Seventeenth International

Seventeenth International Scientific Symposium on Improving Quality and Value in Health Care

Presenting

Research on the Application of Continuous Improvement in Professional Education, Health Services Delivery and Research Methods

December 5, 2011
Orlando, Florida, USA

Sponsored by the

Institute for Healthcare Improvement

In conjunction with the

23rd Annual National Forum on Quality Improvement in Health Care

and by the

Academy for Healthcare Improvement

Acknowledgments

On behalf of the Academy for Healthcare Improvement, the Co-Chairs would like to thank the individuals whose contributions have made the Seventeenth International Scientific Symposium on Improving Quality and Value in Health Care a success. The Institute for Healthcare Improvement (IHI) has been phenomenal in its 17 years of enduring encouragement, assistance and collaboration. Particular thanks are due the abstract reviewers Andrea Benin, Dean Cleghorn, Peter Dodek, Mary Dolansky, Mary Emmett, Laura Lee, Timothy Lineberry, Andrea Mitchell, Blanca Molina, Duncan Neuhauser, Linda Norman, Greg Ogrinc, Patricia Patrician, David Paulus, Ileana Pina, Brian Regan, Martin Rejler, Sue Scott, Eileen Seeholzer, Dimitrios Siassakos, Jacob Steinberg, and Peter Wilcock without whose efforts we could not accomplish a Symposium of this quality. Thanks, as well, are due all those who are willing to submit their research for review. We would like to thank the staff of the Institute for Healthcare Improvement, who have handled our many requests with patience and courtesy. Thanks to the University of Missouri Office of Continuing Medical Education and Center for Health Care Quality for the donation of staff time and many other things needed to administer a conference of this type. Last, but certainly not least, we thank our program committee members – Pierre Barker, Jill Cawiezell, Julie Johnson, Uma Kotagal, Shirley Moore, David Nash, John Ovretveit, Gareth Parry and Ted Speroff - who have dedicated countless hours to the development of this year's program.

The goals of the Scientific Symposium are to:

1. Encourage, accelerate and improve the science of continuous improvement in health care and health professions education.
2. Provide a forum in which investigators from around the world can introduce new work for peer review and discussion.

Abstract Review Process:

Abstracts are solicited via a "Request for Abstracts" (RFA) through early September. Receipt of abstracts is acknowledged and each abstract is then blinded and reformatted as a PDF document before sending to reviewers . The reviewers are instructed to rate highly studies that advance the field of quality improvement science and application in health care and health professions education based on originality, scientific excellence and results. Anyone with a potential conflict of interest is excluded from the decision making for a particular abstract. The program administrator enters and averages the scores. Abstracts are selected for presentation on the basis of the review scores. This process is true to our mission to provide a forum in which investigators from around the world can introduce new work for peer review and discussion about the science of improving healthcare and health professions education.

Linda Headrick, MD, MS
Co-Chair
Helen Mae Spiese Distinguished Faculty Scholar
Senior Associate Dean for Education
Professor of Medicine
University of Missouri School of Medicine
Columbia, Missouri, USA

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Director, Department of Child Public Health, Jönköping County Council
Chairman, Board of Clinical Research, Jönköping County Council
Chairman of the Swedish Pediatric Society

Allison Rentfro, PhD, MPA
Symposium Administrator
University of Missouri
Columbia, Missouri, USA

Letter of Welcome to the VA National Quality Scholars Fellowship Program

We would like to extend a warm welcome to the VA National Quality Scholars Fellowship Program (VAQS). VAQS is a two year post-residency fellowship program in healthcare quality improvement for physician and nursing scholars. Providers learn to develop and apply new knowledge for the ongoing improvement of healthcare services for the VA and the nation.

The VAQS Program is comprised of six sites located in Birmingham AL, Cleveland, OH; Iowa City, IA; Nashville, TN; San Francisco, CA; and White River Jct, VT. The Dartmouth Institute at Dartmouth College serves as the hub site and coordinates curriculum and studies. The curriculum includes research and clinical training in quality improvement, healthcare measurement, and systems theory. Fellows spend approximately 80% of their time in quality improvement research and education; the remainder is spent in clinical activities.

This year's posters from the VAQS Fellowship include the following titles:

Birmingham AL - "Quality and Safety Tools for Improvement" Authors: Jeremiah Newsom, Suzie Miltner, Carlos Estrada

Cleveland OH – "Teaching Interdisciplinary Improvement While Doing Improvement" Authors: Mary Dolansky, RN, PhD, Nancy Tinsley, RN, MBA

San Francisco CA- "Creating Change from the Bottom Up: Mobilizing Interdisciplinary Stakeholders to Improve Care Transitions for High Risk Veterans" Authors: Stephens, C., Moy, N., Pierce, R., Bachhuber, M., Wallhagen, M., Lee, S.

White River Jct. VT – "A Decision Support Intervention for Depression Treatment in a Multiple Sclerosis Mental Health Clinic Using a Clinical Microsystems Approach." Author: Brant J. Oliver, NP, MSN, MPH

Please take some time during the break to review the posters of these dedicated scholars and faculty.

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INVITED SPEAKERS and PLANNING COMMITTEE CONFLICT OF INTEREST DISCLOSURE

*Current ACCME (Accreditation Council for Continuing Medical Education) rules state that participants in CME activities should be made aware of any affiliation or financial interest that may affect the planning of a conference or a speaker's presentation(s). Each planning committee member and speaker has been requested to complete a conflict of interest statement for the **17th International Scientific Symposium on Improving Quality and Value in Health Care**, and those statements follow:*

The following planning committee members/speakers do not anticipate discussing unlabeled uses of any commercial or investigational products, and have disclosed that they have no relationship with any commercial firm having products related to topics they will discuss at this educational activity:

- Richard H. Allen
- Chris N. Alsip
- Boel Andersson-Gäre
- Anthony V. Aspesi
- Pierre Barker
- Lindsay A. Bliss
- Michael E. Bowen
- Yiscah Bracha
- Irene D. Castelino
- Justin M. Glasgow
- Marjorie M. Godfrey
- Jonathan T. Huntington
- Jill S. Huppert
- Linda Headrick
- Julie Johnson
- Srikant B. Iyer
- Brent C. James
- Ernest Kanyoke
- Uma Kotagal
- Miriam S. Marcus-Smith
- V. Rebecca Marrone
- Wallace J. Matthews
- Richard E. McClead, Jr.
- Rory McQuillan
- Marian E. Melish
- Adam G. Mezoff
- Faten Mitchell
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- David Nash
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- John Øvretveit
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- Allison Rentfro
- Natalie B. V. Riblet
- David W. Roberson
- Jill Scott Cawiezell
- Kim A. Sears
- Julia J. Smith
- Stacey James Smith
- Ted Speroff
- Bonnie Stevens
- Katherine M. Stevenson
- Dawn A. Thorsten
- Carolyn A. Watts

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- None

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The Office of Continuing Education, School of Medicine, University of Missouri designates this educational activity for a maximum of 5.5 *AMA PRA Category 1 Credit(s)™*. Physicians should only claim credit commensurate with the extent of their participation in the activity.

17th International Scientific Symposium on
Improving the Quality and Value of Health Care
December 5, 2011 - Orlando, Florida, USA
Gaylord Palms Resort, Osceola Ballroom C/D

Moderators: Linda Headrick, MD and Julie Johnson, MSPH, PhD

Page	Time	Title	Presenter
	7:30-8:15A	Continental Breakfast	
	8:15A	Welcome and Opening Comments	**Mark Splaine, MD** **Maureen Bisognano, President and CEO, IHI**
1	8:40A	"Fast Track": Designing the System to Perform as the Name Suggests	**Srikant B. Iyer, MD, MPH** Assistant Professor Cincinnati Children's Hospital Medical Center Cincinnati, Ohio, USA
5	9:00A	Professionals Learning to Lead Improvement Efforts in Health and Social Care: A Realist Evaluation of an Interprofessional Practice-Based Masters Program	**Katherine Stevenson, MSc, BScPT, BA (Honours)** Adjunct Lecturer and PhD Candidate The Jönköping Academy for the Improvement of Health and Welfare Jönköping, Sweden
7	9:20A	Improving Quality Care Goals Through an Interprofessional Intervention on an Exemplary Care and Learning Site	**Stacey J. Smith, MD, FACP** Associate Program Director and Clerkship Director, Internal Medicine Lehigh Valley Health Network Allentown, Pennsylvania, USA
11	9:40A	A Quality Improvement Project to Reduce Avoidable Emergency Department Admissions Due to Falls and UTIs at a Long-Term Care Home	**Faten Mitchell, Hons.B.Sc, PMP** Quality Improvement Coach Health Quality Ontario Ontario, Canada
14	10:00A	Rapid Adoption of an Evidence Based Recommendation: Lactobacillus Rhamnosus GG for Acute Gastroenteritis	**Michelle W. Parker, MD** Clinical Instructor and Pediatric Hospitalist Cincinnati Children's Hospital Medical Center Cincinnati, Ohio, USA
	10:20A	Poster Session and Break	

Moderators: Lloyd Provost, MS and Pierre Barker, MD

Page	Time	Title	Presenter
17	10:40A	Decreasing Adverse Drug Events (ADES) via a Hospital-Wide Quality Collaborative	**Richard E. McClead, Jr., MD, MHA** Professor & Vice-Chairman Medical Director, QI Services, Dept of Peds The Ohio State University Nationwide Children's Hospital, Columbus. Ohio. USA
20	11:00A	Effect of a Computerized Decision Support Tool on Percent of Asthma Patients with Current Asthma Action Plans: An Interrupted Time Series Analysis	**Yiscah Bracha, MS, PhD** Assis Vice President for Data/Analytic Systems Anderson Center for Health Systems Excellence Cincinnati Children's Hospital Cincinnati. Ohio. USA
23	11:20A	Improving the Quality of Time-Out with Enhanced Communication and Teamwork to Promote a Culture of Safety	**Dawn A. Thorsten, RN, BBA** Quality Improvement Specialist Gundersen Lutheran Medical Center La Crosse, Wisconsin, USA
	11:40A	AHI Duncan Neuhauser Award for Curricular Innovation	**Presented by: Karyn Baum, MD and Les Hall, MD**
		•**1st Place**: "Interprofessional Safety Simulation"	Institution: University of Missouri
		•**2nd Place**: "The Dartmouth-Hitchcock Leadership Preventive Medicine Residency Program's 'Developmental Journey'"	Institution: Dartmouth-Hitchcock Leadership Preventive Medicine Residency Program and the Concord Leadership Preventive Medicine Residency Program
	12:00P	Lunch and Posters	
	1:00P	Guided Poster Tour with Duncan Neuhauser, PhD Tour to Include the Following Posters:	
		• A Hub and Satellite Model to Improve the Quality of Care for Patients with Congestive Heart Failure	**Michael E. Bowen, MD, MPH** Fellow, VA National Quality Scholars' Program VA Tennessee Valley Healthcare System Nashville, Tennessee, USA

		• Reducing Nosocomial Infections (NI) in the NICU - A Performance Improvement Journey	**Marian E. Melish, MD** Medical Director of Infection Control and Professor of Pediatrics Kapi'olani Medical Center and University of Hawaii John A Burns School of Medicine Honolulu, Hawaii, USA
		• Transparency with Performance Measurement and Outcomes Reporting Drives Clinical Improvements in an Uncomplicated Essential Hypertension Disease Management Program	**Dawn A. Thorsten, RN, BBA** Quality Improvement Specialist Gundersen Lutheran Medical Center La Crosse, Wisconsin, USA

Moderators: Boel Andersson-Gäre, MD, PhD and Jill Cawiezell, PhD, RN, FAAN

Page	Time	Title	Presenter
26	1:30P	Establishing a System for Reliable Implementation of Partograph Use Reduces Stillbirth Rates in a District Hospital in Rural Ghana	**Ernest Kanyoke, MSc.** Project Officer Project Fives Alive, National Catholic Health Service (NCHS) Tamale, Ghana
29	1:50P	IBCD: Effectiveness and Sustainability of a Checklist to Improve Quality of Care for Hospitalized General Medical Patients	**Anthony V. Aspesi** University of Chicago Pritzker School of Medicine Chicago, Illinois, USA
33	2:10P	Primary Care Sensitive Measures Before and After the 1999 Implementation of a Patient-Centered Medical Home Model in an Urban Primary Care Center	**Julia J. Smith, MS** Biostatistician Southcentral Foundation Anchorage, Alaska, USA
36	2:30P	Improving our Ability to Contact Adolescent Women with an STI: Results of a Planned Experiment	**Jill S. Huppert, MD, MPH** Associate Professor, OB/GYN and Pediatrics Cincinnati Children's Hospital Medical Center Cincinnati, Ohio, USA
40	2:50P	Stroke 90:10 - Improving Stroke Care Across North West of England Using the IHI Breakthrough Series Collaborative Model	**Maxine Power, PhD, MPh** Executive Director NHS QUEST/QIPP National Improvement Advisor Salford United Kingdom
	3:10P	Short Break	

Moderator: Paul V. Miles, MD		
3:30P	Learning from Every Patient: Building Research into High-Performance Care Delivery	**Brent C. James, MD** Chief Quality Officer Executive Director, Institute for Health Care Delivery Research Intermountain Healthcare Salt Lake City, Utah, USA
4:15P	Scientific Symposium Best Presentation Award AHI Paul Batalden Leadership Award	
4:30P	Program Adjourns	

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POSTER SESSION

Page	Title	Presenter
43	"Understanding Instantaneous Demand: Modeling Staffing Levels Against Patient Demand"	**Richard H. Allen, Dr.P.H.** San Marcos, Texas, USA
45	"Decreasing Wrong Patient/Wrong Examination Events in the Radiology Department of a Large Children's Hospital"	**Chris N. Alsip, BSRT (R) (CT)** Cincinnati Children's Hospital Medical Center Cincinnati, Ohio, USA
49	"Thirty-Day Outcomes Support Implementation of a Surgical Safety Checklist: Changing Culture"	**Lindsay A. Bliss, MD** Resident, General Surgery, Univ of Connecticut/Saint Francis Hospital and Medical Center Hartford, Connecticut, USA
52	"A Hub and Satellite Model to Improve the Quality of Care for Patients with Congestive Heart Failure"	**Michael E. Bowen, MD, MPH** VA Tennessee Valley Healthcare System Nashville, Tennessee, USA
56	"Management of Urgent and Emergent Cases Timeliness to Operating Room at a Level 1 Trauma Center"	**Irene D. Castelino, RN, CNOR, MBA** Surgical Services Regional Quality and Performance Improvement University of Virginia Health System Charlottesville, Virginia, USA
60	"Novel Classification Approach for Longitudinal Evaluation of Quality Improvement"	**Justin M. Glasgow, MS** Iowa City VA Healthcare System and University of Iowa Iowa City, Iowa, USA

POSTER SESSION (CONTINUED)

POSTER SESSION (CONTINUED)

Page	Title	Presenter
82	"Improving the Emergency Care of Intestinal Rehabilitation Patients with Central Lines and Fevers"	**Adam G. Mezoff, MD, CPE, AGAF** Clinical Director of Gastroenterology Cincinnati Childrens Hospital Medical Center Cincinnati, Ohio, USA
85	"Using the IOM Core Competencies to Improve Inpatient Core Measures Compliance: A Collaborative Quality Improvement Project"	**Jamie E. Moran, MSN, RN, CMSRN, CIC** Infection Preventionist Seton Highland Lakes Hospital and Clinics Burnet, Texas, USA
87	"Pharmacist Glycemic Control Team Improves Quality of Glycemic Control in Surgical Patients, While Reducing Post-Discharge Hospital Admissions and Medical Costs"	**David M. Mosen, PhD, MPH** Health Services Researcher Director of the Research Response Team Affiliate Investigator Portland, Oregon, USA
89	"Feasibility and Effectiveness of a Platform for Interdisciplinary Learning, Innovation, and Improvement in the Operating Room"	**Sharon L. Muret-Wagstaff, PhD, MPA** Vice Chair, Faculty Development & Innovation, Dept of Anesthesia, Critical Care and Pain Medicine Beth Israel Deaconess Medical Center/Harvard Medical School Boston, Massachusetts, USA
92	"A Decision Support Intervention for Depression Treatment in a Multiple Sclerosis Mental Health Clinic Using a Clinical Microsystems Approach"	**Brant J. Oliver, PhD(c), NP, MSN, MPH** Fellow, VA National Quality Scholars Program (VAQS) White River Junction, Vermont, USA
97	"Improving the Safety and Effectiveness of Heparin Infusions at a Large Academic Hospital"	**Robert M. Patrick, MD, MBA** First Year Fellow VA Quality Scholars Program (VAQS) Louis Stokes Cleveland Veterans Affairs Medical Center Cleveland, Ohio, USA
101	"Family Medicine Residency Improvement Curriculum: Development, Evaluation and Improvement"	**Mellisa A. Pensa, MD** Preventive Medicine Resident Oregon Health and Science University Portland, Oregon, USA

POSTER SESSION (CONTINUED)

Page	Title	Presenter
104	"Making Improvement Science Mainstream"	**Julie E. Reed, PhD** Imperial College London London, United Kingdom
107	"Implementation of a Distress Screening Instrument into Routine Care for Head and Neck Cancer Patients: A Mental Health Quality Improvement Project"	**Natalie B. V. Riblet, MD** Resident in Psychiatry and Preventive Medicine Dartmouth Hitchcock Medical Center Lebanon, New Hampshire, USA
109	"Medical Record Complexity and Adverse Events"	**David W. Roberson, MD, FACS** Associate Professor of Otolaryngology Children's Hospital Boston/Harvard Medical School Boston, Massachusetts, USA
113	"Medication Errors in Hospital and Community Settings: Risk Factors in Eight Countries"	**Kim A Sears, RN, PhD** Assistant Professor, School of Nursing Queen's University Kingston, Ontario, Canada
115	"Factors Influencing Implementation of Knowledge Translation Strategies for Improving Pediatric Pain Practicies in Hospitalized Children"	**Bonnie Stevens, RN, PhD, FCAHS** Professor, University of Toronto/Signy Hildur Eaton Chair Hospital for Sick Children Toronto, Canada
116	"Transparency with Performance Measurement and Outcomes Reporting Drives Clinical Improvements in an Uncomplicated Essential Hypertension Disease Management Program"	**Dawn Thorsten, RN, BBA** **Quality Improvement Specialist** Gundersen Lutheran Health System La Crosse, Wisconsin, USA
120	"Patterns in Patient-Centered Care Innovation in Washington State"	**Carolyn (Cindy) A. Watts, PhD** Virginia Commonwealth University School of Allied Health Richmond, Virginia, USA

"Fast Track": Designing the System to Perform as the Name Suggests

Srikant B. Iyer, Michael J. Buncher, Paula J. Gallagher, Joseph W. Luria

Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio

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Background:
Emergency department (ED) crowding is a well-recognized phenomenon resulting from a mismatch between demand and capacity, and the CCHMC ED offered no exception to its occurrence. Analysis of baseline system performance revealed that the existing ED Fast Track (FT) served 48% of patients classified as Emergency Severity Index (ESI) 4 or 5 and resulted in a 2.4 hour average length of stay (LOS).

Purpose of the Study:
The aim was to redesign the FT to improve capacity and patient LOS without negatively affecting timeliness of care for patients seen outside the FT. Specifically, we sought to increase the proportion of patients with ESI 4 or 5 seen in FT from 46% to 60%, while reducing FT LOS to 1.5 hours.

Methods:
The improvement team proceeded through a design phase from May 1 through August 31, 2010. A key driver diagram was created to inform the theory for improvement. Queuing theory and discrete event simulation were used to determine necessary server resources to better align demand and capacity. The intervention consisted of 4 major components: a 2-tiered triage system was designed to efficiently segment patients eligible for FT; a team approach to care delivery was designed (in contrast to the baseline silo model); a virtual bedding concept was applied by the creation of a results waiting area; and finally, medical documentation was offloaded to scribes. An intervention prototype (without scribes) was tested from September 1 through September 29, 2010. Results were used to modify the intervention, and a near-final design was implemented on January 14, 2011. Scribes were fully implemented on May 14, 2011. Statistical process control methods were used to determine the effects on system performance. A p-chart was used to measure the proportion of patients with ESI level 4 or 5 receiving care in FT, and a run chart was used to measure LOS. Standard rules for control and run chart interpretation were used to determine the occurrence of statistically significant change.

Results:
The period from November 14, 2009 through February 28, 2010 established a baseline system performance of 48% and 2.4 hours for proportion of patients and LOS, respectively. Figure 1 is an annotated p-chart displaying the proportion of patients each week with ESI level 4 or 5 receiving care in FT. This chart revealed an improvement over time to a current average value approaching 60%. Figure 2 is an annotated run chart displaying the weekly average LOS for patients receiving care in FT. This chart reveals an improvement over time to an average value of 1.8 hours since full intervention

implementation on May 14, 2011. LOS for patients seen outside FT was not negatively affected; in fact, a conservative estimate reveals a 4% reduction in LOS for patients seen outside FT.

Conclusions and Implications:
The FT was redesigned to deliver care to increased numbers of patients while simultaneously decreasing patient LOS. An indirect reduction in LOS for patients seen outside the FT is also suggested. Collaboration with ancillary services, such as laboratory medicine and radiology, are likely required to meet the LOS goal of 1.5 hours.

FIGURE 1

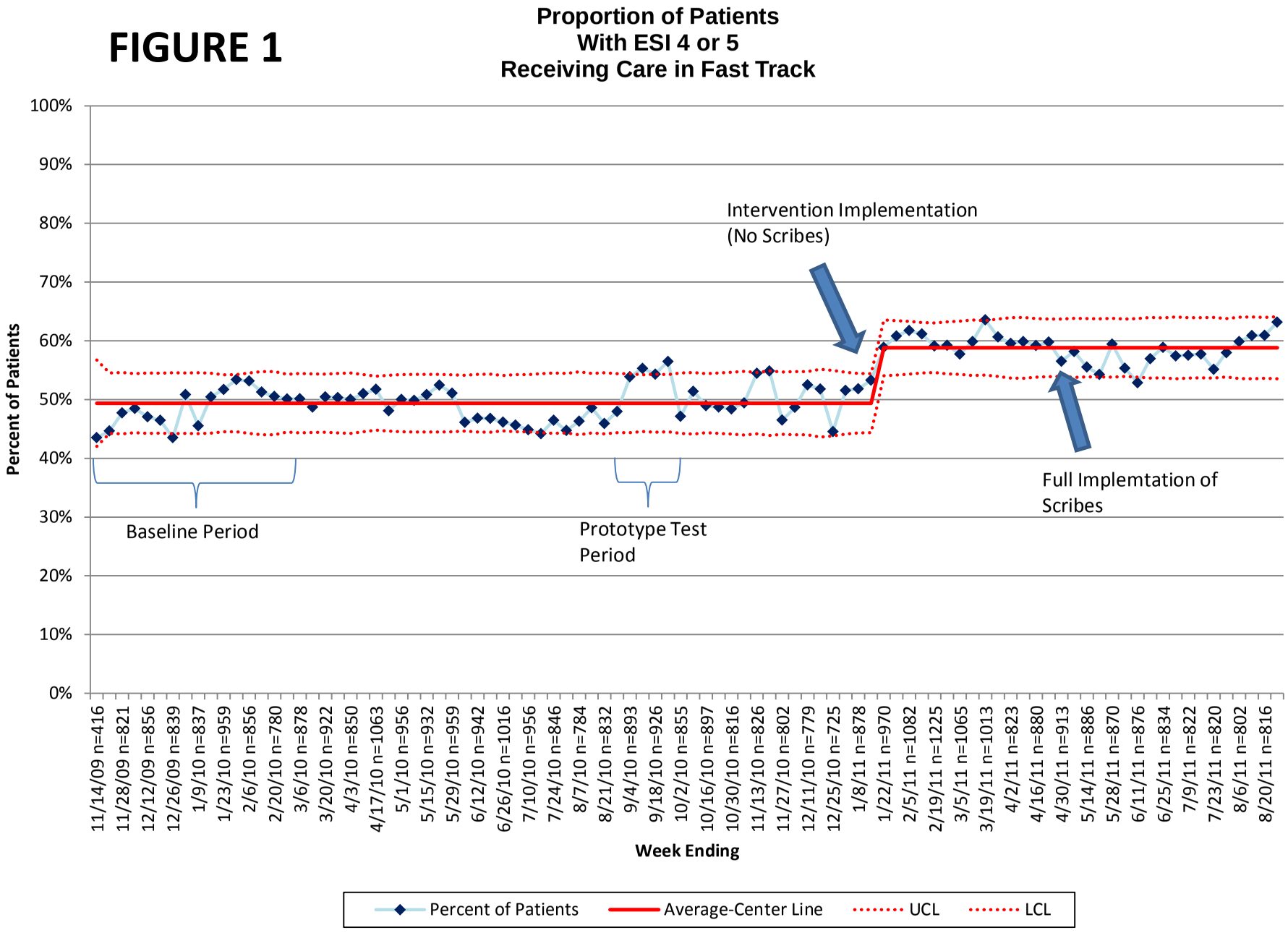
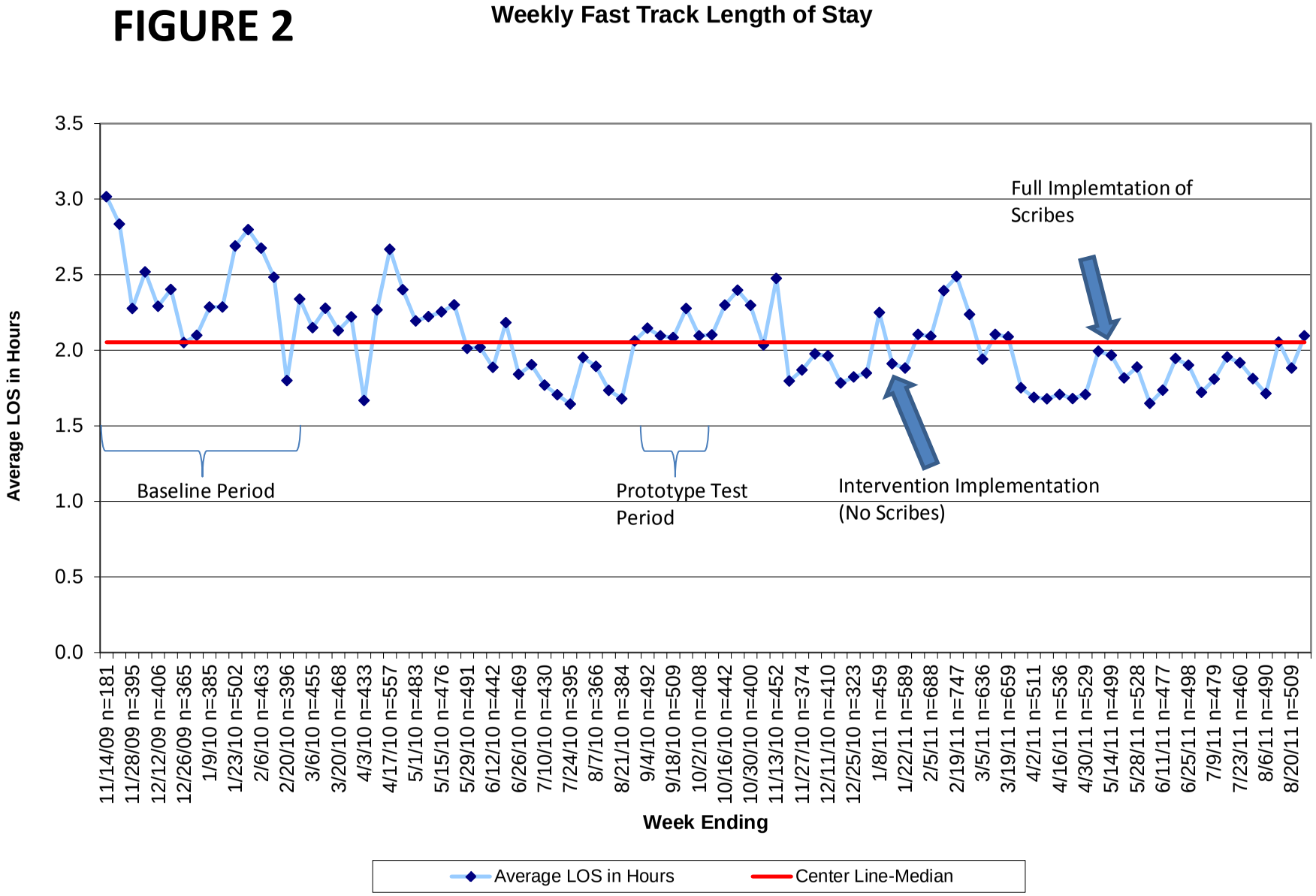

Proportion of Patients
With ESI 4 or 5
Receiving Care in Fast Track
Percent of Patients
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Intervention Implementation
(No Scribes)
Full Implemtation of
Scribes
Baseline Period
Prototype Test
Period
11/14/09 n=416
11/28/09 n=821
12/12/09 n=856
12/26/09 n=839
1/9/10 n=837
1/23/10 n=959
2/6/10 n=856
2/20/10 n=780
3/6/10 n=878
3/20/10 n=922
4/3/10 n=850
4/17/10 n=1063
5/1/10 n=956
5/15/10 n=932
5/29/10 n=959
6/12/10 n=942
6/26/10 n=1016
7/10/10 n=956
7/24/10 n=846
8/7/10 n=784
8/21/10 n=832
9/4/10 n=893
9/18/10 n=926
10/2/10 n=855
10/16/10 n=897
10/30/10 n=816
11/13/10 n=826
11/27/10 n=802
12/11/10 n=779
12/25/10 n=725
1/8/11 n=878
1/22/11 n=970
2/5/11 n=1082
2/19/11 n=1225
3/5/11 n=1065
3/19/11 n=1013
4/2/11 n=823
4/16/11 n=880
4/30/11 n=913
5/14/11 n=886
5/28/11 n=870
6/11/11 n=876
6/25/11 n=834
7/9/11 n=822
7/23/11 n=820
8/6/11 n=802
8/20/11 n=816
Week Ending
Percent of Patients
Average-Center Line
UCL
LCL

FIGURE 2


Weekly Fast Track Length of Stay
Average LOS in Hours
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Full Implemtation of Scribes
Baseline Period
Prototype Test Period
Intervention Implementation (No Scribes)
11/14/09 n=181
11/28/09 n=395
12/12/09 n=406
12/26/09 n=365
1/9/10 n=385
1/23/10 n=502
2/6/10 n=463
2/20/10 n=396
3/6/10 n=455
3/20/10 n=468
4/3/10 n=433
4/17/10 n=557
5/1/10 n=483
5/15/10 n=476
5/29/10 n=491
6/12/10 n=442
6/26/10 n=469
7/10/10 n=430
7/24/10 n=395
8/7/10 n=366
8/21/10 n=384
9/4/10 n=492
9/18/10 n=509
10/2/10 n=408
10/16/10 n=442
10/30/10 n=400
11/13/10 n=452
11/27/10 n=374
12/11/10 n=410
12/25/10 n=323
1/8/11 n=459
1/22/11 n=589
2/5/11 n=688
2/19/11 n=747
3/5/11 n=636
3/19/11 n=659
4/2/11 n=511
4/16/11 n=536
4/30/11 n=529
5/14/11 n=499
5/28/11 n=528
6/11/11 n=477
6/25/11 n=498
7/9/11 n=479
7/23/11 n=460
8/6/11 n=490
8/20/11 n=509
Week Ending
Average LOS in Hours
Center Line-Median

Professionals Learning to Lead Improvement Efforts in Health and Social Care: A Realist Evaluation of an Interprofessional Practice-Based Masters Program

Katherine M. Stevenson, The Jönköping Academy for the Improvement of Health and Welfare, Jonkoping, Sweden, Christina Keller, Jönköping International Business School, Jonkoping, Sweden, Boel Andersson-Gäre, The Academy for the Improvement of Health and Welfare, Jönköping, Sweden, Klas Gäre, Jönköping International Business School, Jönköping, Sweden, Johan Thor, The Jönköping Academy for the Improvement of Health and Welfare, Jönköping, Sweden

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Background:
In 2009, the Jönköping Academy for Improvement of Health and Welfare launched a Masters Program in Improvement and Leadership designed to prepare health and social care staff and leaders to better meet the challenges of today's complex systems. The 3-year program includes a mix of course and improvement work (figure1) and has attracted a diverse group of learners, including nurses, doctors, physical therapists, engineers, and managers.

