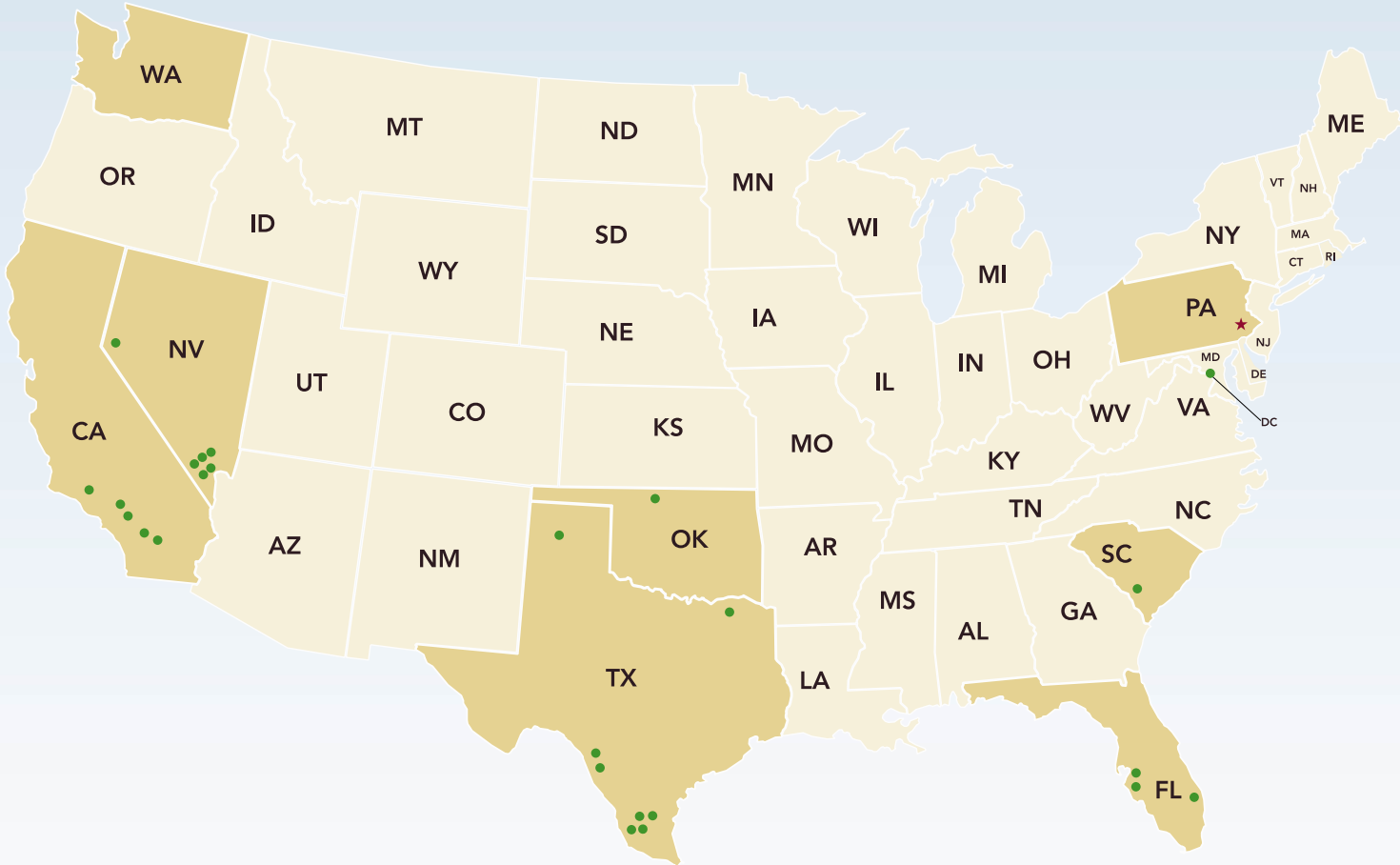




Enhanced Dynamic Documentation & Improved Clinical Workflows on the Cerner EMR

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Chief Medical Information Officer

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Director of Business Development



Corporate Information

- Subsidiary of UHS, headquartered in King of Prussia, PA
- Created as response to multiple requests for our software from other Cerner clients.

Advanced Clinical Decision Support Modules

- Expedited development of custom Views, Advisors, Applications
- Follow Cerner best practices for development & implementation
- Offer a full spectrum of services to make this software work for customers

Leveraged Clinical Informatics Team

- Corporate Clinical Informatics Team:
 - 4 full-time MDs
 - 8 full-time Clinical Informaticists
 - 12+ FTEs full time developing software
- Used Cerner MPage development toolkit & Cerner best practices to create significant enhancements to nursing workflows and dynamic documentation (11 new components and 60+ smart templates)
- Recognized with five innovation awards in past 3 years from Cerner, HIMSS & Industry Publication

