Improving the Quality of Pediatric Trauma Care

Brian D. Kenney, MD, MPH
Associate Professor of Clinical Surgery
The Ohio State University
Director, Surgical Critical Care Fellowship
Surgical Director, Quality Improvement
Nationwide Children's Hospital

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Objectives

- Consider benchmarking for pediatric trauma care
- Improve care with Quality Improvement Science
- Review NCH efforts to improve care

Benchmarking

- Cobblers
  - Standardization of shoe size
- Internal
  - Compare to yourself
  - Results over time
  - Results between services or providers
- External
  - Compare hospitals
  - Health systems
  - National
  - International

Feasibility of benchmarking

- Pro
  - Patient centered
  - Reduce variability
  - Avoid waste
  - Increase efficiency
  - Avoid errors (lapse, slip, fumble)
- Con
  - One size fits all
  - Inattention to patient variability
  - Lack of standard for care
  - Loss of autonomy (surgeon, patient)
  - Danger to innovation

Typical excuses I have used and have heard used to argue against benchmarking

- data is wrong or collected differently
- our patients are sicker than yours
  - severity of illness argument
- our hospital is busier than yours
- our patient population is different than yours
- my hospital is world famous and we don't need to compare

All potentially true and maybe even relevant but collaborative learning requires transparency to learn from the best in the group

Nationwide Children's Hospital

- More than 8,600 employees
- >1,100 medical staff
- Fourth busiest children's hospital in the country

- Fourth largest children's hospital in the US
- Top 10 Pediatric Research Institute for NIH funding

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Trauma Peer Review

- Monthly
- Physicians and nurses
- Detailed case review
- Identify opportunities for improvement

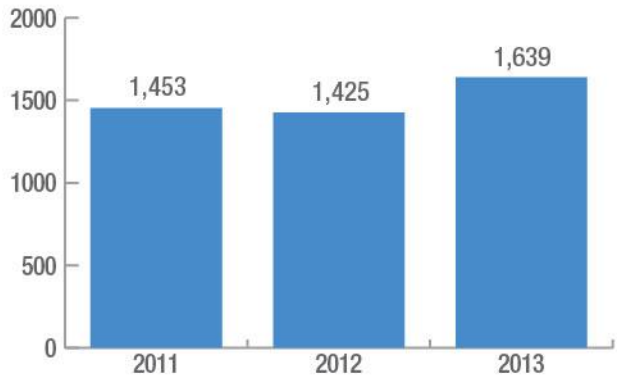
Trauma Performance Improvement and Patient Safety Committee

- Monthly
- Multidisciplinary
- Based on trauma registry
  - Statistics
  - AIM statements
  - Indicators/process filters

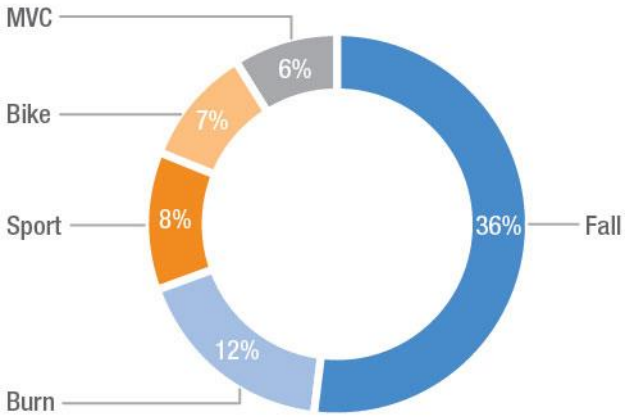
TPIPS Statistics

- Admissions
- Trauma team activations
  - Level 1 or 2
  - Disposition
- PICU admissions
- Direct to OR
- ISS > 15
- Deaths
- Complications

Admissions



Leading Cause of Injury



TPIPS Aim Statements

- Abuse screen
- Intrafacility transport guidelines followed
- Alcohol or Drug screening
- Psychology consults
- Red, Yellow and Green levels on dashboard

TPIPS Indicators/Process Filters

- Undertriage
- EMS runsheets
- PM&R consults
- Admit matrix
- RN documentation
- Transport to OR in ≤ 20 minutes
- Delay in DX
- Readmission
- Separate technical factors for
  - EMS, RN, MD, Referring Hospital, System

Trauma Executive Board

- Twice monthly meetings
- Review all of the above
- Ongoing policy review
- Respond to issues/problems
- Plan Peer Review and TPIPS meetings

Fixing problems within hospital

- Education
- Policies
- Guidelines
- Protocols
- Structures of care

Tools for Quality Improvement

- PDSA cycles
- Convene a small team of front line workers
- Flowchart diagram/Process Map
- Cause and Effect Diagrams
- Pareto Chart
- Review of Baseline Data on
  - Process Performance
  - Customer/Patient Satisfaction
  - Outcomes
- Brainstorming
- Tree Diagram
- Nominal Group Technique
- Multivoting
- Run Chart/Control Chart
- Lean
- Six sigma

Ohio Solutions for Patient Safety

- Statewide Collaboration
  - Surgical Site Infection
  - Medication Safety
- Surgical procedures
  - Ventriculoperitoneal Shunts
  - Spinal Fusions
  - Cardiac Surgery

SSI Reduction

SPS Collaborative

AIM

Reduce the number of SPS defined SSIs from 12 per year to 8 per year by December 31, 2013. Sustain this result and reduce the number further in 2014.

