

Clinical Decision Support: Technology at the Point of Care

HealthIT 2011:
The Tools for Meaningful and Accountable Care
Massachusetts Health Data Consortium
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Daniel Nigrin, MD, MS



Children's Hospital Boston - Profile

- Founded 1869
- Comprehensive center for pediatric (and fetal) health care
- Primary pediatric teaching hospital of Harvard Medical School
- World's largest research enterprise based at a pediatric center (\$225 million of public and private funding)
- 3 satellite locations, a community health center, 18 hospital and health center affiliations, 200 affiliated community based physicians



1919, Children's Hospital Boston

Beds = 396
Discharges = 24,971
Outpatient Visits = 524,790
Emergency Room Visits = 61,631
Surgical Cases = 25,719

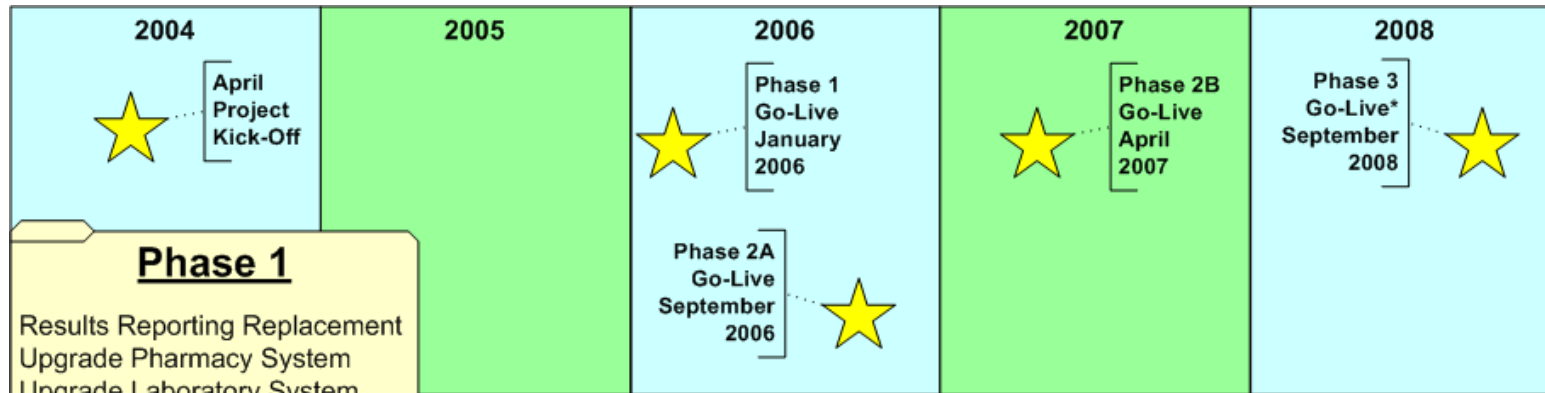


IT-Related Recognition

- Leapfrog Group
 - Top Hospital in 2008 - 2010
- Most Wired
 - 8 awards since 1999, last 6 years straight
- HIMSS Analytics – Stage 7



Children's Hospital Applications Maximizing Patient Safety



Phase 2A

Nursing Documentation

- Inpatient Units
- Emergency Department
- Pre-Op Clinic
- Day Surgery
- Ambulatory Clinics

Phase 2B

Computerized Provider Order Entry (CPOE)

- eMAR
- Electronic I & O's
- Bedside monitors download to flow sheets
- Begin rollout to Ambulatory Clinics

Phase 3 & Beyond

Operating Room Documentation (SurgiNet)

- Scheduling and Case Tracking
- Documentation

Continued 2B rollout to Ambulatory Clinics

Advanced Clinical Documentation

- Clinical Notes
- PowerNotes (ED)
- Care Management Plans
- Clinical Care Guidelines (CPG's)

High-Volume Scanning

Upgrade Radiology System (RadNet)

*OR Go-Live September. Other activities go live throughout the year

Current State of Clinical IT at Children's

- Inpatient & Emergency Department
 - Near-paperless environment
 - CPOE w/ decision support
 - Nursing and physician documentation (both structured and unstructured)
 - Point of care med admin documentation w/ barcoding
 - Labs, Rad, Pharmacy, Blood Bank
 - PACS for all modalities (standalone and integrated into EMR)
 - ePrescribing
 - Data warehousing all clinical data
- Ambulatory
 - Same as Inpatient, except no point of care med documentation
- Operating Rooms
 - Procedure scheduling, documentation
 - Intraoperative Anesthesia documentation coming next