Purpose of the Study:
The evaluation team is engaged in a comprehensive Realist evaluation of the program. As a first step, we are clarifying the program theory as understood by the actors (planners, teachers, students) and using a formative approach to program development and evaluation, by asking: How does the education management team describe the goals and methods of the program? What is the program theory? How do the teachers understand the program theory and enact it in their teaching? What are their local theories? How do students experience the program? What are the enablers and barriers to learning embedded within the program content and delivery methods? And in their work situations?

Methods:
Program Methodology: The Masters program provides tools and methods for change, but also skills in reflective practice and ways of seeing and naming underlying values, theories, and structures that create the current system. The program uses a blended-learning approach, which allows participants to remain in practice while enrolled in the program. In their final year, students carry out an improvement project in their work context. Evaluation Methodology: Realist Evaluation does not focus on achieving statistical generalizability, but rather questions "what works, for whom, in what circumstances, and how". There is an aim to identify the mechanisms that lead to desired outcomes in different contexts, while retaining the complexity and richness inherent in social interventions. The empirical material consisted of the students enrolled in the Master's program 2009-2012, their teachers, and the education management team. Data collection included interactive workshops, questionnaires, interviews, document studies of curriculum and student work, and observations. Qualitative content analysis was used to theme the results and elucidate patterns.

Results:
The clarified program theory includes 9 themes: patient-centered focus, interprofessional learning, knowledge dissemination in a learning community, student selection and potential for impact, co-production between education and practice environments, intertwining of theory and practice, change management, leadership, and conscious pedagogy in a teaching community. Interviews performed with students show the significance of continuous feedback from teachers and peers. Other important themes from student interviews were the importance of grouping, including interprofessional contact, and how contradictions between course content and work practice sometimes gave rise to frustration , which was a trigger of learning.

Conclusions and Implications:
The pilot evaluation provides initial insights into an ambitious and innovative practice-based Masters Program in Improvement and Leadership. The results are of interest to the program planners, implementers, and evaluators, but also to the health systems in which the students of the program work. As well, educators working at any stage of professional development can benefit from these early results.

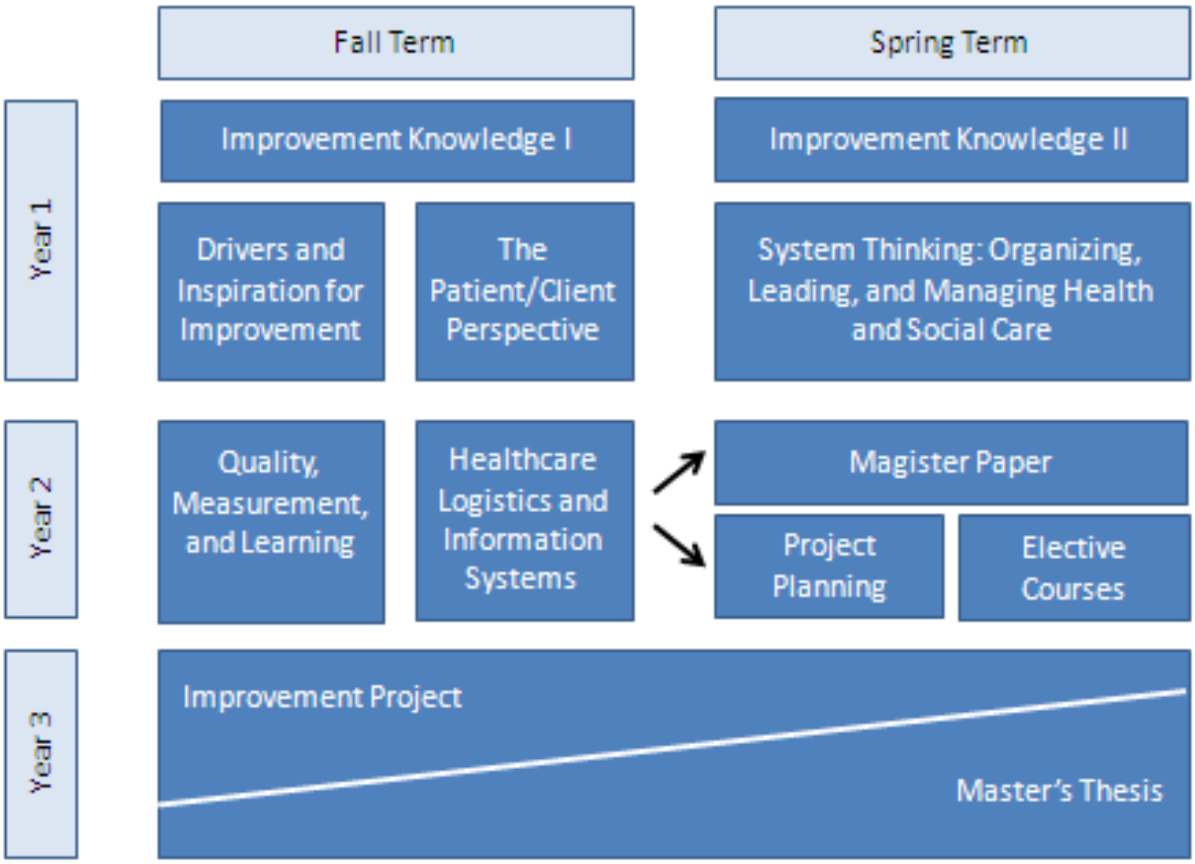


Figure 1: Overview of the Masters Program

Improving Quality Care Goals Through an Interprofessional Intervention on an Exemplary Care and Learning Site

Stacey J. Smith, Marc Shalaby, Najarian Joyce, Gretchen Perilli, Jrista Casey

Lehigh Valley Health Network, Allentown, Pennsylvania

Background:
The quality of diabetes management in hospitalized patients is problematic for hospital systems, with an associated cost of 174 billion dollars annually. Improved glycemic control can decrease healthcare costs and complications of diabetes. Attending physician, resident, and nursing knowledge may not be adequate to ensure appropriate inpatient management of diabetes given increasingly complex treatment protocols. Such issues challenge hospital systems to implement strategies that will result in sustainable improvements in diabetes care. We have developed a dedicated clinical microsystem known as the Exemplary Care and Learning Site (ECLS). The ECLS model was recently published and is the product of an international working group. The ECLS has three aims better patient care, better professional development, and improved system performance (Figure 1). Our ECLS is an inpatient medical floor staffed exclusively by two inpatient medicine teaching services. It provides an opportunity for interprofessional learning and patient care. It also serves as a platform for innovations in Quality Improvement (QI).

Purpose of the Study:
To develop and test an interprofessional model to improve inpatient glycemic control and to document downstream educational and clinical improvements.

Methods:
Baseline medical knowledge of diabetes was measured for interns, residents, nursing staff and attendings using a validated tool. Post-tests were performed after health care team members experienced the ECLS intervention. Baseline data on the ECLS was measured and included glucose measurements, patient satisfaction, average length of stay (ALOS), and severity of illness. For nine months, weekly interprofessional didactics were given by the diabetes specialists to all members of the ECLS floor (attending physicians, residents, nurses, case managers, and students). Additionally, weekly interprofessional collaborative rounds were performed on complex patients with diabetes. These rounds reinforced concepts learned during the didactics and occurred at the bedside when possible. Residents received weekly scorecards analyzing their diabetic management of their patients. Outcomes dashboards were displayed in the hallway and updated weekly and included glucose control, ALOS, and other pertinent quality markers.

Results:
Baseline diabetes medical knowledge was low, but comparable to that reported in the literature. On post-testing resident medical knowledge improved by 33%. Sustainable improvements were seen in our glucose target of 70-180 (Figure 2). Balancing measures

showed no statistically significant increase in hypoglycemia rates or complications of hypoglycemia. A dramatic 0.59 day reduction in ALOS occurred compared to baseline (with identical severity of illness) on the ECLS. Similar length of stay reductions were not seen on non-ECLS floors. The ECLS demonstrated an average ALOS that was 0.52 days shorter than comparable non-ECLS floors. Estimated cost savings based on ALOS reduction was about $557, 550 over the intervention period. This figure does not factor in potential reductions in diabetic complications.

Conclusions and Implications:

The ECLS model provides a clinical microsystem that allows for better patient outcomes, better professional development and better system performance. Educating learners in this environment prepares them to meet the challenges of providing better care at less cost. By linking educational interventions to improvements in patient care, training programs can effectively make QI value added standard work rather than an add-on task.

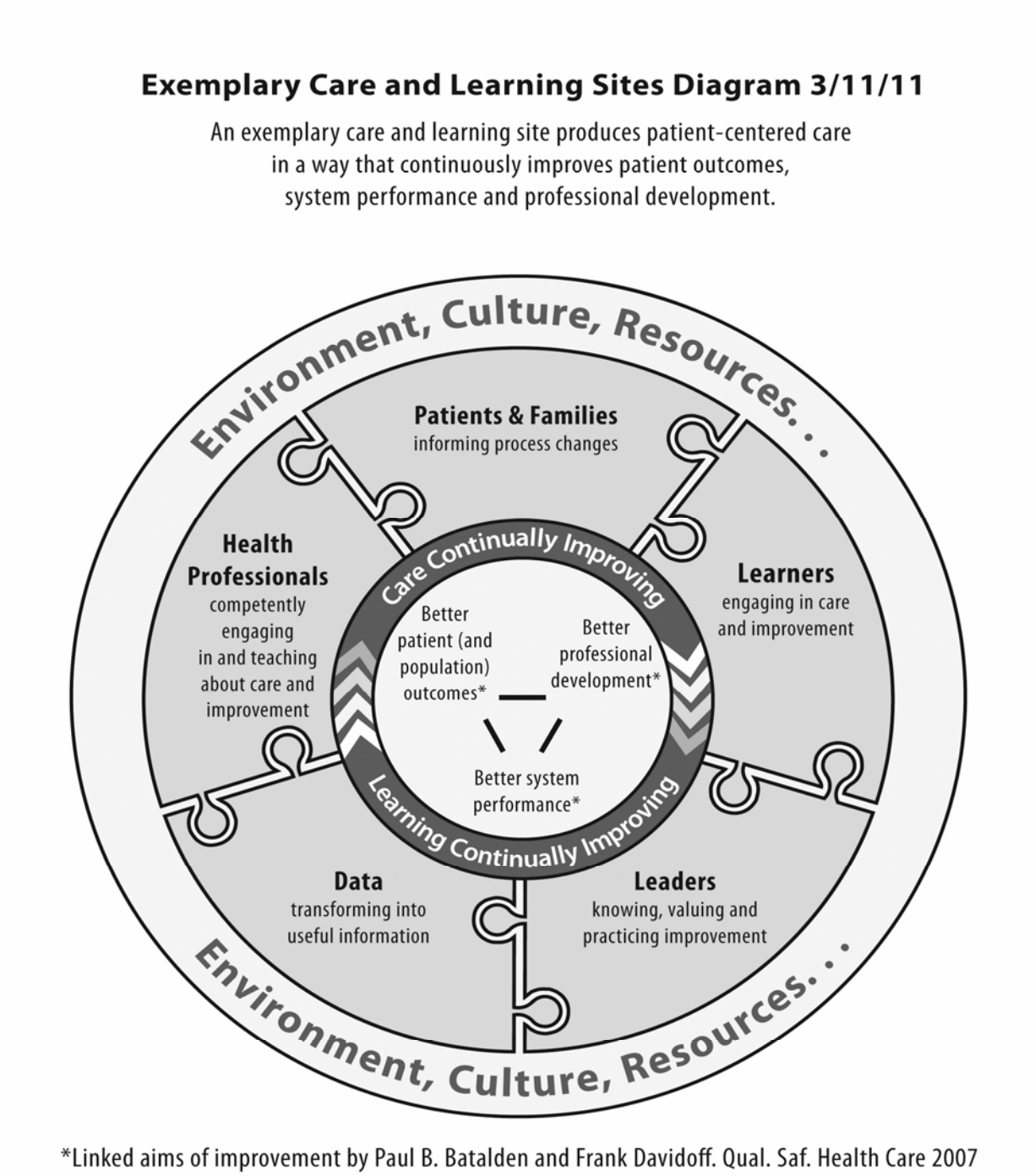
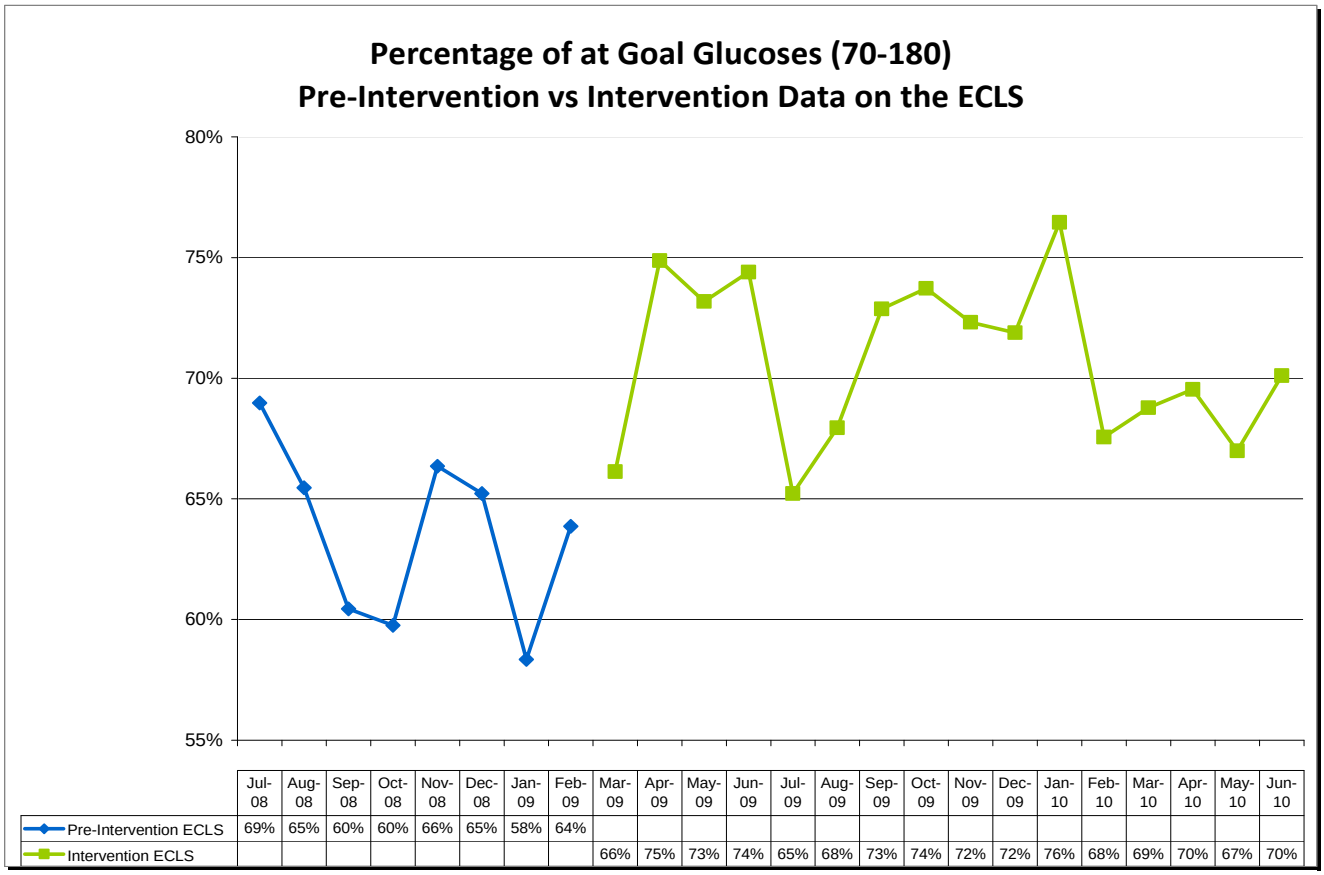


Figure 1: The ECLS Diagram



	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10
Pre-Intervention ECLS	69%	65%	60%	60%	66%	65%	58%	64%																
Intervention ECLS									66%	75%	73%	74%	65%	68%	73%	74%	72%	72%	76%	68%	69%	70%	67%	70%

Figure 2: At goal glucose control

A Quality Improvement Project to Reduce Avoidable Emergency Department Admissions due to Falls and UTIs at a Long-Term Care Home

Faten Mitchell, Hons B.Sc, Lora Monaco, ESM, Caterina Ierino, RN, Slava Tomych, RN, Valentyna Kurylo, RPN, Raquel Monaghan, RPN, Sultana Khan, RPN, Michelle Lancaster, RSSW, Deborah Harpley

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Key Contact Email: faten.mitchell@hqontario.ca

Background:
Health Quality Ontario (HQO) has been mandated by the provincial government to advance quality improvement in over 600 Long-Term Care Homes (LTCHs) across Ontario. The Residents First, an initiative led by a sector wide steering committee, was developed by HQO to reduce falls, pressure ulcers, incontinence, emergency department (ED) utilization, and provide consistency of Personal Support Worker (PSW) assignment**.** As a Quality Improvement Coach with HQO, I chose one of the LTCHs that I support and completed a Pareto Diagram of all preventable and treatable conditions that lead to ED admissions. Based on the Pareto diagram results, the team decided to focus on UTIs and falls. These conditions are common, costly, and preventable; they accounted for 29% of ED admission in 2010. They impact residents' quality of life and use valuable staff time. Our study areas were chosen based on the high incidence of these conditions.

Purpose:
The aim of our project is to reduce the number of UTIs and falls in an area pilot population by 50% from April to October 2011.

Methods:
A team was formed consisting of a Director of Care (DOC), Associate Director of Care (ADOC), RN, RPN, Social Service Worker, Program Manager, and PSWs. We completed a process map for each condition, reviewed collected data, and audited residents' care plans. Based on our findings, the team made changes to each process and residents' care plans. Process changes for falls and UTIs: identified high risk residents, using real-time data to tailor interventions to residents. For falls: huddles and synoptically collected data were used to analyze to prevent falls. For UTIs, we increased fluid intake by providing juice 24 hours a day, a pre-dinner social with drink ticket, and encouraged staff to have a beverage with residents. The pre-improvement baseline measure was from Jan 2011 to April 2011 (16 weeks) and the post- improvement

measure was from May 2011 to Sept 2011 (20 weeks). The final report will include data up to November.

Results:

During the improvement period we were able to increase the percent of residents' days that met 2000ml target from 15% to over 60%. (figure1). No one in the pilot population developed a UTI. Baseline average number of falls was 5.3 per week. Post improvement average is 1.2 (figure 2). There are 14 consecutive fall data points below the baseline signifying special cause. During the post improvement period there were no ED admissions due to UTIs and one ED admission due to falls.

Conclusions and Implications:

The changes led to a statistically significant decrease in the number falls. UTIs in the pilot population are no longer occurring. This information will be shared with other LTCHs. The report will include cost and time savings to LTCHs, and discussions on the improved quality of life to residents.

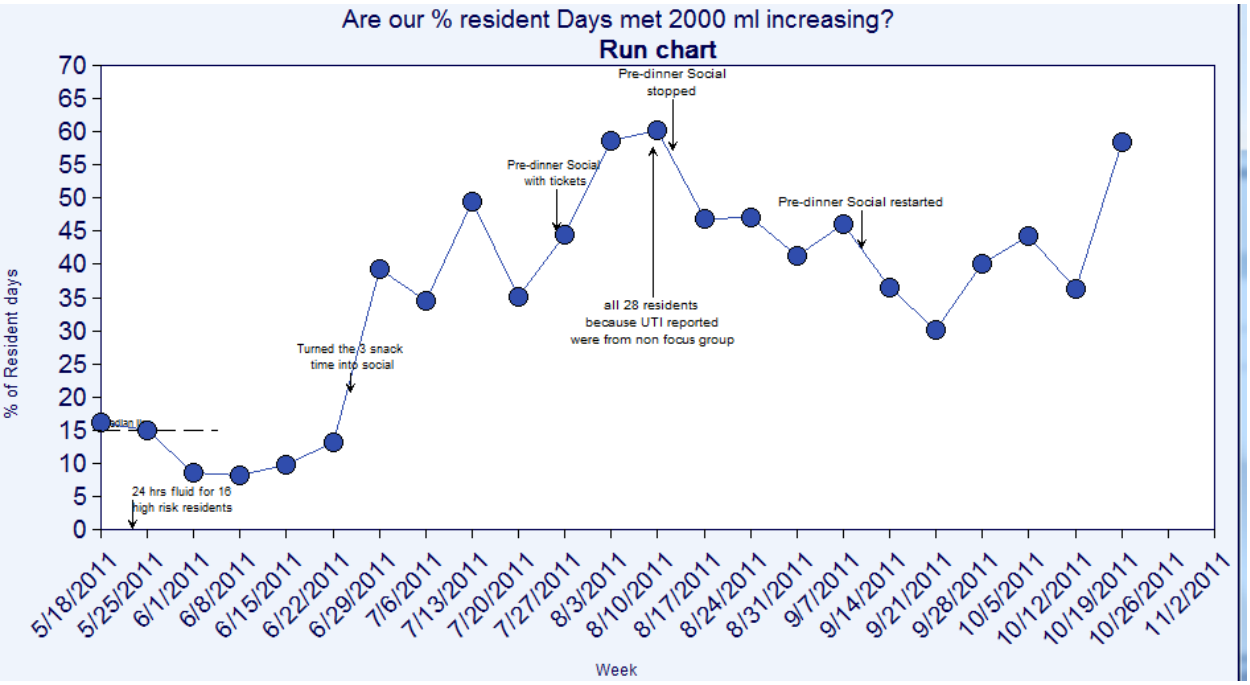

Figure 1

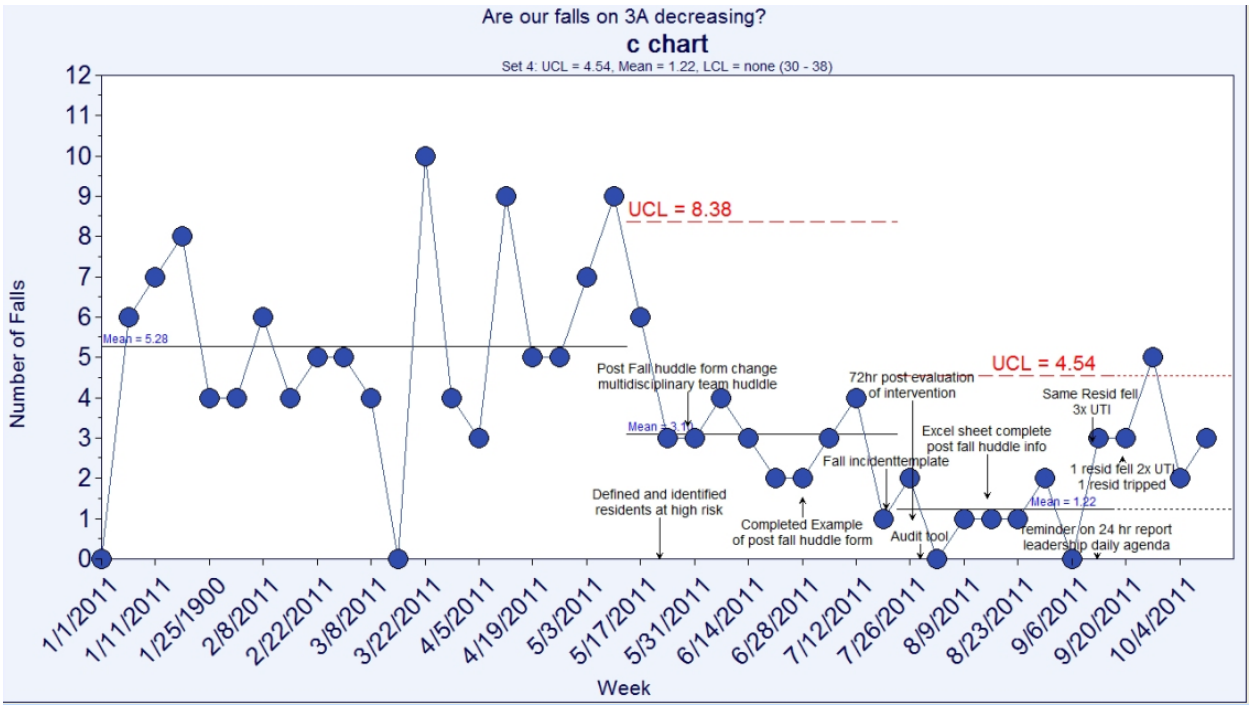
Are our falls on 3A decreasing?
c chart
Set 4: UCL = 4.54, Mean = 1.22, LCL = none (30 - 38)
Number of Falls
Week
UCL = 8.38
Mean = 5.28
UCL = 4.54
Mean = 1.22
Post Fall huddle form change multidisciplinary team hudldle
72hr post evaluation of intervention
Excel sheet complete post fall huddle info
Same Resid fell 3x UTI
Fall incidenttemplate
1 resid fell 2x UTI 1 resid tripped
Defined and identified residents at high risk
Completed Example of post fall huddle form
Audit tool
reminder on 24 hr report leadership daily agenda
1/1/2011
1/11/2011
1/25/1900
2/8/2011
2/22/2011
3/8/2011
3/22/2011
4/5/2011
4/19/2011
5/3/2011
5/17/2011
5/31/2011
6/14/2011
6/28/2011
7/12/2011
7/26/2011
8/9/2011
8/23/2011
9/6/2011
9/20/2011
10/4/2011

Figure 2

Rapid Adoption of an Evidence Based Recommendation: Lactobacillus Rhamnosus GG for Acute Gastroenteritis

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Cincinnati Childern's Hospital Medical Center, Cincinnati, Ohio

Andrea Lo Vecchio, University of Naples "Federico II", Naples, Italy

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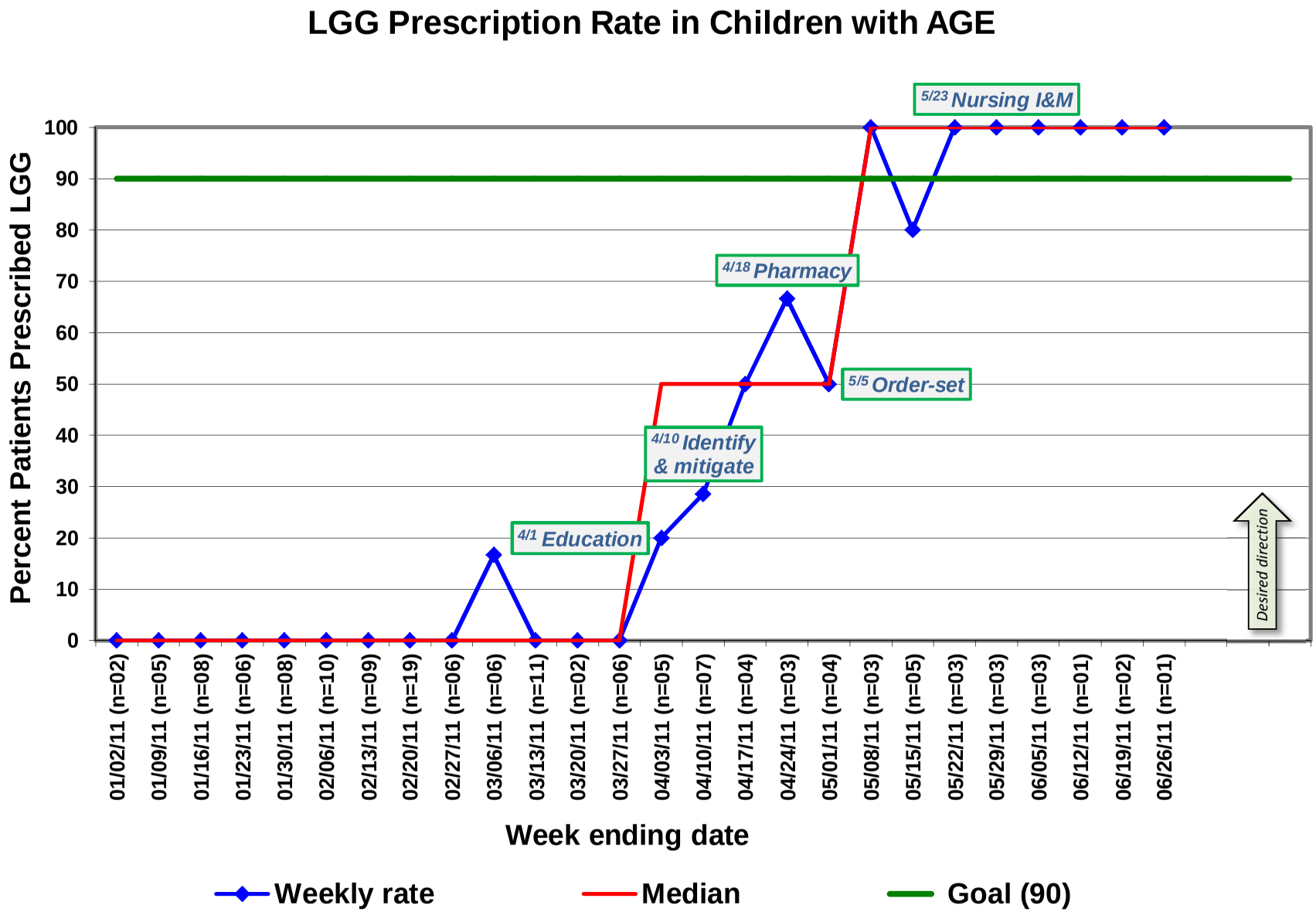
Background:
A 2010 systematic review demonstrated that using probiotics for acute infectious diarrhea shortens diarrhea duration by 24 hours and decreases the risk of progression beyond 4 days. *Lactobacillus rhamnosus* GG (LGG) is the probiotic most studied in multiple randomized controlled trials showing a dose-dependent benefit. Despite a 2005 Clinical Practice Guideline at our large pediatric hospital recommending consideration of probiotics in patients with acute gastroenteritis (AGE), during January through March, 2011, approximately 1% of general pediatric in-patients with AGE were prescribed LGG.