Implementation Strategy

- UHS has 26 Acute Care facilities across the U.S.
- Three (3) production domains (East, Central, West)
- Timeline
 - Design and configure January, 2010 – April 2011
 - Installation @ 25 hospitals May, 2011 – July, 2013
- Phase 1 – Completed, Core clinical modules
- Phase 2 – Completed, Inpatient CPOE
- **Phase 3 – Completed, Inpatient Physician Documentation with Dragon Direct**
- Currently engaged in both Ambulatory and Rev Cycle with Cerner

Approach to Physician Documentation

- Started planning for physician documentation (Phase 3) in early 2014
- Inpatient physicians were mostly using dictation with mix of electronic & handwritten progress notes
 - Hybrid chart (EMR + Paper Record)
- Primarily Independent Medical Staff (95%+)
- Goal was to transition physicians off dictation and to the EMR

Physician Alignment

- Over 6,000 active medical staff practice at the 26 UHS facilities
- UHS employs only ~475 Providers (115 clinics)
- Rest are independent physicians that split patients with competitors
- Challenge for us is to create a better EMR experience for physicians and nurses practicing in our facilities
 - We are mindful of alerts

Available Software Modules - Physicians

Product	Category	Key User	Brief Product Description
Enhanced Dynamic Documentation	Mpage	Physician	Comprehensive inpatient physician documentation with significant automation and embedded clinical decision support
Quality Advisor *	Advisor	Physician	Checks for Quality Measure(AMI, CHF, Stroke) adherence on the workflow MPages and allow physician to address any gaps by ordering or documenting an acceptable reason directly in the tool.
Inpatient Physician Notification*	MPage	Physician	Award winning package inclusive of Order Renewal, Catheters & Lines, and Communication MPages
Order History*	MPage	Physician	Addresses challenge of "telling the patient's story" by sequencing orders in reverse chronological order
Blood Management Advisors	Advisor	Physician	Supports evidence-based red blood cell transfusion
TPN Advisor	Advisor	Physician	An interactive advisor that facilitates inpatient total parenteral nutrition (TPN) management
Prescription Routing	Program	Physician	A custom solution that automatically routes prescriptions to printer nearest provider or patient.
Professional Fee Billing Component	MPage	Physician	Enables providers to efficiently enter and submit charges directly from within the enhanced dynamic documentation platform.

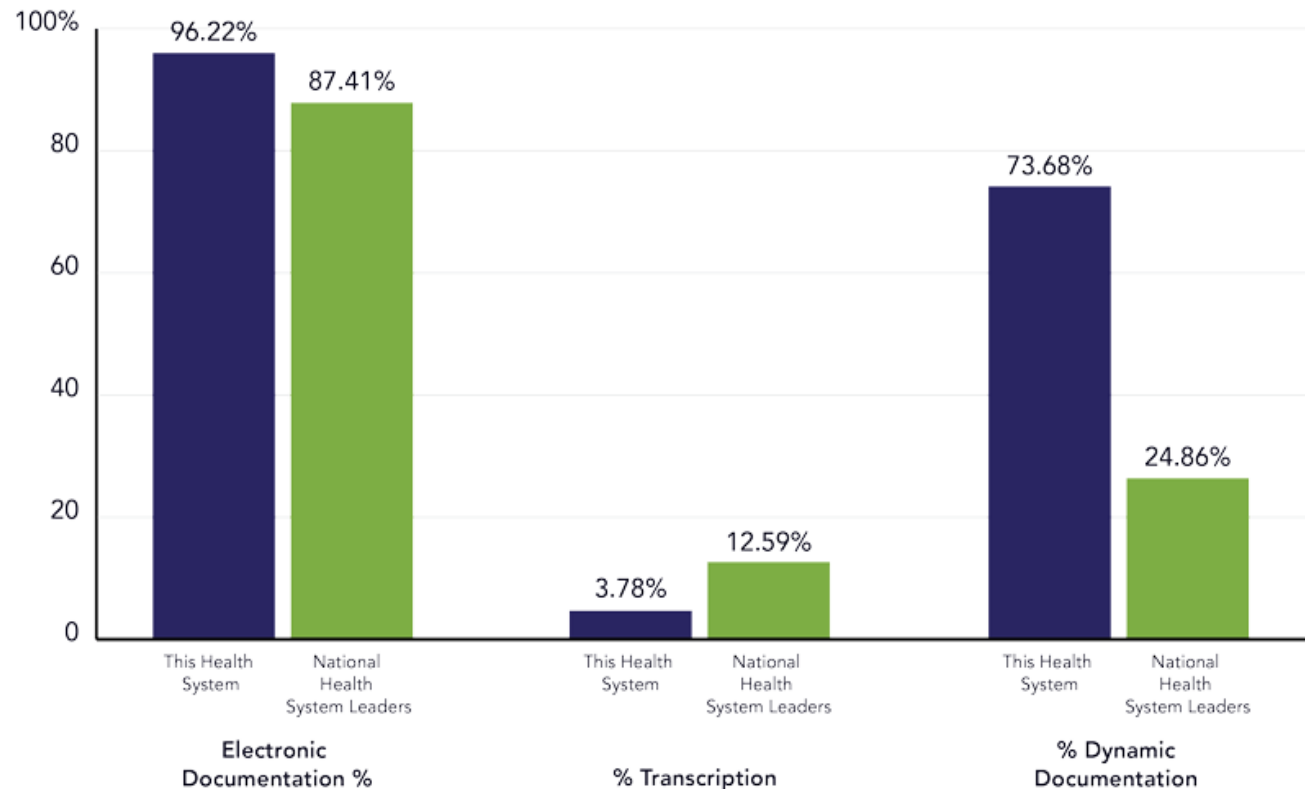
*Can be implemented individually or as part of Enhanced Dynamic Documentation