Key Drivers

- Appropriate Prophylactic Antibiotic; Delivered on Time
- Skin Prep
- VP Shunt Bundle Compliance
- Physician / Staff Involvement and Ownership
- Normothermia
- Ortho Specific "Bundle"

Design Changes/ Interventions

- Timing (0 to 60 minutes)
- Re-dosing
- Efficacy of drug/dose
- Real-time data analysis
- Real-time reporting of issues
- Receiving feedback concerning barriers
- Prophylactic ABX Boards in each OR

- Pre-operative patient skin prep
- Hair removal technique
- Chloraprep / Duraprep as the standard agent
- CT surgery use of Chloraprep
- CHG wipes for CT – night before and day of surgery

- Intrathecal antibiotics
- Antibiotics in irrigation fluids
- Soak shunt pieces in Vanco
- Change anesthesia changeover practice for shunts
- Redesign "Do not enter sign"
- Shunt specific cart
- Phone installed outside Neuro OR to help limit traffic.
- Anesthesia added magnet to assignment board to eliminate breaks for shunt cases.

- Use Vancomycin – agree on compliant admin
- Home instructions for washes
- Involvement of IV Team
- AM Shampoo in SU
- New location for wipes
- Checklist for OR/SU nurses
- ED to OR admits – Vanco to OR from Pharm

- Next day feedback of non-compliance to Antibiotic Timing
- Provide control charts to teams

- Creation of a Bundle

- Use of sealant for dural openings
- Change to Ancef and Gent for all NM patients
- Consider drainage of hematomas using post-op drains or via needle post-op
- Consider Plastics consult for pre-existing scars for MM patients
- Nutritional workup for potential fusion patients at initial clinic visit
- Post-op antibiotic discontinuation standard of 48 hours

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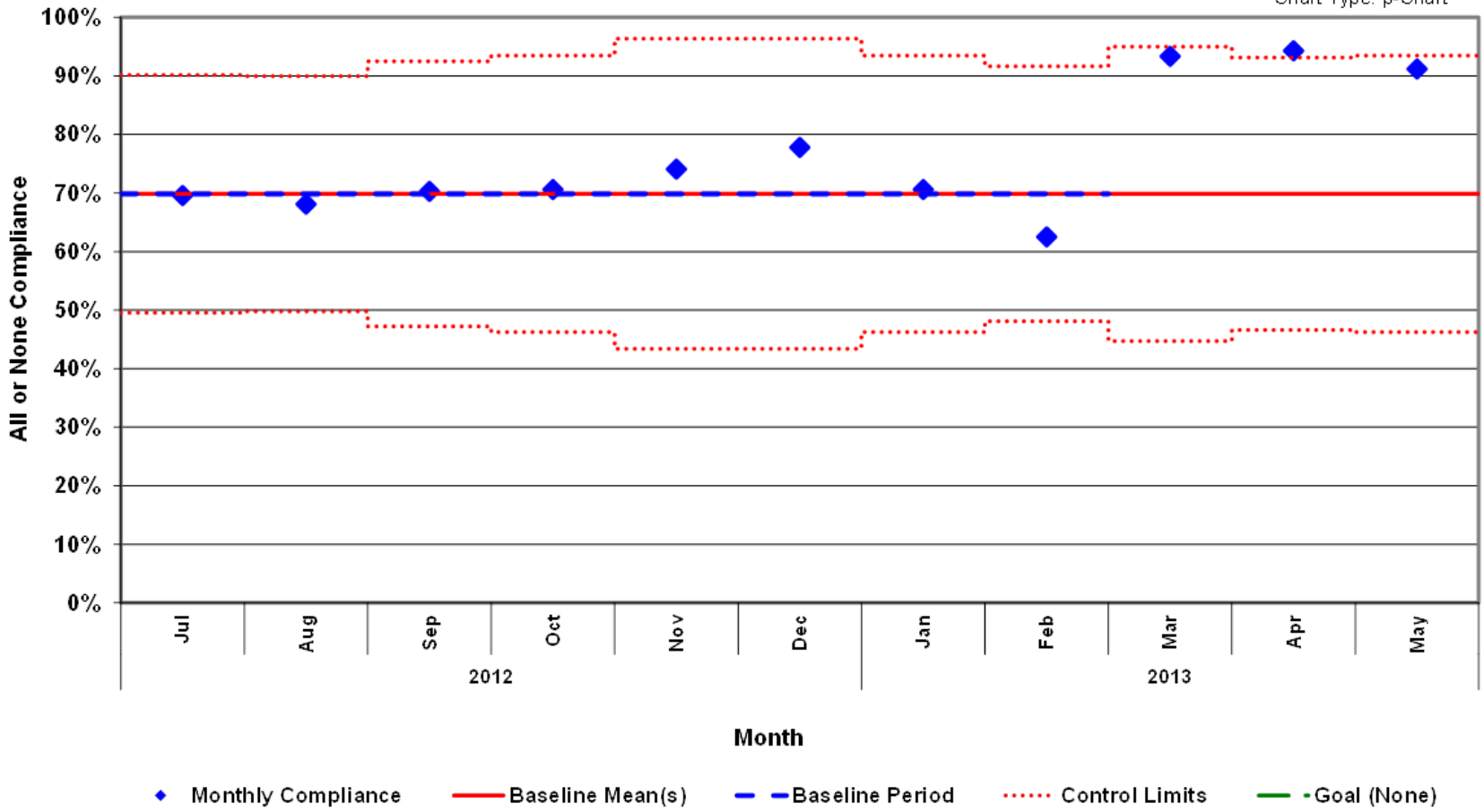
SSI Prevention Bundle
All or None Compliance

Chart Type: p-Chart



Compliant Bundles	32	32	26	24	20	21	24	25	28	33	31
Total Surgeries	46	47	37	34	27	27	34	40	30	35	34

