

Proven Near-immediate Investment Impact for EPR/EMR: Early Findings from the United Kingdom



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Disclosures & Bio

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Former Dir. KLAS Research/Performance Insights

130+ peer-reviewed publications, 380+ peer-reviewed presentations, 3 books

Advisory and consulting work for 11 govt.s in Asia, Australia, Europe and No. America

Advisory and consulting to over 50 non-healthcare organisations, among them:

Disney, Ritz-Carlton, Coca-Cola, New Line Cinema, IBM, AT&T, Time Warner

Employment history includes: Coca-Cola, RAND Corporation, UCLA Medical Center, Intermountain HC, Gartner

Education:

PhD, Research Methods & Applied Statistics

DBA, Business Administration (PhD)

MA, MEd, BS

Prof. Steven H. Shaha, PhD, DBA



Sample of Peer-reviewed Journals

- Advance for Health Information Executives
- Advances in Patient Safety
- Agency for Healthcare Res & Qual (AHRQ Journal)
- American Journal of Ob & Gynecology
- American Journal of Sports Medicine
- Applied Clinical Informatics
- Archives of Otolaryngology, Head & Neck Surg
- Breast Cancer Research and Treatment
- British Medical Journal of Quality & Safety
- Epidemiology and Infection
- Health Management Technology
- Healthcare Financial Management
- Healthcare Technology Management
- Intl. Journal of Medical Informatics
- Intl. Journal of Pediatric Otorhinolaryngology
- Intl. Journal for Quality in Health Care
- Journal of Arthroscopic and Related Surgery
- Journal of Clinical Ultrasound
- Journal of Emergency Nursing
- Journal of Mat, Fetal & Neonatology Med
- Journal of Neurosurgery
- Journal of Obstetrics and Gynecology
- Journal of Orthopedic Trauma
- Journal of Pediatric Emergency Care
- Journal of Perinatal Medicine
- Journal of Perinatology
- Journal of Shoulder and Elbow Surgery
- Journal of the Am Acad of Ped Ophth & Strab
- Journal of Ultrasound in Medicine
- Journal of Ultrasound in Ob & Gynecology
- Laryngoscope
- Nurse Executive Watch
- Nurse Leader
- Nursing Economics
- Pediatric Critical Care Medicine
- Pediatric Emergency Care
- Pediatrics
- RN Magazine
- Spine
- Intl. Journal of Pediatric Otorhinolaryngology
- The Journal of Bone & Joint Surgery
- Ultrasound in Obstetrics & Gynecology

The Dynamics in Healthcare

Pressure on every aspect of performance



“Safety, quality and value-based delivery.”



“Do more with less.”

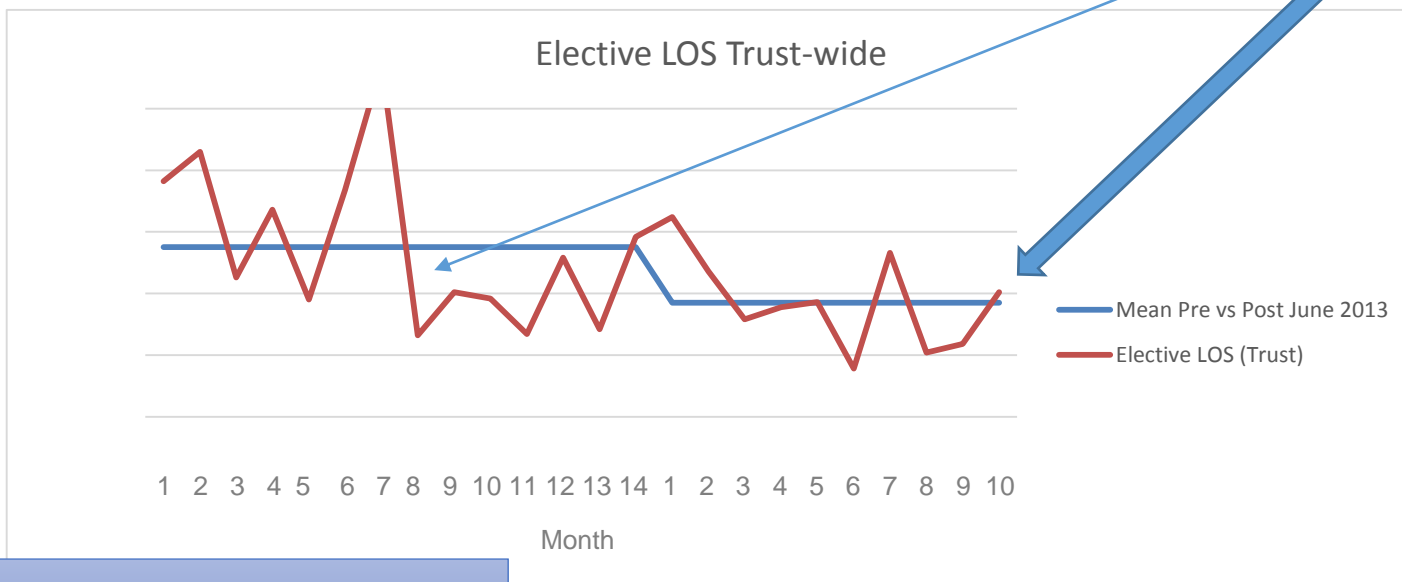


“Variable demand with fixed capacity & poor patient flow.”



Lengths of Stay Trust-wide

Impact of pre-implementation preparations and planning



Estimated impact: **£10.1 million**

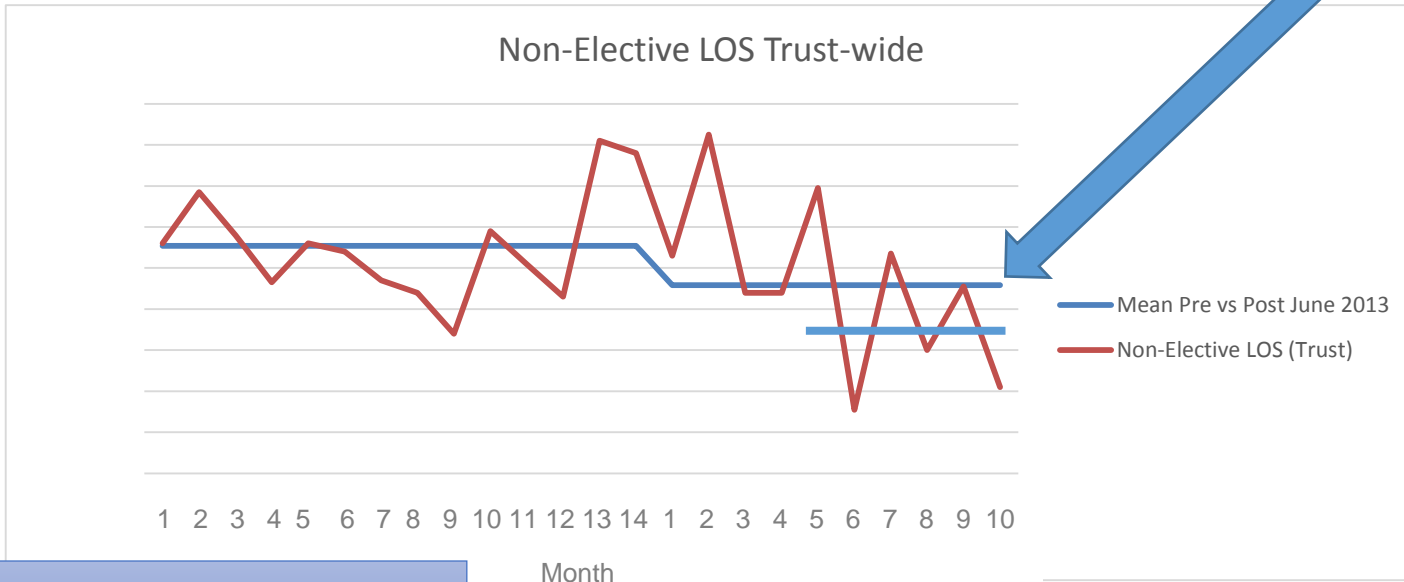
Elective LOS (Trust)