Enhanced Dynamic Documentation Results

Comparing Enhanced Dynamic Documentation Results to Industry Leaders and National Average

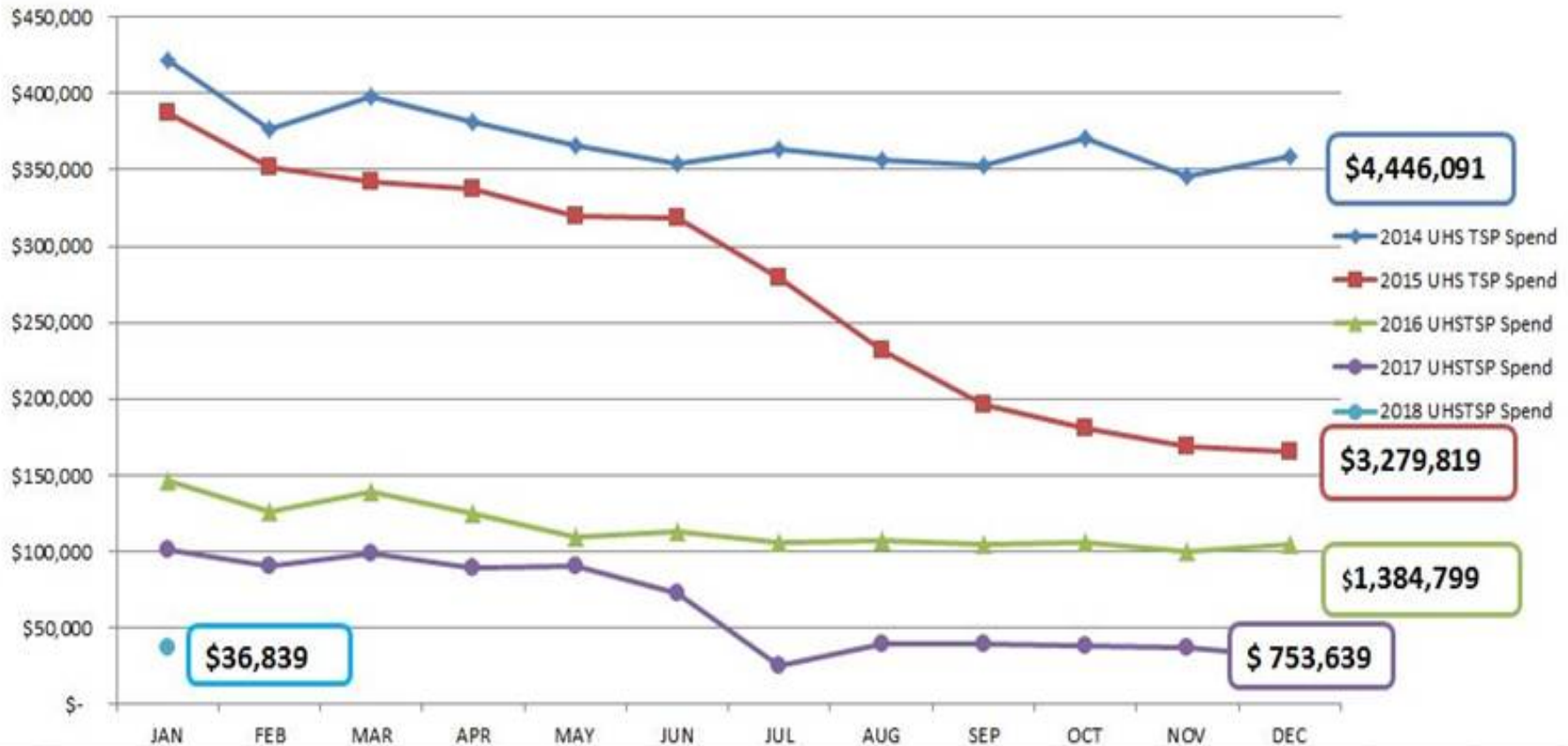
Crossings' Enhanced Dynamic Documentation solution has resulted in:

- High electronic documentation adoption of **96 percent** – **10 percent higher** than national health system leaders
- Reduction in transcription to **3.8 percent** – **9 percent lower** than national health system leaders
- Significant use of dynamic documentation of **73.7 percent** – **49 percent higher** than national health system leaders