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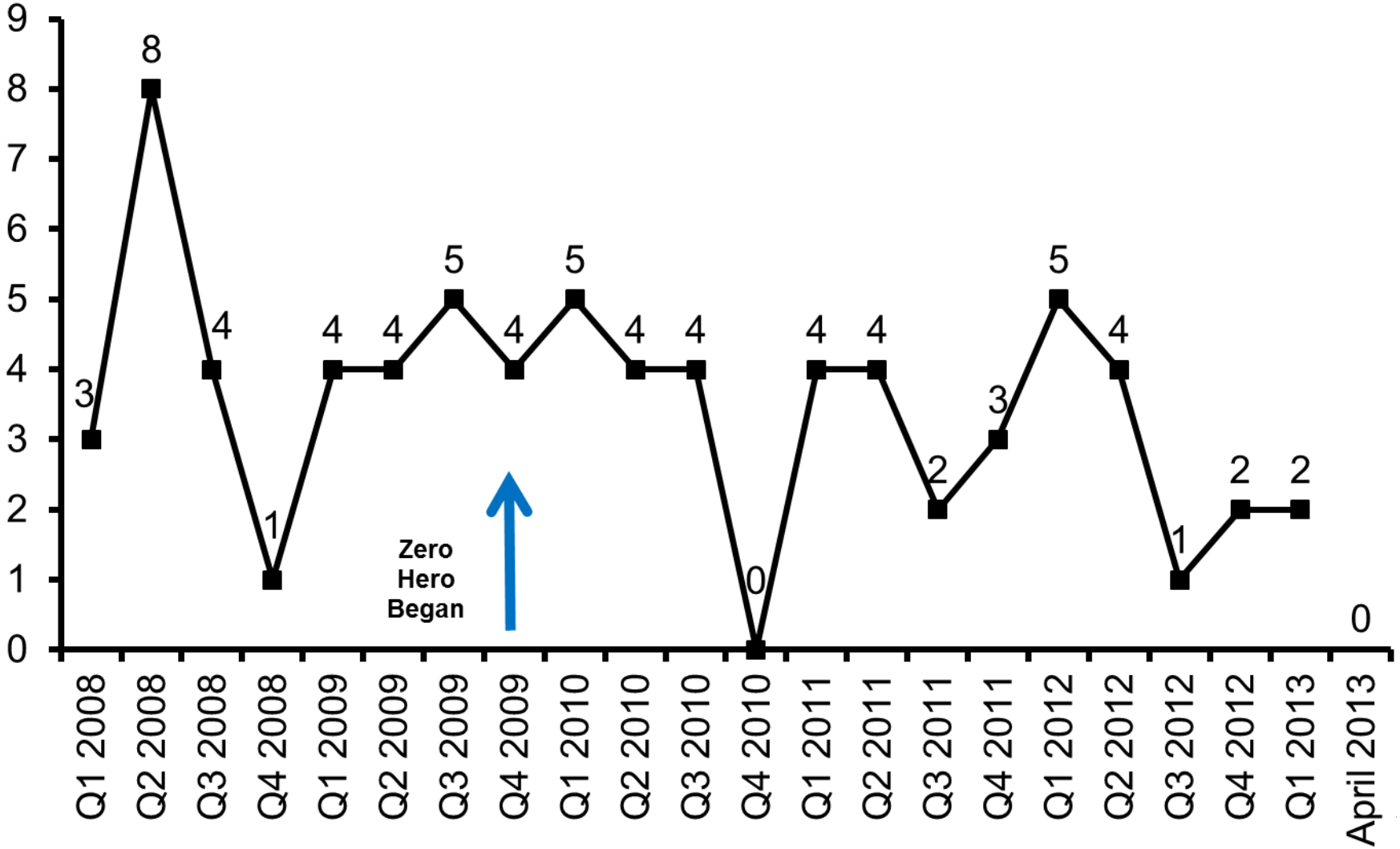
Number of Surgical Site Infection



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Eliminate Preventable Harm by end 2013

Zero HeroSM

Create a safe day. Every day.