Pre Mean	Post Mean	Net Change	Pct Change (+=improved)	p-Value
--	--	-0.45	10.3%	0.000



Lengths of Stay Trust-wide

Impact of planned delay in implementation



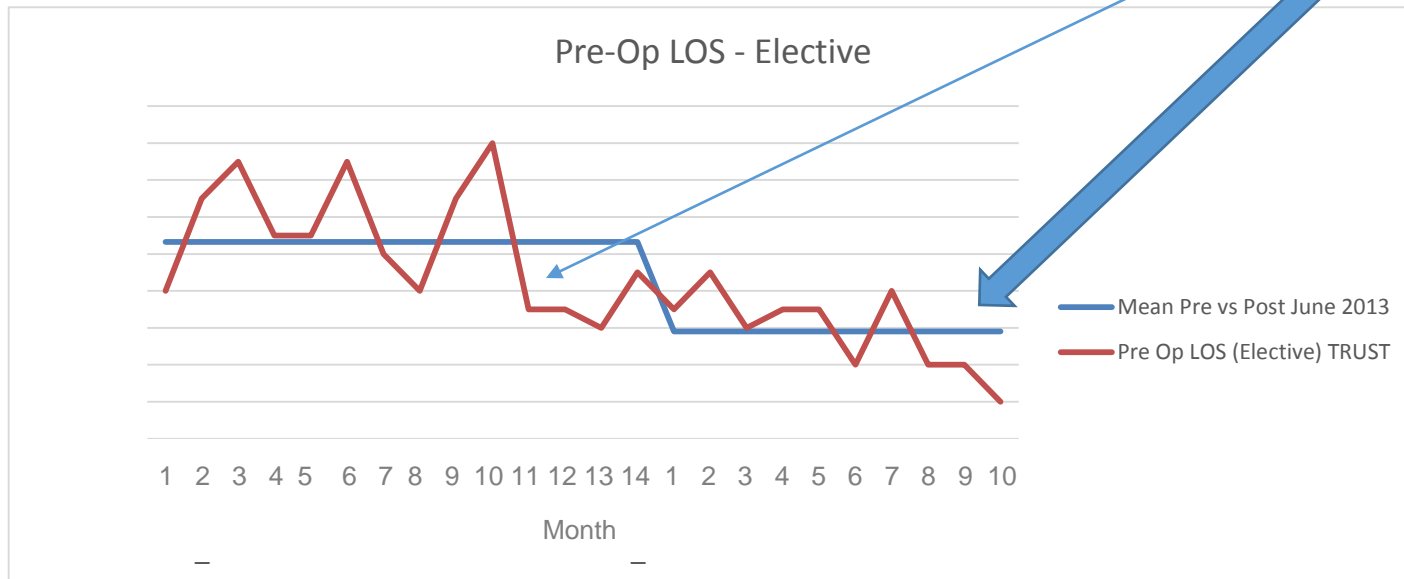
Estimated impact: **£7.2 million**

Non-Elective LOS (Trust)				
Pre Mean	Post Mean	Net Change	Pct Change (+=improved)	p-Value
---	---	-0.19	3.4%	0.000



Pre-Op LOS

Impact of pre-implementation preparations and planning



Pre Op LOS (Elective) TRUST

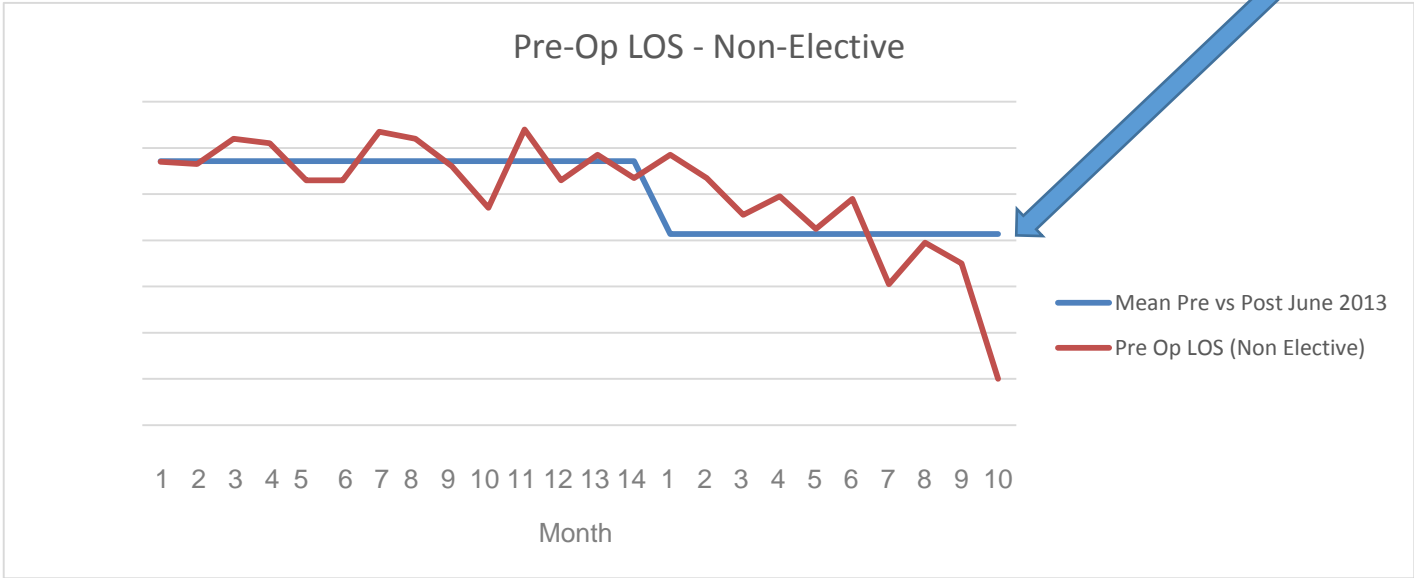
Pre Mean	Post Mean	Net Change	Pct Change (+=improved)	p-Value
		-0.05	38.3%	0.000