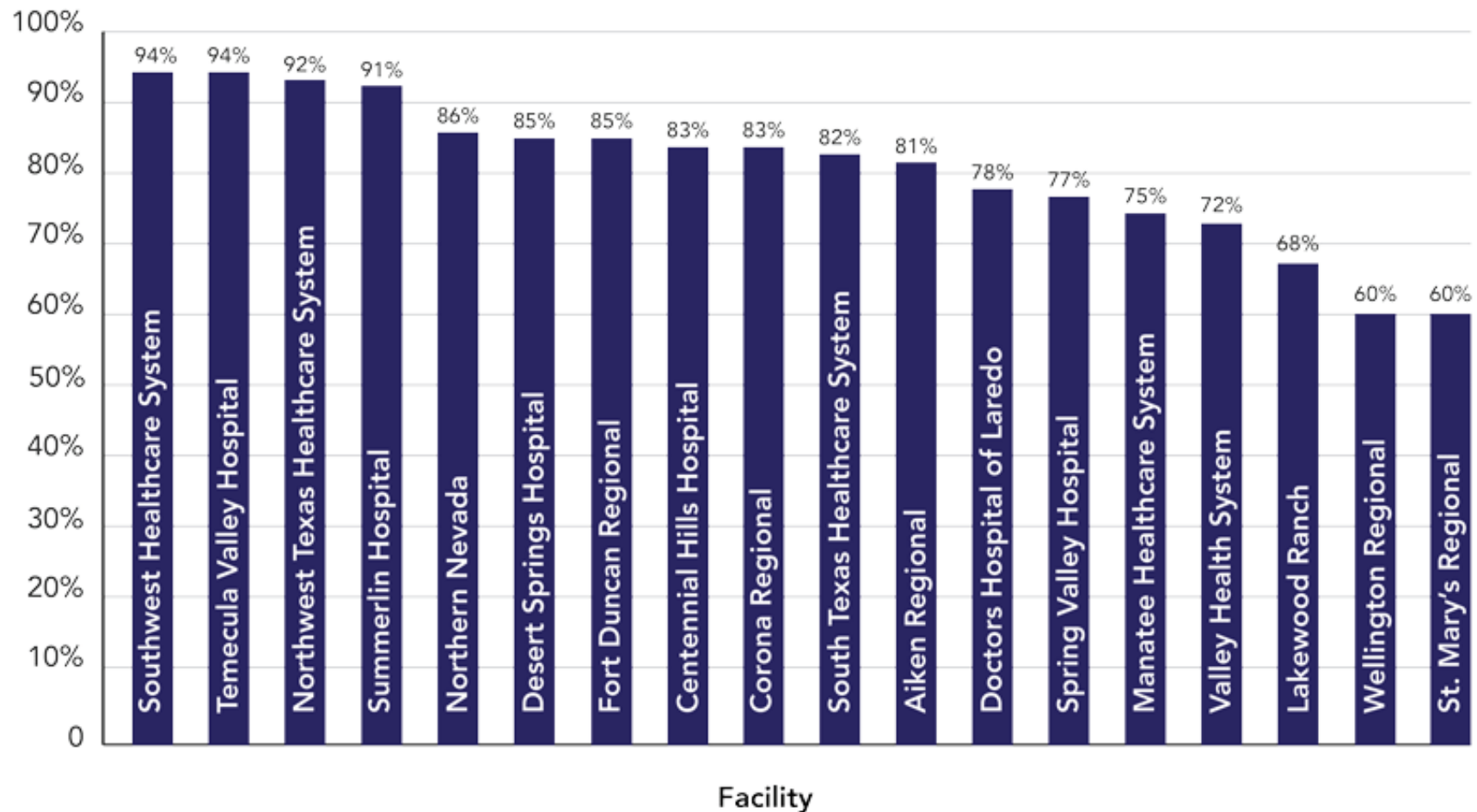
Transcription Service Providers (TSP) Expense Reduction After MD Documentation Project