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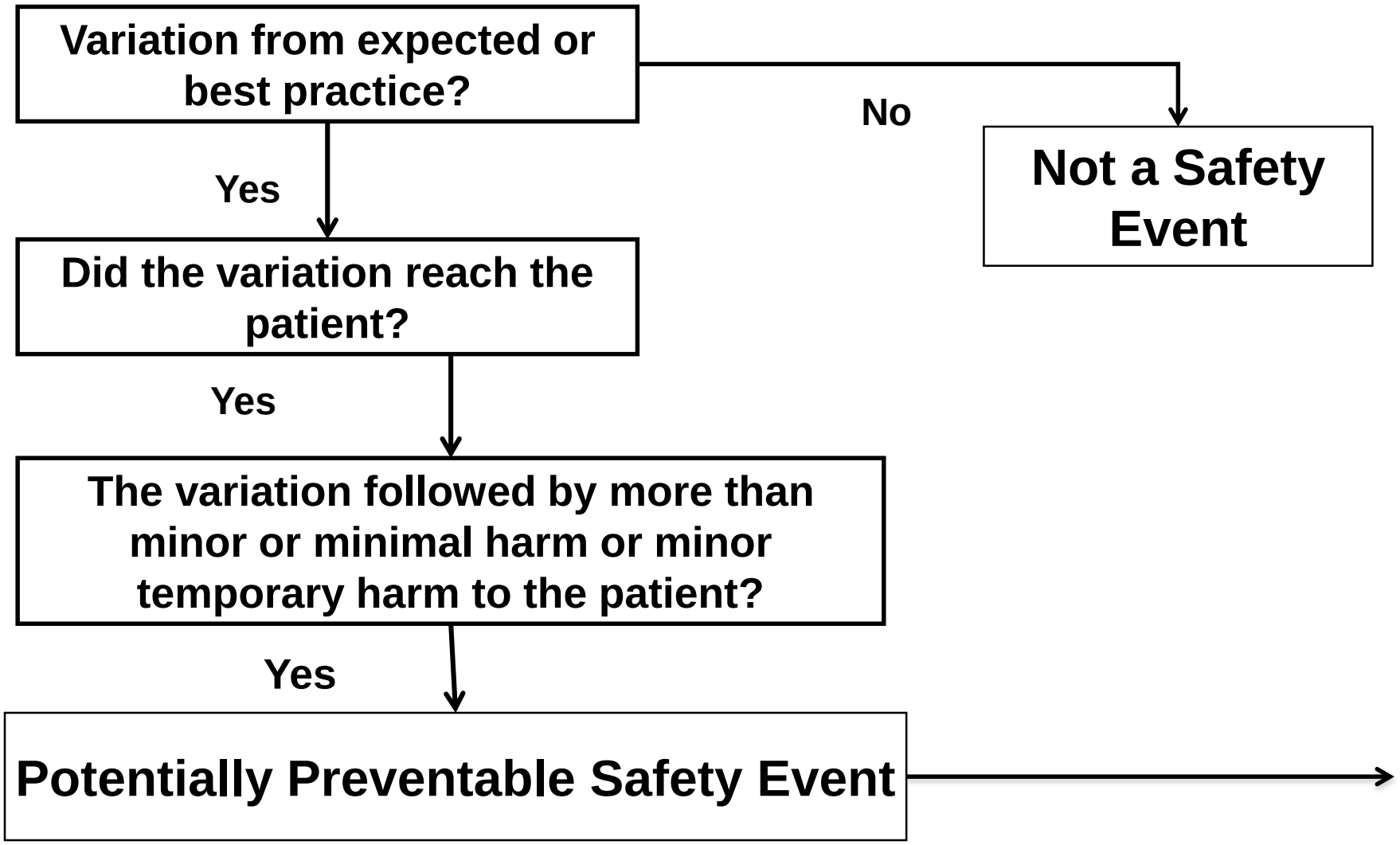
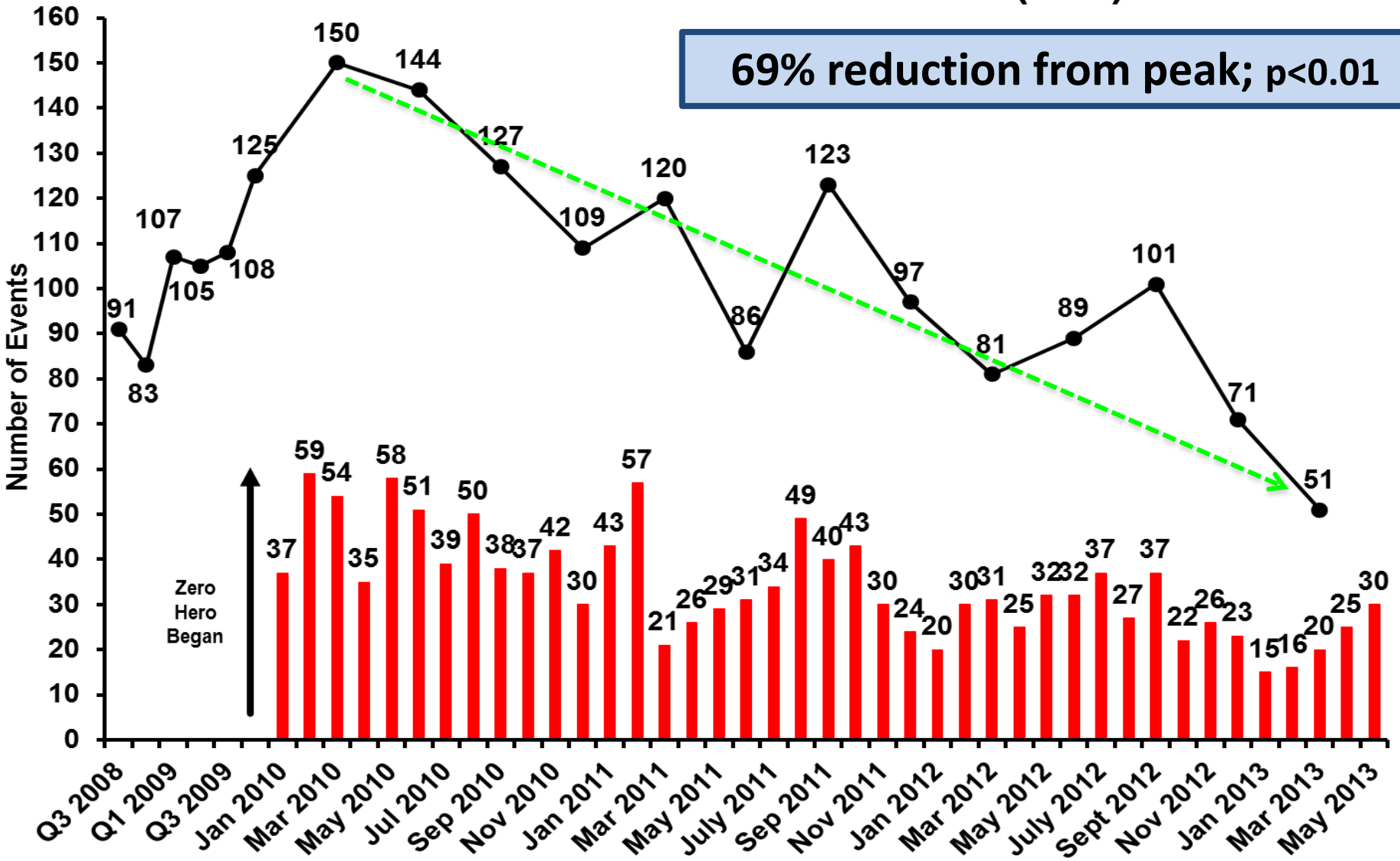
Preventable Harm Index℠	2012
Total Hospital Acquired Infections	n
Total Adverse Drug Events	n
ACT Preventable Codes	n
Surgical Complications	n
Total Serious Falls	n
Hospital Acquired Pressure Ulcers	n
Miscellaneous Harm	n
Total Serious Safety Events	n
Annual Sum	**Sum n's**

Preventable Harm Adjudication



Known complication is defined as an adverse outcome, supported in the literature as a potential risk related to care, and is not present at the time of admission or outpatient encounter.

