tools have also helped many technology companies better position and justify their unique value proposition.

For more information, please visit www.hobsonco.com