2014 - 2017 TSP Dollar Volume Comparison



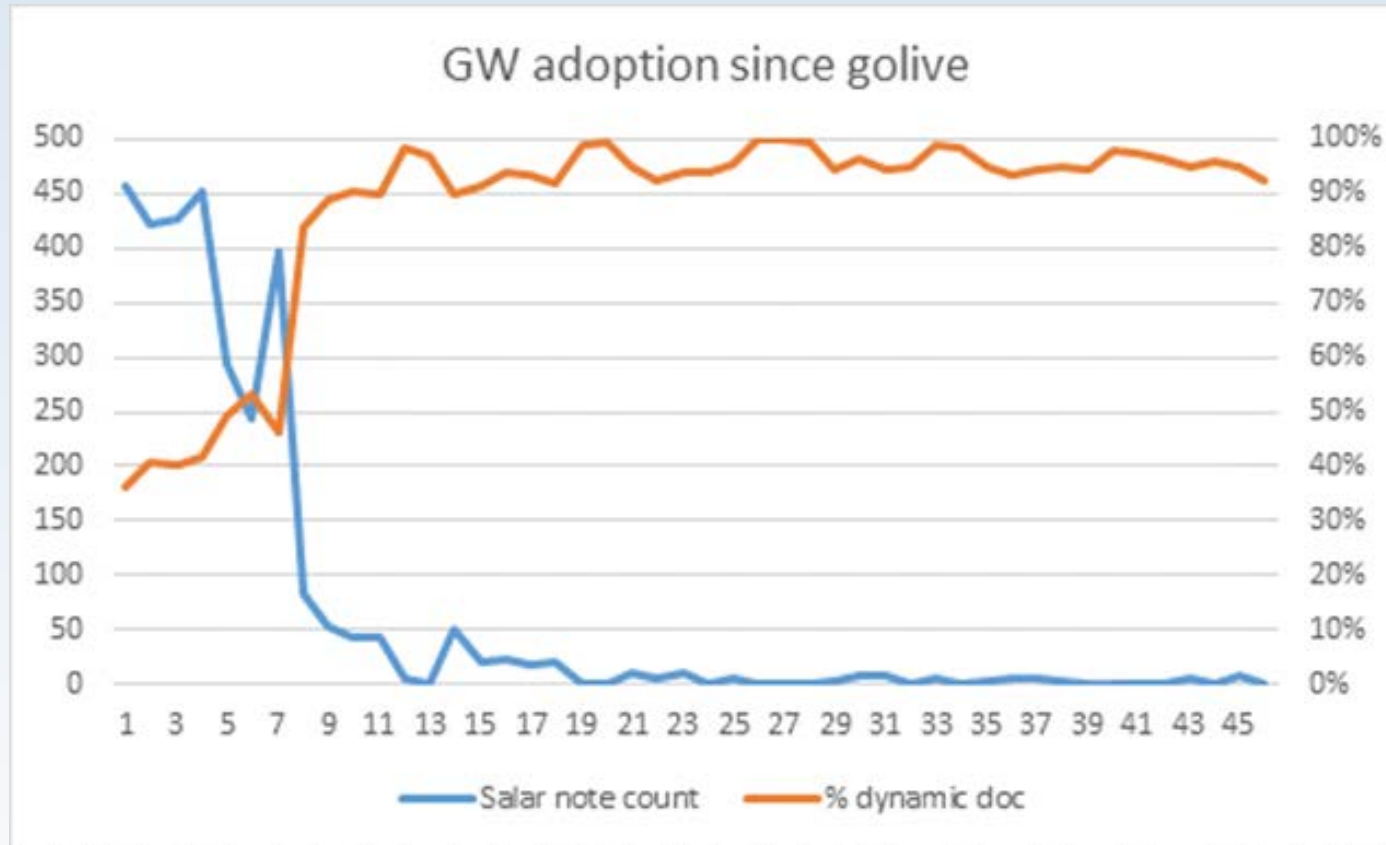
Enhanced Dynamic Documentation Results Transcription Reduction by Facility

Crossings' Enhanced Dynamic Documentation Solution resulted in average reduction of 69% across facilities



Enhanced Dynamic Documentation Results

Transcription Reduction at Academic Medical Center – First 45 days



Documentation Time in EMR

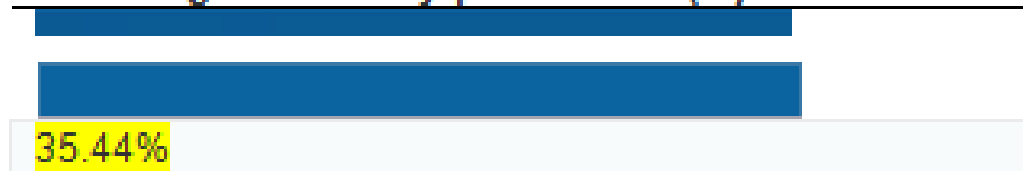


UHS Discharge Summary Turn Around Time

Facility Statistics - Turn Around Time 2015

AVG TAT(hr)	MIN TAT(hr)	MAX TAT(hr)	MEDIAN TAT(hr)
203.73	-506.15	3784	10.85

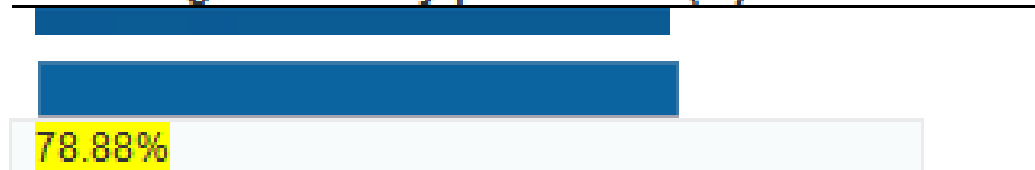
Discharge Summary prior to DC (%)



Facility Statistics - Turn Around Time 2017

AVG TAT(hr)	MIN TAT(hr)	MAX TAT(hr)	MEDIAN TAT(hr)
5.22	-561.17	556.03	-2.85

Discharge Summary prior to DC (%)