Preventable Harm Index (PHI)



Brilli et al. *J Pediatr* 2013; in press

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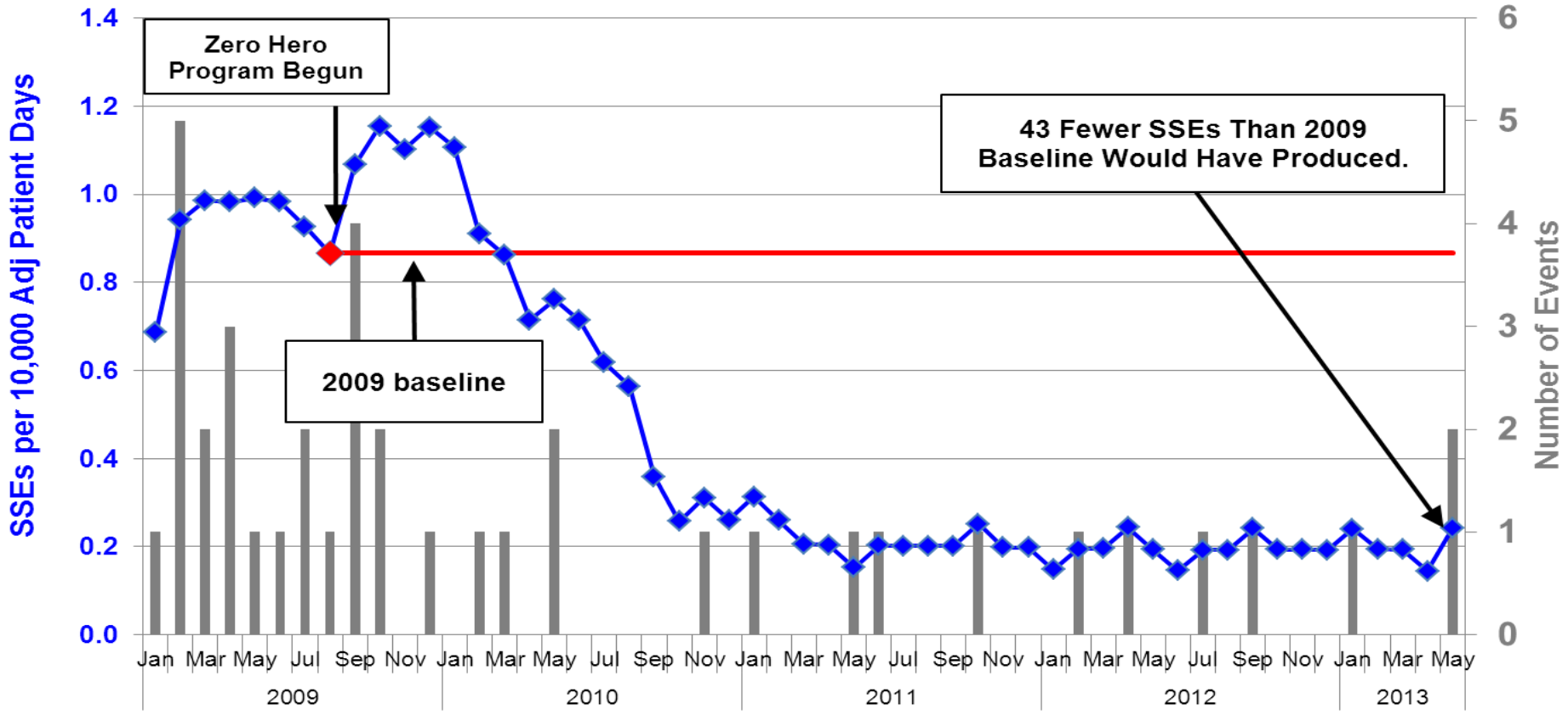
Serious Safety Event Rate