Decision Support at the Point of Care: *Focus on Medication Process*

- Especially high risk in Pediatrics
- “Brain to vein” – close the loop
- Multi-disciplinary process:
- *Physicians*: Medication order
- *Pharmacists, Techs, Couriers*: Medication review, dispensing, documentation and delivery
- *Nurses*: Medication review, administration and documentation



Med Process Decision Support: Ordering

- Ordersets: ~1000 custom ordersets with medication content (~70% of total ordersets)
 - Support localization of evidence based practice
 - Educate and inform prescribers of best practices
 - Facilitate initial start of high risk medications
 - Ensure proper monitoring
- Order Sentences
 - Within ordersets
 - Available on individual orderables in the system
 - Customized content to support weight-based dosing while not exceeding adult maximums
- Standardization
 - Automatic standardization for medications with wide therapeutic ranges
- Custom Rules
 - Look-alike sound-alike, renal dysfunction, bleeding risk, restricted medications, disease-state sensitive medications, etc...



Med Process Decision Support: Ordering

- Complex Orders

- Examples

- Total Parenteral Nutrition
 - PCA/NCA
 - PCEA/NCEA

- Challenging

- Multiple dosing components and parameters to the order

- Electronically supported by

- Creating electronic forms similar to previously existing paper forms
 - Guidance provided for each parameter on the form
 - Form feeds the electronic order

The screenshot shows a web browser window titled "PCANCA Morphine - SYSTEMTESTONLY - FIVELEAFPROG". The browser address bar shows "http://11/10/2010 13:00". The page content is titled "Morphine PCA/NCA Orders" and includes a warning: "No Dose Range Checking is available for PCA/NCA settings. Calculate carefully and review dose limits." The form contains several sections: "Weight for Calculation" with a value of 25.000 kg; "Loading Dose" with a value of 0.03 mg/kg; "Mode" with radio buttons for PCA only, PCA-NCA only, NCA only, Continuous only, PCA and continuous, PCA-NCA and continuous, and NCA and continuous; "Additional Information" with a text field containing "None"; and "Settings" with fields for PCA/NCA Dose (0.025 mg/kg), Lockout (Usual 7-32 minutes), Continuous (0.015 mg/kg/hr), and 4 Hour Dose Limit (0.3 mg/kg).



Med Process Decision Support: Dispensing

- DoseEdge (BAXA)
 - Leverages barcode scanning, automated calculations and digital images within pharmacy dose preparation to improve patient safety and turnaround
 - Barcode scanning within medication preparation prevents wrong medications from being utilized and meds for discontinued & changed orders from being dispensed
 - >4,500 potential errors prevented in 8 months since implementation
 - Automated calculations prevent manual calculation errors
 - Dose preparation (formerly recorded on paper) is automated and digital
 - Web interface allows pharmacist to check products remotely as soon as the product is completed, optimizing workflow and turnaround
 - Timestamps each user-specific event
 - Produces wide range of management reports



Med Process Decision Support: Tracking

- Medication Tracking (in house developed)
 - Tracks all events related to each new med order from prescribing through administration
 - Barcode scanning within medication fill prevents wrong med and meds for discontinued & changed orders from being dispensed
 - >4,500 potential dispense errors prevented in 8 months since implementation (almost 20/day)
 - Timestamps each user-specific event including delivery of product
 - Allows users (including nurses) to track the exact status/location of their patient's medication every step of the way (aka PhedEx)
 - Produces wide range of management reports which focus on both overall system and individual performance



Med Administration: MAR Safety View

Group multiple orders for same med (Old order vs. new order, scheduled order and PRN, two different routes (IV/PO, PO/PR))