Purpose of the Study:
To increase the prescription rate of LGG at admission from 1% to 90% within 4 months for children hospitalized on the general pediatric service with a diagnosis of AGE.

Methods:
Quality improvement science was used to rapidly implement the evidence based recommendation for LGG administration. Patients considered for inclusion were children between 2 months and 18 years old admitted to the general pediatric service with the diagnosis of AGE with diarrhea. Diarrhea was defined as decreased stool consistency or 3 or more stools in the preceding 24 hour period. Patients with known immune suppression or predisposition to intestinal translocation (such as those with short gut syndrome) were excluded, as were patients with any major comorbid condition and those with presumed or known bacterial gastroenteritis (including those presenting with bloody diarrhea). To disseminate knowledge and encourage ownership of the process, admitting and supervising physicians and nurses were educated on the evidence and recommendation; physician knowledge was documented with pre- and post-testing. To facilitate timely proper prescription, we partnered with our pharmacy to ensure LGG was adequately stocked and an AGE-specific order set including LGG was included in our electronic medical record system. Identification and mitigation of failures was conducted by bedside nurses at the time of admission and by study personnel through daily chart review and email communication. The primary outcome was the percent of patients who met inclusion criteria who were prescribed LGG within 18 hours of admission. Impact of the interventions was assessed with run charts that tracked our primary outcome over time.

Results:
Both admitting and attending physicians knowledge of the evidence supporting LGG as a dose-dependent means to reduce the duration of diarrhea increased following educational sessions (approximately 57% pre to 98% post among admitting and 70% to 100% among supervising physicians). The rate of prescription steadily increased to 100% within 5 weeks of initiating the project. This rate was sustained through week 13 of the project (Chart 1). Interventions with greatest impact appeared to be education, active identification and mitigation, and our partnership with the pharmacy.

Conclusions and Implications:
We successfully achieved our goal of adherence to an evidence-based recommendation using interventions of both low and high reliability. Keys to our success were our partnerships with our colleagues in the pharmacy and nursing units. Sustaining the practice required continued active monitoring and mitigation, which was labor intensive though facilitated through use of the electronic medical record. Rapid implementation of additional evidence-based practices is likely possible using improvement science methods.


LGG Prescription Rate in Children with AGE
Percent Patients Prescribed LGG
100
90
80
70
60
50
40
30
20
10
0
5/23 Nursing I&M
4/18 Pharmacy
5/5 Order-set
4/10 Identify & mitigate
4/1 Education
Desired direction
01/02/11 (n=02)
01/09/11 (n=05)
01/16/11 (n=08)
01/23/11 (n=06)
01/30/11 (n=08)
02/06/11 (n=10)
02/13/11 (n=09)
02/20/11 (n=19)
02/27/11 (n=06)
03/06/11 (n=06)
03/13/11 (n=11)
03/20/11 (n=02)
03/27/11 (n=06)
04/03/11 (n=05)
04/10/11 (n=07)
04/17/11 (n=04)
04/24/11 (n=03)
05/01/11 (n=04)
05/08/11 (n=03)
05/15/11 (n=05)
05/22/11 (n=03)
05/29/11 (n=03)
06/05/11 (n=03)
06/12/11 (n=01)
06/19/11 (n=02)
06/26/11 (n=01)
Week ending date
Weekly rate
Median
Goal (90)

Decreasing Adverse Drug Events (ADES) via a Hospital-Wide Quality Collaborative

Richard E. McClead, Charlene Catt, James L. Gallup, Dorcas A. Lewe, Shelly D. Morvay, Barb B. Stewart, Richard E. Lisciandro, Randall L. Frost, James W. Dail, Mike Fetzer, Sheilah Harrison, Bruce C. Dellaposta, Patricia S. Benkowski, Sandhya Ramachandra, Richard J. Brilli,

Nationwide Children's Hospital, Columbus, Ohio

Background:
In 2008, the leaders of Nationwide Children's Hospital (NCH) set a goal to eliminate preventable harm by 2013. Historically, harmful ADEs accounted for half of our preventable harm. ADEs in children are costly and, frequently, life-threatening.

Purpose of the Study:
Our global aim is to eliminate harmful ADEs by December 31, 2013. Our specific aim was to reduce harmful ADEs (severity D-I) from a quarterly baseline of 85 ADEs (0.24 ADEs/1000 doses) to 30 ADEs (~0.08 ADEs per 1000 doses) by March 31, 2011.

Methods:
We conducted a common cause analysis of ADEs identified by voluntary reporting, trigger tool analysis, and pharmacy interventions. 50% of ADEs were administration errors, 20% prescribing errors, and 10% were dispensing errors. To decrease ADEs, a quality collaborative (ADEQC) of NCH inpatient units was formed and an ADE prevention aim/key driver diagram was developed. During 2009/2010 major interventions included: a) revised independent double check policy; b) a wireless communication system; and c) smart pump drug libraries; d) audits of 5-rights of medication administration; e) implementation of smart infusion pumps; f) development of an ADE "prevention bundle"; and g) an ADE "huddle" process. In April 2011, medication barcoding was implemented.

Results:
In 2009, reporting of all untoward events including ADEs increased substantially as a result of a survey-validated, improved hospital-wide safety culture. Total harmful ADEs peaked in Q1 2010 at 85 per quarter (0.24 ADEs/1000 doses; representative baseline for ADEs in 2009.) The number of harmful ADES fell to 51 per quarter (0.12 ADEs/1000 doses) by Q1 2011 and 30 harmful ADEs (0.076 ADEs/1000 doses) by Q2 2011 (Figure 1). Monthly reporting of non-harmful ADEs (severity A-C) increased to over 160 (1.22 non-harmful ADEs/1000 doses, Figure 2). This increase parallels reporting of other untoward (non-medication) events.

Conclusions and Implications:
We met our aim by Q2 2011, and reduced harmful ADE by an estimated 84.6%. Our success is largely the result of QI team methodologies, the collaborative effort, and the emphasis and implementation of a high-reliability-safety-focused culture. Event reporting increased. New tools were developed (e.g. ADE "bundle", ADE "huddle".) New technologies were implemented (e.g. smart pump drug libraries, barcoding). The collaborative model proved effective for group learning and spreading improvement quickly throughout NCH.

Figure 1

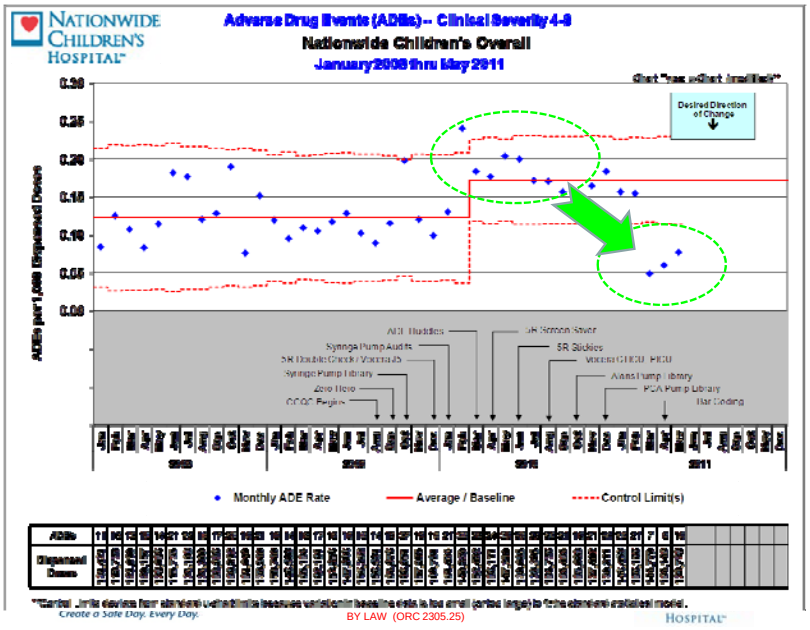
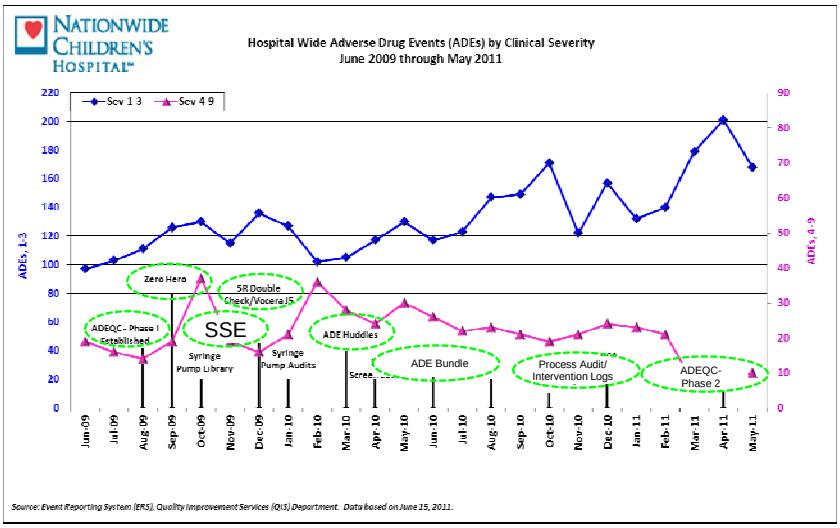


Figure 2



Effect of a Computerized Decision Support Tool on Percent of Asthma Patients with Current Asthma Action Plans: An Interrupted Time Series Analysis

Yiscah Bracha, MS, PhD, Gail M. Brottman, MD, Angeline Carlson, PhD, Kevin Larsen, MD

Background:
Written, individualized asthma action plans (AAP) support patient self-management, but few primary care physicians (PCPs) provide them. Barriers include gaps in asthma-specific knowledge, and insufficient time to produce an AAP during an ambulatory visit. To overcome these barriers, we introduced a computerized decision support (CDS) asthma tool into primary care clinics at an urban safety net. The tool directed PCPs through diagnostic and treatment decisions, and automatically produced an individualized AAP. The tool's clinical content was based upon the 2007 guidelines from the National Asthma Education and Prevention Program.

Purpose of study:
Evaluate the effect of introducing the CDS tool on the percentage of asthma patients with current AAPs. Two hypotheses explaining "no effect" were considered: 1) PCPs were not completing AAPs, 2) PCPs resisted the computerized technology.

Methods:
For a targeted sample of 899 asthma patients, we calculated two years of weekly prevalence rates for current AAPs generated manually on paper and with the computerized tool. The sample included pediatric (age 5-11 years) and adult (age 21+) asthma patients receiving care at two pediatrics and two family medicine clinics. We analyzed the effect of the intervention using Box-Jenkins interrupted time series analysis, modeling weekly rates as an auto-regressive integrated moving average (ARIMA) time series. Models were constructed separately for each age-clinic group; intervention effects were ascertained from model fit and the statistical significance of intervention terms.

Results:
In age-clinic groups where pre-intervention rates of AAPs were less than 20%, there was an immediate increase in the percentage of asthma patients with current AAPs following introduction of the CDS tool. In these groups, rates in children reached approximately 45% and rates in adults reached approximately 12%. In age-clinic groups where pre-intervention AAP rates ranged from 40-80%, introducing the CDS tool had either no effect or a weak equivocal effect on subsequent AAP rates. In the latter groups, percentage of patients with paper AAPs declined as the percentage of patients with CDS tool- generated AAPs increased.

Conclusions and implications:
A general parsimonious theory can explain these results: Clinicians who were inclined to create AAPs did so when support was available, and they preferred support provided by the computerized tool compared to paper templates. Clinicians not inclined to create AAPS did not do so even though support was available. A strategy to increase AAP prevalence rates is to target

disinclined physicians with interventions that include, but cannot be limited to, computerized decision support. Adoption of the CDS tool has the additional benefit that clinicians who use it are exposed to guidelines' recommendations for evidence-based care, and that AAPs created with the tool contain all recommended elements. Further research into successful interventions which accompany CDS is required.

Figure 1. Weekly Prevalence Rates for Current Asthma Action Plans Pediatric and Adult Asthma Patients at Four Primary Care Clinics

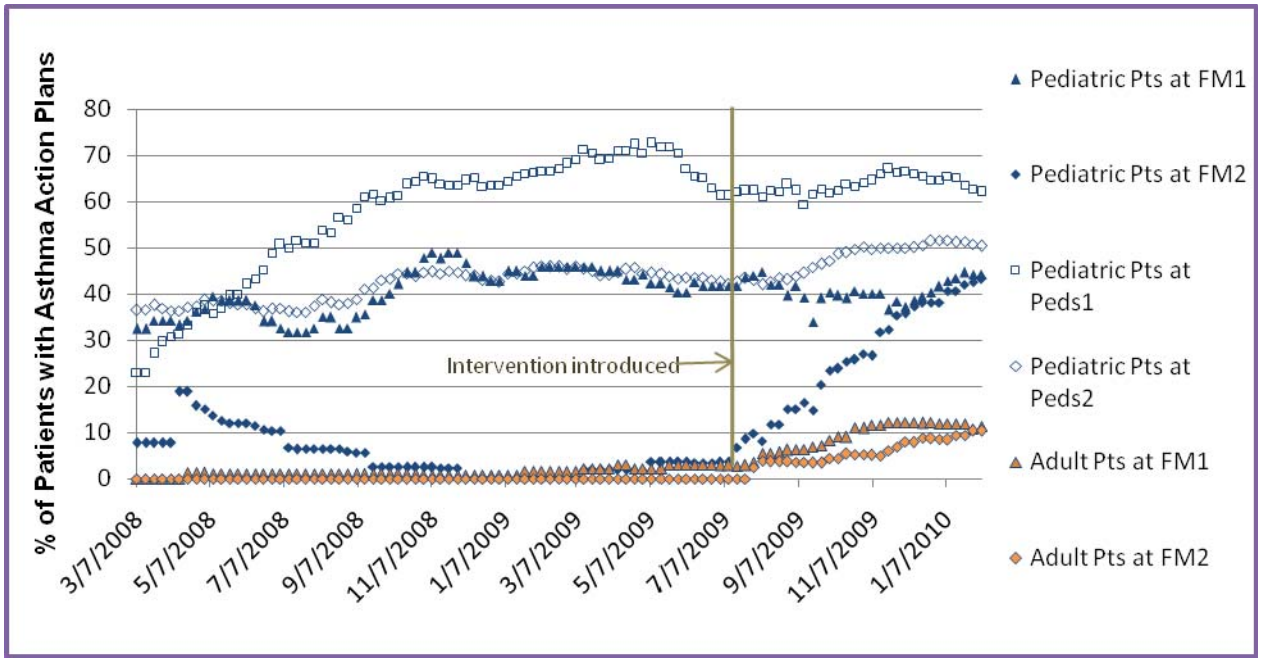
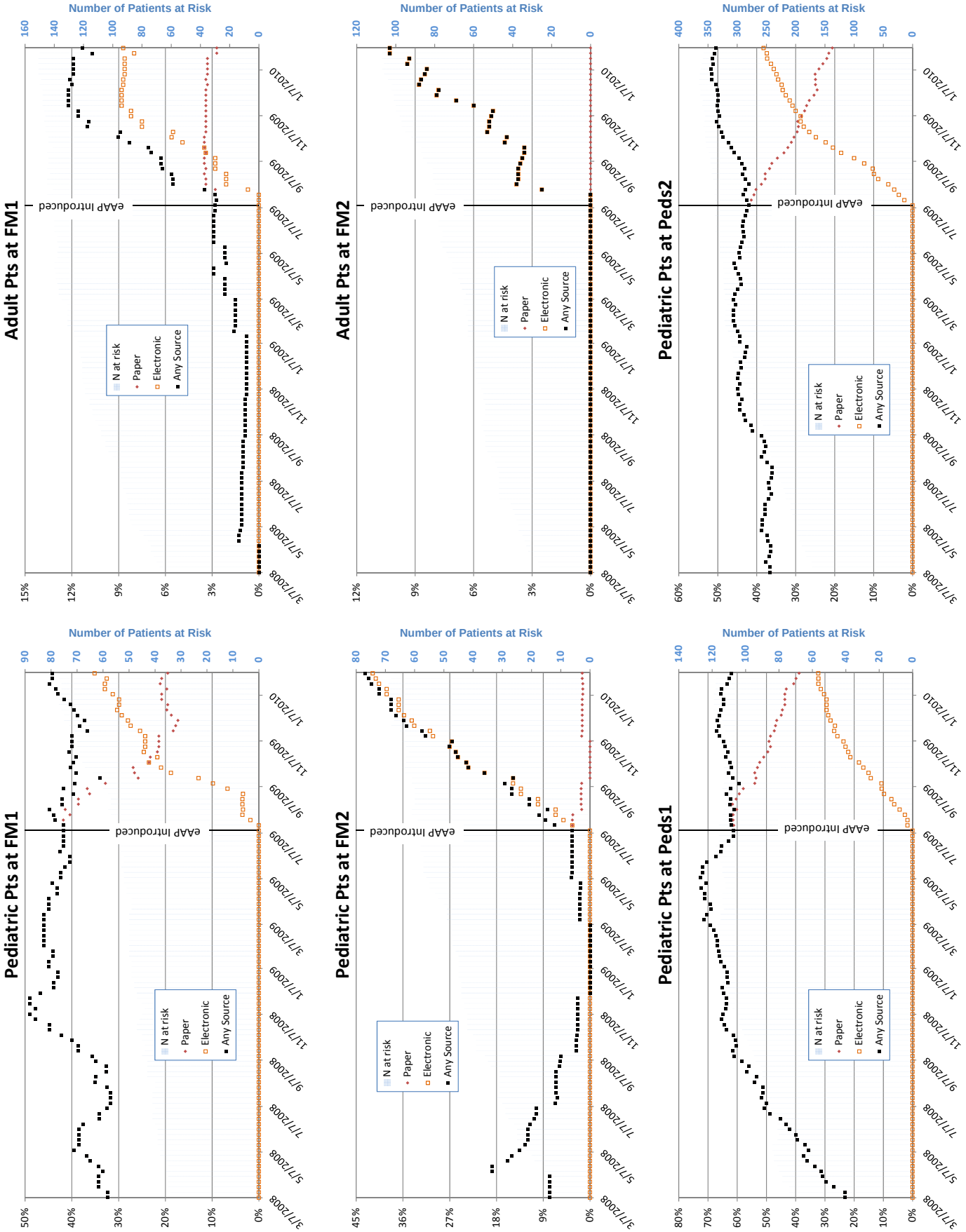


Figure 2. Weekly Prevalence Rates for Current Asthma Action Plans Created Manually, Electronically and Overall. For Six Age-Clinic Groups Examined Separately



Improving the Quality of Time-Out with Enhanced Communication and Teamwork to Promote a Culture of Safety

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Background:
Active communication and teamwork are essential elements to promote a culture of safety and a critical element in the time-out process. Our operating room documentation record indicated 98% - 100% compliance with the time-out process. Anecdotal data indicated a variation in the "quality" of the time-out. Variation of performance included elements communicated and individual engagement of surgical team members in the time-out process. The decision was made to observe and measure actual performance.

Purpose of the Study:
Develop and test techniques for improving communication and teamwork in the operating room by enhancing the quality of time-outs. Two primary goals include: (1) Complete time-out in the operating room according to policy 100% of the time. (2) Time-outs in the operating room will be led by the physician 90% or more.

Methods:
In January 2010, a multi-disciplinary team was formed which included surgeons, the director and managers for the operating rooms, a quality improvement nurse, and a nurse educator. The scope of the improvement effort was narrowed to the operating rooms in the hospital and outpatient surgery center. As the work evolved, staff nurses from the operating rooms joined the team to champion the work to promote a culture of safety and teamwork.

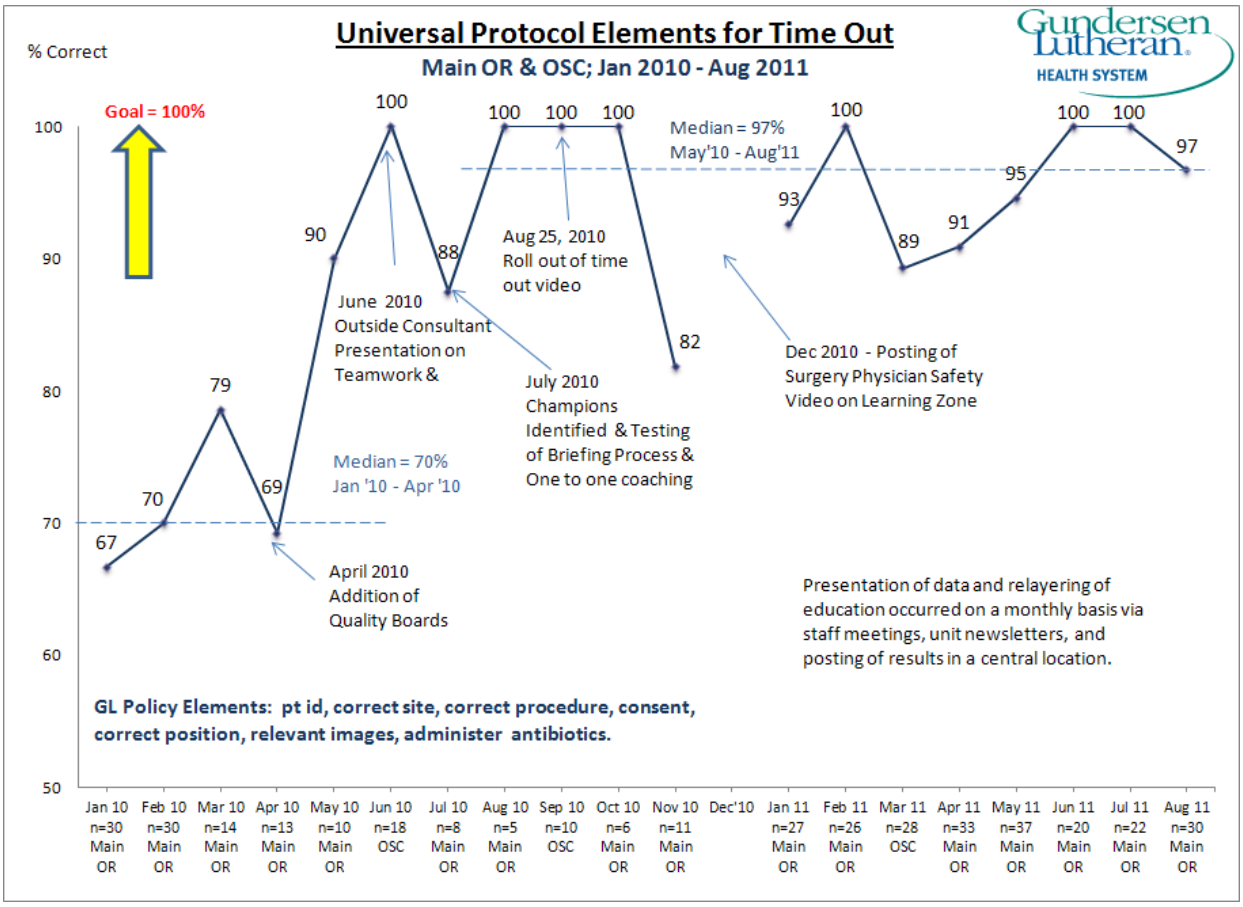
The Model for Improvement and tests of change were used to develop process changes. The changes included (1) education and presentation of observational data to staff, (2) introduction of "briefing" as a communication technique to improve teamwork, and (3) physician and staff production and distribution of a training video providing a visual representation of a standardized time-out.

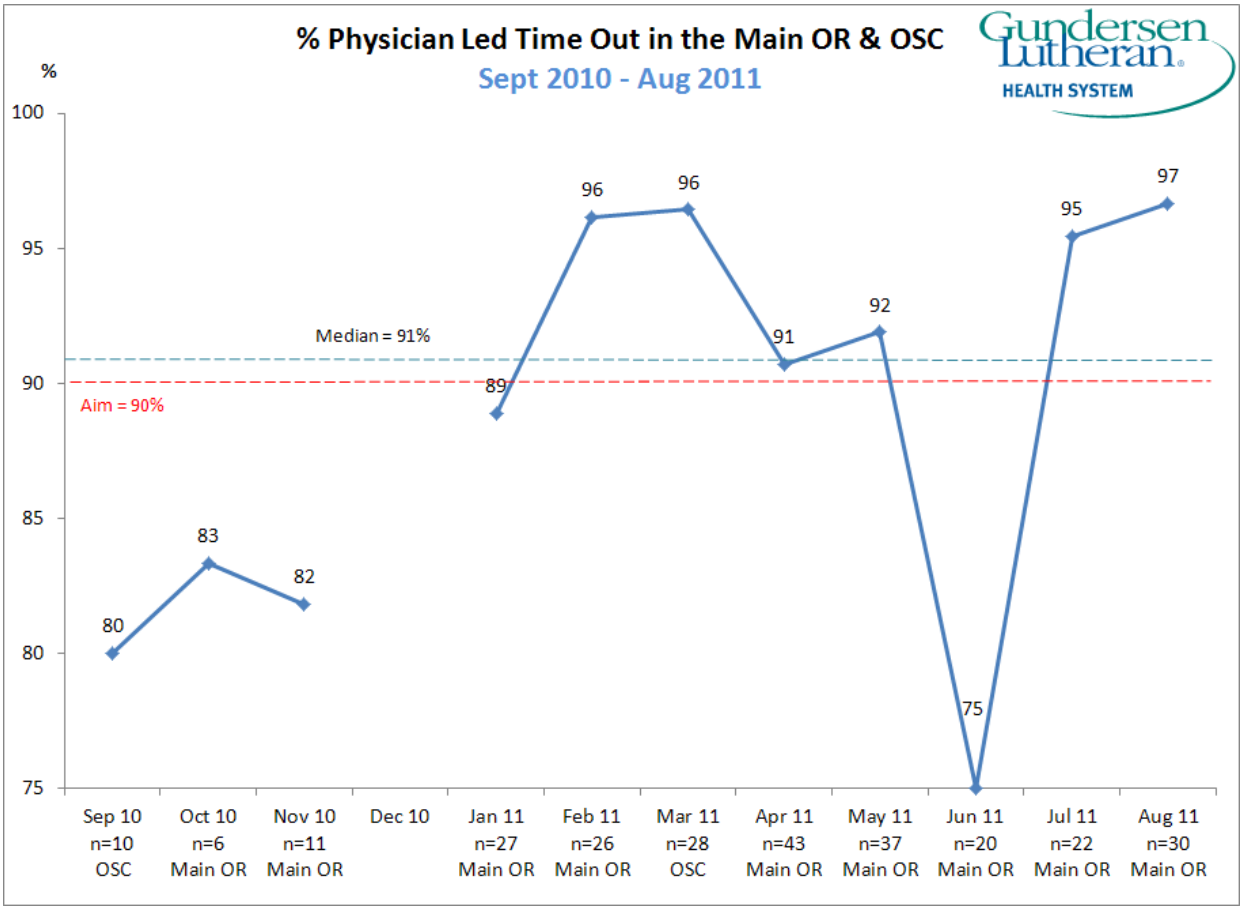
Monthly data was collected through observation of a random stratified sample of surgical cases with a standard data collection tool. The data collected on the quality of time-out included the individual elements as required by our policy represented as an all-or-none measure. A measure for the physician led time-out was added in September 2010.

Results:
The baseline data collection confirmed staff feedback of variation in the quality of time-out. 67% of the time all elements were included during the time-out. Presentations to increase staff awareness resulted in a median of 70%. Subsequent implementation of briefings and the video increased our median rate of completion of all required elements of time-out to 97%. We increased our compliance of time-out led by a physician from a baseline of 80% to a median of 91%. We decreased serious preventable events by 80% between 2010 and year-to-date 2011.

Conclusions and Implications:

Education and the presentation of observational data did not improve the quality of time-outs. The introduction of "briefing" as a communication technique to improve teamwork and the production and distribution of a training video providing a visual representation of a standardized time-out improved compliance to universal protocol and improved teamwork in the operating room. This is demonstrated by an improvement in the quality of time-out and physician engagement with the physician led time-out.




% Physician Led Time Out in the Main OR & OSC
Sept 2010 - Aug 2011
Gundersen Lutheran
HEALTH SYSTEM
%
100
95
90
85
80
75
Median = 91%
Aim = 90%
80
83
82
89
96
96
91
92
75
95
97
Sep 10 n=10 OSC
Oct 10 n=6 Main OR
Nov 10 n=11 Main OR
Dec 10
Jan 11 n=27 Main OR
Feb 11 n=26 Main OR
Mar 11 n=28 OSC
Apr 11 n=43 Main OR
May 11 n=37 Main OR
Jun 11 n=20 Main OR
Jul 11 n=22 Main OR
Aug 11 n=30 Main OR

Establishing a System for Reliable Implementation of Partograph Use Reduces Stillbirth Rates in a District Hospital in Rural Ghana

Ernest Kanyoke, National Catholic Health Service, Tamale, Ghana, Sebastian N. Sandaare, Ghana Health Service, Lawra, Ghana, Henry Ping-Naah, Ghana Health Service, Lawra, Ghana, Boye Y. Etowi, Ghana Health Service, Lawra, Ghana, Mary . Adolee, Ghana Health Service, Lawra, Ghana, Nana A. Twum-Danso, Institute for Healthcare Improvement, Accra, Ghana

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Background:
Reliable implementation of evidence-based interventions remains a major obstacle to achieving the Millennium Development Goals for mothers and children in most sub-Saharan African countries despite the knowledge and resources available. Within the context of a Breakthrough Series Collaborative Network of all nine health districts in the Upper West Region of Ghana aimed at accelerating reduction in perinatal and child mortality, Lawra District Hospital (LDH) determined its baseline (January 2009 to April 2010) fresh stillbirth rate to be 6.3 per 1000 livebirths. Most of these stillbirths could have been prevented through reliable use of a partograph, a graphical tool for monitoring the progress of labour. LDH is one of two referral centres for 25 primary health clinics in a rural district with an estimated population of 105,357.