Physician Satisfaction Survey

- Survey conducted by 3rd party organization
- Scores benchmarked to national physician satisfaction scores
- 25 hospitals included (community, academic, etc.)
- MD's had EMR Satisfaction at 75th percentile
- Best results across all categories surveyed
- Results after less than 24 months using Voice Recognition and the customized Physician documentation

Quotes from Physicians about Enhanced Dynamic Documentation

- “That is an outstanding piece of software” (Chief Medical Officer)
- “For lack of a better descriptor, you guys rock! I’m in love with your solution.” (CMIO)
- “The transition to the Crossings’ provider workflow tools was significantly easier than expected” (Chief of Staff)
- “I love this system. It is really the best thing you have introduced Cerner wise” (Orthopedic Surgeon)
- “I am so glad you showed me this. Knowing that we can save Op Reports as templates and personalize them to each patient will save me a lot of time.” (OB/GYN)
- “ This is the best thing I’ve seen from our Cerner EMR” (Urologist)

Benefits to physicians

- Positive impact of real time documentation on patient care
All team members have immediate access to the note
- Automatically pulls data into documentation
Saves time and minimizes transcription errors
- Non-disruptive reminders
- Collaborative components (e.g. hospital course)
Allows multiple providers to complete the discharge summary over time
- Lighter message center inbox
- Removes duplicative work

Benefits to Health System

- Clinical, Efficiency, Communication, Quality, Patient Safety benefits
- Reduction of Transcription Expense
- Increased Provider Satisfaction
 - Strong results from UHS Physician Satisfaction survey
- Access to optimized workflows not on Cerner's development roadmap
- Comprehensive and improved EHR experience for Clinicians

Role of Documentation in Quality

- Hospitals and now Physicians are being measured on the quality of care delivered
- Metrics being monitored include:
 - **Severity of Illness (SOI)**
 - Indication of the complexity of your patients based on your documentation
 - **Risk of Mortality (ROM)**
 - Calculated based on the diagnosis and the degree of complexity (SOI)
 - **Observed/Expected Mortality (O/E Mortality)**
 - Compares observed mortality rates to the risk of mortality (ROM) rates calculated based on SOI documentation
 - **Length of Stay (LOS)**
 - Expected LOS is calculated based on the SOI documented.
- Each metric is dependent upon provider documentation that reflects accurate severity of illness

What is DQR?

- DQR is an automated decision-support tool within physician documentation that analyzes clinical notes and responds in real time
- DQR prompts the physician for clarifications only when there is high confidence for additional diagnosis to most accurately reflect severity of illness (SOI)

Document Quality Review (DQR)

Sepsis?

Physician documents Left Lower Lobe pneumonia with no other co-morbidities Documented

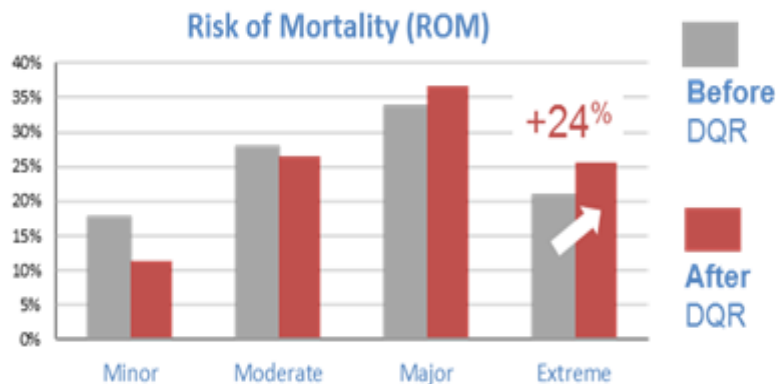
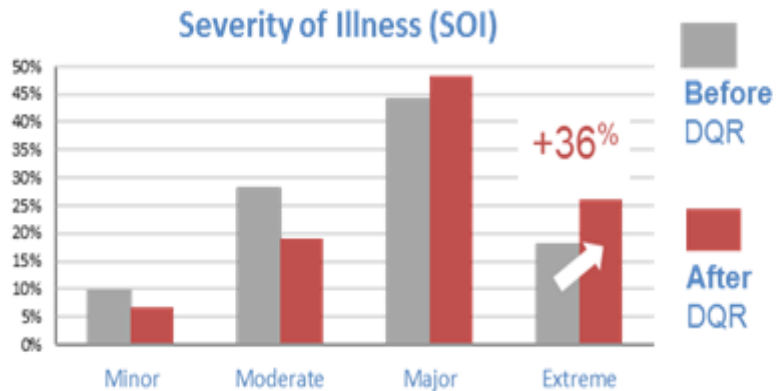
Current MS DRG 195 Simple Pneumonia & Pleurisy W/O CC/MCC

Clarification is fired from DQR noting that clinical documentation suggests the patient has sepsis. If accepted by the physician the DRG will be MS DRG 871 Septicemia/severe Sepsis w/o MV 96+ Hrs w MCC

Example	CODE	MS DRG	Mortality Expected	Complication Expected	Ave LOS Expected	Expected Readmission Rate
Pneumonia	J18.9	195	0.55%	5.91%	3.33	7.89%
Sepsis + Pneumonia	A41.9 J18.9	871	14.80%	20.12%	6.90	16.12%

*Expected (Exp) Outcome Values based on specific Population with Proprietary analysis of Severity may vary with different population and assessment methods. For illustrative purposes only; based on real data.