From 3.03 hrs to 1.87 hrs



Pre-Op LOS

Impact of planned delay in implementation



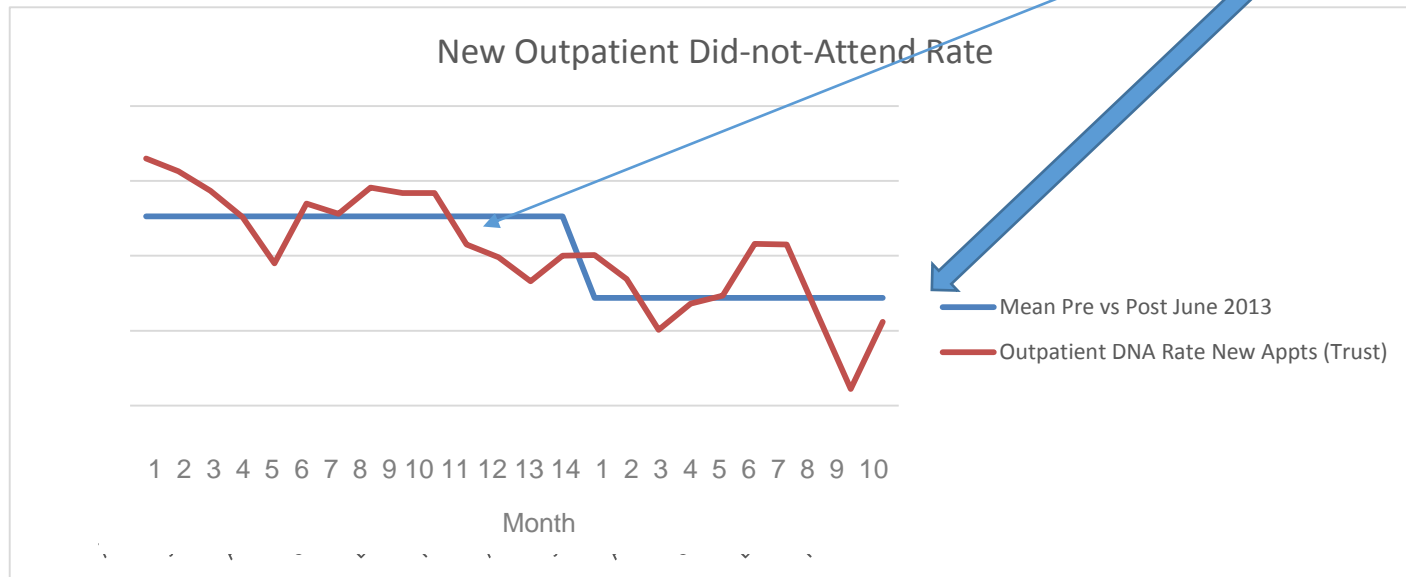
Pre Op LOS (Non Elective)

Pre Mean	Post Mean	Net Change	Pct Change (+=improved)	p-Value
---	---	-0.32	17.1%	0.000



Did not Attend Rates

Impact of pre-implementation preparations and planning



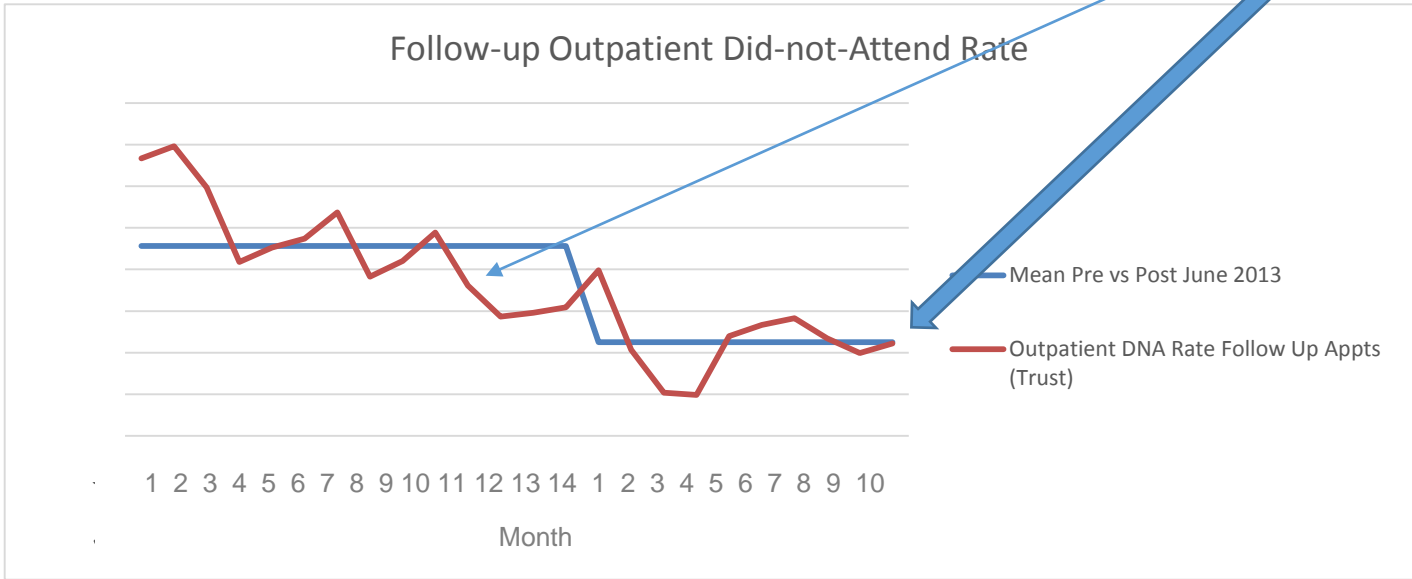
Outpatient DNA Rate New Appts (Trust)

Pre Mean	Post Mean	Net Change	Pct Change (+=improved)	p-Value
		-1.09	10.3%	0.000



Did not Attend Rates

Impact of pre-implementation preparations and planning



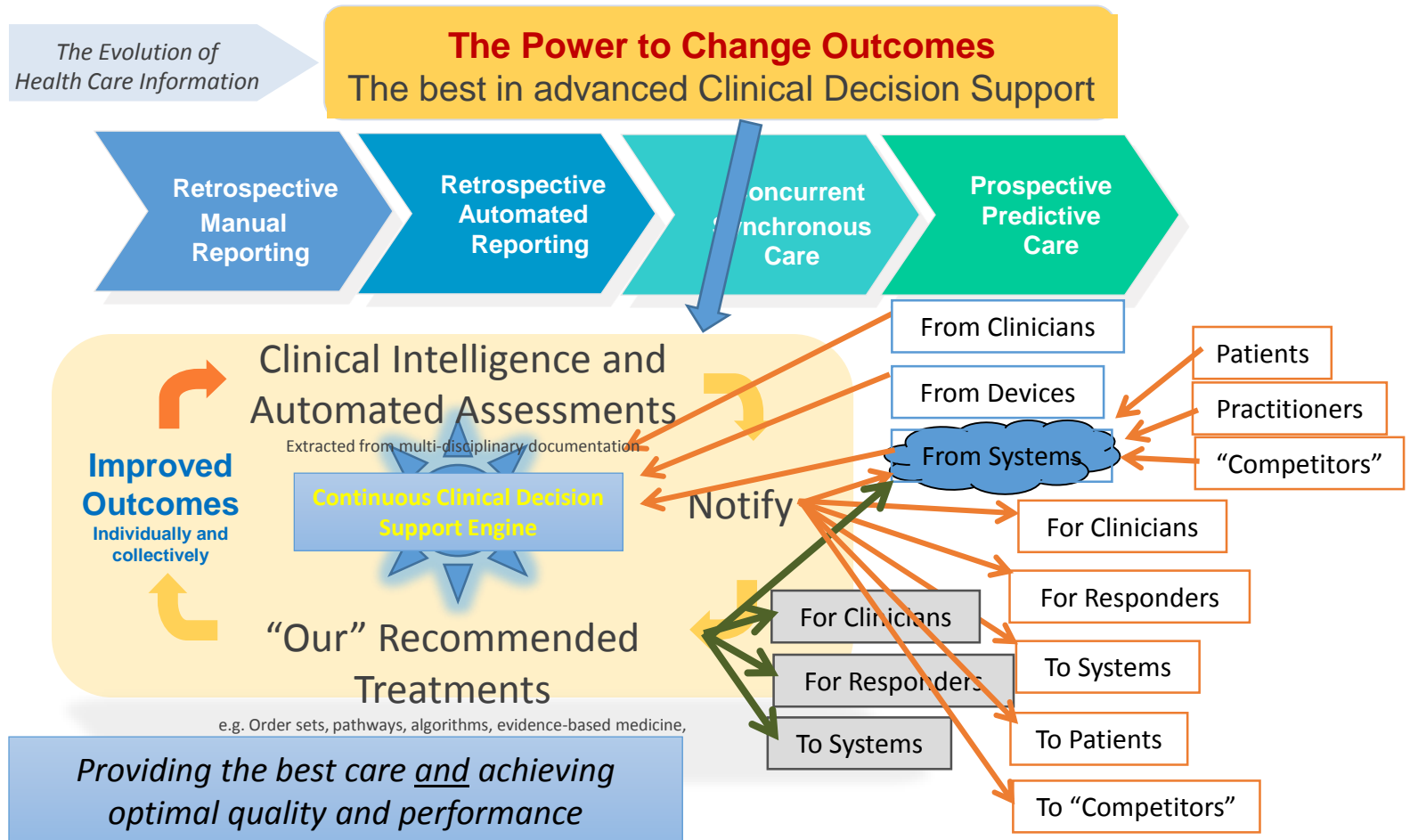
Outpatient DNA Rate Follow Up Appts (Trust)