Purpose of the Study:
To reduce the fresh stillbirth rate in LDH by 80% or more within 12 months by improving the reliability of partograph use in the Maternity Ward.

Methods:
A root cause analysis revealed the absence of a system for monitoring and promoting partograph use. Not all maternal health record (MHR) books contained partograph sheets and midwives in the Maternity Ward acknowledged that they did not use partographs because they were burdensome and not required. At the first Learning Session in April 2010, the quality improvement (QI) team and the midwives, resolved to test three changes: 1) Replace all the old MHR books with new ones; 2) Introduce a partograph monitoring register; and 3) Start partographs on all eligible clients (i.e. first stage of labour). In November 2010, the team agreed to test: 4) Monthly performance reviews to strengthen feedback to midwives and management, and in March 2011, three additional changes were introduced: 5) Task-shifting of minor activities to health aides so midwives would have more time to monitor labour with partographs; 6) Micro-analysis of partograph use by individual midwife and giving feedback accordingly; and 7) Inclusion of partograph usage in the midwife appraisal system. Monthly measures were: 1) Percentage of eligible deliveries monitored with partographs; and 2) Rate of fresh stillbirths per 1000 livebirths.

Results:
During the period of Level 1 changes (May 2010 - Nov 2010) partograph usage for eligible clients increased from 0% to 27% and further to 59% during Level 2 changes (Dec 2010 - Mar 2011). During the implementation stage, Level 3 (Apr 2011 - Jul 2011), partograph usage improved to 92% (Figure 1). Outcome results reflected this improvement in process performance: Level 1 - fresh stillbirth rate declined from 6.3 to 5.4 per 1000 livebirths; and Level 2 and 3 - the rate further reduced to zero (Figure 2).

Conclusions and Implications: Establishing systems for reliable partograph use improved midwives' adherence and was associated with reduction in fresh stillbirth rates. Factors that were associated with this result included leadership engagement, committed QI team that pursued sequential testing over time, and strong data feedback systems. The next steps are to include intrapartum asphyxia survival rates in the midwife appraisal system and to scale up the LDH experience to the other hospitals in the region through the Collaborative Network

Figure 1: P Chart showing partograph usage in Lawra District Hospital from Sep 2009 - Jul 2011

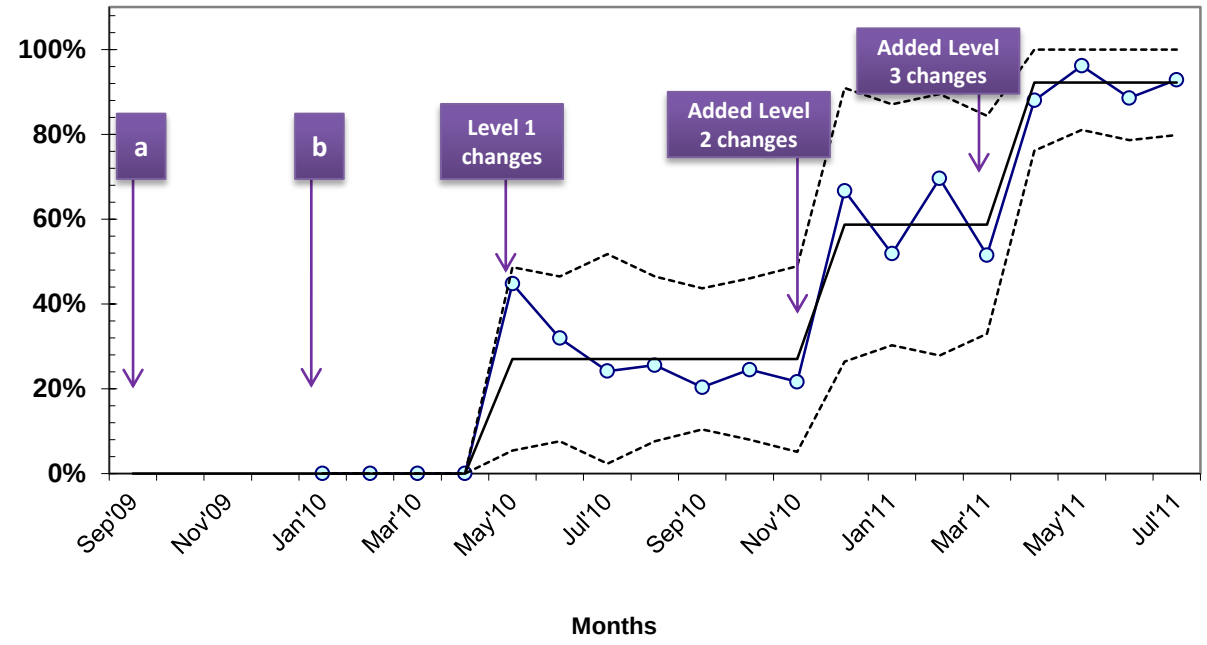
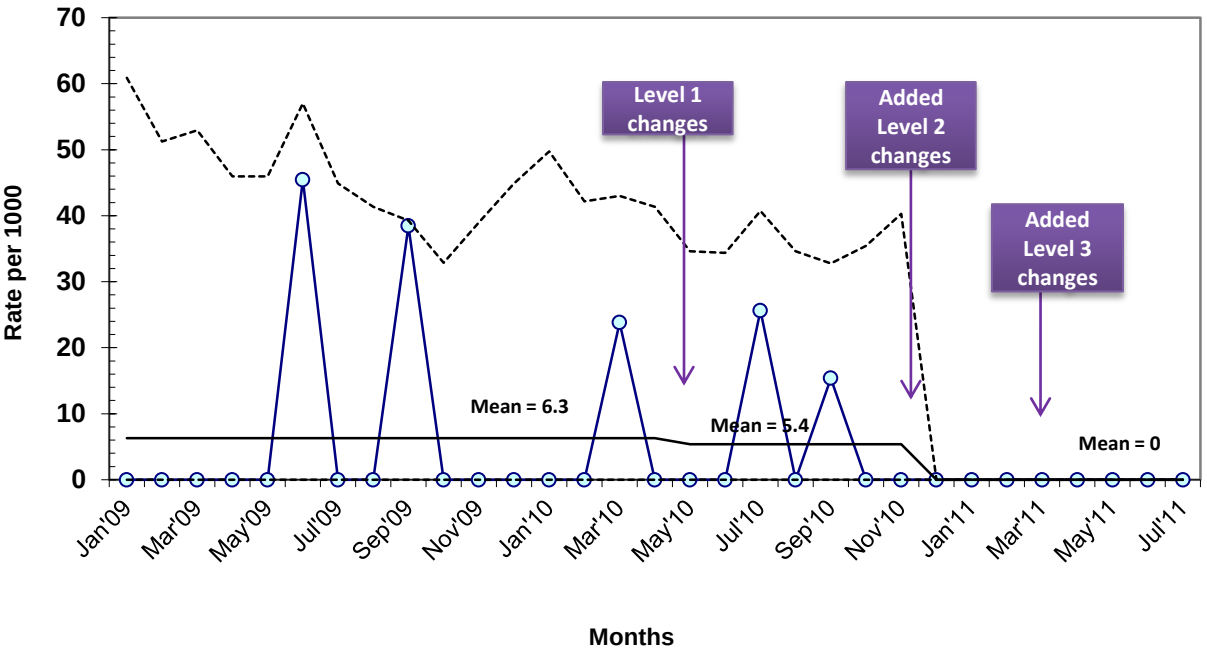


Figure 2: U Chart showing fresh stillbirth rate in Lawra District Hospital from Jan 2009 - Jul 2011



Annotations for Figures 1 and 2:

a: No data system to track partograph use

b: Available but unreliable data on partograph use

Level 1 changes: (i) Replacement of old maternal health record books
(ii) Introduction of a reliable data system for partograph monitoring
(iii) Resolution to start partographs on all eligible clients

Level 2 changes: Institution of monthly performance reviews to strengthen feedback to both midwives and management

Level 3 changes: (i) Task-shifting of minor activities to health aides so midwives would have more time to monitor labour with partographs
(ii) Micro-analysis of partograph usage by midwife and giving individual feedback to respective midwives;
(iii) Management decision to include partograph usage in the midwife appraisal system

IBCD: Effectiveness and Sustainability of a Checklist to Improve Quality of Care for Hospitalized General Medical Patients

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Background:
Although checklists have shown significant promise as a tool to improve care in surgery and intensive care unit settings, they have been underutilized in hospitalized medical patients. Critics of checklists cite check the box mentality and concerns about sustainability.

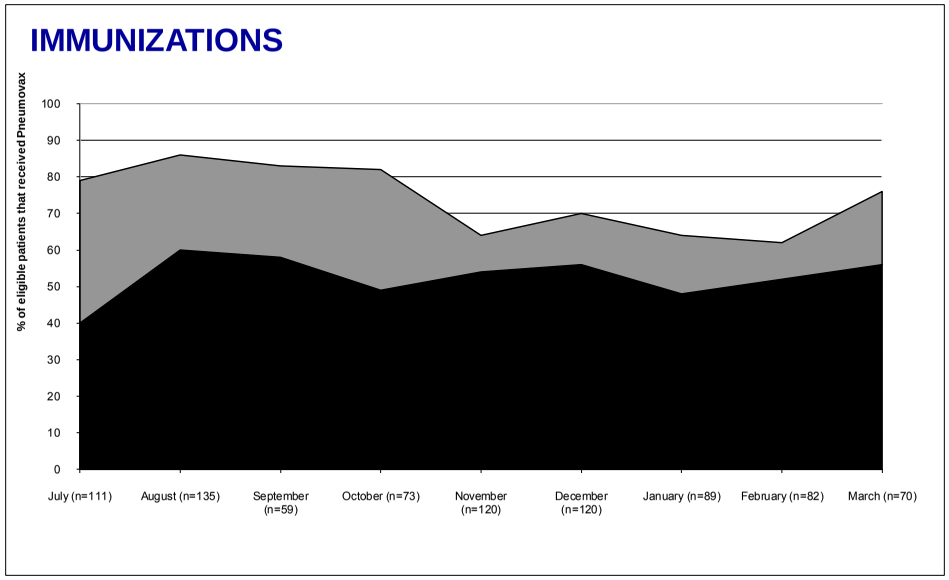
Purpose of the Study:
To ascertain whether there were sustained improvements in processes of care addressing four hospital conditions [(I) pneumococcal immunization, (B) pressure ulcers (bedsores), (C) catheter-associated urinary tract infections (UTIs), and (D) deep venous thrombosis (DVT)] for hospitalized general medical patients during the IBCD checklist intervention.

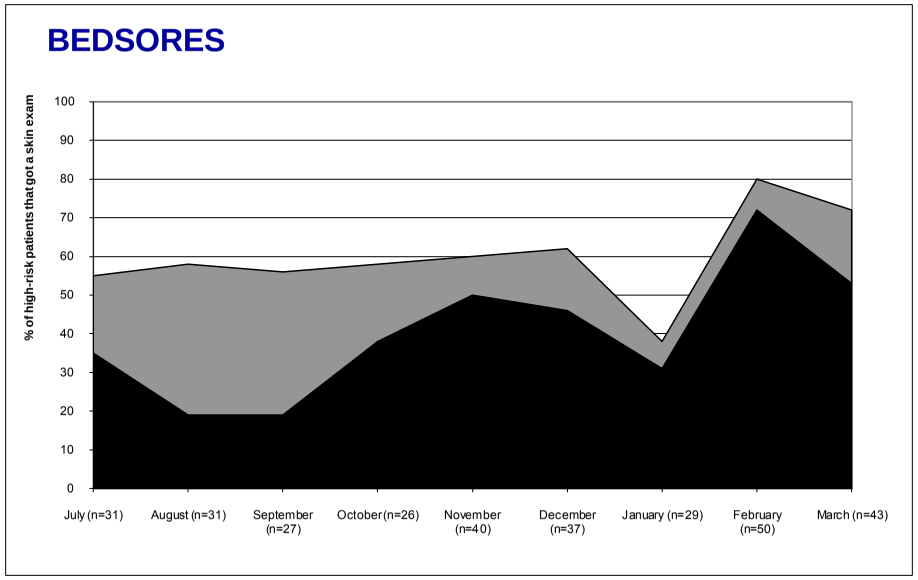
Methods:
The IBCD checklist was integrated into the established routine of post-call morning rounds for new admissions. At this time, the team first presents information about newly admitted patients to the attending physician, providing a convenient time to review the four processes of care. Checklists prompted physicians to offer Pneumovax© polysaccharide vaccine for indicated patients (I), perform a heel and sacrum skin exam for patients high risk for bed sores (B), remove Foley catheters from patients without an indication (C), and administer pharmacologic DVT prophylaxis when indicated (D). Charts were reviewed to ascertain if documentation on the checklist resulted in care intended.

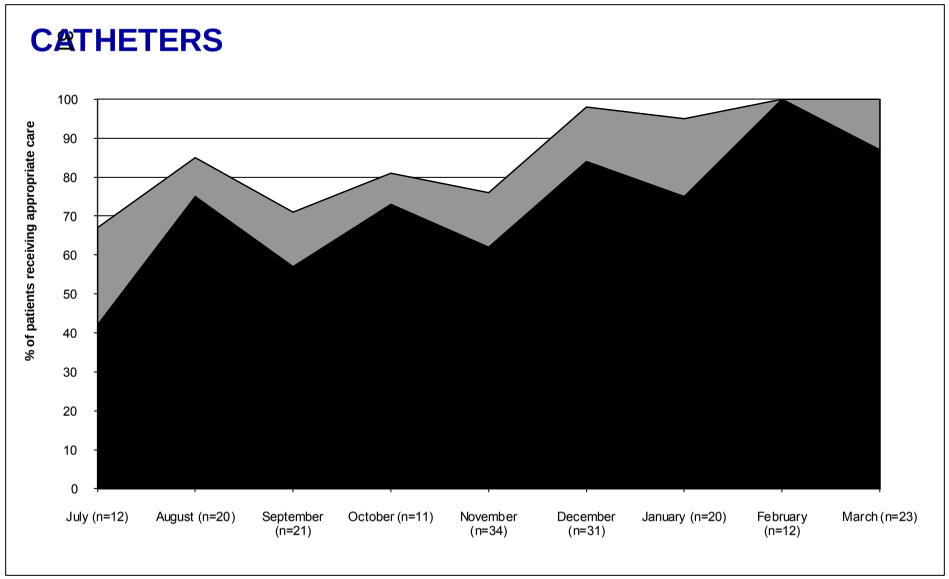
Results:
Seventy percent (46/66) of medical teams during July 2010 - March 2011 used the IBCD checklist with 1168 (52.5%) patients. While participation varied by month, the variation was not statistically significant ($X2 = 8.37$, $p = 0.40$). Overall, the IBCD checklist prompted 301 actions, and overall adherence to these four domains increased from 68% on admission to 82% after checklist use ($p<0.001$). During the IBCD checklist intervention, average adherence rates for immunizations were observed to rise from 52% on admission to 74% after checklist use ($p<0.001$). For pressure ulcers, average adherence was observed to rise from 44% to 62% ($p<0.001$). For catheters, average adherence was observed to rise from 73% to 86% ($p<0.001$). While DVT prophylaxis was high on admission prior to checklist use (93%), use of the checklist was associated with near universal prophylaxis (96%, $p<0.01$). A statistically significant improvement on adherence to quality measures on admission, a learning effect, was observed for

bedsores (0.034) and catheters (0.01) meaning more residents completed the quality measure on admission before use of the checklist indicating that they were incorporating those processes of care into their routine.

Conclusions and Implications:
A paper checklist can be a useful tool to improve adherence to and documentation of four key quality indicators in general medicine. Improvements were greatest for appropriate use of catheters. Adherence to appropriate DVT prophylaxis was already high prior to the intervention (93%), yet the checklist still improved this measure. The observed learning effects indicate that the checklist intervention can be effective in helping teams incorporate quality measures into their routine of care. Future work will include chart reviews of a historical control group, examining the use of a new IBCD checklist adapted for our hospital's electronic health record, and studying the effect of the IBCD checklist on patient outcomes.







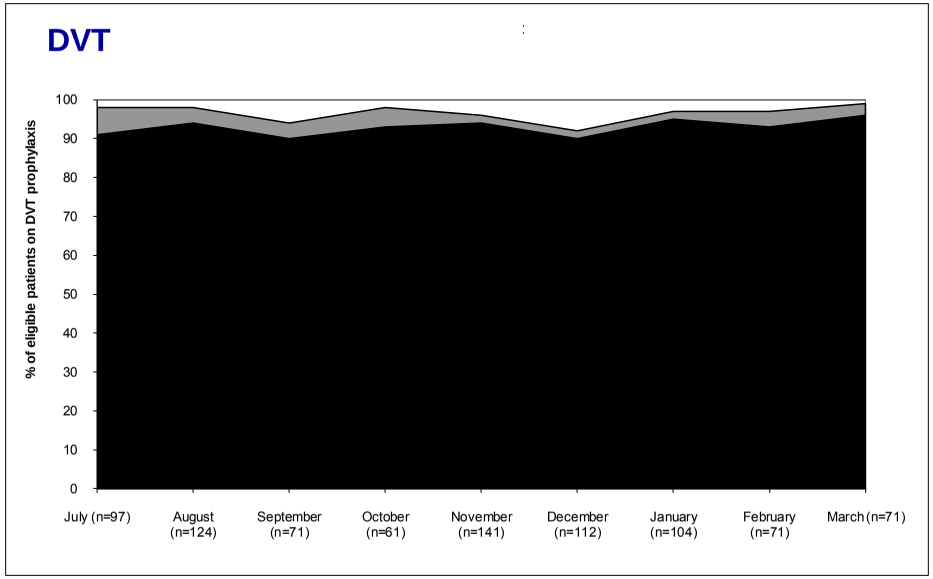
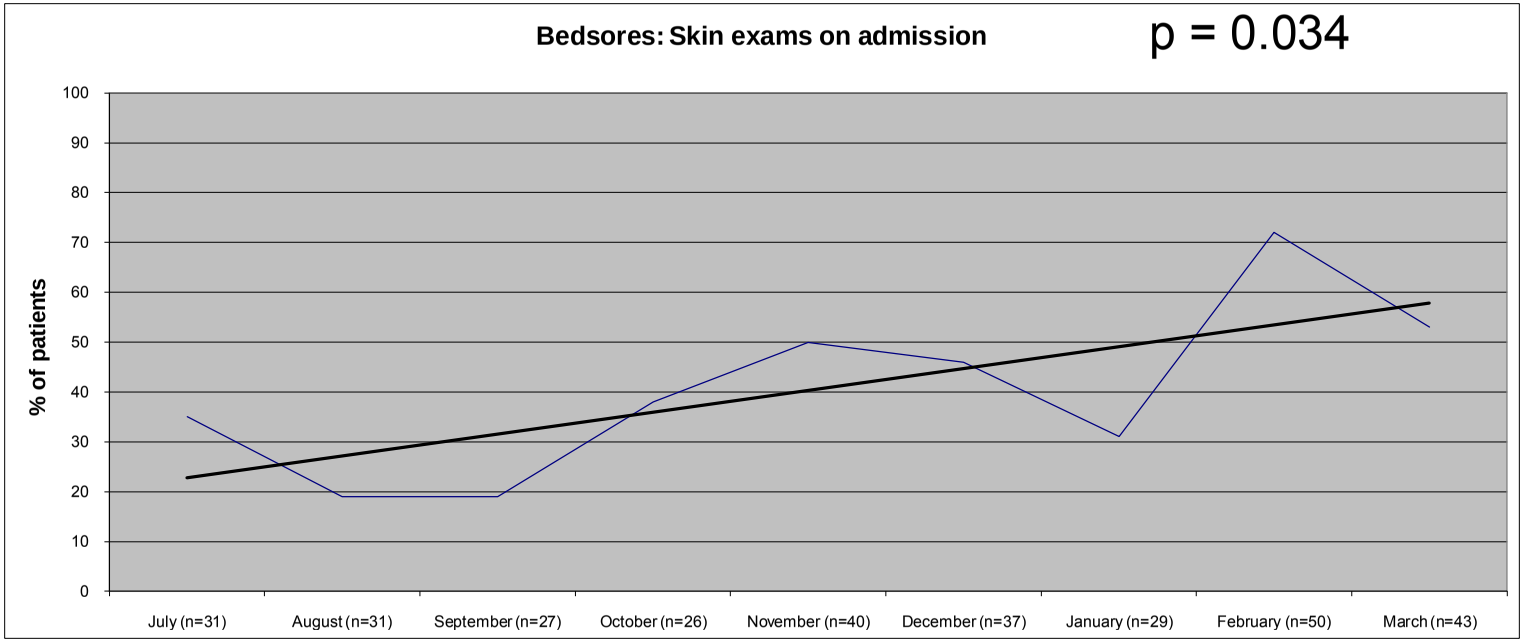


Figure 1: Adherence to four process measures over the intervention period of July 2010 – March 2011. Average overall adherence raised from 68% to 82% ($p<0.001$) for 1135 patients.

- Completed on admission
- Completed after checklist



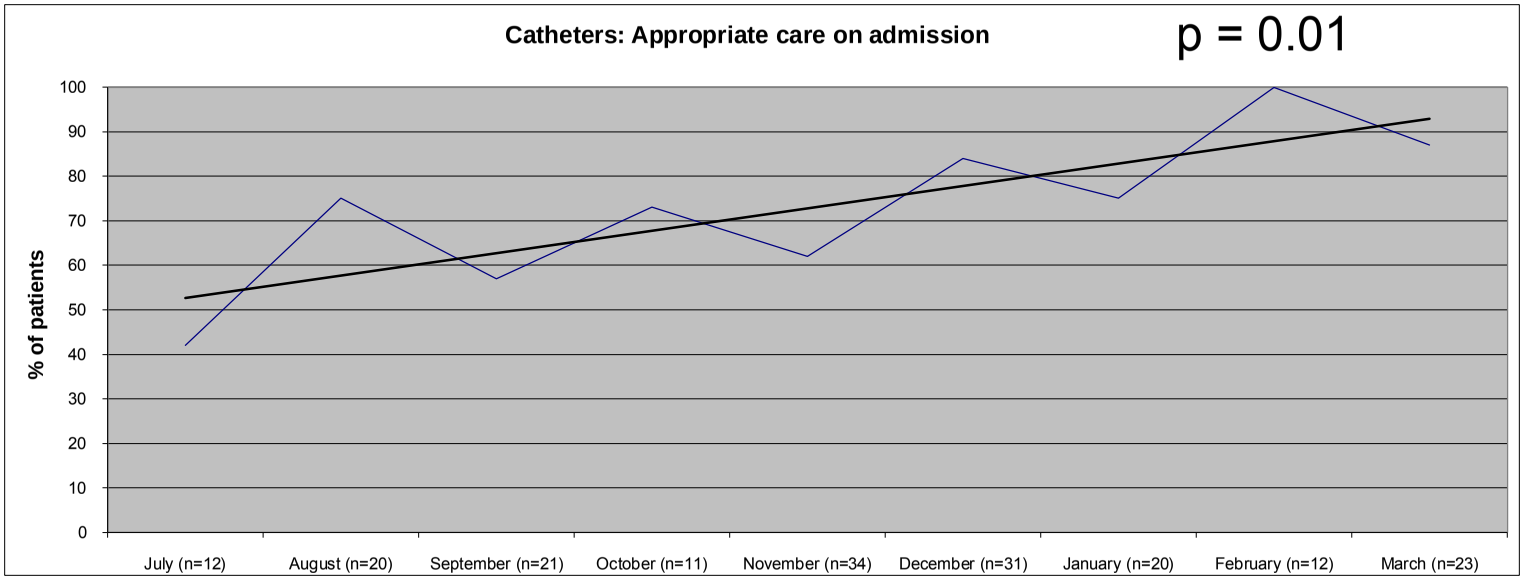


Figure 2: Learning effect on pressure ulcer and catheter care. As the intervention progressed, a greater percentage of patients began receiving the recommended care on admission and before use of the checklist. On admission, more patients received skin exams if high risk for pressure ulcers (p = 0.034) and had their Foley catheter discontinued if the catheter was not indicated (p = 0.01) than when the intervention started .

Primary Care Sensitive Measures Before and After the 1999 Implementation of a Patient-Centered Medical Home Model in an Urban Primary Care Center

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Background:
Southcentral Foundation (SCF) provides prepaid primary care services for Alaska Native (AN) and American Indian (AI) people living in the southcentral region of Alaska, including Anchorage. In 1999, SCF implemented a new model of care with many components of the Patient-Centered Medical Home (PCMH) in an effort to increase continuity of care and improve access. In 2010 the Institute for Circumpolar Health Studies at the University of Alaska, Anchorage, in collaboration with SCF, began this study to assess changes in level and trend for several primary care sensitive outcomes measured before and after implementation of these PCMH components.

Purpose of the Study:
To describe the long term effects of a transformation to a PCMH model on primary care sensitive health outcomes.

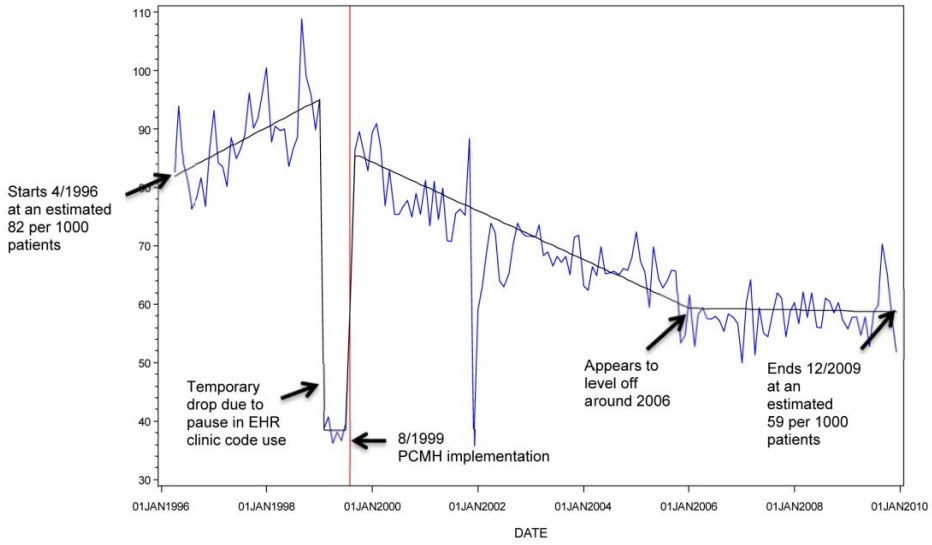
Methods:
We present preliminary results of an interrupted time series analysis of monthly process and outcome measures calculated over a fourteen year period. The population studied is AI/AN people residing in urban areas of the southcentral region of Alaska and receiving healthcare at the Alaska Native Medical Center between 1996 and 2009.

Results:
Some primary care sensitive measures indicated positive change on the quality and characteristics of health care at SCF following implementation, and varying length of sustained trend in the post-transformation period. The following run charts are three examples of monthly rates overlaid with estimated trend before and after the 1999 PCMH implementation.

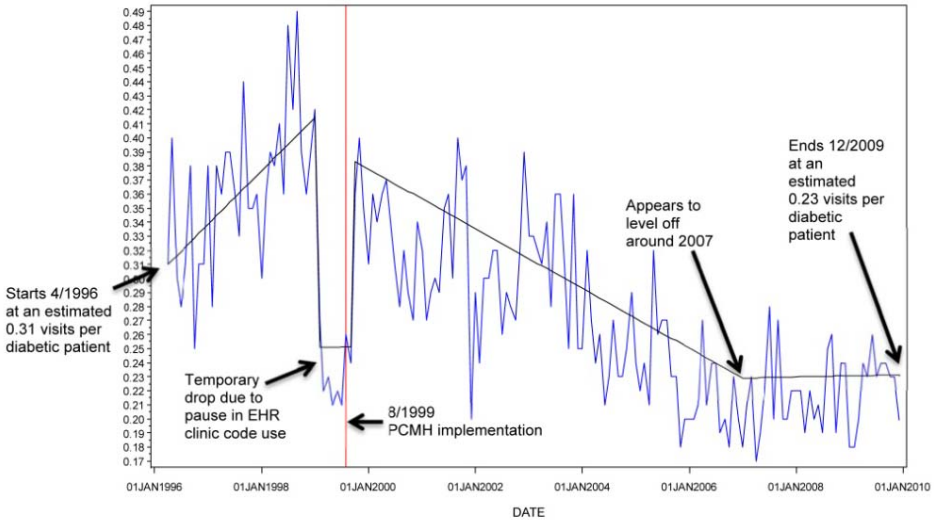
Conclusions and Implications:
Following the transformation to a PCMH model of care, preliminary quantitative results suggest that there was change in some key process and health outcome measures in a population that experiences health disparities. Further, there was improvement in certain measures for subsets of the population with specific chronic conditions such as diabetes. It should be noted that this is a quasi-experimental study relying on secondary electronic medical record data of unknown validity and causation cannot be proven. These results will be explored further in interviews with past and present employees, tribal leadership, and patients.

The PCMH model has garnered strong support among many, but there have been few studies of the PCMH model with long-term outcome data. This study provides preliminary quantitative evidence of some improvements in healthcare and outcomes following PCMH implementation.