UHS Document Quality Review (DQR) Pilot



- Overall shift in capture of SOI and ROM from Minor/Moderate to Major/Extreme
- 36% improvement in capture of Extreme SOI
- 24% improvement in capture of Extreme ROM
- 12% CMI uplift across accepted encounters

Source: Metrics captured during a nine-week ROI study from June through August 2016 at two UHS facilities.

Available Software Modules – Nursing & Departmental

Product	Category	Key User	Brief Product Description
Table of Contents	MPage	Nurse	Provides infrastructure to enable alerting & enhanced navigation
Electrolyte Advisor	Advisor	Nurse	An interactive advisor that facilitates inpatient electrolyte management
Interdisciplinary Rounding	MPage	Nurse	Allows comprehensive concurrent documentation of interdisciplinary team rounding and transitional care planning
Patient Care Dashboard	Mpage	Nurse	A comprehensive dashboard of key nursing and patient care metrics that allows the healthcare team to see relevant clinical information and performance indicators from three unique views.
Measurements HT/WT/Allergy	Advisor	Nurse	Streamlines data entry immediately upon arrival and upon daily documentation
Perinatal/Related Records MPage	MPage	Nurse	Utilizes existing Cerner Related Record functionality to ensure pediatricians, obstetricians and maternal fetal nurses have a singular view of all necessary information from both mother and baby's electronic charts.
Powerform Search	MPage	Nurse	Enables quick search of Powerforms with ability to save favorites
Smart Template Wizard/Content	MPage	IS	This MPage allows staff without CCL experience to build basic smart templates as well as utilize the Smart Templates pre-developed by UHS.
Emergency Dept. Triage	MPage	ED	Facilitates enhanced ED communication, throughput and efficiency.

Appendix

How does DQR work?

The screenshot shows a web-based document viewer for a medical note. The interface includes a top navigation bar with 'Document Viewing', 'Full screen', 'Print', and '1 minutes ago'. Below this is a toolbar with icons for adding, saving, and printing. The main content area is divided into sections: 'Chief Complaint', 'History of Present Illness', 'Review of Systems', 'Physical Exam', 'Assessment/Plan', 'Problem List/Past Medical History', 'Procedure/Surgical History', 'Medications', 'Allergies', 'Social History', and 'Family History'. A blue callout box with white text points to the 'SmartReview' button at the bottom right of the document area. The text in the callout box reads: 'Signing the note will auto-trigger SmartReview.' The bottom of the screen shows a footer with 'Note Details: Admission Note, O'Neill, Patrick, 4/7/2015 10:47 AM CDT, Admission H & P' and a row of buttons: 'SmartReview', 'Sign/Submit', 'Save', 'Save & Close', and 'Cancel'.

Chief Complaint

History of Present Illness

Review of Systems

Physical Exam
Vitals & Measurements

Assessment/Plan
Hepatic cirrhosis.
Oriented times person but not to place or date.
SGOT 80. Bilirubin 2.8.
Altered mental status. LFTs abnormal.
Begin lactulose.

Problem List/Past Medical History
Ongoing
No qualifying data
Historical
No qualifying data

Procedure/Surgical History

Medications
Inpatient
Acetaminophen, 1104 mg, 3ROUTE, 01_SR_BID_0100_0600
Home
Acetaminophen, 2006 mg, 34 AUC(Carboplatin), 3ROUTE, 01_SR_BID_0100_0600
Acetaminophen, 1104 mg, 23 AUC(Carboplatin), 3ROUTE, 01_SR_BID_0100_0600

Allergies
No active allergies

Social History

Family History
Angina: Negative: Mother and Son.
Blood carbon dioxide tension: Child. Negative: Father.
CHICKEN SERUM AB: Negative: Son.
Congestive cardiomyopathy: Negative: Mother, Father and Child.
Des Fosses (Communes de l'Ouest) goat: Negative: Mother.
Diabetes insipidus: Negative: Mother.
Diabetes medication review: Negative: Child.
HEMATOLOGIC+LYMPHATIC+IMMUNOLOGIC SYSTEM: Negative: Mother.
Head: Negative: Child.
Shoulders: Father. Negative: Mother.
Hemoglobin assay, NOS: Son.
Hemoglobin assay, NOS: Child.
Hematologic system: Negative: Mother.
Hematologic system: Negative: Mother.