Pre Mean	Post Mean	Net Change	Pct Change (+=improved)	p-Value
-	-	-2.31	20.0%	0.000



Real-Time Outcomes Optimization

Best care and best quality scores optimized while the patient is still in the bed



“Clinical Decision Support” – *Many Meanings*



Alert-based

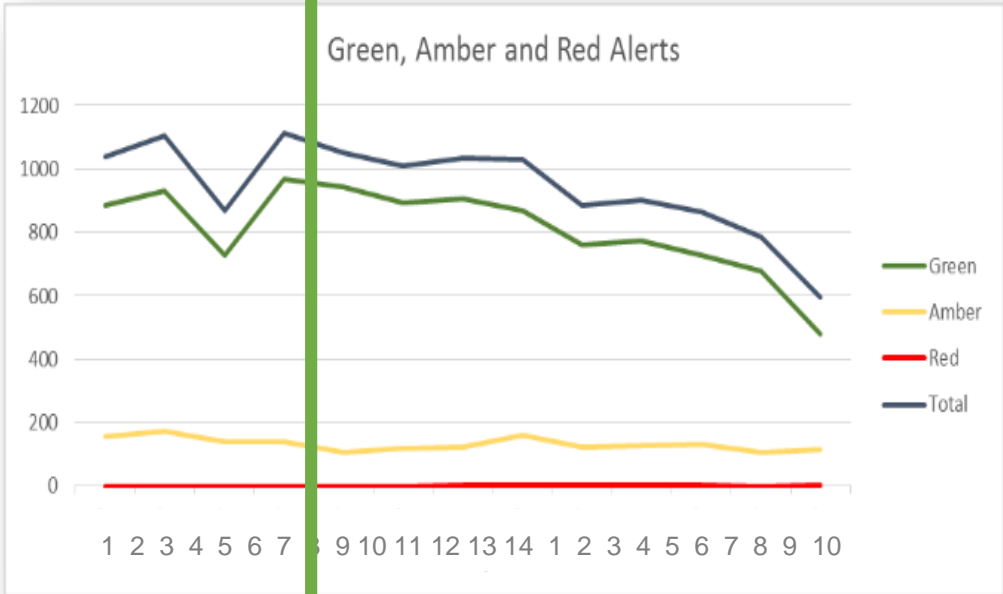
- “Guardrails”
- BUT
- *After* error is made
- Interrupts
- Alert fatigue
- Non-response

Where HIT Lives

Additional Outcomes

- Automated Risk Assessment and Alerts



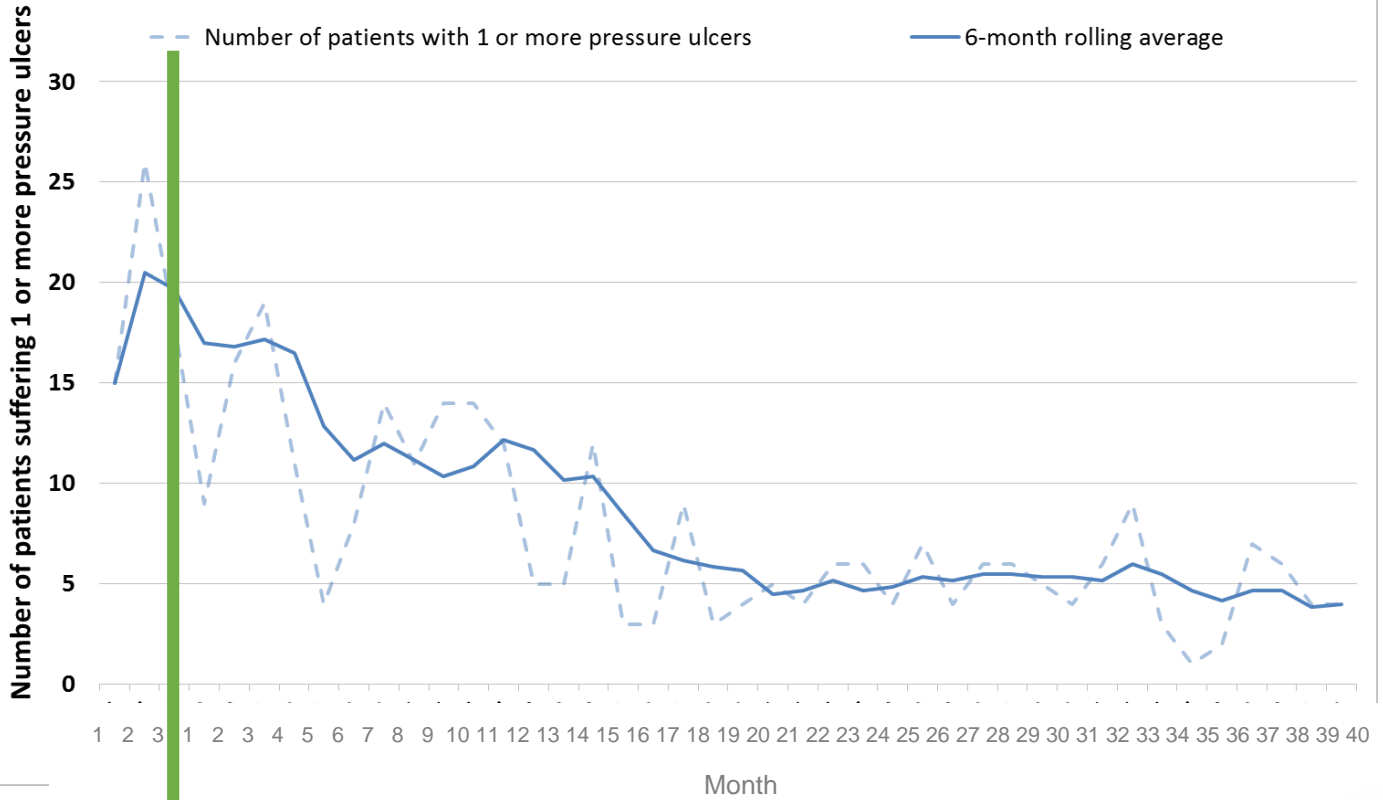


Pre

Post



acquired pressure ulcers: number of patients affected per month
(Grade 2 and above)