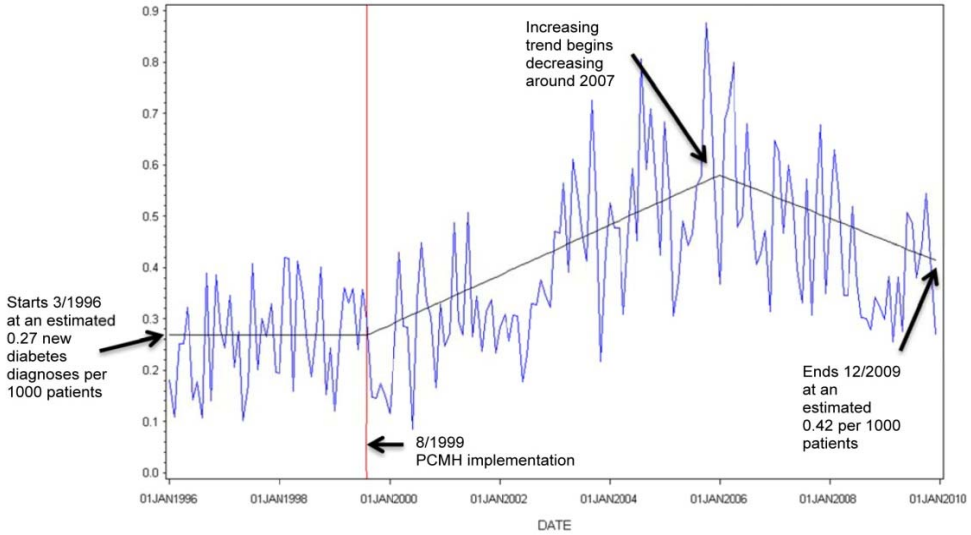
RATE WITH AT LEAST ONE ER/UCC VISIT PER 1000 PATIENTS



AVERAGE NUMBER OF ER/UCC VISITS PER DIABETIC



RATE DIABETES DIAGNOSIS PER 1000 PATIENTS



Improving our Ability to Contact Adolescent Women with an STI: Results of a Planned Experiment

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Cincinnati Children's Hospital Medical Center, University of Cincinnati College of Medicine, Cincinnati, Ohio

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Background:
By law, adolescents may seek confidential sexually transmitted infection (STI) testing and notification of results. Inadequate follow up of positive results of (STI) testing is a gap in health care quality that contributes to the epidemic of STIs in adolescent women.

Purpose of the study:
To use learning from a planned experiment to improve our ability to successfully reach adolescent women with a positive STI documented at an Emergency Department (ED) visit.

Methods/Design:
This was a planned experiment set in the ED of Cincinnati Children's Hospital Medical Center. We used a 2 x 2 factorial design that evaluates two factors, each with two possible levels or dichotomous outcomes. In addition to the two factors, the design incorporated 1 background variable. The entire experiment was repeated after a four month hiatus to accommodate a change in the electronic medical record (EMR) system, giving us two replications under different conditions.

Measurements/ Outcomes:
We generated counts of the number of women age 14-21 who tested positive for an STI (either chlamydia or gonorrhea) at an ED visit during the study time period. The background variable was the proportion of women with a confidential number documented in their EMR. Factors under study were a card instructing women to call for test results and a designated study cell phone for incoming/outgoing result phone calls. The primary outcome was the proportion of infected women successfully contacted within 7 days. Results were analyzed using Shewhart control charts and graphical displays (response plots).

Results:
Prior to our interventions, only 24% of infected women had a documented confidential cell number listed, and 45% were successfully contacted within 7 days of their visit. After a series of interventions, the proportion with a confidential number documented increased to over 60%, and

the proportion of infected women successfully contacted within 7 days increased to over 70% (Figure 1). In the planned experiment, there was a significant interaction between replications and successful contact that coincided with a change in EMR system and decrease in confidential number recording. Therefore we stratified the analyses: In replication one, when the confidential number was present in 78% of charts (high reliability condition) other factors did not improve successful contact (stable at nearly 70%). However, in replication two, when confidential numbers were less reliably documented (65% of charts), a card instructing women to call for results improved contact success within 7 days, and the combination of card and cell phone increased the proportion notified within 7 days from 20% to 64%. (Figure 2).

Conclusions and Implications:

Obtaining and documenting a confidential phone number is an important strategy that improves our ability to contact adolescent women with their STI results in a timely manner. When documentation is less reliable, interventions to improve direct contact (the card and cell phone) also improved post visit contact success. These inexpensive, system-level interventions to improve notification of STI test results may reduce the adolescent STI epidemic by decreasing transmission and reinfection.

Figure 1. P-Chart: **Top row:** Percent of charts (in groups) with a confidential number documented in the EMR. n= number of charts per interval. Initial data was hand enetered; * denotes electronic data capture. **Bottom Row:** Percent of STI positive women (in groups of 20 except as indicated) contacted by phone within 7 days of visit. Dates are first day of data capture cycle

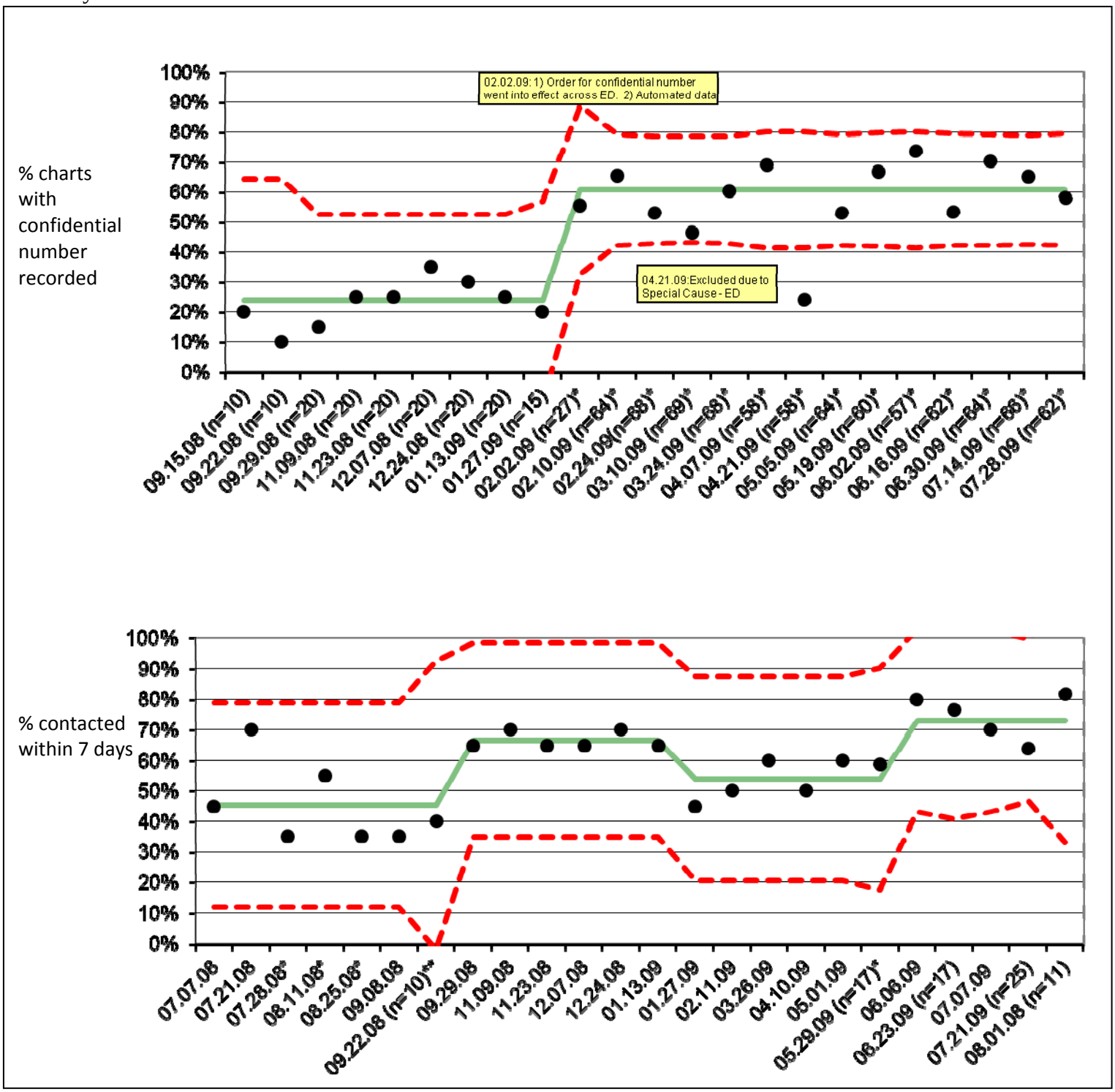
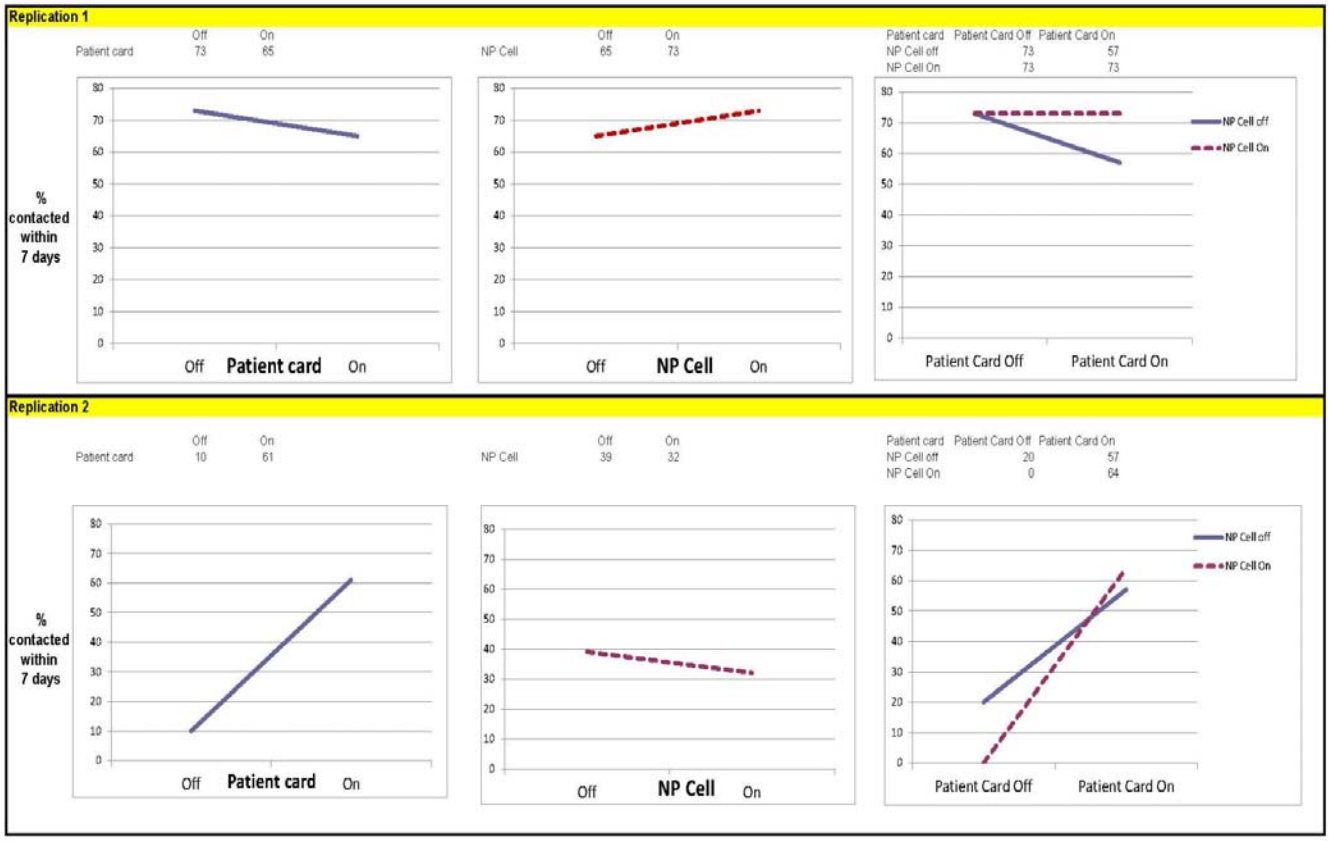


Figure 2: Response plots for replication 1 (top row, high reliability of confidential number recording) and replication 2 (bottom row, lower reliability of confidential number recording) on the outcome "Percent of patients with an STI contacted within 7 days of their visit" plotted on the vertical axis. Columns 1 and 2 represent individual factor responses; column 3 displays the interaction of both factors.



Stroke 90:10 - Improving Stroke Care Across North West of England Using the IHI Breakthrough Series Collaborative Model

Maxine Power, Department of Health, Manchester, Greater Manchester, Delphine Corgie, Advancing Quality Alliance, Manchester, Greater Manchester, Ian Chappell, Advancing Quality Alliance, Manchester, Greater Manchester, Gareth Parry, IHI, Cambridge, Massachusetts

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Background:
Stroke affects up to 110,000 people per year in the United Kingdom. Mortality remains unacceptably high and in the North West of England stroke outcomes are amongst the worst in Europe. The English national sentinel audit of stroke has been undertaken by the Royal college of Physicians every 2 years since 2002 based data on 9 key process indicators for stroke and we were able to determine that over 6 years the North West of England had improved by only 18% (from 54 to 72% on these key indicators).

Purpose of the Study:
We aimed for the North West region of England to reach a score of 90% by the 2010 national audit, whilst trying to establish whether improvement naive teams joining a mature collaborative improve faster in the establishment year.

Methods:
We designed the programme as a cluster randomised control trial with 26 participating hospitals randomized into two groups. Group one (intervention) joined in January 2009 for two years and Group two (control) in January 2010 for one year. We used The Breakthrough Series Collaborative (BTS) model, from the Institute for Healthcare Improvement. We worked on 9 processes of care grouped into 2 bundles. Bundle 1 (early hours care) comprised CT scan, swallow screen, aspirin delivery and weight within 24hours of admission. Bundle 2 (rehabilitation) comprised physiotherapy assessment, occupational therapy assessment, multidisciplinary goals, mood assessment and 50% stay on a stroke unit. Non-identifiable patient level data were collected through retrospective case note review. Data on patients admitted to participant hospitals with a stroke diagnosis (ICD 10 codes: 61, 63 and 64) between July 2008 and December 2010 were analysed for this submission. Twenty cases per month per site were randomly selected. A total of 10,028 cases are included in this submission (6591 intervention, 3437 control). Data were analysed over time using a linear regression model. Special cause variation was identified using pre-selected rules. Sigma limits were adjusted after each special cause flag.

Results:
For Bundle 1, the intervention sites improved from 19% to 42% (up 23%) and the control sites from 24% to 37% (up 13%) during the same period. For Bundle 2, the intervention sites improved from 27% to 46% (up 19%) and the control sites from 22% to 33% (up 11%). Across the nine individual measures, the intervention group performed favourably

in 3 of the 9 measures (aspirin delivery (p 0.022); mood assessment (p 0.003) and rehabilitation goal setting (p 0.048) table 1.

Conclusions and Implications:
Collaboratives have impact where background activity is stable but may not add value in circumstances where other system levers (policy, regulation, performance systems) are being used to galvanise change. This improvement programme has shown demonstrable improvement in stroke care and also has an important role in defining more clearly the benefits of the collaborative as a quality improvement intervention.

Table 1: Stroke 90:10 – data comparison on 9 key process indicators of stroke care

	Control		Intervention				
	Before	After	Before	After	Slopes (Before vs After)		
	Proportion (%)	Proportion (%)	Proportion (%)	Proportion (%)	Odds Ratio	95% CI	P
Bundle 1	122/502 24.3%	212/566 37.5%	114/583 19.6%	258/610 42.3%	1.00	(0.90, 1.11)	0.975
Brain Scan within 24hrs of Hospital Admission	316/502 62.9%	435/566 76.9%	353/583 60.5%	455/610 74.6%	0.94	(0.86, 1.04)	0.248
Aspirin in 24hrs of hospital Admission	151/502 30.1%	258/566 45.6%	115/583 19.7%	261/610 42.8%	1.12	(1.02, 1.24)	0.022
Swallowing Screening Recorded in 24hrs of Hospital Admission	220/502 43.8%	350/566 61.8%	326/583 55.9%	426/610 69.8%	1.05	(0.95, 1.15)	0.334
Weighed during Hospital Admission	258/502 51.4%	346/566 61.1%	286/583 49.1%	462/610 75.7%	1.02	(0.93, 1.12)	0.669
Bundle 2	110/502 21.9%	188/566 33.2%	159/583 27.3%	282/610 46.2%	1.20	(1.07, 1.35)	0.002
Ward of 50 Percent + Of Stay	325/502 64.7%	414/566 73.1%	384/583 65.9%	473/610 77.5%	1.06	(0.96, 1.17)	0.260
Physiotherapist Assessment in 72hrs of Hospital Admission	302/502 60.2%	393/566 69.4%	394/583 67.6%	479/610 78.5%	1.10	(1.00, 1.21)	0.055
Occupational Therapist Assessment in 4 days of Hospital Admission	235/502 46.8%	354/566 62.5%	330/583 56.6%	419/610 68.7%	0.99	(0.90, 1.09)	0.788
Mood Assessed during Hospital Admission	147/502 29.3%	226/566 39.9%	192/583 32.9%	315/610 51.6%	1.17	(1.06, 1.30)	0.003
Rehabilitation Goals set during Hospital Admission agreed by MDT	210/502 41.8%	266/566 47%	176/583 30.2%	324/610 53.1%	1.10	(1.01, 1.21)	0.048

NB: Comparison is before and after the time the control group joined the collaborative

Understanding Instantaneous Demand: Modeling Staffing Levels Against Patient

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Background:
Columbus Regional Hospital, 325-bed hospital in Columbus, Indiana, used the Lean concept of instantaneous demand as a principal tool in a rigorous project to redesign its process for patient placement and staffing.

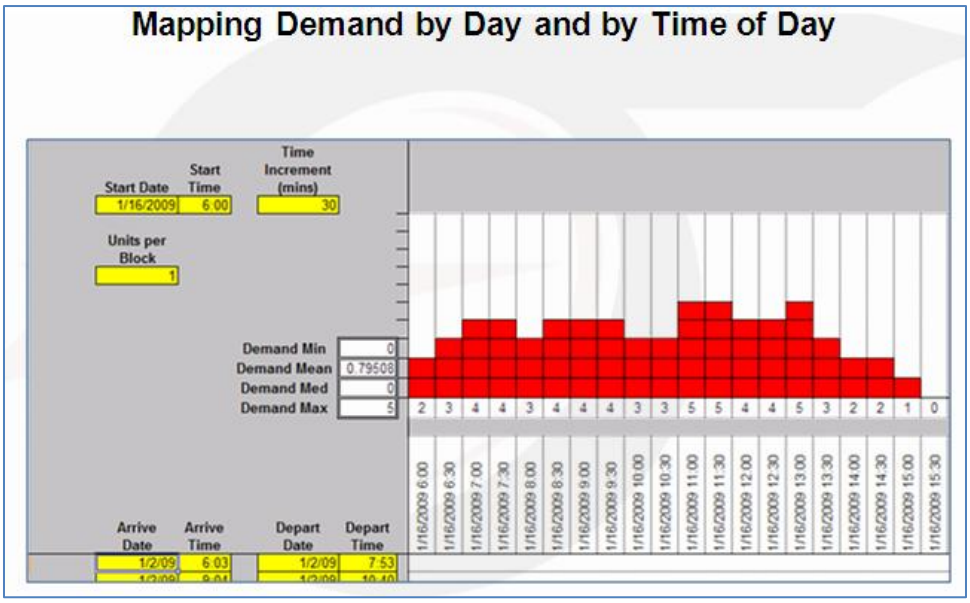
Purpose of the Study:
If we recognize the pace of demand for services, we can map staffing levels to meet the peaks, valleys, and variability of demand. Unfortunately, typically available data is not in the right form to understand demand profiles: midnight census; average census; and average patients per day. In this instance, the hospital used arrival and departure times to map both staffing levels and patient demand.

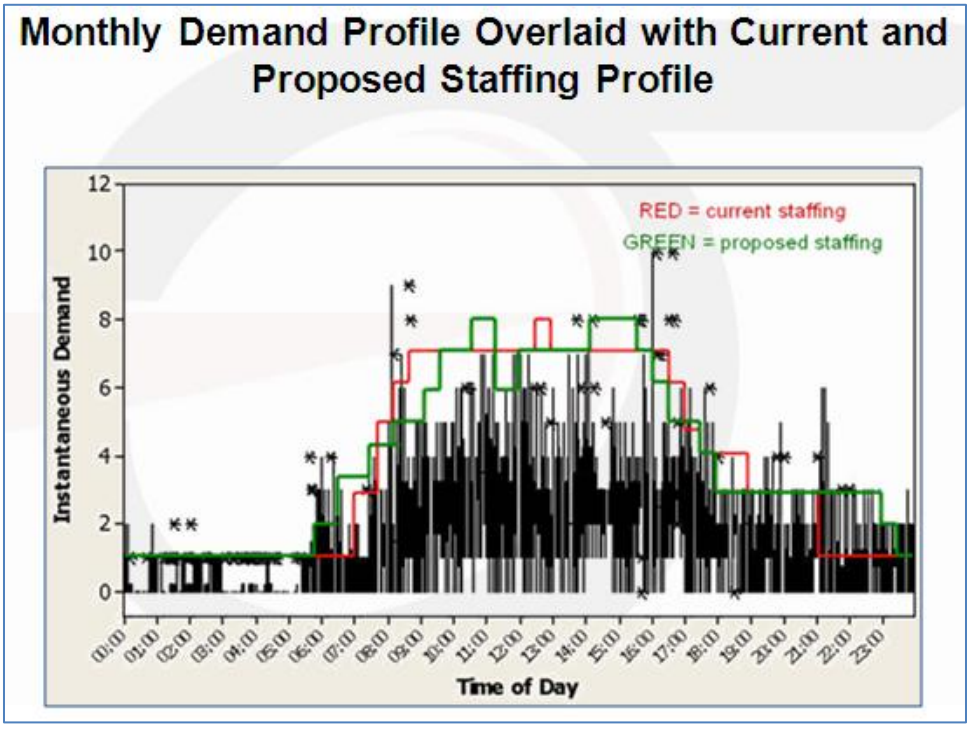
Methods:
The concept of instantaneous demand comes from the energy industry: the rate of energy use at any instant. This can be applied to patient demand using databases that capture patient arrival/departure dates and times. This provides a picture of the demand burden in any department (e.g., radiology, emergency, inpatient) at any instant in time. When charted over a period of time, it provides a graphic portrayal of the peaks, valleys, and variability in demand. This hospital used existing data to examine a one-year history of patient arrival and departure for its inpatient units. By having an entire year of data, the hospital could evaluate average and variability by month by time of day, by week, by day of week, by diagnostic grouping, by unit, etc. Armed with this understanding, the hospital created a running mode to enable staffing based on budgetary demand projections and actual activity. The demand projection concept was applied in other departments to facilitate accurate staffing, including the Emergency Department and Cardiac Cath Lab.

Results:
The hospital was able to consolidate from six inpatient units to five (even with an 18% volume increase), increase floor utilization from 55% to more than 80%, and reduce inpatient annualized staffing costs by $608,000.

Conclusions and Implications:
Instantaneous demand is a robust Lean tool capable of enhancing a hospital understanding of the average and variable load of patient demand.

Graphs Supporting Submission to International Science Symposium 2011 Entitled: Understanding Instantaneous Demand: Using the Lean Concept of Demand Forecasting to Model Staffing Levels against Patient Demand





Decreasing Wrong Patient/Wrong Examination Events in the Radiology Department of a Large Children's Hospital

David B. Larson, ,Chris N. Alsip, Wendy M. Bankes, Todd W. Lehkamp, Susan N. Smith, Mona Valentine, Matthew F. Lilly, Julie M. Dickerson, Rebecca M. Pryor

Children's Hospital Medical Center,Cincinnati,Ohio

Background:
In 2009, 4 wrong patient/exam events (defined as studies not matching the order) were reported in a diagnostic radiology department performing approximately 220,000 studies per year. In 2010, 17 such errors were reported. Such events increase risks associated with radiation exposure and possible misdiagnosis, wrong site surgery, or other harm.

Purpose of the Study:
Decrease the rate of wrong patient/exam events from once every 22 days to less than once every 50 days.

Methods:
An improvement team, including the department QI director, technologist managers, and quality improvement support personnel, began the Right Patient Right Exam (RPRE) initiative by encouraging non-punitive reporting of all wrong patient/exam events through the hospital's reporting system. Events and near-misses could also be recorded on patient control sheets and submitted during a shift. Analysis of errors, near misses, and failure modes and effects suggested that most events could be prevented by accurate patient and exam verification. Prevention of most "upstream" errors, such as order entry errors, were deemed outside the project scope; it was decided to defend against such errors through identification and mitigation strategies. Through collaboration with frontline personnel, the team established a standardized verification process entitled "4-Please" after the four open-ended questions that radiology personnel were expected to ask patients/parents: first and last name, date of birth, exam to be performed, and reason for the exam. The process incorporated reliability strategies such as checklists, "hold points," "quiet zones" (where nonessential conversation is prohibited), role definition, and limitations on number of personnel involved in an exam (Figure 1). Other process changes included similar name alerts, institution of a daily huddle, and changes to protocols and order sets. To ensure adherence to standard processes, the team instituted educational sessions, a standardized training video, practice opportunities, coaching, and demonstration of competence. Compliance was assessed by reviewing initials on control sheets and through auditing performed by departmental QI staff and by parents.

Results:
In the first 9 months of the project, the reported event rate was approximately once every 13 days (Figure 2). The initial "4-Please" process was introduced in the eighth month. In the ninth month, 7 events were reported in a single 4-week period. Investigations

revealed that verification processes remained highly variable. The standardized verification process was further refined and the above-described mechanisms were instituted to ensure consistent adherence (Figure 1). It has currently been 59 days since the last reported event, surpassing the upper control limit of 53 days, indicating a shift in the process mean. Sample audits suggest that approximately 1,200 order errors have been detected and rectified through the RPRE initiative.

Conclusions and Implications:
An initial increase in reported event rates likely reflected improved reporting. Wrong patient/exam events were decreased through a combination of reliability strategies. Improvement can be accomplished through a non-punitive approach. When outcomes are dependent on human performance, reliable mechanisms are needed to ensure consistent training, adherence to standard processes, and use of aids such as checklists.

Figure 1. Key driver diagram.

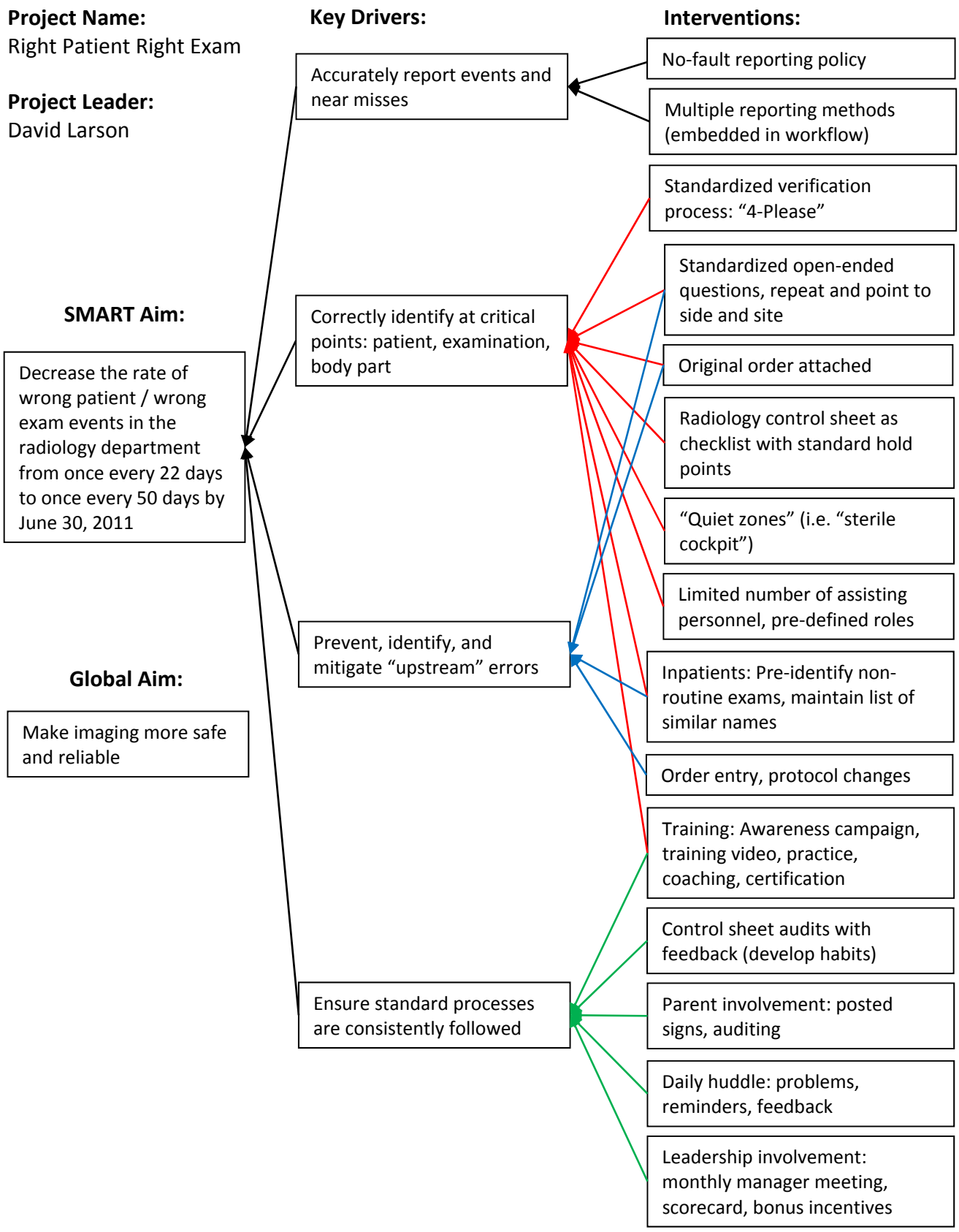
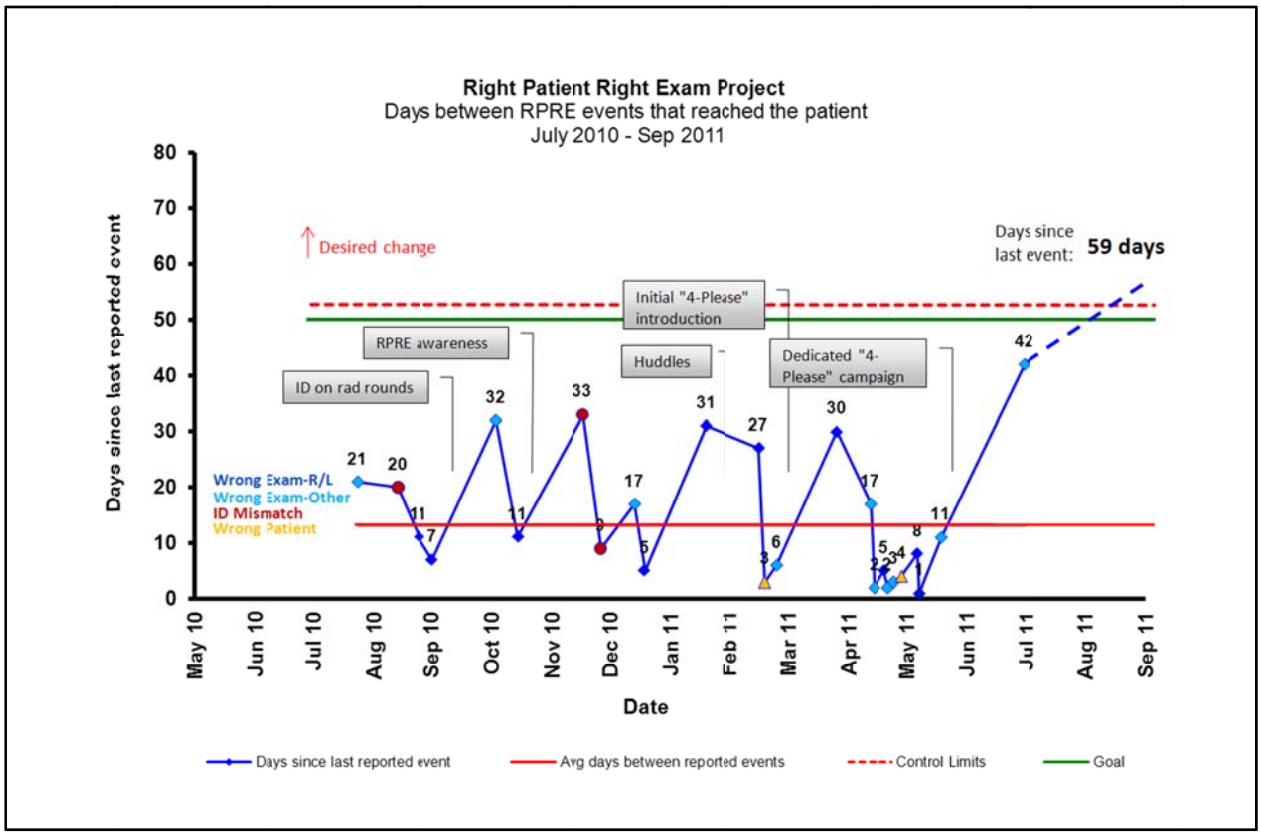


Figure 2. Process control chart for days between wrong patient / wrong exam events that reached the patient.