Note Details: Admission Note, O'Neill, Patrick, 4/7/2015 10:47 AM CDT, Admission H & P

SmartReview Sign/Submit Save Save & Close Cancel

Clarification Found

The screenshot displays a medical software interface for a patient named DQRPerson10. The main window is titled "SmartReview" and shows a list of "Opportunities for clarification" under the heading "1". The first item is "HE - Hepatic encephalopathy" (HEPATIC COMA (572.2)), which is highlighted in blue. A blue callout box with a white border and a pointer to the diagnosis text contains the text "Clarification suggested for review". Below the diagnosis, there are three buttons: "Clarify", "Ask Later", and "Does Not Apply". To the right of the diagnosis, there is a "Supported Diagnosis" label. Below the diagnosis, there is a section for "Computer interpreted findings" with three columns: "Findings", "Medications", and "Measurements". The "Findings" column lists "altered mental status" and "cirrhosis". The "Medications" column lists "Lactulose". The "Measurements" column lists "Bilirubin" and "SGOT". At the bottom of the window, there is a checkbox labeled "Run SmartReview when signing this note type (Admission Note)" which is checked. There are also "Save" and "Cancel" buttons at the bottom right of the window.

SmartReview - DQRPerson10, DQRPerson10

DQRPerson10, DQRPerson10 Female 31 years DOB: 3/3/1984 FIN: 00012942

SmartReview 4/7/2015 10:49:55 AM

1 Opportunities for clarification

Supported

HE - Hepatic encephalopathy

HEPATIC COMA (572.2)

Clarify Ask Later Does Not Apply

Supported Diagnosis

Computer interpreted findings

Findings	Medications	Measurements
altered mental status	Lactulose	Bilirubin
cirrhosis		SGOT

Run SmartReview when signing this note type (Admission Note)

Save Cancel

Note Details: Admission Note, O'Neill, Patrick, 4/7/2015 10:47 AM CDI, Admission H & P

SmartReview Sign/Submit Save Save & Close Cancel

DQR Options for Supported Diagnoses

◆ **Clarify**: Choose this if you agree with recommendations

◆ **Does Not Apply**: choose this only if you are sure the diagnosis proposed is incorrect

◆ **Ask Again Later**: Choose this if unsure.

Based on the computer-interpreted findings, indicate if the diagnosis may be clarified.

Supported Diagnosis

Acute respiratory failure

Acute respiratory failure with hypoxia (J96.01)

Clarify Ask Later Does Not Apply

▲ Computer interpreted findings

Findings	Medications	Measurements
accessory muscle use	NPPV	Oxygen Saturation
dyspnea	oxygen mask	PaCO2
pneumonia		PaO2
respiratory insufficiency		Respirations

Clarification Accepted

The screenshot displays a medical software interface with a central dialog box for clarifying a diagnosis. The dialog box is titled "HE - Hepatic encephalopathy" and includes the following elements:

- A header: "Based on the computer-interpreted findings, indicate if the diagnosis may be clarified." and a sub-header: "This will be added to your Diagnosis List and to your Note."
- Buttons: "Clarify", "Ask Later", and "Does Not Apply".
- Text: "Review and edit the following text before updating the medical record:"
- Text box: "Based on evidence within the medical record during this hospital stay, the patient is being treated for HEPATIC ENCEPHALOPATHY."
- Section: "Computer interpreted findings" with a table:

Findings	Medications	Measurements
altered mental status	Lactulose	Bilirubin
cirrhosis		SGOT

At the bottom of the dialog box, there is a green checkmark icon and the text: "Done! There are no more SmartReview clarifications to review. Click Save to write your selections to your note." Below the dialog box, there are "Save" and "Cancel" buttons. A blue callout box on the right side of the dialog box contains the text: "This text can be edited prior to pulling into the note".

The background interface shows a patient record for "DQRPerson10, DQRPerson10" (Female, 31 years, DOB: 3/3/1984, FIN: 00012942) with a "SmartReview" timestamp of "4/7/2015 10:49:55 AM". The left sidebar lists various medical history sections, and the right sidebar shows a "History" section with medication entries.

No Clarification Found

The screenshot shows a 'Document Viewing' interface for a 'Consult Note'. The document content includes sections for Chief Complaint, Reason for Consultation, History of Present Illness, Review of Systems, Physical Exam, and Assessment/Plan. A 'SmartReview' dialog box is overlaid on the document, displaying a blue exclamation mark icon and the text 'No clarification needed at this time.' Below the message is a checkbox labeled 'Run SmartReview when signing this note type (Admission Note)' which is checked, and an 'OK' button. A blue callout box with a white border and a pointer to the dialog box contains the text: 'Upon signing the note, users will either see a clarification pop up or this message if no clarifications are found.' The right side of the interface shows a 'Problem List/Past Medical History' section with sub-sections for Ongoing, Historical, Procedure/Surgical History, Medications, Allergies, Social History, and Family History. At the bottom of the document viewer, there are buttons for 'SmartReview', 'Sign/Submit', and 'Save'. The footer of the page includes the 'Crossings HEALTHCARE SOLUTIONS' logo.