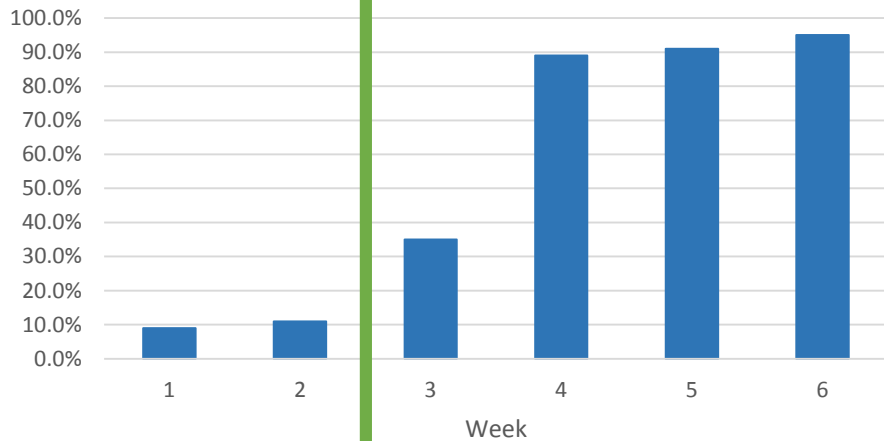
Pre

Post



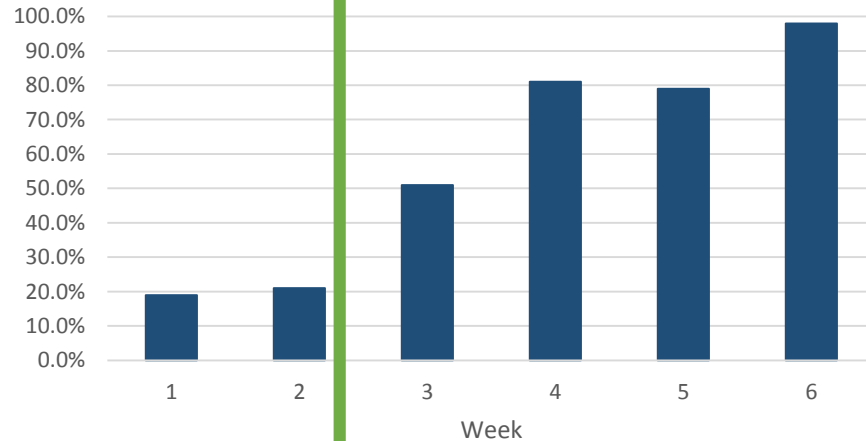


VTE Assessment on Admission

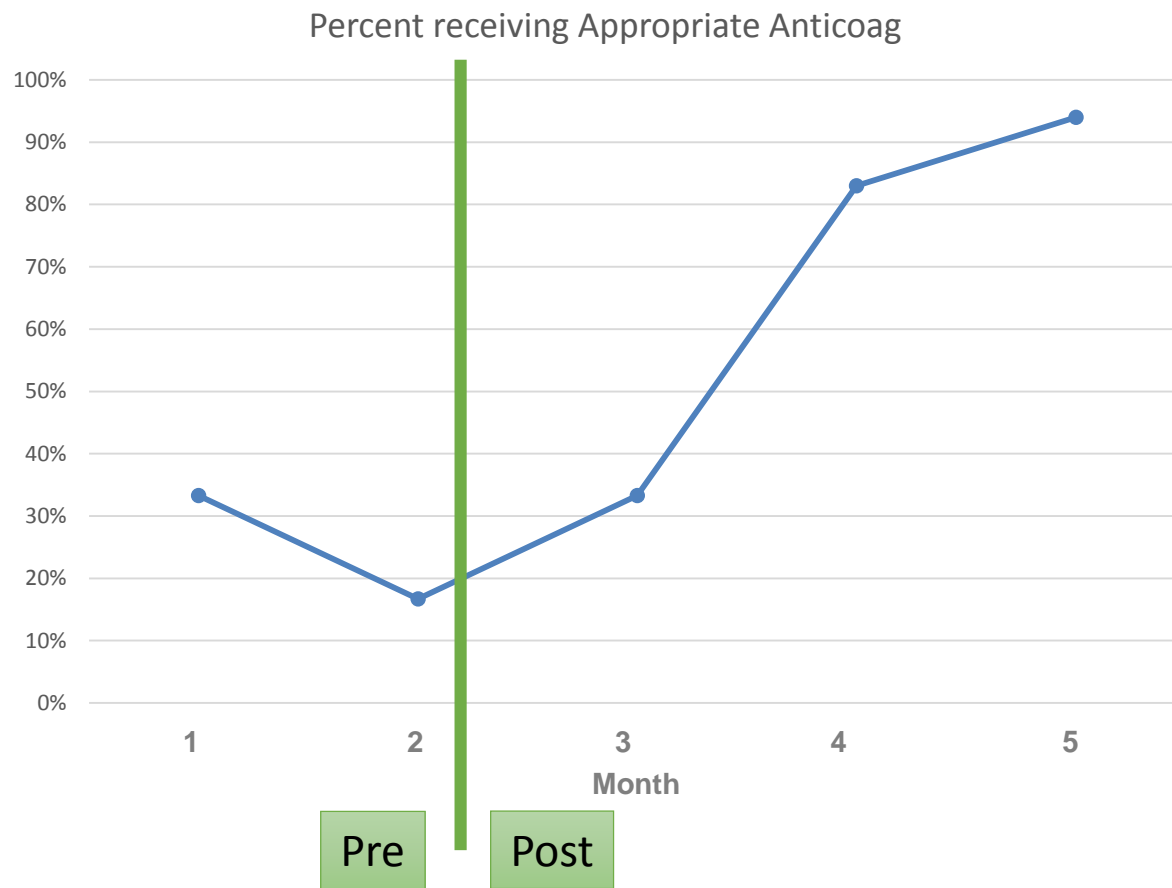


Pre Post

VTE Re-assessment within 24 hrs



Pre Post



Pressure Ulcers

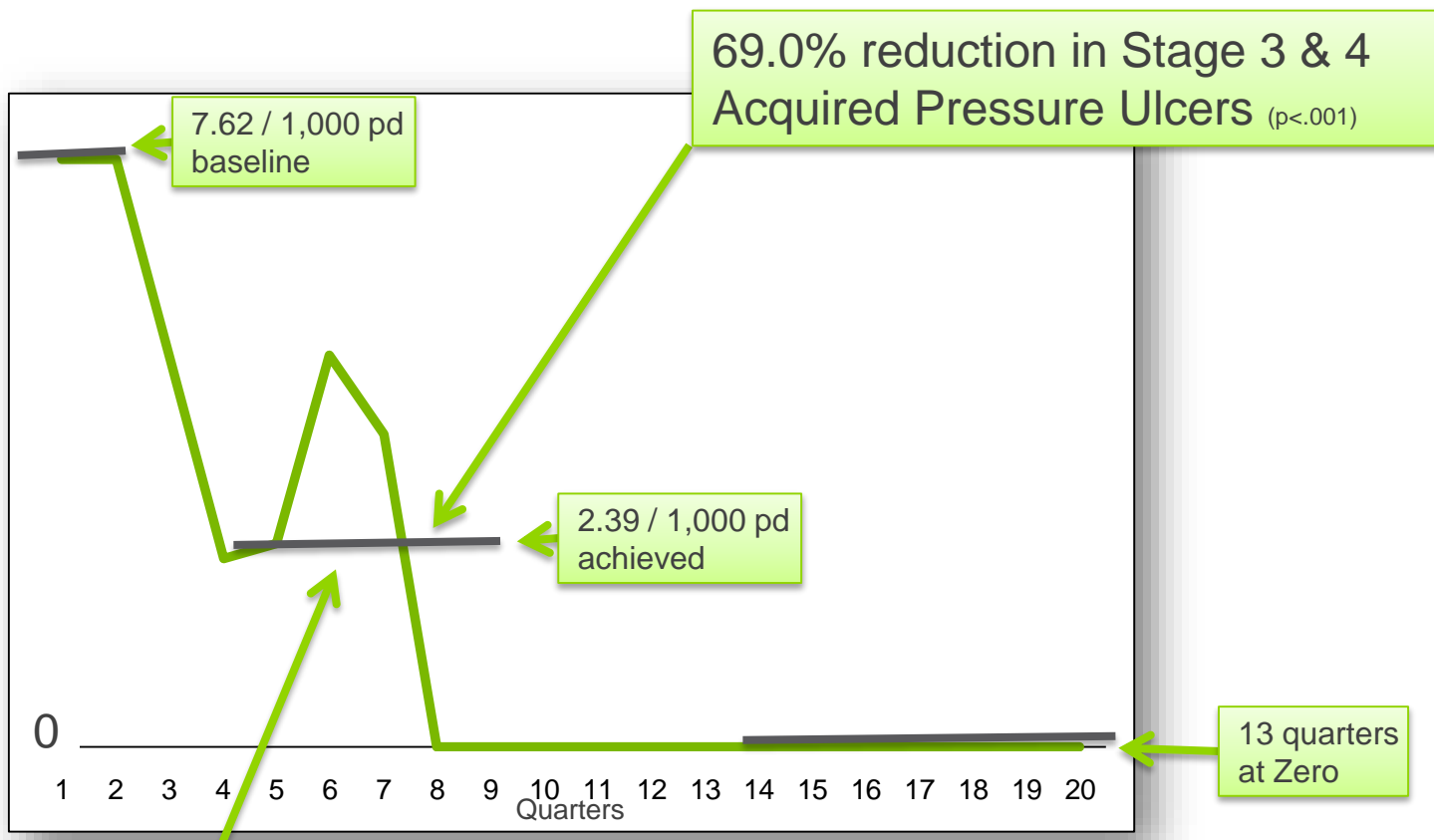
75% reduction in pressure ulcer incidence (stage 2 or above)

Maintained zero % pressure ulcer incidence rate 2+ consecutive quarterly sweeps

70% improvement in pressure ulcer incidence ($p < .001$)

Significant Reduction in Pressure Ulcer Rate

Achieved through Advanced CDS, smart order sets and clinical documentation



Approximately 167 fewer patients acquiring stage 3 or 4 pressure ulcers each year.

National average between 9% and 4%:

Financial Impact between **£1.4 M³** and **£9.2 M¹**

(1) DEPARTMENT OF HEALTH AND HUMAN SERVICES, Centers for Medicare & Medicaid Services, 42 CFR Parts 411, 412, 413, and 489. Medicare Program; Changes Hospital Inpatient Prospective Payment Systems and Fiscal Year 2008 Rates. Page 47205

(3) 2004 DRG manual. Average of MDC 009 (pressure ulcers) and DRG 271 (skin ulcers) charges (\$12,922 and \$16,724 respectively) divided by charge to cost ratio of 2.44.

WHY these successes?

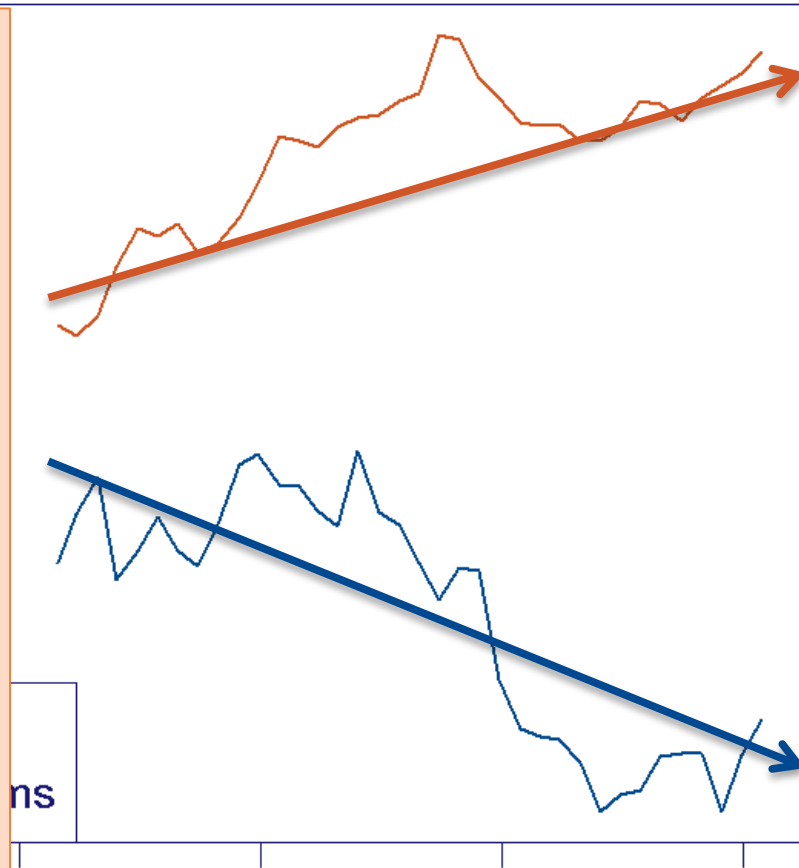