Thirty-Day Outcomes Support Implementation of a Surgical Safety Checklist: Changing Culture

Scott J. Ellner, Saint Francis Hospital and Medical Center, Hartford, CT, Lindsay . Bliss, University of Connecticut Surgical Residency Program, Farmington, CT, Cyndy Ross-Richardson, Saint Francis Hospital and Medical Center, Hartford, CT, Laura Sanzari, Saint Francis Hospital and Medical Center, Hartford, CT

Background:
Thirty-day postoperative complications from unintended harm adversely affect patients and their families while increasing institutional health care costs. A surgical checklist is an inexpensive tool that will facilitate effective communication and teamwork. Surgical team training has demonstrated the opportunity for stakeholders to professionally engage one another through leveling of the authority gradient to prevent patient harm. The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database is an outcomes reporting tool capable of validating the use of surgical checklists.

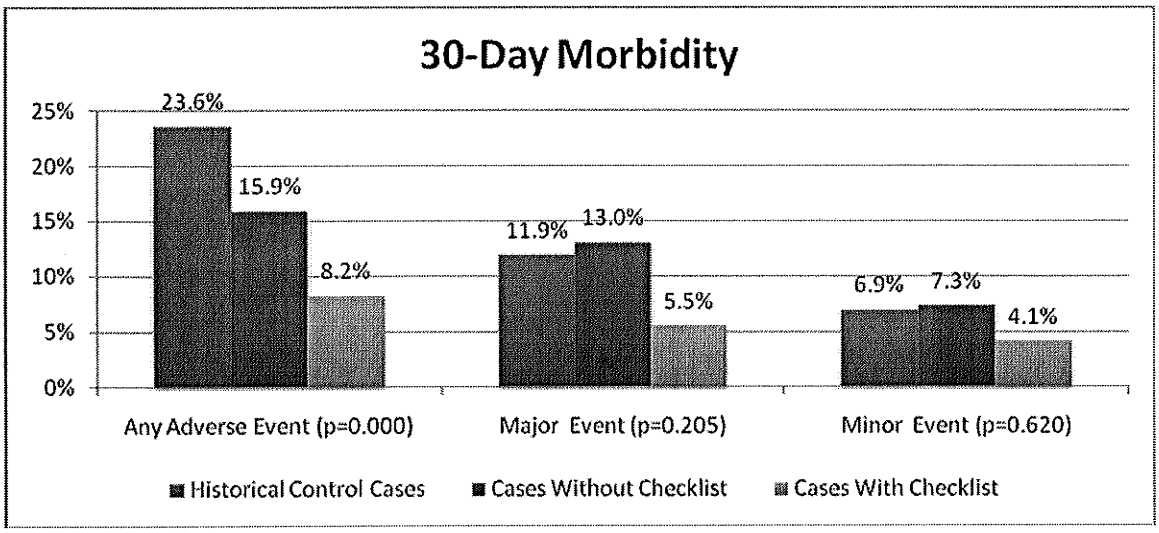
Purpose of the Study:
The purpose of the study was to determine the impact of a standardized preoperative briefing and postoperative debriefing comprehensive surgical checklist on patient safety and quality. The primary hypothesis was that implementation of a surgical safety training program centered on the use of a comprehensive surgical checklist will reduce 30-day post-operative complications through validation by the ACS NSQIP database.

Methods:
Three 60-minute team training sessions were conducted by internal professional development staff and participants were oriented to the use of a comprehensive surgical checklist. The surgical ream used the checklist for high risk procedures selected from those analyzed for NSQIP. Trained observers assessed the checklist completion and collected data regarding the number of circulating nurse exits during the case, the nature of peri-operative communication and any safety compromising events.

Results:
Data from NSQIP was compared for 2079 historical control cases, 246 cases without checklist utilization and 73 cases with checklist utilization. Overall completion of the checklist sections was 97.26%. Further, there was a median of 3 circulating nurse exits for observed cases with a checklist compared to 6 for those without a checklist. Comparison of 30-day morbidity demonstrated a statistically significant ($p=0.000$) reduction in overall adverse event rates from 23.60% for historical control cases and 15.90% in cases with only team training to 8.20% in cases with checklist utilization. Checklist utilization was correlated with a decrease in all measured areas of 30-day morbidity.

Conclusions and Implications:
The utilization of a comprehensive surgical safety checklist and the implementation of a structured team training curriculum produced a measurable and statistically significant decrease in 30-day morbidity. Furthermore, utilization of specific checklist items can be correlated with decreased morbidity rates. This suggests that adoption of a comprehensive checklist is feasible with team training intervention and can produce measurable improvements in patient outcomes. When compared with historical controls, cases with checklist utilization showed a small reduction of time in the OR. Lower frequencies of circulating nurse exits from the OR during cases and shorter OR times are correlated with decreased rates of morbidity that achieve statistical significance.

Figure 1. 30 Day Morbidity Comparing Historical Cases, Cases Without a Checklist and Cases With a Checklist.



A Hub and Satellite Model to Improve the Quality of Care for Patients with Congestive Heart Failure

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Background:
Evidence-based treatments for congestive heart failure (CHF) can modify disease progression, reduce admissions, and result in cost savings; however, quality gaps between current and desired practice exist. Barriers to improving CHF care include lack of guideline awareness, lack of provider support, and time. With this in mind, we developed a model to provide regional CHF support services to remote primary care clinics.

Purpose of the Study:
Our aim was to improve CHF quality metric performance by providing centralized support from a regional heart failure center.

Methods:
A hub and satellite model was created with support from the Veterans Health Administration CHF National Quality Enhancement Research Initiative (QUERI). Eligible patients had systolic CHF with an ejection fraction<40% and received primary care from one of 6 volunteer study providers. A random sample of patients meeting CHF study criteria followed by non-study providers in the same clinics formed a control group. Patients were followed from May 2010 through May 2011. A multidisciplinary team (including a heart failure physician, nurse practitioner, and pharmacist) was formed and conducted a 3 day, interactive CHF management course for study providers. Data on prospectively defined performance measures were collected from provider encounters, and quarterly performance feedback was given to study providers. A clinical pharmacist at the regional CHF center was available by referral to assist in medication titration. Study providers were also given access to the hub team and allowed expedited referral for complicated patients. Matched pairs analysis was conducted using McNemar s test for within group comparisons, and logistic regression was used for between group comparisons. Structured interviews with study providers were conducted to assess satisfaction and barriers to program implementation.

Results:
Two hundred fifty-eight patients cared for by 32 providers (6 study and 26 control) were identified. Baseline quality metrics in patients cared for by study and non-study providers were similar (Table 1). Performance exceeded 80% on 5 of 9 performance measures at baseline, and a median of 5 (IQR 4-6) quality measures were met. Unadjusted within group comparisons found that intervention patients were more likely to be prescribed a

beta blocker at the end of study (81% vs. 88%, p=0.016). No intervention effect on quality outcomes was observed after adjustment for baseline performance (Table 2). Less than 20% of patients were referred for pharmacist-led medication titration, and only 3% of study patients were referred to CHF clinic. Qualitative responses revealed high provider satisfaction with the educational training, performance feedback, and increased confidence in CHF management skills. Providers cited perceptions that patients were already in the system as a key barrier to utilizing support services offered by the hub site.

Conclusions and Implications:
Although the hub and satellite model of CHF care was well received by providers, the model did not improve CHF performance measures in this study. A ceiling effect from high baseline performance on some indicators and limited clinical follow-up visits may have limited opportunity for improvement. Pharmacist referrals were also low, potentially limiting opportunities for medication titration. Further study of this model and additional strategies to increase provider engagement are needed.

Table 1: Baseline Characteristics and Quality Metrics by Study Group

Characteristic	Control (N=129)	Intervention (N=129)
Median Age, years (IQR)	65 (59-72)	65 (62-74)
Male, n (%)	125 (97)	128 (99)
Median number PCP visits during study, n (IQR)	2 (1-2)	2 (1-3)
Median Ejection Fraction, % (IQR)	30 (25-35)	30 (23-35)
Followed by Cardiologist, n (%)	116 (90)	108 (84)
Followed in Advanced HF Clinic, n (%)	23 (20)	31 (29)
CHF Hospitalization past 12 months, yes n (%)	26 (20)	16 (12)
Baseline Quality Metrics		
Weight Measured, n (%)		
Eligible	129 (100)	129 (100)
Achieved	129 (100)	128 (99)
Activity Assessment[§], n (%)		
Eligible	116 (90)	111 (86)
Achieved	19 (16)	23 (21)
Volume Assessment, n(%)		
Eligible	129 (100)	129 (100)
Achieved	122 (95)	122 (95)
Prescribed ACEI/ARB[§], n (%)		
Eligible	120 (93)	122 (95)
Achieved	105 (88)	102 (84)
ACEI/ARB at target dose[§], n (%)		
Eligible	105 (88)	102 (84)
Achieved	35 (33)	34 (33)
Prescribed Beta-blocker[§], n (%)		
Eligible	129 (100)	127 (98)
Achieved	115 (89)	103 (81)
Beta-Blocker at Target Dose[§], n (%)		
Eligible	115 (89)	103 (81)
Achieved	40 (35)	35 (34)
Evidence Based Beta-Blocker[§], n (%)		
Eligible	115 (89)	103 (81)
Achieved	95 (82)	84 (82)
Coumadin use in AFib[§], n (%)		
Eligible	42 (32)	38 (29)
Achieved	30 (71)	27 (71)

[§]Patients with pre-specified contraindications excluded from performance measure.

Table 2: End of Study Quality Metrics

Quality Metric	Control[†] N=111	Intervention[†] N=107	OR[*] (95% CI)
Weight Measured, n (%)			
Eligible	111 (100)	107 (100)	---
Achieved	110 (99)	106 (99)	0.96 (0.06-15.6)
Activity Assessment, n (%)			
Eligible	88 (79)	88 (82)	---
Achieved	16 (18)	11 (12.5)	0.73 (0.31-1.74)
Volume Assessment, n(%)			
Eligible	111	107	---
Achieved	101(91)	102 (95)	2.02 (0.65-6.22)
Prescribed ACEI/ARB[§], n (%)			
Eligible	97 (87)	97 (87)	---
Achieved	90 (93)	86 (89)	0.57 (0.18-1.85)
ACEI/ARB at target dose[§], n (%)			
Eligible	90 (93)	86 (89)	---
Achieved	33 (37)	25 (29)	0.57 (0.23-1.4)
Prescribed Beta-blocker[§], n (%)			
Eligible	110 (99)	104 (97)	---
Achieved	104 (95)	92 (88)	0.71 (0.19-2.66)
Beta-Blocker at Target Dose[§], n (%)			
Eligible	104 (95)	92 (88)	---
Achieved	41 (39)	31 (34)	0.52 (0.22-1.24)
Evidence Based Beta-Blocker[§], n (%)			
Eligible	104 (95)	92 (88)	---
Achieved	80 (77)	77 (84)	2.0 (0.55-7.29)
Coumadin use in AFib[§], n (%)			
Eligible	37 (33)	33 (31)	---
Achieved	30 (81)	23 (70)	0.23 (0.22-2.37)

[†]Excludes 18 patients in Control Group and 22 patients in Intervention group without follow-up clinic visit/

[§]Patients with pre-specified contraindications excluded from performance measure.

[*]Odds ratio for intervention group meeting performance measure at end of study, adjusted for baseline performance.

Management of Urgent and Emergent Cases Timeliness to Operating Room at a Level 1 Trauma Center

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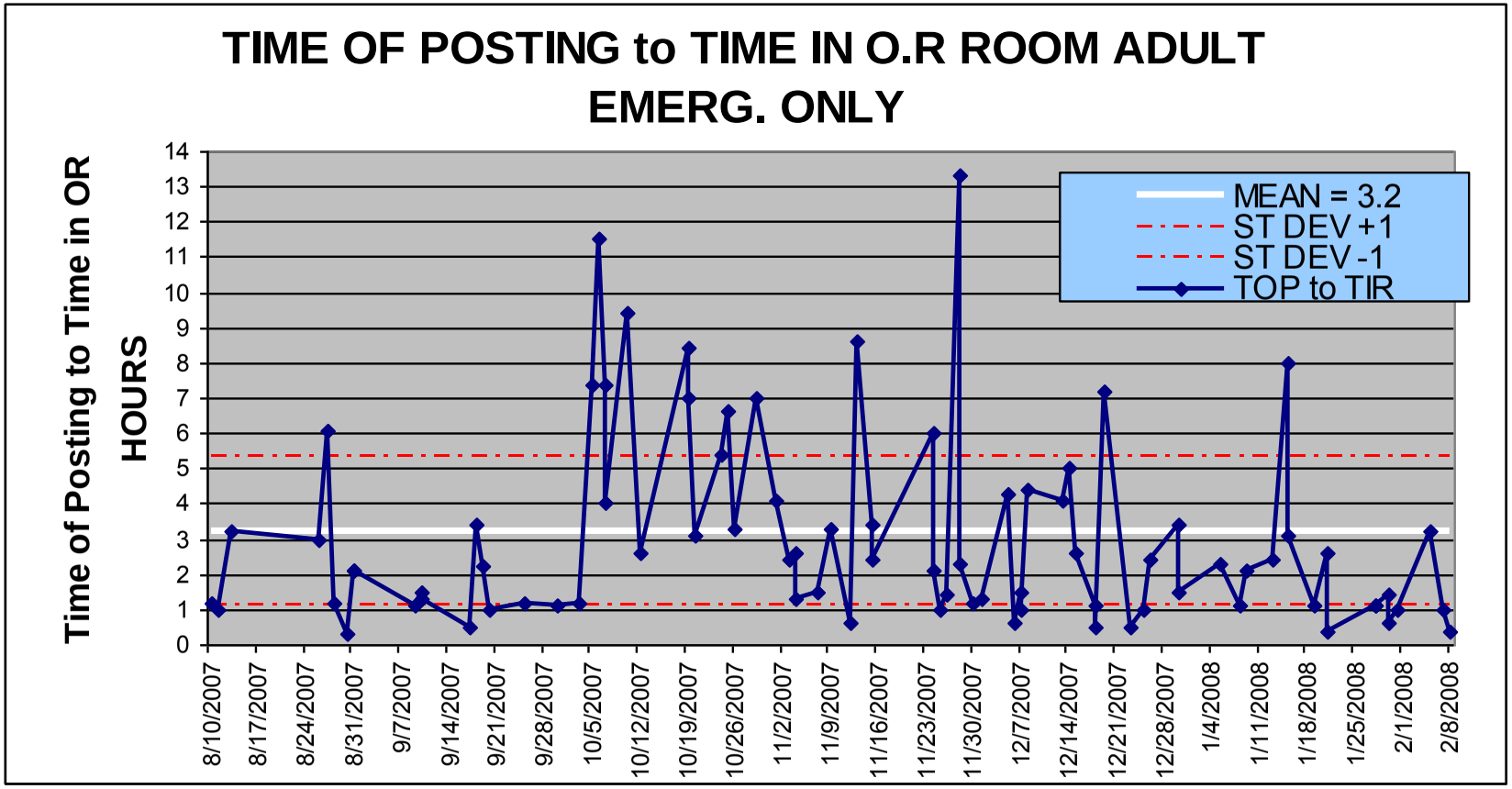
Background:
In January of 2008, a group of University of Virginia Medical Centre surgeons voiced their concern regarding the variability in the timeliness with which urgent and emergent cases progressed to the Operating Room (O.R.) for surgical intervention. Start time for potentially life threatening cases was subjective, and at the discretion of decision makers who, often were unable to discern the level of acuity of the case. There were no guidelines or expectations for the time frame for emergency cases. Procedures didn t have a differentiation between levels of acuity, and how long was too long to wait for definitive care. Lack of communication or miscommunication between the person posting the case and decision makers also influenced the start time. Another problem was that there weren t a sufficient amount of rooms reserved for emergency cases on a daily basis. This frequently resulted in urgent procedures going to the O.R. after the elective schedule was near complete or late at night, causing dissatisfaction of the surgeons, and may have clinical implications that have gone undocumented.

Purpose of the Study:
Being a Level 1 Trauma Center less than 40% of high-acuity, emergency cases were making it into the operating room in less than an hour (graph 1). Our team was charged with the responsibility of devising a system that would improve patient flow and ensure a more reliable and auditable process. A baseline understanding of the magnitude and scope of the problem helped us in setting aims to improve upon the issue.

Methods:
Review of existing data (graph 1) of emergent procedures showed average wait time from posting to OR was 3.2 hours. Application of PDSA methodology led to modifications in the processes of case posting and room allocation for urgent and emergent surgical cases. We asked Trauma surgeons for guidance in creating acceptable categories of urgency, to further distinguish the time that each procedure needed to be done in. These categories were determined to be Emergency (within 1 hour), Urgent (within 4 hours), Urgent (within 12 hours), and Emergency Transplant cadaveric. We instituted a timestamp on when the case was posted, so that we could study the issue further, monitor the effectiveness of the process and accountability. Elective patient flow was being disrupted by only having one room designated to emergency care, and therefore we recognized the need to have additional designated emergent rooms and a process for allocation. After much discussion, the executive management decided to commit 3 discretionary rooms for emergent, urgent or transplant procedures Monday thru Friday.

Results:
Since January 2009, data shows that 67% of the cases posted within one hour are in the O.R within the specified time frame. While 86% compliance in within 4 hours category and 94% of cases "within 12 hrs" graph 2).

Conclusions and Implications:
At completion of our project, the Operating room had a new procedure for streamlining the flow of patient care in the urgent/ emergent operative procedures, and decreased wait time to intervention. Improving patient flow and efficiency of patient care required strong team leadership; inter disciplinary collaboration as well as staff participation and cooperation. Allocation of resources and creation of urgent / emergent categories with clear expectations for procedural start time overcame miscommunication, increased satisfaction and has shown sustained improvement to intervention time.


TIME OF POSTING to TIME IN O.R ROOM ADULT EMERG. ONLY
Time of Posting to Time in OR HOURS
MEAN = 3.2
ST DEV +1
ST DEV -1
TOP to TIR
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
8/10/2007
8/17/2007
8/24/2007
8/31/2007
9/7/2007
9/14/2007
9/21/2007
9/28/2007
10/5/2007
10/12/2007
10/19/2007
10/26/2007
11/2/2007
11/9/2007
11/16/2007
11/23/2007
11/30/2007
12/7/2007
12/14/2007
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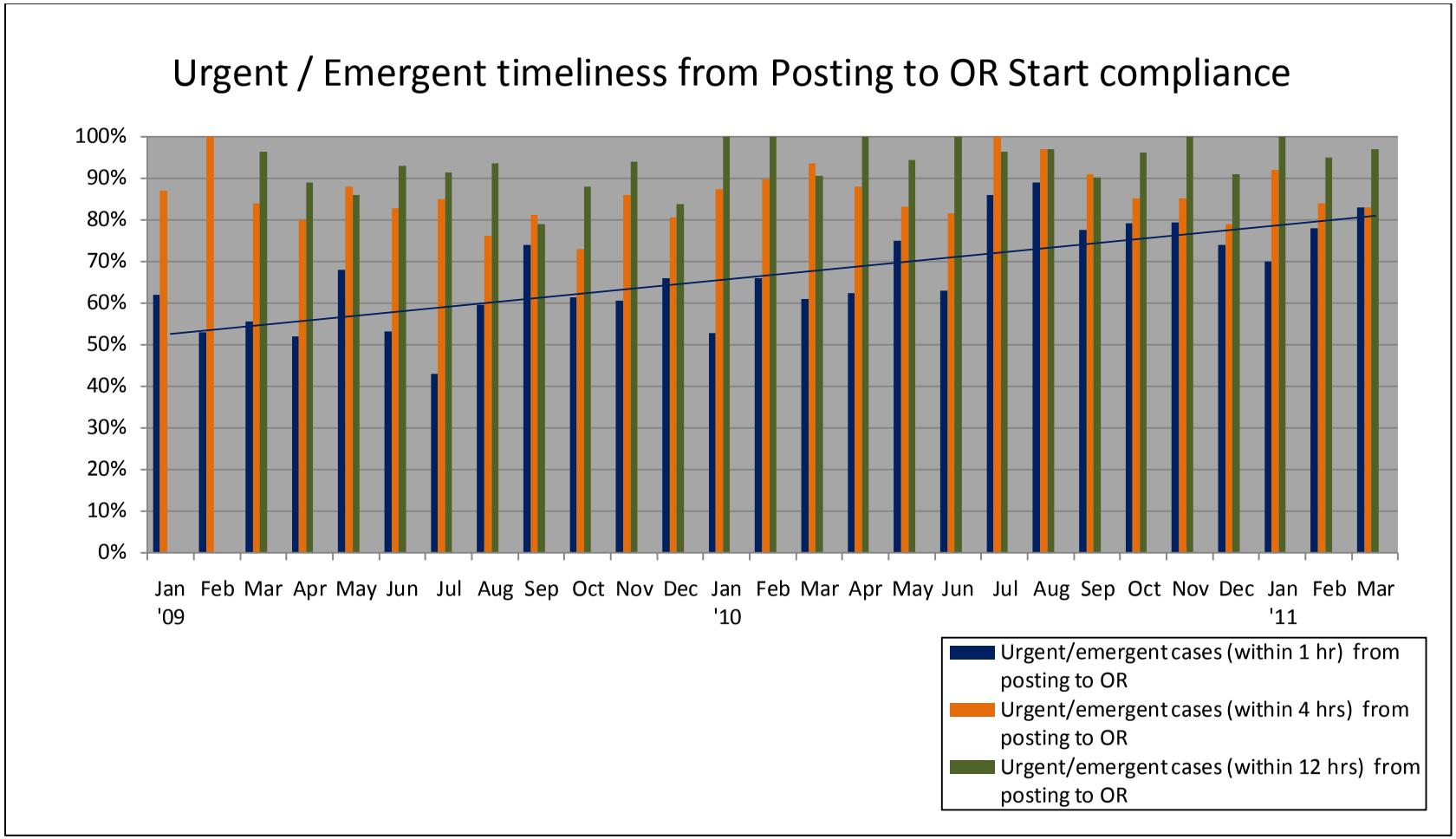
1/18/2008
1/25/2008
2/1/2008
2/8/2008

Graph 1


Urgent / Emergent timeliness from Posting to OR Start compliance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Jan '09
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan '10
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan '11
Feb
Mar
Urgent/emergent cases (within 1 hr) from posting to OR
Urgent/emergent cases (within 4 hrs) from posting to OR
Urgent/emergent cases (within 12 hrs) from posting to OR

Novel Classification Approach for Longitudinal Evaluation of Quality Improvement

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Background:
Despite numerous healthcare quality improvement (QI) efforts, the last decade has not exhibited the desired improvements in overall quality and safety. While it is increasingly understood that not all hospitals succeed even when completing the same QI initiative, current analyses do not help understand how performance varies and what contributes to this variation.

Purpose of the Study:
To employ an interrupted time-series analysis to examine performance of 130 Veterans Affairs (VA) hospitals participating in a patient flow QI collaborative. The results of this analysis will then be utilized to develop a novel classification scheme that aids interpretation of results and can support efforts to compare and contrast hospitals.

Methods:
Interrupted time-series model evaluating five years of data (two pre-intervention, one year during the intervention period, and two-post intervention). Time was parameterized in the model to ensure a continuous piecewise regression. The beta parameters for each year were then interpreted based on their statistical significance and directionality to identify potential performance categories. The primary outcomes for the patient flow collaborative were to shorten hospital LOS and to increase the percentage of patients discharged before noon. The outcomes were risk adjusted for patient characteristics and the time-series models were tested, and when necessary adjusted, for autocorrelation and heteroscedasticity.

Results:
In total the results identified 11 different performance categories which collapsed into 4 major categories: 1. No Change: These hospitals exhibited non-significant beta parameters across the first four years of the study. This was due to high outcome variability which likely reflected inconsistent care processes that need defining before attempting QI. 2. No Benefit: These hospitals exhibit lower outcome variability and had statistically significant beta parameters. During the intervention period these hospitals either have a non-significant change (suggesting no improvement beyond baseline) or an improperly signed beta parameter. 3. Improve: These hospitals had significant beta parameters with appropriate direction during the intervention period. After the intervention period the beta parameters are inappropriately signed leading to a loss of improvements. 4. Sustain: These hospitals have appropriately signed significant beta parameters during the intervention year. Post-intervention they maintain improvements at least above levels predicted at baseline. Hospital performance was distributed across all four categories for both outcomes (Table 1). Two surprising findings from the final classification were that 36 hospitals (27.7%) were classified as No Change for both

outcomes, and only 27 (20.8%) and 19 (14.6%) hospitals Sustained improvements on LOS and discharges before noon, respectively.

Conclusions and Implications:
This study identified a novel classification approach that provided easy interpretation and comparison of results from a time-series analysis. The categories in this classification scheme highlight key differences in how hospitals performed during a QI collaborative. Further exploration of these categories and the organizational characteristics of the hospitals will improve the understanding of how QI occurs in healthcare, what barriers it faces, and why QI initiatives may not translate across all settings.

Table 1: Hospital classification (N = 130)

	LOS	*Noon Discharge*
No Change	36	36
No Benefit	49	34
Improve	18	41
Sustain	27	19

Data Mining to Understand Hospital Performance in a QI Collaborative

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Background:
When closely examined, hospitals exhibit dramatic variation in how they perform on similar quality improvement (QI) projects. However, attempts to understand how organizational characteristics support or inhibit QI efforts generally result in non-significant or conflicting findings. The challenge in understanding these relationships is the complex interactions between organizational characteristics that complicate measurement and statistical analysis.

Purpose of the Study:
Develop a conceptual model that describes how organizational components interact to generate an environment that contributes to overall QI performance. Subsequently, evaluate data mining as a tool for modeling and understanding which organizational characteristics meaningfully contribute to the QI environment

Methods:
Conceptual model development was driven by a review and synthesis of literature analyzing the relationships between organizational characteristics and healthcare quality or quality improvement activities. Organizational characteristics for data analysis came from 2 surveys completed in Veterans Affairs (VA) hospitals during the same time as an enterprise-wide QI collaborative. Hospital performance on the QI collaborative came from a 5-year interrupted time series analysis. Data mining decision trees were developed using a C4.5 information entropy algorithm that aimed to determine how collections of organizational characteristics were associated with different hospital performance categories. Model validation was completed using 10-fold validation with review of kappa and receiver operating characteristic (ROC) performance metrics.

Results:
The final conceptual model (Figure 1) was most predominately influenced by Realistic Evaluation theory and Donabedian's structure-process-outcome model. The model includes four broad categories that individually and collectively create an organizational context that modifies the QI activity of interest. The stacking of these categories in a triangle has several meanings, the most important of which is to signify that top elements cannot have beneficial effects if they are not built upon the correct foundation. The data mining process evaluated 263 individual and composite variables in 4 separate decision trees. All 4 models exhibited weak performance in the validation studies with kappa and ROC metrics suggesting the models classified hospital performance similar to chance. However, more in-depth review of the decision trees identified four categories of variables, sufficient support staff, sufficient inpatient resources, data collection and availability, and promotion of guideline adherence, which had roles in shaping the organizational environment. Additionally, the decision trees suggested strong measures

of QI process characteristics supported efforts to improve, but strong QI structural components were necessary to sustain improvements.

Conclusions and Implications:
While this study did not identify any strong relationships between organizational characteristics and QI performance, it did generate three key contributions. First, this study introduced a conceptual model that future studies can further explore and validate. This model has the potential to improve the understanding of why not all hospitals succeed with proven QI initiatives. Second, the study introduces data mining as a useful tool for large data analysis and shows how it can help generate hypotheses to direct future studies. Third, the results identified 4 specific areas that impact QI; however, their exact roles need clarification in focused qualitative and quantitative studies.