12-Month Rolling Average

NCH experiences a Serious Safety Event once every 73 days



80% reduction from peak; p<0.01

Brilli et al. *J Pediatr* 2013; in press

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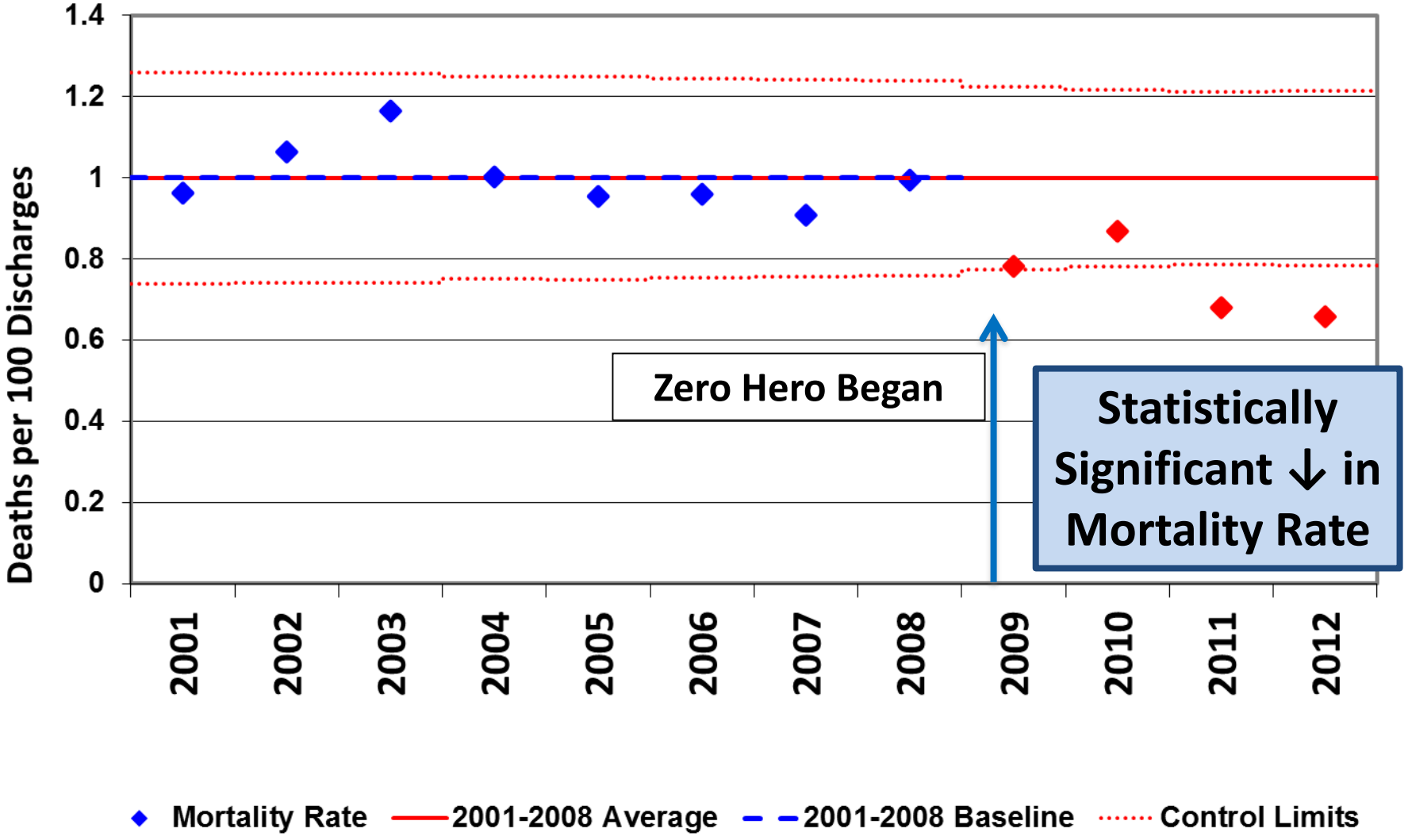
NCH Observed Mortality Rate



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Harm Domains	2010 Events	Cost per Event	Estimated 2010 cost for Domain	2012 Events	Estimated 2012 cost for Domain
Serious Safety Events	5	$440,000	$2,200,000	4	$1,760,000
Falls	5	$13,000	$65,000	0	$0
Codes outside ICU	10	$50,000	$500,000	3	$150,000
Pressure Ulcers (grade 2-3)	158	$16,000	$2,528,000	163	$2,608,000
Pressure Ulcers (grade 4)	1	$70,000	$70,000	1	$70,000
Adverse Drug Events (4-9; D-I)	277	$4,685	$1,297,745	116	$543,460
Catheter associated UTI	17	$2,000	$34,000	9	$18,000
Central line associated BSI	28	$35,000	$980,000	23	$980,000
Ventilator Associated Pneumonia	3	$50,000	$150,000	1	$50,000
Surgical Site Infections	13	$27,000	$351,000	21	$567,000
Surgical Complications	13	$15,000	$195,000	2	$30,000
Total	**530**		**$8,370,745**	**342**	**$6,551,460**