How did the EMR/EPR reach these investment-confirming impacts?

Beware of Appearances

SATISFACTION: IT VS. CLINICIANS

Survey Items showing Significant Differences ($p < 0.05$):

- Overall Satisfaction
- Ease of Use
- Supports Integration Goals
- Product Works as Promoted
- Quality of Implementation
- Money's Worth
- Likelihood to Recommend
- Implementation on Time
- Delivery of New Technology
- Overall Product Quality
- Product Response Time
- Quality of Training
- Proactive Service



Shaha SH (2013). Comparative EPR Usability from the Clinician Perspective: What works and what doesn't for impacting care. *Digital Health Service Delivery – The Future Is Now*. HIC 2013 Proceedings, Health Information Society of Australia, Melbourne, pg. 122.

Shaha SH (2013). *Benefits and Outcomes: Models for Getting the Most Out of Your EPR*. EPR Awareness Forum: Sharing Best Practice from UK, Europe and the US, Manchester, UK, May 2013.

Shaha SH (2013). *Clinical Systems Applications and Related technology: Today and into the Future*. HC 2013: The National Health IT Conf & Exh, Birmingham, England, April 2013.

Schreiber R, Peters K, Shaha SH. (2014) Computerized Provider Order Entry Reduces Length of Stay in a Community Hospital. *Applied Clinical Informatics*, (accepted for publication in 2014).