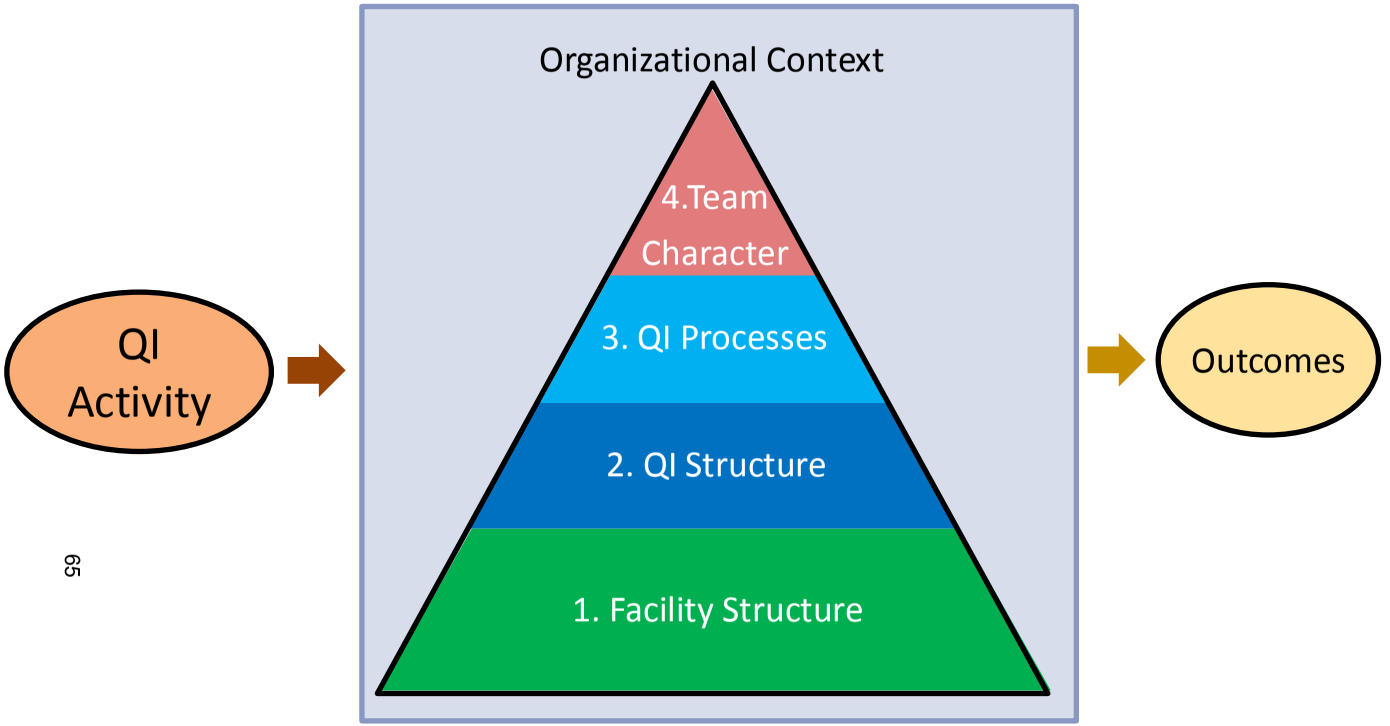

Figure 1: Conceptual Model of how Organizational Context Modifies a QI Activity

Coaching Interdisciplinary Teams in Health Care Improvement

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Background:
Consistency in health care improvement by interdisciplinary health care teams is a significant challenge reported across many health care settings and countries around the world. Inconsistencies have been attributed to a variety of factors including a lack of organizational infrastructure, leadership, cultural insights, clarity of aim, resources and engaged front line staff. A recent review of the literature illustrates a multitude of efforts to make improvements in health care ranging from organizations providing performance data to provoke improvement action, national and international benchmarking, organizational classes in Toyota Production System, LEAN, Six Sigma, Process Control Charts, The Improvement Model, bundles of best practices and campaigns. The most frequently reported improvement activity is some variation of the learning collaborative modeled after the IHI Break Through Series. Moving beyond collaboratives and other efforts into the real-world setting of health care delivery and improvement, small improvement teams are often faced with daily on-the-job crises and organizational inertia that impacts the team's ability to follow through on well intended improvements and goals. Coaching may represent an opportunity to address both the knowledge gap and need for helping interdisciplinary health care improvement teams within and between structured learning sessions in the context of daily work.

Purpose of the Study:
The objective of the study was to study two national learning collaborative groups that utilized the intervention of dedicated coaching for each interdisciplinary groups before, during and after learning sessions over the period of one to two years. The aim was to describe three different perspectives of coaching during the learning collaboratives: coachee, coach and leader to describe coaching actions and behaviors that were viewed to contribute to interdisciplinary front line team engagement in health care improvement.

Methods:
A mixed methods sequential exploratory design with both quantitative and qualitative data was used. Three phases of the research with two groups occurred between 2005 and 2009. Ethical approval was obtained through expedited review-participation was voluntary and based on informed verbal consent and confidentiality. The two groups received coaching interventions over the course of the learning collaborative. Data collection consisted of an internet based survey for the coachees, focus groups for the coaches, and semi-structured interviews with pairs of leaders of the groups who had been coached.

Results:
All data was analyzed in the two groups separately and then together. The quantitative data analysis (coachee survey) was reported on descriptive level and analyzed using Fisher's exact test. The results illustrate statistical signficance between the two groups in nearly half of the survey items. Open ended survey questions were organized using NVIVO8 and further supported the differences between the two groups in categories of helping, relationships, communication and technical skills. Focus groups and semi-structured paired leader interviews were recorded, transcribed and organized using NVIVO8. Analysis was conducted separately in the coachee, coach, and leader data in each group. Again the categories that emerged from the analysis showed consensus between the two groups in helping, relationships, communication and technical skills. An important category of context was identified in the coaching focus groups, leader interviews which was supported in the coachee survey.

Conclusions and Implications:
Health care organizations around the world are well intentioned in their desire to make serious improvements in system outcomes and performance levels. Critical to achievement of these goals, is the engagement and development of members of the front line teams. Clarification of goals, targets and resources build the foundation for beginning awareness of the need to improve. Some organizations use various levels of helpers for front line teams to be able to make important improvements. This study reports the perceptions of three important actors in health care improvement: The coachee, Coach and Leader of the unit. Findings will further advance the body of knowledge to better develop coaching skills, develop evaluations which improve the coaching interactions and identify behaviors and actions which are perceived to make a difference for front line teams interested in making health care improvements.

Adapting the Break Through Series Learning Collaborative Model for Use in the Higher Education Environment

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Background:
The Breakthrough Series (BTS) Learning Collaborative model was developed by the Institute for Healthcare Improvement in order to "help healthcare organizations make breakthrough improvements in quality while reducing costs " (www.IHI.org). While there are numerous reports demonstrating significant improvements in the quality of care delivered within healthcare organizations, the model has not been widely applied outside of the domains of healthcare or public health. The National College Health Improvement Project (NCHIP) was founded in 2010 by Dartmouth College President, Jim Yong Kim at The Dartmouth Center for Health Care Delivery Science and The Dartmouth Institute for Health Policy and Clinical Practice. NCHIP aims to bring public health solutions and quality improvement methods to bear on problems affecting student health at post-secondary institutions. NCHIP's inaugural initiative is the Learning Collaborative on High-Risk Drinking (LC), modeled on the BTS framework, with the aim of reducing harm arising from high-risk drinking on college campuses.

Purpose of the Study:
NCHIP has focused on translating the BTS Learning Collaborative model into the domain of higher education. This study offers insight into this process, highlighting where changes in methodology have occurred while beginning to document the effectiveness of this translation.

Methods:
uantitative and qualitative data pertaining to LC planning, design, and implementation were obtained along with aggregate measures of the member schools' degree of participation and success with utilizing the improvement methodologies presented as a part of the LC.

Results:
Thirty-two institutions joined the LC. Conceptual logic models organizing the factors contributing to harm arising from high-risk drinking (and the requisite drivers that would lead to reductions in this harm) were developed in close consultation with 12 expert faculty members. These logic models identified drivers that fell into three separate domains: 1) the individual drinker, 2) the surrounding environment, and 3) the overarching system. These models served as the framework for the LC structure and directly informed the development of specific change concepts. Given their complexity and scope, these interventions were not amassed into a single, discreet change package (as per the typical BTS model), but rather were organized by domain

(individual, environment, system), with each learning session assigned a theme corresponding to one of the domains. Schools provide monthly reporting of current PDSA cycles, measures currently in use, and a progress report detailing challenges and successes to-date, along with a self-assessment of how their improvement team is functioning (Table 1).

Conclusions and Implications:

Adapting the BTS model to fit within the context of higher education has been challenging; however, our early work indicates that this translation may ultimately prove to be successful. Much of the BTS methodology was directly transferable; however, specific challenges include the need to parcel the change package into manageable pieces over multiple learning sessions, as well as the introduction of improvement methodology to an audience that is largely unfamiliar with this process. Furthermore, the development and implementation of an overall measurement strategy that collects consistent monthly measures has been the largest challenge encountered to date.

Table 1

Activity	Measure
Pre-work	
Aim Statement	
Schools who submitted an aim	32/32 (100%)
Number using quantitative goals	29/32 (91%)
Flowchart screening process	
Schools who submitted	16/30 (53%)
Flowchart management of the toxic drinker	
Schools who submitted	24/30 (80%)
Learning Session	
Participation (# schools)	32/32 (100%)
Action Period	
All collaborative calls	
Participation (# schools)	29/32 (91%)
PDSA Reports	
Total submitted	57
Number per school (avg,range)	1.8 (range: 0-6)
Schools submitting at least one	31/32 (97%)
Schools submitting multiple	13/32 (41%)
Measures	
Total submitted	22
Number per school (avg,range)	0.7 (range: 0-4)
Schools submitting at least one	9/32 (28%)
Schools submitting multiple	6/32 (19%)
Progress Reports	
Total submitted	19
Self-assessment (IHI scale 1-5)	2.1 (range: 1.0-4.0)

Driven to Succeed- Creating a Patient Safety Dashboard

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Background:
Frederick Memorial Hospital Performance Improvement (PI) Department identified the need to develop a tool to effectively communicate data concerning Nurse-sensitive indicators, core measures & infection control measures that impact patient outcomes and patient safety. The measures include but are not limited to: falls, pressure ulcers, hand hygiene, catheter associated urinary tract infections (CAUTIs), Ventilator associated pneumonia (VAP), Blood stream infections (BSIs), clostridium difficile, antibiotic prophylaxis, etc....

Purpose of the Study:
During CART (Continued Accreditation Review Team) surveillances performed by in-house leadership and the PI Department, staff had difficulties answering questions regarding patient safety data, core measures, et al. and speaking to patient safety initiatives in progress on the unit. Departments had pockets of information that was difficult to find and not displayed for all staff to see. In addition, the hospital decided to pursue Magnet certification and had begun collecting data for submission to the National Database of Nursing Quality Indicators (NDNQI). Each nursing unit wanted one dashboard to show trends, progress and identify areas requiring improvement.

Methods:
Data is collected by the PI Department, Infection Control, house-wide prevalence studies performed by nurses, lab and computer generated programs. Dashboards exist for leadership but the staff is not always informed or aware of the data. The data is compiled into one data bank and managed by the PI Department. Pertinent data is displayed in the Patient Safety Dashboard so that staff has a simple, comprehensive, visual report of indicators that is easily accessed on their deparment. Also, a key is provided that explains the definitions, contains the goal for each indicator and states whether it is a quarterly or monthly measure. The dashboard is colored like a street light so it is simple to read. Green - goal met, Yellow - within 10% of the goal and Red - not at goal, needs an action plan. Goals were set based on state or national benchmarks or reasonable goals based on hospital compliance and trends when national and state benchmarks are not available.

Results:
Staff are utilizing the dashboards to develop action plans as needed for improving processes and patient outcomes. The colorful visual report of the dashboard serves as a reminder for staff to use when speaking with co-workers, leadership and surveyors. The dashboards are updated monthly and then distributed to each unit on the first Monday prior to the first Wednesday of the month. This first Wednesday corresponds with the Nursing Leadership meeting and provides nursing leadership with time to review their data prior to full leadership committee discussion. The PI Department posts each unit's dashboard on their Quality/Safety Board as well as delivers a copy to each unit manager

and clinical nurse specialist. The Chief Nursing Officer and directors receive packets that contain the dashboards for every unit. Individual units huddle around the dashboards daily to update staff and discuss action plans. The Unit Practice Councils utilize the dashboard to determine the course of the action plan.

Conclusions and Implications:
The Patient Safety Dashboard is on display on each unit and RNs and ancillary staff create action plans based on the data. For example, the hand washing indicator has led to an initiative of staff reminding each other to wash their hands as well as discovering barriers on the unit. The staff identified areas where new dispensers needed to be placed. Leadership listened to the recommendations and took action. After only two months, improvement was noted in hand washing compliance. The following teams were formed to improve compliance: 1. Hand Hygiene Initiative - three teams - a. Urgency or importance of hand hygiene b. Key words/scripting for staff to use c. Identification of top barriers to eliminate 2. Nursing Quality Committee - four teams - a. Falls b. Pressure Ulcers c. Restraints d. CAUTIs/BSIs/VAPs 3. Clostridium Difficile These groups continue to be very active in monitoring, action planning, and improving measures. The future looks bright as FMH is driven to succeed in improving patient safety and patient outcomes.

	Trend	2009	2010	Dec 2009	Jan 2010	Feb 2010	Mar 2010	Apr 2010	May 2010	Jun 2010	Jul 2010	Aug 2010	Sep 2010	Oct 2010	Nov 2010
ICU - Falls (Rate)	↘	0.83	0.65	0.00	3.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ICU - Pressure Ulcer Prevalence (%)	↓	62.50	0.00	62.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ICU - Central Line Associated BSIs (Rate)	↘	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ICU - VAPs (Rate)	↘	3.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ICU - C Diff (Number)	↘	9.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
ICU - Critical Value Documentation (%)	↑	78.95	88.89	66.67	100.00	100.00	50.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ICU - Hand Hygiene (%)	↑	0.00	57.09	0.00	50.00	47.83	43.68	66.00	65.67	66.67	52.63	60.87	54.55	64.00	0.00
ICU - Patient Identification (%)	↘	100.00	98.04	0.00	100.00	100.00	0.00	100.00	0.00	0.00	95.24	0.00	0.00	0.00	0.00
ICU - Transfusion Vital Signs (%)	→	66.67	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Physician Orders for Life-Sustaining Treatment (POLST), for Medically Fragile/Medically Complex/Technology Dependent, Pediatric Patients

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Background: Decisions regarding treatment when EMS is called to assist medically fragile/complex/technology dependent children has been evaluated. Once a decison for full cardiopulmonary support is initiated in the field it becomes difficult to reverse when the patient is hospitalized.

Purpose of the Study: A program was developed to allow parents, caretakers and, when appropriate, patients to make these decisions prior to acute need. A POLST form has been developed to document agreed upon decisions between the family, primary care provider and pediatric subspecialists. These choices are determined at a time when they can be made without concern of imminent implementation. Hawaii legislation and state law requires that EMS service providers honor the form.

Methods: POLST consists of 3 sets of decisions: CPR, Medical Interventions and Artificially Administered Nutrition. CPR decisions: CPR or DNR(**A**llow **N**atural **D**eath) Medical Intervention decisions: Comfort measures only, limited additional interventions, or full treatment. Artificially Administered Nutrition decisions: No artificial nutrition by tube, long-term artificial nutrition by tube or artificial nutrition defined by a specific time period. The form requires the signatures of a licensed physician and parent/guardian. The form is brilliantly colored and placed at the head of the patient's bed at home. A copy is kept at the PCP's office (Medical Home) and in the EMR at the tertiary pediatric center in Hawaii.

Results: These forms have been completed by 17 families: 2 muscular dystrophy, 1 lisencephaly, 1 panniculitis, 1 suffocating thoracic dystrophy, 1 Leigh's syndrome, 1 mitochondrial dysfunction disease, 3 Acute spinal muscular atrophy type I, 7 severe mental retardation, microcephaly, cerebral palsy, essentially nonresponsive conditions.

Conclusions and Implications: The use of this outpatient directive allows families to make decisions about potentially needed care at a time when such care is not immediately required. The discussions arise during routine medical care in the medical home setting. It is viewed as supporting patient choice. It is not viewed as an attempt to refuse or deny treatment. After the forms were initially completed, further discussions occur at subsequent visits. Several patients and caregivers have made decisions to further limit the care they desire after having time to consider implications of what has been discussed. The ability to have these discussions as part of the medical home is considered a major improvement in this type of decision making process. It is part of an integrated Advance Care Planning program.

HIPAA PERMITS DISCLOSURE OF POLST TO OTHER HEALTH CARE PROFESSIONALS AS NECESSARY

Physician Orders for Life-Sustaining Treatment (POLST)

First follow these orders, then contact physician. This is a Physician Order Sheet based on the person's current medical condition and wishes. Any section not completed implies full treatment for that section. Everyone shall be treated with dignity and respect.

Patient 's Last Name	
First /Middle Name	
Date of Birth	Date Form Prepared

A — CARDIOPULMONARY RESUSCITATION (CPR): *Person has no pulse and is not breathing.*

Check One

☐ **Attempt Resuscitation/CPR** ☐ **Do Not Attempt Resuscitation/DNR** **(Allow Natural Death)**
(Section B: Full Treatment required)

When not in cardiopulmonary arrest, follow orders in **B** and **C**.

B — MEDICAL INTERVENTIONS: *Person has pulse and/or is breathing.*

Check One

☐ **Comfort Measures Only** Use medication by any route, positioning, wound care and other measures to relieve pain and suffering. Use oxygen, suction and manual treatment of airway obstruction as needed for comfort. ***Transfer*** *if comfort needs cannot be met in current location.*

☐ **Limited Additional Interventions** Includes care described above. Use medical treatment, antibiotics, and IV fluids as indicated. Do not intubate. May use less invasive airway support (e.g. continuous or bi-level positive airway pressure) ***Transfer*** to hospital if indicated. Avoid intensive care.

☐ **Full Treatment** Includes care described above. Use intubation, advanced airway interventions, mechanical ventilation, and defibrillation/cardioversion as indicated. ***Transfer*** *to hospital if indicated. Includes intensive care.*

Additional Orders: _____

_____

C — ARTIFICIALLY ADMINISTERED NUTRITION: *Always offer food and liquid by mouth if feasible and desired.*

Check One

(See Directions on next page for information on nutrition & hydration)

☐ No artificial nutrition by tube.

☐ Defined trial period of artificial nutrition by tube.
Goal:_____

☐ Long-term artificial nutrition by tube.

Additional Orders:_____

D — SIGNATURES AND SUMMARY OF MEDICAL CONDITION:

Discussed with:

☐ Patient ☐ Patient's Surrogate (Health Care Decision-maker) ☐ Parent of Minor ☐ Guardian

Signature of Physician

My signature below indicates to the best of my knowledge that these orders are consistent with the person's medical condition and preferences.

Print Physician Name	Physician Phone Number	Date
Physician Signature (required)	Physician License #	

Signature of Patient, Surrogate, Parent of Minor or Guardian

By signing this form, the legally recognized decision maker acknowledges that this request regarding resuscitative measures is consistent with the known desires of, and in the best interests of, the individual who is the subject of the form.

Signature (required)	Name (print)	Relationship (write self if patient)

Summary of Medical Condition	Office Use Only

SEND FORM WITH PERSON WHENEVER TRANSFERRED OR DISCHARGED

HIPAA PERMITS DISCLOSURE OF POLST TO OTHER HEALTH CARE PROFESSIONALS AS NECESSARY

Patient Name (last, first, middle)	Date of Birth	Gender: M F
Patient Current Address		

Contact Information

Patient's Surrogate (Health Care Decisionmaker)	Address		Phone Number
Health Care Professional Preparing Form	Preparer Title	Phone Number	Date Prepared

Directions for Health Care Professional

Completing POLST

- Must be completed by health care professional based on patient preferences and medical indications.
- POLST must be signed by a physician and the patient/surrogate to be valid. Verbal orders are not acceptable.
- A surrogate may be designated by a patient or if the patient lacks capacity to consent to or refuse treatment, a non-designated surrogate may be appointed by consensus of the interested persons as per HRS §327E-5.
- Use of original form is strongly encouraged. Photocopies and FAXes of signed POLST forms are legal and valid.

Using POLST

- Any incomplete section of POLST implies full treatment for that section.

Section A:

- No defibrillator (including automated external defibrillators) should be used on a person who has chosen "Do Not Attempt Resuscitation."

Section B:

- When comfort cannot be achieved in the current setting, the person, including someone with "Comfort Measures Only," should be transferred to a setting able to provide comfort (e.g., treatment of a hip fracture).
- IV medication to enhance comfort may be appropriate for a person who has chosen "Comfort Measures Only."
- A person who desires IV fluids should indicate "Limited Interventions" or "Full Treatment."

Section C:

- A surrogate who is not designated by the patient may make all health-care decisions for the patient except that artificial nutrition and hydration may be withheld or withdrawn only when the primary physician and a second independent physician certify in the medical records that the provision/continuation of nutrition/hydration prolongs the act of dying and the patient is highly unlikely to have any neurological response in the future. HRS §327E-5.

Reviewing POLST

It is recommended that POLST be reviewed periodically. Review is recommended when:

- The person is transferred from one care setting or care level to another, or
- There is a substantial change in the person's health status, or
- The person's treatment preferences change.

Modifying and Voiding POLST

- A person with capacity or, if lacking capacity, the surrogate can request a different treatment plan and may revoke the POLST at any time and in any manner that communicates an intention as to this change.
- To void or modify a POLST form, draw a line through Sections A through D and write "VOID" in large letters on the original and all copies. Sign and date this line. Complete a new POLST form indicating the modifications.
- The patient's physician may medically evaluate the patient and recommend new orders based on the patient's current health status and goals of care.

Kokua Mau – *The Hawaii Hospice and Palliative Care Organization*

Kokua Mau is the lead agency for implementation of POLST in Hawaii. This form has been adopted by the Department of Health *(August 2009)*. For more information or to download a copy, visit www.kokuamau.org

SEND FORM WITH PERSON WHENEVER TRANSFERRED OR DISCHARGED

The Effect of a Transition Program on Adherence in Young Adult Kidney Transplant Recipients Moving from a Pediatric to an Adult Care Setting

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University Health Network, Toronto, Ontario

Background:
Patients who receive kidney transplant recipients as children and adolescents are at high risk of non-adherence with their immunosupressive medication regimen as young adults. Non-adherence is associated with poor outcomes. The reason for this non-adherent behaviour may be the young adults desire to assert independence from their parents as well as the numeous life events which typically occur in this age group such as moving out of the family home, starting work or college and establishing relationships. The point of transition between the pediatric and adult care setting is critical in determining future adherence. It is the first occasion at which the individual can assert control over their management as an adult. Patients may feel overwhelmed by this process or uncomfortable with unfamiliar staff and environment. If not closely followed they may disengage with health services with detrimental consequences

Purpose of the Study:
The hypothesis for this study was that adherence could be improved by adult nephrology services engaging with adolescent patinets in the paediatric hospital prior to transfer to the adult care setting in a newly created multi-disciplinary transition clinic, and, by a single transplant nephrologist and co-ordinator assuming responsibility for all these high risk patients upon transfer

Methods:
Baseline data were recorded. These included date of birth, gender, date of end stage renal disease and kidney transplant, type of transplant, number of transplants, histocompatability information, viorlogy status at time of transplant where available, number and type of rejection episodes, non-adherence prior to transfer, date of transfer and renal function at time of transfer. After transfer measures of adherence including attendance at clinic and blood test appointment, drug levels and self reported non-adherence were identified. Serial measures of renal function, episodes of rejection or graft loss and number of admissions and emergency department visits in the first year post transfer were also recorded. A patient was considered to be non-adherent if they either directly admitted missing medication doses, or, exhibited at least 2 of the following 3 characteristics: missing appointments, missing blood tests or having undetectable immunosupressant levels. Patients were split into two groups: those transferred prior to the initiation of the clinic and those who had attended the new transition clinic. Adherence in the first year post transition was compared between the two goups.

Results:
There were 16 patients in each group. There were no significant differences in baseline characteristics. Based on the above measure of adherence 11 of 16 patients were non-adherent in the group transferred before the transition clinic was in place, compared to 2 of 16 in the group after the ammendment of the transition process. This difference was statistically significant (p=0.009)

Conclusions and Implications:
This study demonstrates that innovation in the transition process from pediatric to adult care improves adherence in young adult kidney transplant patients. Improved adherence may lead to better long term graft function and survival

Reducing Nosocomial Infections (NI) in the NICU- A Performance Improvement Journey

Marian Melish, Heather Delaney, Chieko Kimata, Pamela Carey-Goo, Brandy Rhinelander, Karen Whithead, Charles Neal

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Background:
Setting - 60 bed tertiary care NICU with a wide variety of NI. The tropical environment fosters hyperendemic community acquired Staphylococcus Aureus (SA)infections, both Methicillin Sensitive (MSSA) and MRSA. History of both endemic and sharply defined SA NICU epidemics in 1998, 2002, 2004, 2005 and 2009. NICU SA infections are particulary severe. Major NI co-factors: skin breakdown, central lines, Necrotizing Enterocolitis (NEC), surgical wounds. Lab based surveillance of all NI since 2003

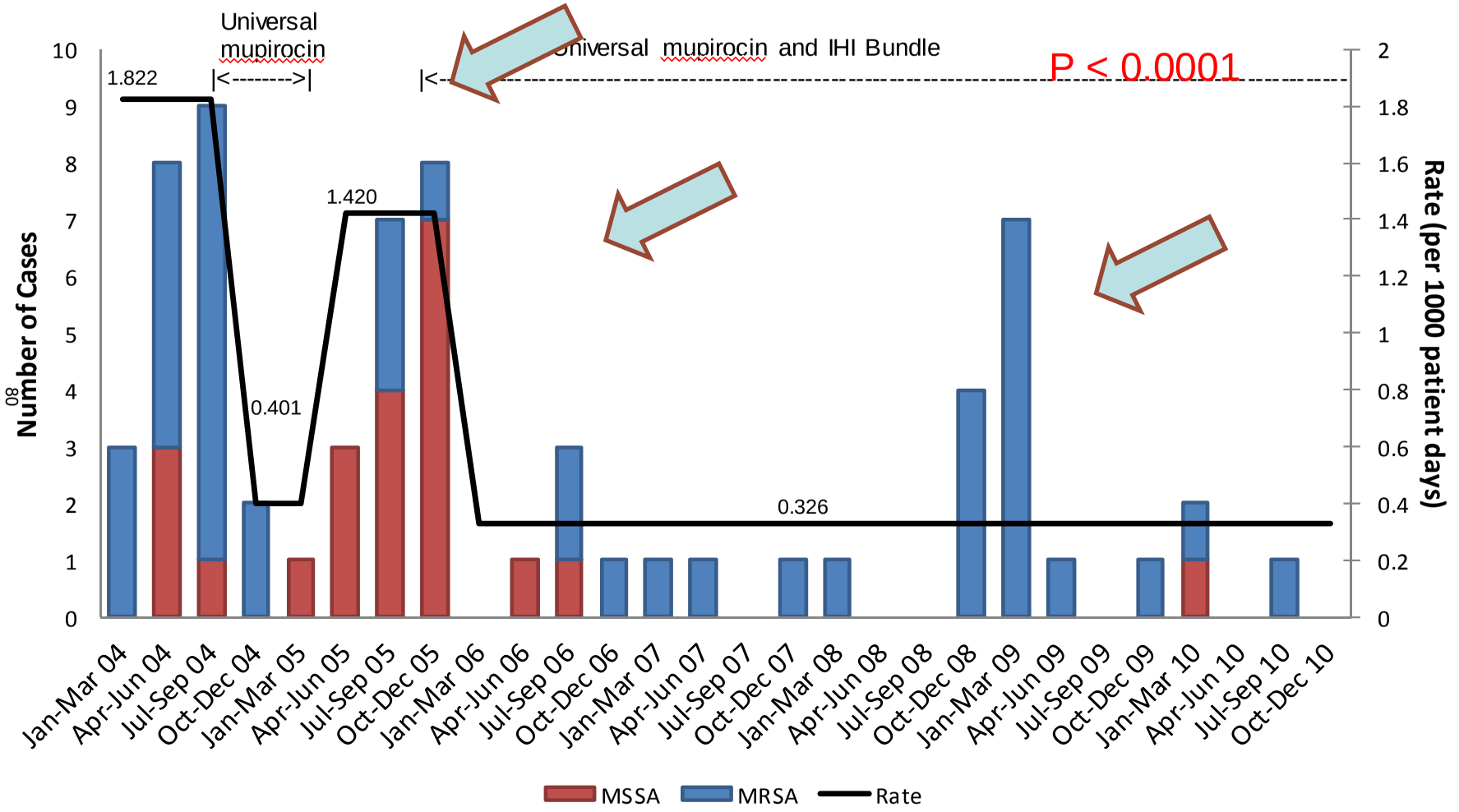
Purpose of the Study:
To illustrate the effectiveness of sequential performance improvement interventions and the cycle of Plan-Do-Study-Act (PDSA) in reducing bacteremia, SA infections, all NI.