Last given, next due times

Medication Rescheduling Safety (MAR Safety) View

		DOB: 03/03/10	Age: 8 Months	Weight for Calc: 12.5 kg [11/07/2010]	As of 11/09/10 07:26
Detail				Last Given	Next Due
	800 mg IV bedtime PRN Agitation			Never Given	PRN
	- acetylcysteine	150 mg IV 7x/Day PRN Allergic Reaction		Never Given	PRN
	furosemide	77.7 mg IV 5x/Day PRN Anaphylaxis		11/07/10 02:29	PRN
	magnesium gluconate	2,312.5 mg PO QID		Never Given	11/07/10 08:00
	methylPREDNISolone				
	- methylPREDNISolone	300 mg IV 5x/Day PRN Allergic Reaction		11/07/10 02:29	PRN
	- methylPREDNISolone	22 mg IV bedtime		11/06/10 22:00	11/01/10 22:00
	sodium chloride 0.9%				
	- NS bolus	67 mL IV 1time Stop: 09/15/10 12:13		Never Given	09/15/10 12:13
	sodium phosphate	6 mEq IV 6x/Day PRN Abdominal Pain		11/07/10 02:29	PRN
	tacrolimus				
	- TACROLimus	10 mcg IV 6x/Day PRN Agitation		Never Given	PRN
	TACROLimus	1.1 mg IV 6x/Day PRN Arthritis		Never Given	PRN
	- TACROLimus	33 mcg IV bedtime PRN Anaphylaxis		Never Given	PRN
	tolvaptan	15 mg PO daily		10/12/10 18:00	10/13/10 18:00
	warfarin	3 mg PO QPM		11/06/10 20:00	11/01/10 20:00

Link to online formulary brings you directly to this med

Warning icons
(dose too close or dose too far apart, potential extra dose, etc.)

Bar Coded Med Administration (BCMA)