SATISFACTION: IT VS. CLINICIANS

Sample sentiments from IT Professionals:

- The prescriptive implementation was very effective
- The vendor/supplier does not abide either discontent nor dissension
- Clinicians adoption was assured – it's not an option
- Standardization ensures best cost and care for populations

atis

Sample sentiments from Clinicians:

- The limited number of order sets allowed was strictly/restrictively enforced
- Suggestions for improved adaptability for my patients were not options
- I cannot access my data beyond pre-programmed screens or reports
- Innovation is limited – we're back to one-off separate systems
- Patients either fit molds or simply get treated as though they did

AV

— Information Systems

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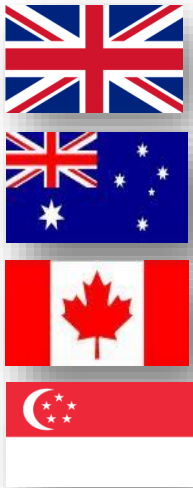
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Lessons Learnt:

- The EMR is not “electronified paper”
 - Computers that Compute
 - Programmability
 - Clinical Intelligence
- Adaptability and Interoperability
 - Rigidity vs. Openness
- Local Innovation *then* Broader Standardization
 - “What work here with our needs, populations and capabilities”
 - Try, refine, prove ... then standardise ... then innovate
- Access to Clinical Data
- Community Connectivity
- Outcomes-driven
 - Clinical
 - Efficiency
 - Cash Releasing and Cost Reducing
 - Clinician Satisfaction



Sepsis disease of infections and “avoidables”

Statistics:

- The leading cause of death in hospitals globally – 1.7 Million cases a year
- Prolonged LOS in ICU w/ CCs, complex therapies, high costs – est. **£18Bn annually**

Solution:

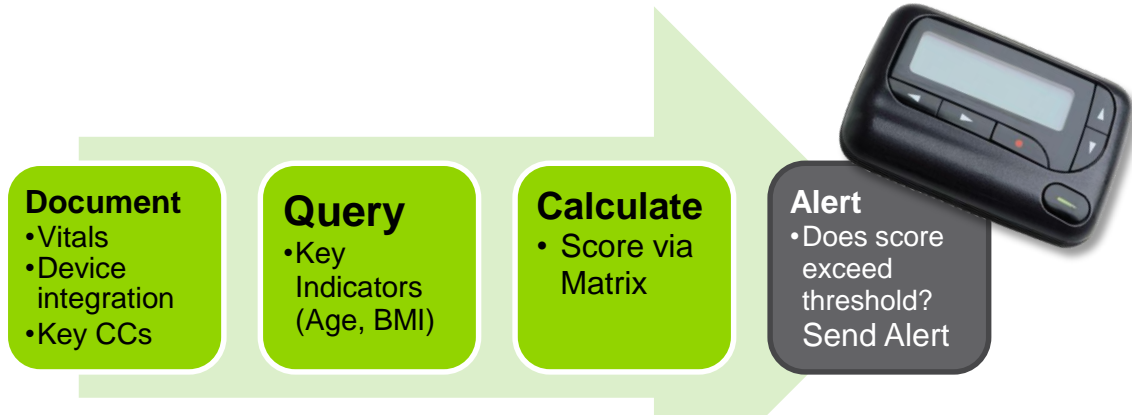
- SQL query 12-month retrospective chart review
- MEWS: Perpetual, house-wide, imbedded monitoring and surveillance

	3	2	1	0	1	2	3
Systolic BP (mmHg)	< 70	71-80	81-100	101-199		>= 200	
Heart rate (bpm)		< 40	41-50	51-100	101-110	110-129	>= 130
Respiratory rate (bpm)		< 9		9-14	15-20	21-29	>= 30
Temperature (°C)		< 35		35-38.4		>= 38.5	
Age (y)					65-74	75-84	>= 85
BMI (kg/m ²)			< 18.5		25.1-34.9	> 35	

<http://www.nigms.nih.gov/>

1. Angus DC, Linde-Zwirble WT, Lidicker J, Clermont G, Carcillo J, Pinsky MR. Epidemiology of severe sepsis in the United States: analysis of incidence, outcome and associated costs of care. *Critical Care Medicine*. 2001 Jul;29(7):1303-10.
2. Wood KA, Angus DC. Pharmacoeconomic implications of new therapies in sepsis. *Pharmacoeconomics*. 2004;22(14):895-906.
3. Yende S, Angus DC. Long-term outcomes from sepsis. *Current Infectious Disease Reports*. 2007 Sep;9(5):382-6.
4. Kho MD, Abel. "Utility of commonly captured data from an EHR to identify hospitalized patients at risk for clinical deterioration.." AMIA 2007 Symposium Proceedings. (2007): 404-407. Print.

The Process: Identification and Remediation

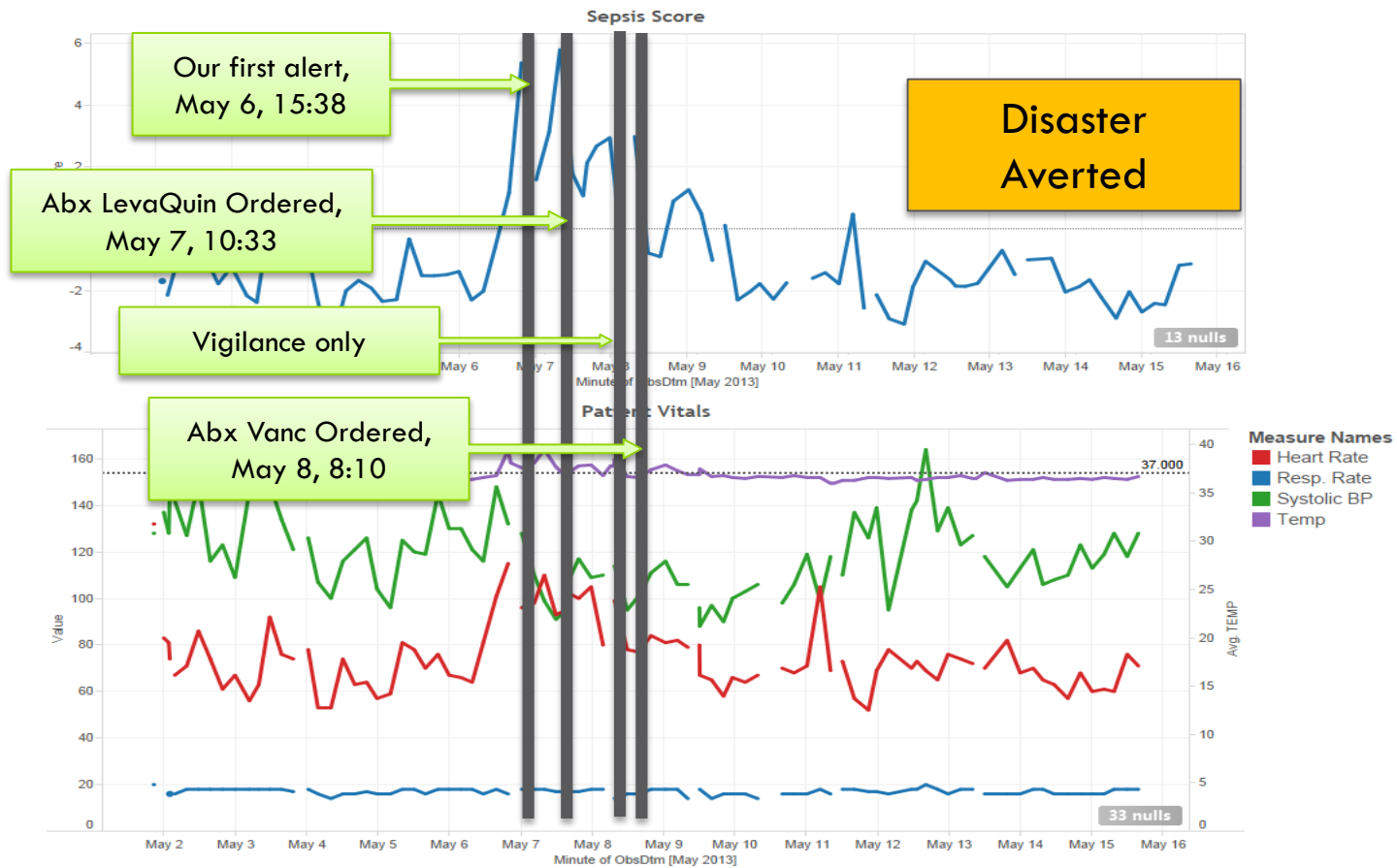


Down to 28.2 min (11-D)