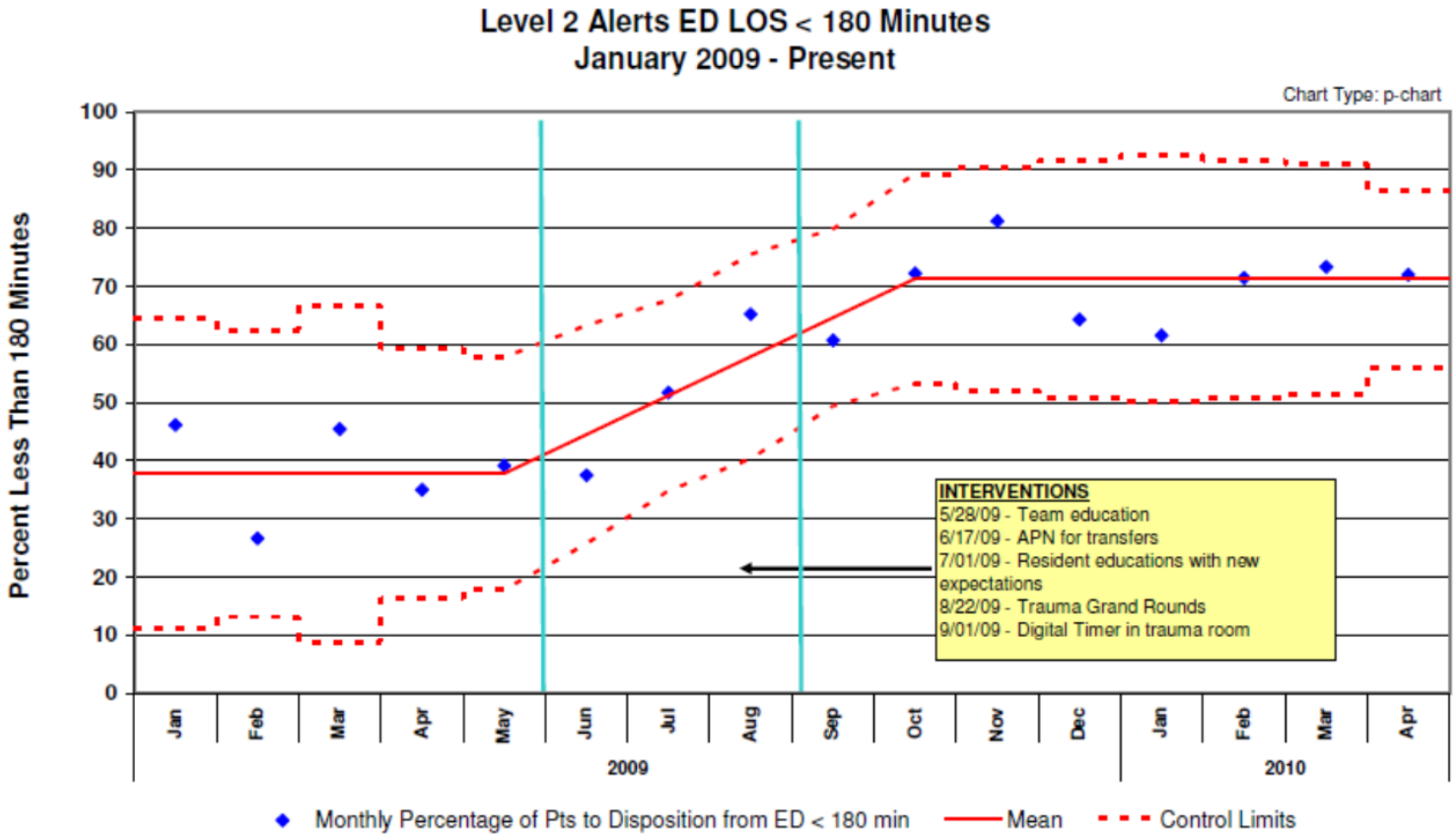
21.7% Reduction in Costs – 2010 v. 2012

QI Infrastructure Investments

- 2009 – QI Department
  - 7 FTEs
  - $700,000 budget
- 2012 – QI Department
  - 33 FTEs
  - $3.3M budget

System Infrastructure - Resources

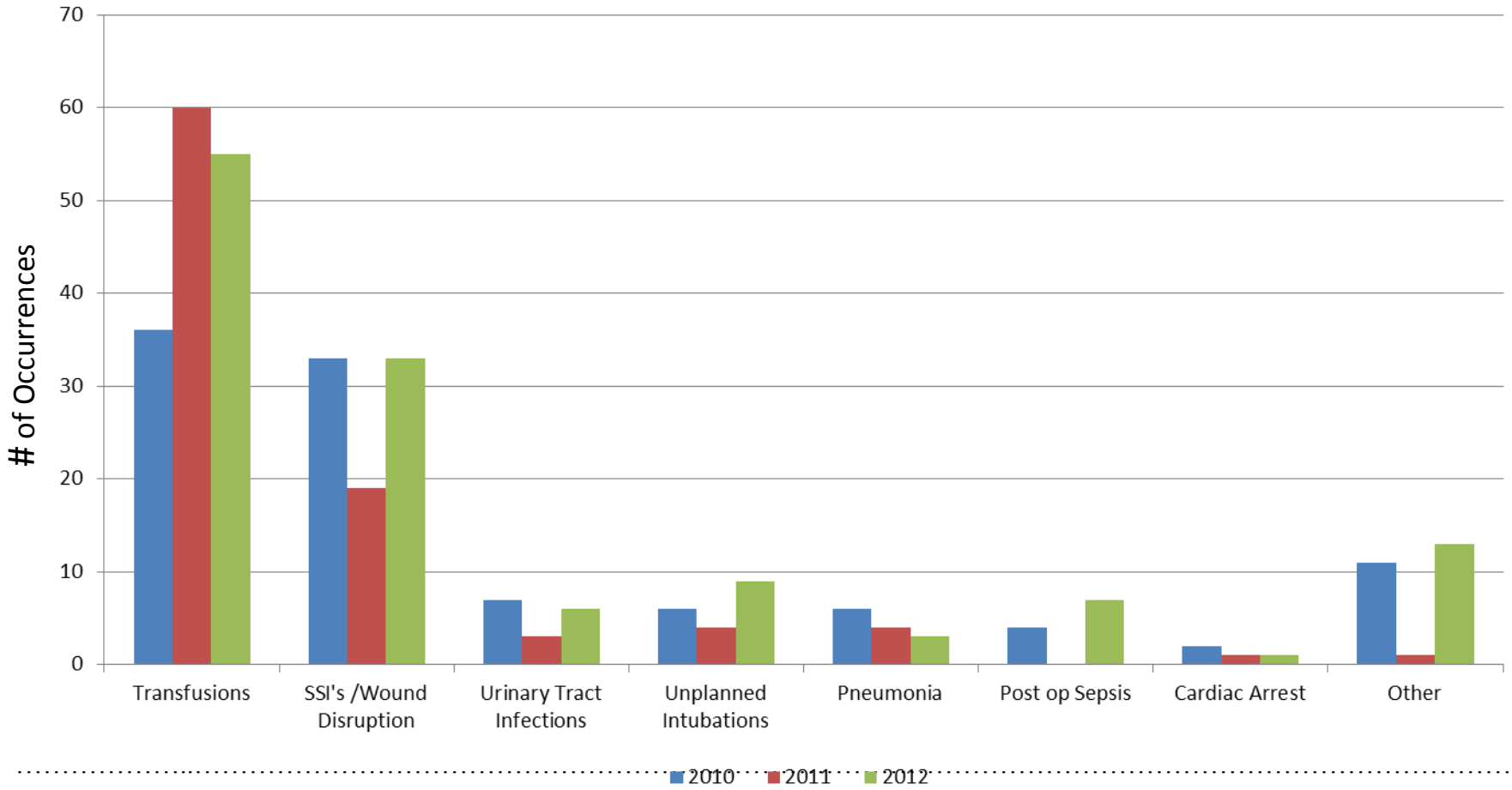
1. Error Prevention Training for all 7000 employees
2. Leadership Methods Training for 600 leaders
3. Tripled QI Staff, imbedded QI Service Line Coordinators
4. 100+ Clinical Leaders trained in Science of Quality; including 3 NCH Quality Improvement Essentials classes
5. Significantly More Data Transparency
   - Multiple Harm metrics on Internet and intranet
6. Better Real Time Reporting of Data - Intranet
7. Tactical Teams focused on each harm domain
8. Over 40,000 person-hours