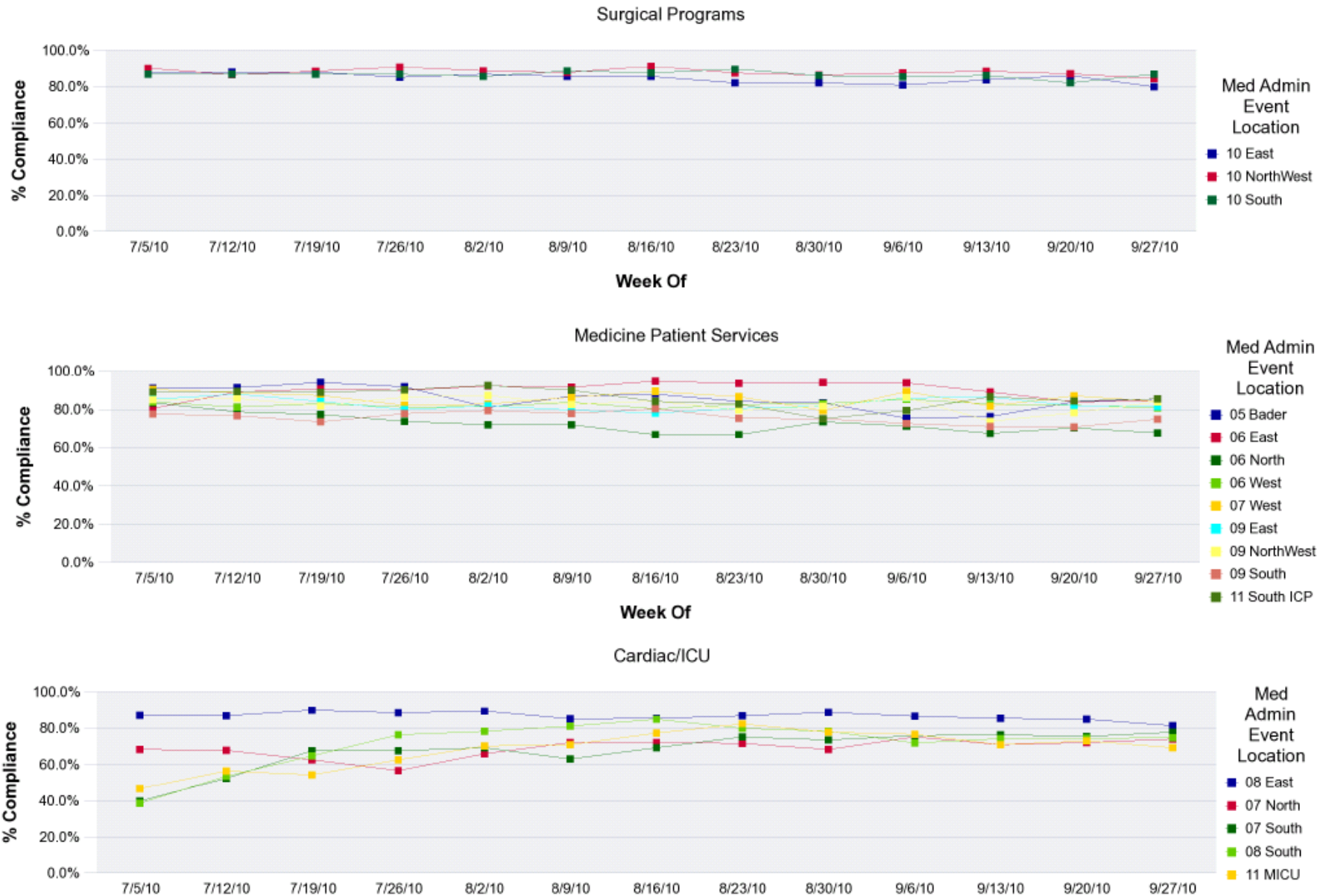


- Implementation began in 2008
- Barcode scanning implemented for medications and breast milk
- Decrease in ADEs directly attributable to initiation of BCMA documentation
- Accelerated rollout as a result
- Automated reporting at RN, unit and program level



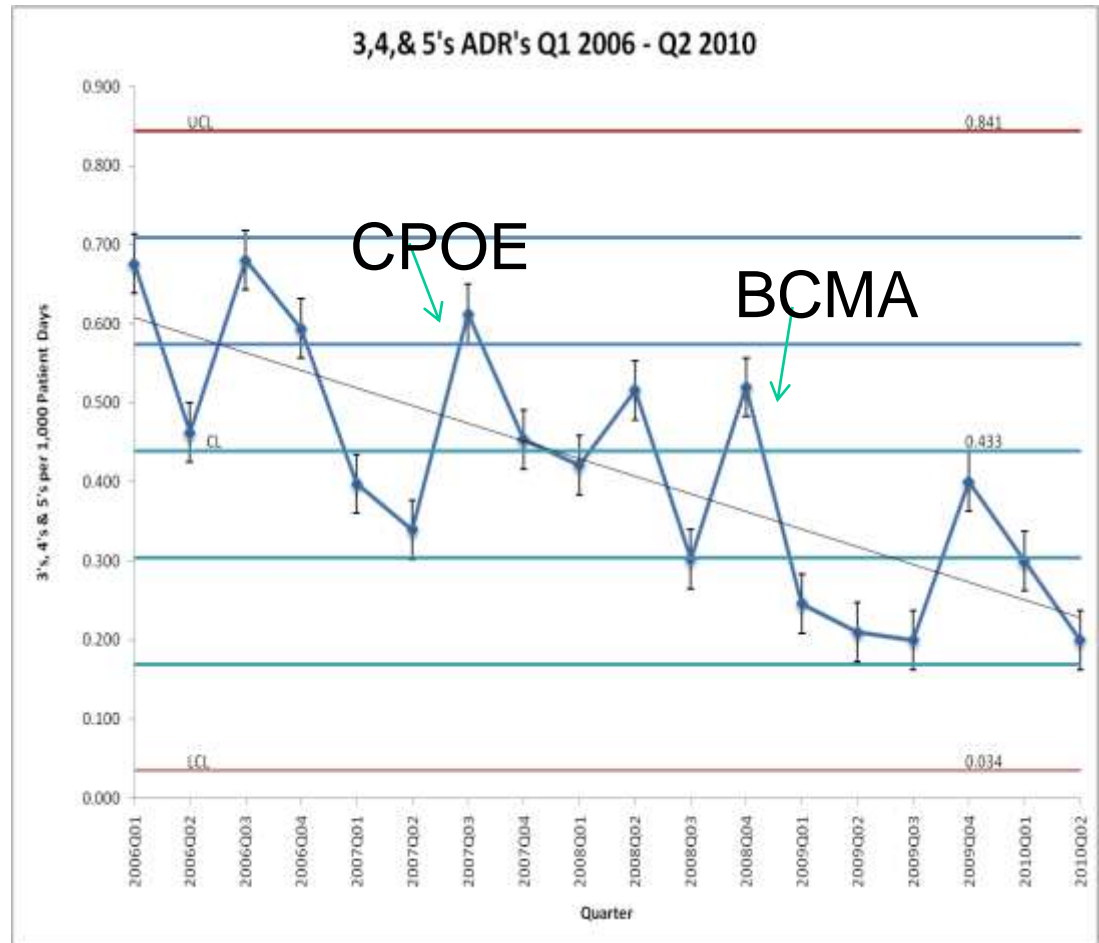
BCMA Compliance

Organized by program to allow leadership a quick view of compliance over time



ROI – Patient Safety

- Serious Med Errors reduced ~ 50%
- CPOE alone produced modest effect
- Bar Coded Med Administration has had sustained effect



Thank You!



Children's Hospital Boston

life-changing care world-changing research