Summary Impacts:

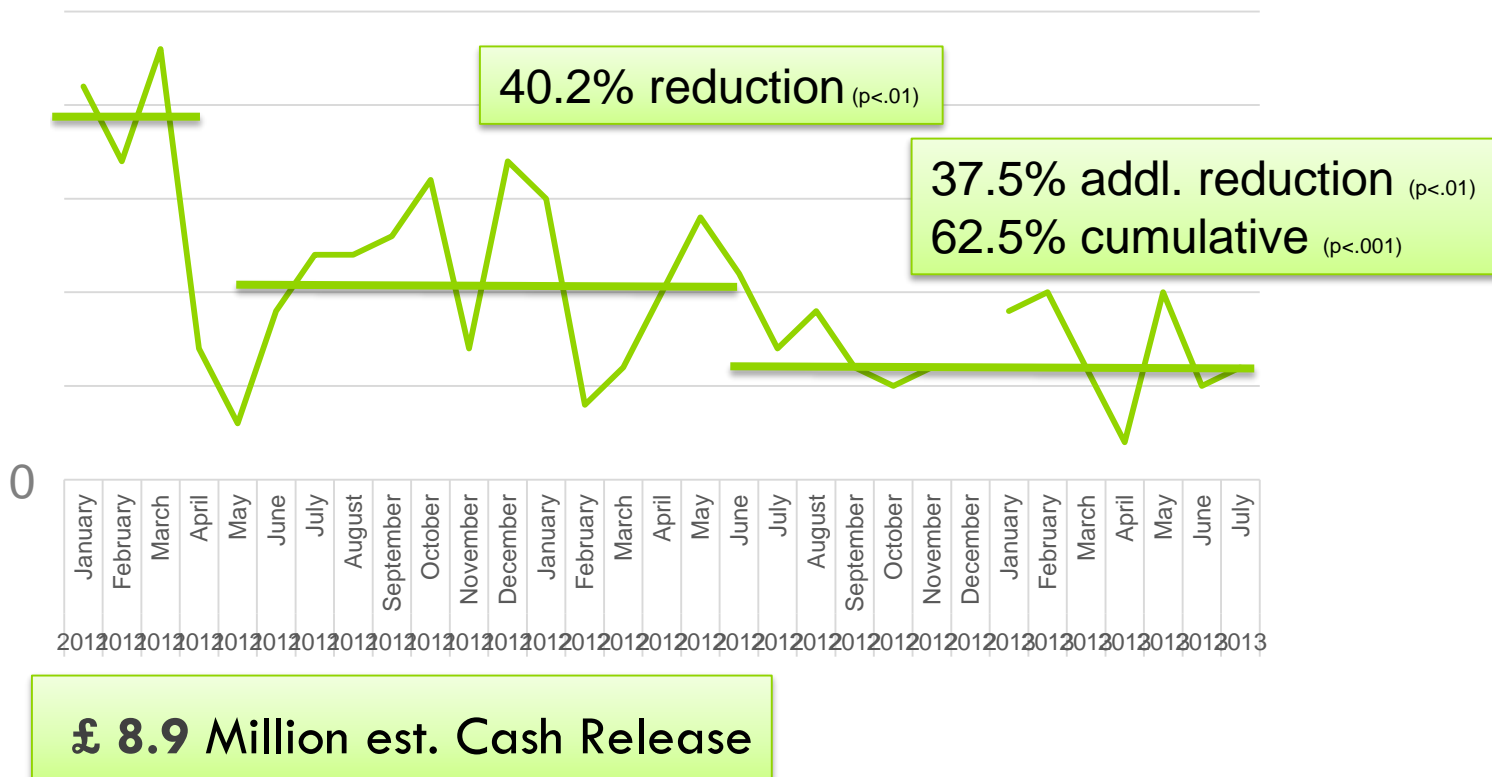
Measure	Pre
Timeliness of Recognition ¹	571.2 minutes
Cardiopulmonary Arrest Rate Outside ICU ²	5.54%
ICU Length of Stay ³	3.8 days

1. T Test procedure, statistically significant (p <.0001)
 2. Chi square procedure, statistically significant (p 0.046)
 3. Not statistically significant (t=1.74/p=.08) but *clinically significant*?



Shaha SH (2014) *The EMR as an Effective Tool for Boosting Medication Adherence*. Invited Presentation: 2nd Annual World Congress Summit to Improve Adherence and Patient Engagement, March 10-11, 2014, Phil.
 Shaha SH, Hutchinson M (2014). *EPR Impacts: The Real ROI*. HC 2014: The National Health IT Conf & Exh, Manchester, England, March 20, 2014.
 Shaha SH, et.al. (2014). *CPOE's Predictive Impact on LOS: Three Case Studies Illustrate the Impact of High Capability EMRs*. HIC 2014 Health Informatics Society of Australia, Melbourne.

Sepsis Outside of the ICU



Lessons Learnt:

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 - Computers that Compute
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 - Clinical Intelligence
- Adaptability and Interoperability
 - Rigidity vs. Openness
- Local Innovation *then* Broader Standardization
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- Access to Clinical Data
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 - Clinical
 - Efficiency
 - Cash Releasing and Cost Reducing
 - Clinician Satisfaction



Remembrance Day ...



THE UNITED STATES OF AMERICA

TO ALL WHO SHALL SEE THESE PRESENTS, GREETING: THIS IS TO CERTIFY THAT THE PRESIDENT OF THE UNITED STATES OF AMERICA AUTHORIZED BY EXECUTIVE ORDER, 24 AUGUST 1962 HAS AWARDED

THE BRONZE STAR MEDAL

CAPTAIN JACOB E. SHAHA
1ST BATTALION, 187TH INFANTRY REGIMENT


TO

FOR

EXCEPTIONALLY MERITORIOUS SERVICE IN SUPPORT OF OPERATION ENDURING FREEDOM, AFGHANISTAN FROM 14 JANUARY 2010 TO 25 JANUARY 2011. CAPTAIN SHAHA'S PERSONAL COURAGE AND COMMITMENT TO MISSION ACCOMPLISHMENT IN A COMBAT ZONE, UNDER THE MOST EXTREME OF CIRCUMSTANCES, GREATLY CONTRIBUTED TO THE SUCCESS OF OPERATION ENDURING FREEDOM. CAPTAIN SHAHA'S PERFORMANCE REFLECTS GREAT CREDIT UPON HIMSELF, TASK FORCE RAKKASAN, COMBINED JOINT TASK FORCE-101 AND THE UNITED STATES CENTRAL COMMAND.

GIVEN UNDER MY HAND IN THE CITY OF WASHINGTON

THIS 30TH DAY OF NOVEMBER 2010


JOHN F. CAMPBELL
Major General, US Army
Commanding
PO# 334-256




JOHN W. McHUGH
SECRETARY OF THE ARMY



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