Level 2 Alerts ED LOS < 180 Minutes
January 2009 - Present
Chart Type: p-chart
Percent Less Than 180 Minutes
100
90
80
70
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
2009
2010
INTERVENTIONS
5/28/09 - Team education
6/17/09 - APN for transfers
7/01/09 - Resident educations with new expectations
8/22/09 - Trauma Grand Rounds
9/01/09 - Digital Timer in trauma room
Monthly Percentage of Pts to Disposition from ED < 180 min
Mean
Control Limits

NSQIP Post Op Occurences

	Cases	Cases with Occurrences	Overall Occurrences
2010	1,354	84 (6.2%)	105
2011	1,434	87 (6.1%)	92
2012	1,466	105 (7.2%)	127

NSQIP Post Op Occurrences



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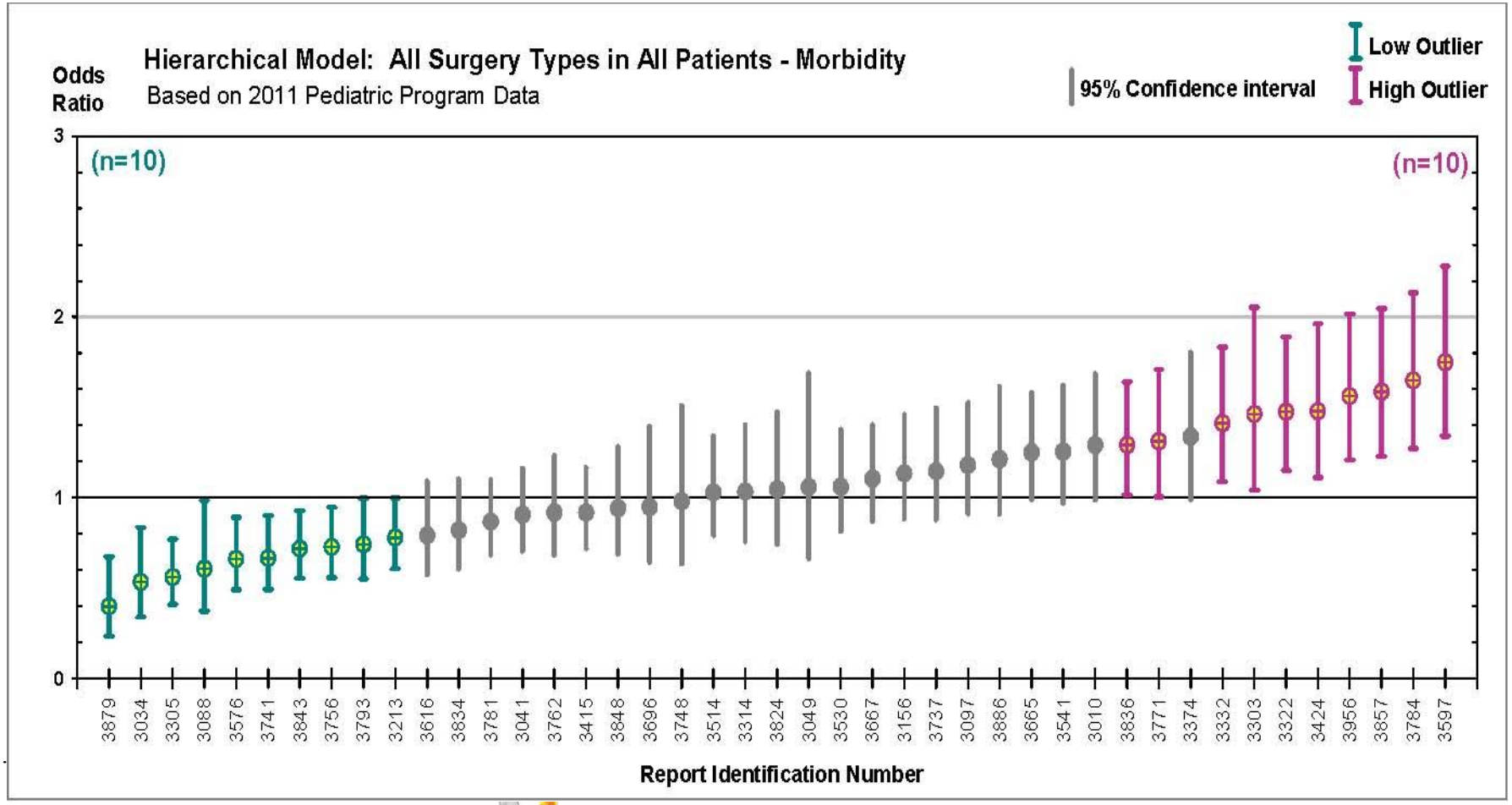
2011 NSQIP Annual Report



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How to improve

- Collaboratives
  - Within hospital
  - Between hospitals
- Definitions
  - Severity of illness
  - Measures of morbidity
- Transparency
- Seek and reduce variation
  - Processes
  - outcomes

Useful Sites for Trauma QI

- Canadian Foundation for Healthcare Improvement
- Society of Trauma Nurses
  - Trauma Outcomes & Performance Improvement Course
- McMaster Evidence Based Clinical Practice
- ACS: NTDB, TQIP
- Institute for Healthcare Improvement

Teamwork

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