Methods:
Major Interventions: 1. SA Outbreak Investigations 2004,2005,2009 2. Colonization Survey Staff and Patients 2004 and 2005 3. Universal daily Mupirocin all infants 2004-2005, PDSA 2006-Present 4. Central Line Bundle December 2005 6. Nasal swab for SA colonization weekly all infants 2006 7. Hand Hygiene direct Surveillence 2006 7. Bimonthly meetings of NICU and Infection Control (IC) leadership to review all infections, PDSA '08 8. Dwell time limits of umbilical and central lines 2008 9. NEC Bundle introduced - 2008 10. Statewide CLABSI initiative 2010

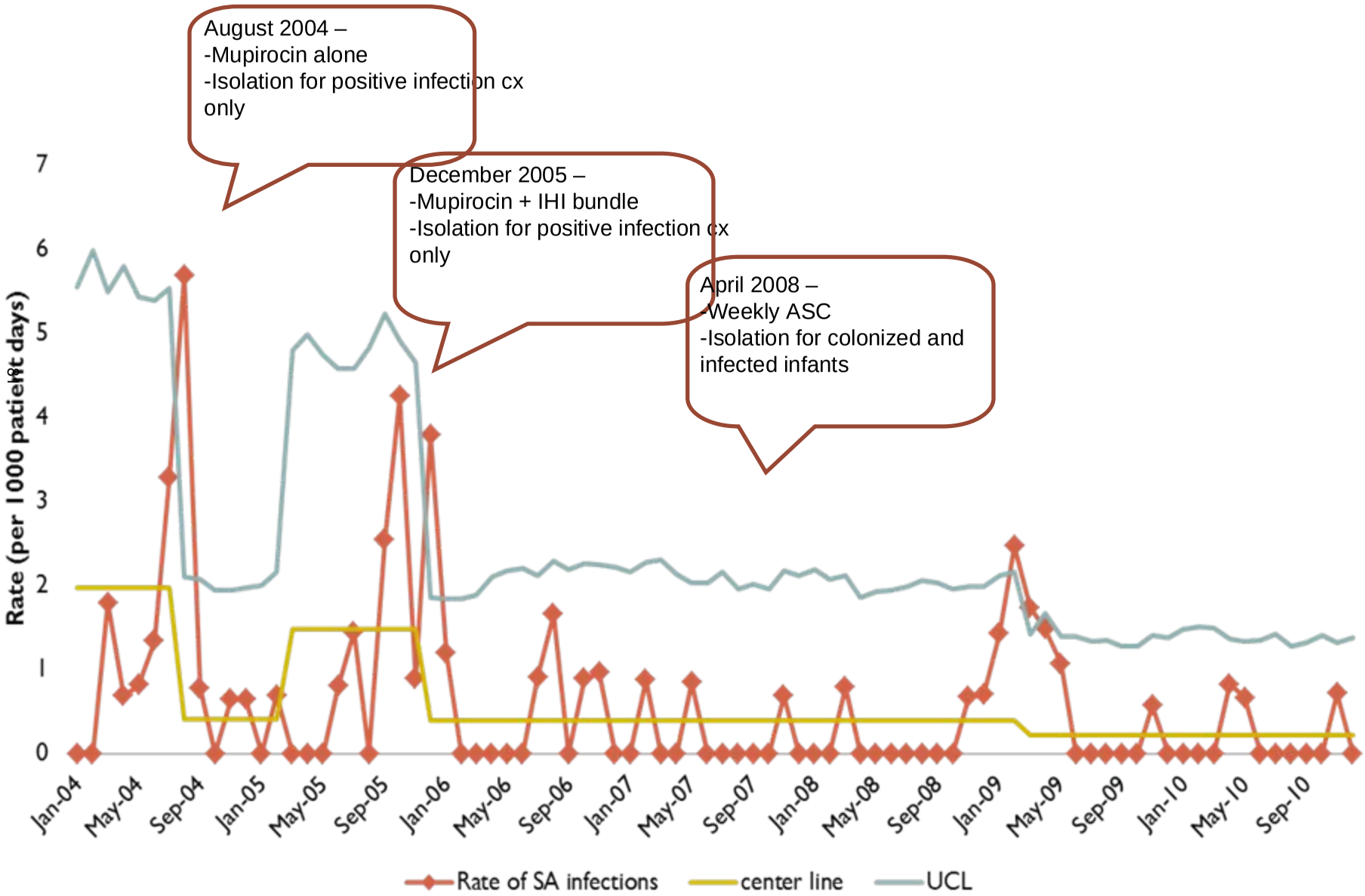
Results:
1. All bacteremia rates declined - 2003 - 2010 p 0.001 2. SA bacteremia declined: Before 2006 to after p 0.0012 3. All SA NI declined 4. All NI in < 1500 g infants declined: 20% vs 6% p 0.001 5. NEC in < 1500 g declined: 11% vs 4% p 0.04 6. CLABSI declined 7. SA nasal colonization rates declined: 15-60% 2004-05 vs 4.5% average 2008-10 p 0.0001 8. SA colonization predicts SA NI: 14% vs 0.2% p 0.0001 9 Interventions are cost-effective 10. Universal daily mupirocin has not caused resistence > 1 year

Conclusions and Implications:
NICU NI are severe, have high mobidity and mortality, prolong hospital stay and increase costs. The use of performance improvement techniques and PDSA have resulted in significant improvement in rates of all bacteremia, SA bacteremia, SA NI, all NI, NEC, CLABSI and lowered SA colonization rates.

S. aureus Cases and Infection Rate



U-chart: *S. aureus* Infection Rate



Improving the Emergency Care of Intestinal Rehabilitation Patients with Central Lines and Fevers

Adam G. Mezoff, Joe Luria, Evaline Alessandrini, Elizabeth Williams,,Beth Scheid, Jean Simpkins, Lois Siegle

Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio

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Background:
More than 75% of intestinal rehabilitation patients at our institution with fevers will ultimately grow a bacterial pathogen from their central line culture. Prompt treatment can limit morbidity including hepatic complications, as well as mortality

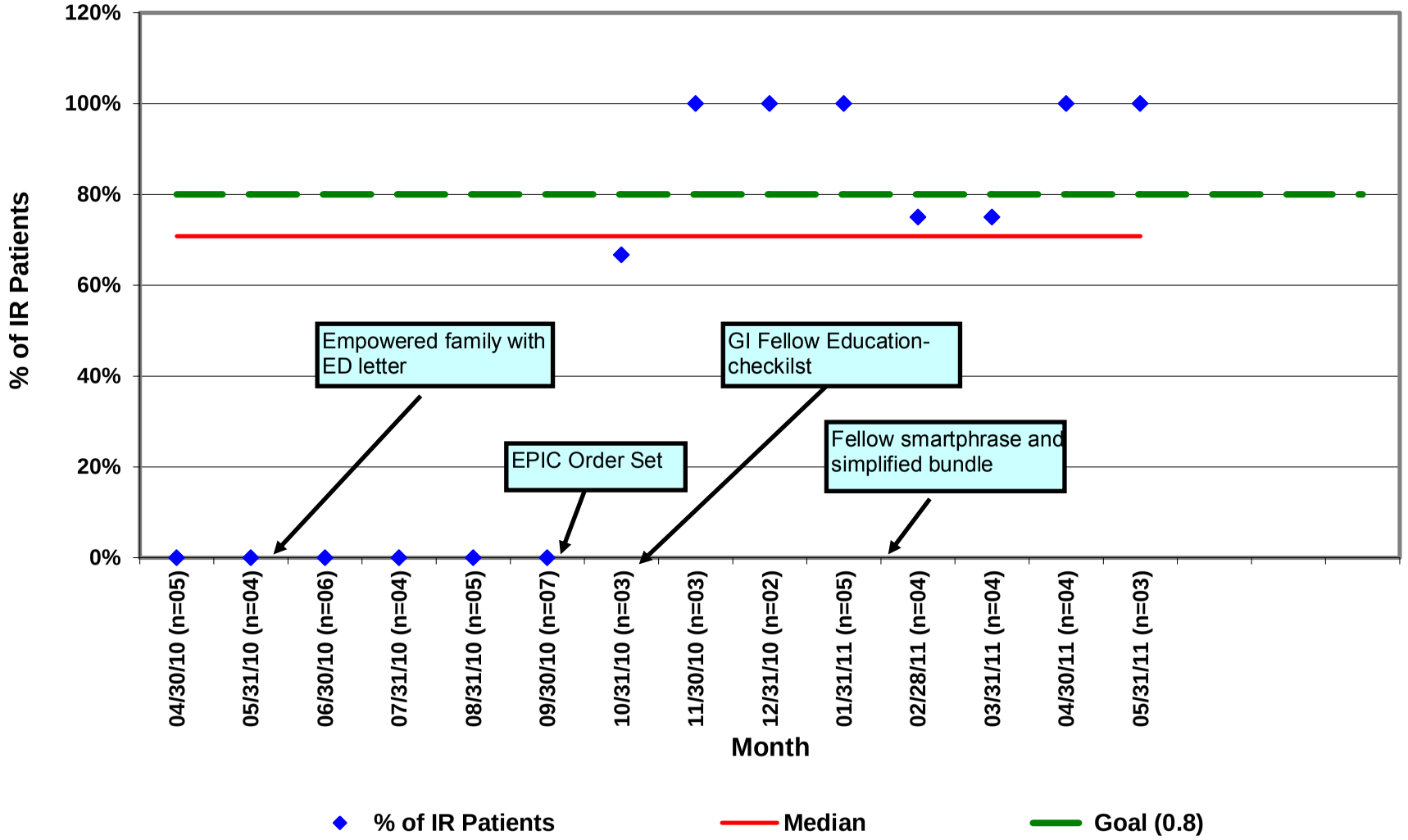
Purpose of the Study:
To improve the initial emergency care of intestinal rehabilitation patients with Central lines and fever to insure prompt and appropriate care. We sought to develop a complete safety bundle and achieve an eighty per cent implementation rate in the emergency department within 9 to 12 months Setting: Cincinnati Children's Hospital Medical Center, a more than 500 bed children's hospital with 90,000 visits per year at the base hospital and forty to fifty visits per year of intestinal rehabilitation patients at this location.

Methods:
A cross-divisional team of emergency department and gastroenterology division members cooperated in 6 month quality improvement initiative that included multiple interventions designed to address key drivers which included increased GI divisional ownership of facilitating emergency department processes, improved communication, and institution of novel interventions of electronic medical record systems to insure consistency of treatment of intestinal rehabilitation patients with central lines and fevers. A safety bundle was created which included the basic requirements for appropriate care; blood culture, urine culture, complete blood count, and renal profile. Included in the bundle was an hour of observation in the emergency department after receiving antibiotics, to insure stable vital signs with endotoxin release from gram negative infections Significant improvement in the ability to administer a complete safety bundle only occurred when the GI process for alerting the emergency department of impending patient arrival and admission was structured to complement the emergency department process for receiving them.

Results:
Prior to the creation of the improvement team, patients were cultured and then received some form of antibiotics, but the evaluation and treatment was not consistent. At least two patients of the total monitored required triage to an intensive care unit because of change in vital signs. Nine months after instituting several level 2 reliability interventions, 100% of patients in 7 of the past 9 months have received the complete safely bundle (see attached Run Chart).

Conclusions and Implications:
Nearly 100% of intestinal rehabilitation patients with central lines and fevers are now receiving a complete safety bundle of care, compared with none at baseline. Improving emergency care of subspecialty patients requires cooperation and ownership of the quality improvement process in both divisions. A template developed for administration of specialized care to a limited population of patients in a busy emergency department can be modified for use in other patient populations and facilitate improved quality of care. Current efforts are focused on hardwiring the new process for spread to other divisions.

Percent of GI Patients Admitted with Complete Safety Care Bundle



Using the IOM Core Competencies to Improve Inpatient Core Measures Compliance: A Collaborative Quality Improvement Project

Jamie E. Moran, Cynthia S. Glover

Seton Highland Lakes, Burnet, Texas

Background:
National Hospital Quality Measures (core measures) are evidence-based processes that demonstrate high-quality patient outcomes when consistently applied. In the fall of 2010, Seton Highland Lakes Hospital,a 25-bed, critical access hospital in Burnet, Texas,sought to improve its core measures compliance through an innovative, interdisciplinary approach to performance improvement. The resulting project incorporated the Institute of Medicine (IOM) *Core Competencies for Healthcare Providers for the 21st Century* and established an atmosphere of collaboration that transformed interdisciplinary communication and the provision of care at Seton Highland Lakes.

Purpose of the Study:
The overall purpose and goals of the project were to improve the appropriate care score to 95% or greater, to increase participation of ancillary clinical disciplines in collaborative care activities, and to engage all disciplines in actively taking responsibility for management of core measures compliance.

Methods:
The project utilized the IOMs *Core Competencies for Healthcare Providers* as a framework for performance improvement. The core competencies included: applying quality improvement, employing evidence-based practice, utilizing informatics, working in interdisciplinary teams, and providing patient-centered care. The project started with an innovative, point-of-care prevalence assessment of nursing regarding core measures compliance. The assessment found: real-time identification of core measures-eligible patients was difficult; fragmented, multi-disciplinary source data was a barrier to compliance; no clinician-level accountability for compliance existed; and the perception that nurses alone were responsible for compliance. The project objectives and plan were synthesized from the results of the assessment and past performance data, and included: taking the burden of compliance off nursing, facilitating identification of core measures patients in real-time, improving communication between departments and between disciplines around compliance needs, embedding accountability for compliance in the culture, and providing ongoing feedback about performance to front-line staff members. A literature review found helpful information regarding data mining and *fix-it tickets*, an innovative communication tool designed to improve individual accountability for compliance. To help identify potentially-eligible patients, ancillary departments developed automated, patient-specific reports regarding medications, lab reports, and imaging results. A whiteboard was installed to track the patient-specific data, and a daily, multidisciplinary huddle was implemented to discuss patient-centered core measures and other care needs.

Results:
The core measures appropriate care score improved from a low of 81.25% in the third quarter of 2010 to greater than 93% in the first nine months of the project. Daily interdisciplinary communication improved around all quality of care issues, and ancillary staff subjectively reported improved satisfaction with their contributions to patient care and their relationships with other disciplines.

Conclusions and Implications:
Ancillary clinical departments, in addition to nursing and medical staff, own essential data and perform important tasks for core measures compliance. Using the IOMs core competencies to organize and structure an interdisciplinary quality improvement project helped establish a robust environment of collaboration. The project demonstrated an improvement in core measures performance and transformed Seton Highland Lakes approach to interdisciplinary communication and collaboration around all aspects of care.

Pharmacist Glycemic Control Team Improves Quality of Glycemic Control in Surgical Patients, While Reducing Post-Discharge Hospital Admissions and Medical Costs

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Background:
Perioperative hyperglycemia is a risk factor for increased morbidity and mortality. Improved glycemic control has been demonstrated to reduce surgical site infections, reduce perioperative morbidity, and reduce length of stay. However, safe and effective glycemic control upon transition from the operating room to a the post anesthesia care unit (PACU) can be limited by expert clinician availability.

Purpose of the Study:
To evaluate the effectiveness of pharmacist-based glycemic control team (GCT) to: 1) improve glycemic control and 2) reduce post-discharge hospital admissions and medical costs.

Methods:
A glycemic control protocol was approved by the hospital Pharmacy and Therapeutics Committee. This was created to provide a standardized guideline for pharmacists to direct the safe use of intravenous (IV) and subcutaneous (SQ) insulin to treat perioperative dysglycemia. A designated group of pharmacists were trained (GCT) on how to use the glycemic protocol and how to manage dysglycemia. The team wrote all orders pertaining to insulin management on patients on whom they were following. All surgical patients with dysglycemia were eligible, but the GCT only intervened on a consultation basis. We identified all patients admitted to the PACU who had 2 or more point of care test (POCT) glucose measures each day of hospitalization for quality measurement. We excluded cardiac surgery patients and critically ill postoperative patients who are directly admitted to the intensive care units. Outcome Measures: We defined good glycemic control as having all, or all but one, point of care blood glucose values between 70-180 mg/dL in each 24 hour period, with day 1 defined as the date of the surgical procedure. We defined hypoglycemia as having any POCT glucose value less than 70mg/dL in any of the 3 days evaluated. All-cause hospital admissions and per member per month (PMPM) medical costs were measured via electronic medical record, 182-days (6-months) post discharge from index hospitalization. Analysis: Using a pre-post quality evaluation design, we used multivariate modeling to assess the efficacy of the GCT intervention on 1) good glycemic control (days 1-3), 2) any hypoglycemia (days 1-3), 3) all-cause hospital admissions (> 1 vs. none), 182 days post discharge, 4) PMPM costs, 182 days post discharge; adjusting for age, gender, race, economic status, Charlson co-morbidity score, length of stay (LOS), surgery type, and prior 12 month healthcare utilization.

Results:
A higher proportion of patients achieved good glycemic control on day 1 (Odds Ratio 3.08, 95% confidence interval (CI) 2.61-3.63), and day 2 (OR 1.69, 95% CI 1.37-2.08) after implementation of the GCT. At the same time, fewer patients experienced hypoglycemia (OR 0.34, CI 0.29-0.41). Patients were also less likely to have any all-cause hospital re-admissions (OR 0.66, 95% CI 0.54-0.81) and lower PMPM costs (beta coefficient = -288.61, p = .02), 182 days post discharge.

Conclusions and Implications:
A pharmacist based GCT was effective in improving good glycemic control (day 1-2 post surgery), reducing any hypoglycemia (day 1-3 post surgery) and reducing hospital readmissions and medical costs, 182 days post discharge.

Feasibility and Effectiveness of a Platform for Interdisciplinary Learning, Innovation, and Improvement in the Operating Room

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Background:
Advances in improvement science create new opportunities for clinicians to learn, innovate, and rapidly enhance patient outcomes. However, clinical demands and production pressure severely limit the opportunities for caregivers from the intensive, high-risk operating room environment to interact in collaborative learning and improvement efforts.

Purpose of the Study:
Determine the feasibility and impact of an interdisciplinary learning platform providing protected time, infrastructure, and resources for improvement in the perioperative environment. Primary outcome measures: voluntary interdisciplinary participation; organizational performance survey results. Secondary measures: achievement of chartered team aims; on-time OR starts.

Methods:
We launched Faculty Hour in 2010, an interdisciplinary partnership for performance excellence uniting Anesthesia, Surgery, Nursing, Orthopaedics, Obstetrics and Gynecology, and others at a large teaching hospital. The OR start time is moved 30 minutes later each Tuesday to provide protected time for meeting, and a Steering Committee and Departmental Advisory Council guide efforts along with engagement of the hospital Patient and Family Advisory Council. Staff participate voluntarily at 6:45 a.m. in 90-day chartered teams, cross-discipline division meetings, and peer-led faculty development sessions. Key elements include triad leadership of each team by an anesthesiologist, surgeon, and nurse; just-in-time leadership prep sessions and toolkit; discovery teams that visit other sites to spark innovation; balanced scorecard development; data capture; and systematic review, recognition, and improvement cycles.

Results:
During the first 18 months, 114 faculty and staff voluntarily participated one or more times as chartered team members (anesthesia 20%, surgery 20%, nursing 27%, others, e.g., pharmacists, information system engineers, simulation specialists, social workers, surgery technicians, administrators, 32%). Eleven cross-disciplinary divisions (e.g., cardiac anesthesia with cardiac surgery and nursing) met together quarterly. Departments held faculty development and improvement sessions (e.g., 67 anesthesiologists participated in clinical innovation workshops, as well as leadership, scholarship, and

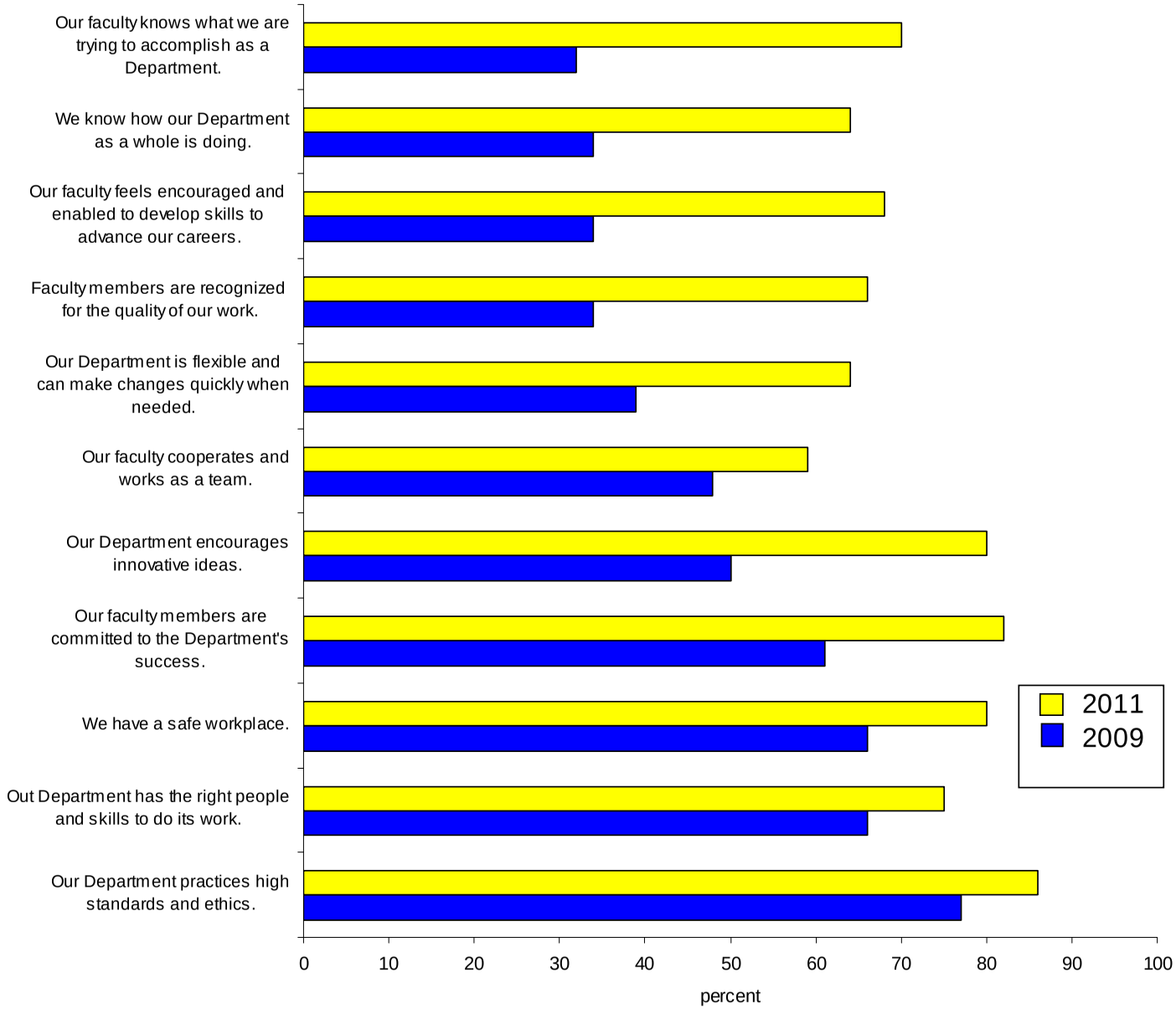
education series). Organizational performance before and 12 months after introduction of Faculty Hour showed 9 to 38 percentage point gains on items in a Baldrige-based survey in the anesthesia department (Figure 1). For example, faculty encouraged and enabled to develop skills improved significantly (p=.05) as did encouragement of innovative ideas (p=.0001). Sample results from twelve 90-day chartered teams include optimized OR layout to reduce surgical infection risk; improved patient flow with 1,200 annual miles saved in staff walking between sites; reduced instruments opened in robotics by 53%; and the design and launch of numerous programs including monthly simulation-based, interdisciplinary OR team training; clinician support in adverse event situations; interactive videos on safety communication in the OR; computerized preoperative order entry; and patient- and family-centered communication innovations for trauma patients. Counter intuitively, on-time OR start rates on Tuesdays are better than any other day of the week.

Conclusions and Implications:
We have instituted a viable, sustainable, and easily replicable platform for learning, innovation, and improvement in the fast-paced, high-risk operating room environment. Faculty Hour engages anesthesiologists, surgeons, nurses, and colleagues in robust collaborative efforts, with high participation rates, striking evidence of change in organizational performance, and promising early project results that demonstrate lowered risks and improved efficiency and patient experience.

Figure 1. Organizational Performance: How Are We Doing?

Percent of participants who agree or strongly agree, 2009 vs. 2011

(survey adapted from Baldrige Performance Excellence Program)



A Decision Support Intervention for Depression Treatment in a Multiple Sclerosis Mental Health Clinic Using a Clinical Microsystems Approach

Brant J. Oliver, The Dartmouth Institute, Lebanon, NH, Susan Berg, Center for Shared Decision Making, Lebanon, NH, Stephen Kearing, Center for Shared Decision Making, Lebanon, NH

Background:
Multiple Sclerosis (MS) is a common neurological chronic autoimmune disease with a prevalence of 4/100,000, affecting young and middle aged adults.[1] MS patients have a 25-50% lifetime prevalence of depression[2] and the suicide rate is 4-7 times higher than the national average.[3] MS patients with depression also experience poor immunotherapy treatment adherence[4] and demonstrate suboptimal outcomes.[5] Using a Clinical Microsystems approach,[6] a MS mental health clinic was embedded within an academic MS center at Dartmouth-Hitchcock Medical Center (DHMC) and demonstrated significantly shorter access times and superior remission rates at 6 months compared to standard referral-based care.[7] There are a number of effective treatment options for depression, including counseling, medication, and combination therapy,[8] which effectively classifies the selection of treatment in uncomplicated forms of depression as preference-sensitive.[9]

Purpose of the Study:
This study aimed to improve the quality of preference-sensitive depression treatment decisions by incorporating shared decision making(SDM)[10] into the care process at the DHMC MS mental health clinic.

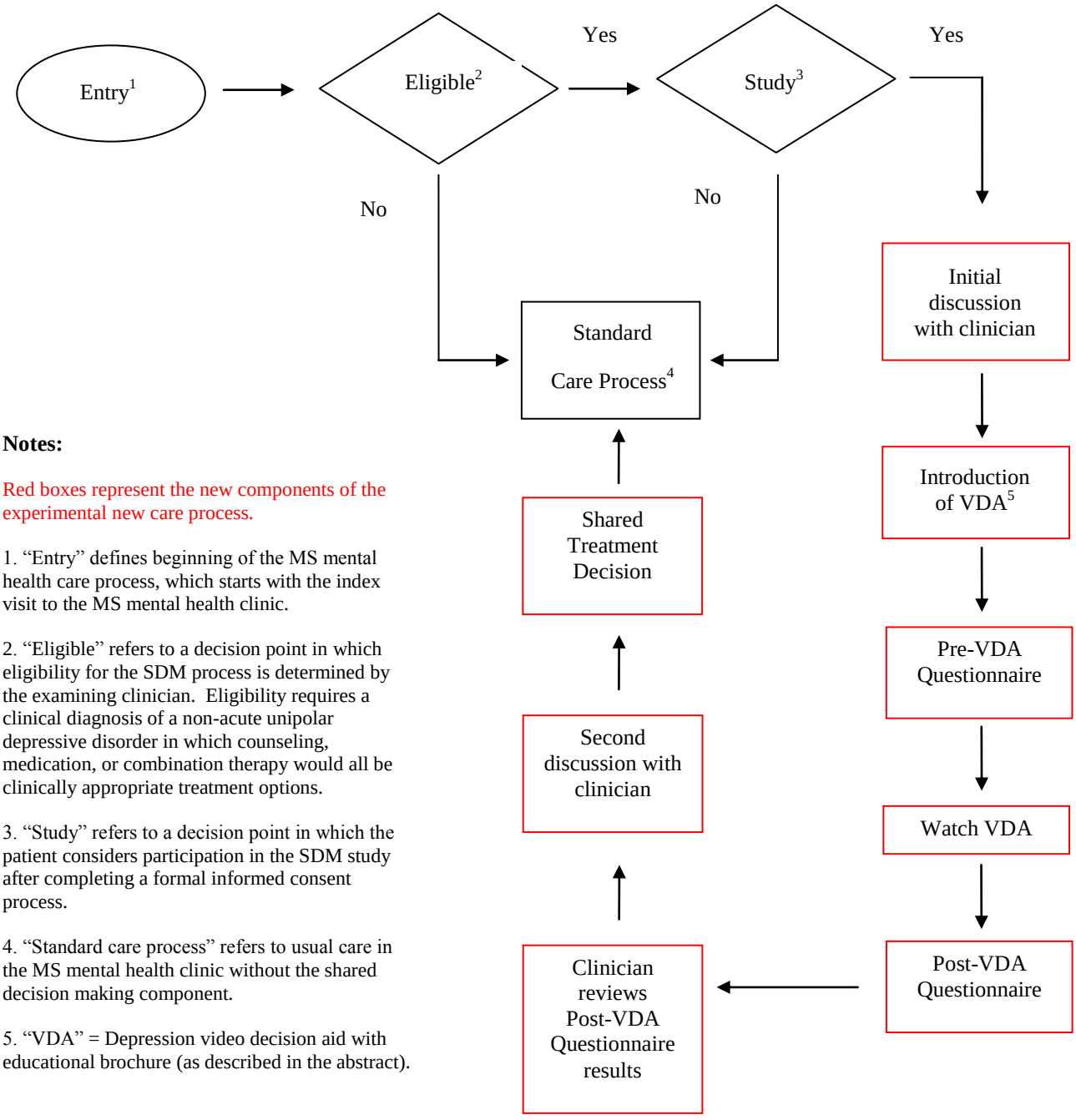
Methods:
A microsystems assessment was conducted to assess the need for decision support in the MS mental health clinic, readiness of the microsystem for change, and to establish the optimal approach for SDM implementation. PDSA cycles were conducted to optimize the method of implementation and facilitation, resulting in a new care process (Figure 1) incorporating the use of a video decision aid with an accompanying educational brochure (VDA) and questionnaires. Study participants received the VDA "Coping with Symptoms of Depression"[11] and completed pre- and post-VDA questionnaires. Post-VDA results were also utilized to guide education in the treatment counseling process.

Results:
Participants in the study were MS patients with newly diagnosed depression followed at the DHMC MS mental health clinic from November 2010 to April 2011. Twenty-six eligible patients were offered participation in the study and sixteen (62%) chose to enroll. Average age was 45 years and 81% were female. Important quantitative results (Figure 2) included: (1) substantially fewer participants remained unsure about their treatment decision (44% vs. 13%) post VDA; (2) most (88%) felt that the treatment decision process should be shared between patient and provider; and (3) a majority (71%) felt it

was very important to include the VDA in the decision process. Qualitative clinician and participant feedback demonstrated that the SDM process targeted counseling for knowledge and values clarification gaps and actively engaged participants in the treatment decision process.

Conclusions and Implications:
This study successfully utilized a quality improvement approach to optimize the implementation of SDM in the care process prior to a formal descriptive study of a VDA. Results suggest that the new care process may reduce decisional conflict[12] and that decision support improved the quality of educational and treatment decision processes. This study illustrates that a microsystems analysis can be utilized to optimize a SDM approach within a clinical care process and compliment the study of SDM interventions using traditional research methods. Further study is needed to more specifically examine longitudinal outcomes of this approach in a larger cohort.

Figure 1. DHMC MS Mental Health Clinic Care Process Incorporating Decision Support



Notes:

Red boxes represent the new components of the experimental new care process.

1. "Entry" defines beginning of the MS mental health care process, which starts with the index visit to the MS mental health clinic.

2. "Eligible" refers to a decision point in which eligibility for the SDM process is determined by the examining clinician. Eligibility requires a clinical diagnosis of a non-acute unipolar depressive disorder in which counseling, medication, or combination therapy would all be clinically appropriate treatment options.

3. "Study" refers to a decision point in which the patient considers participation in the SDM study after completing a formal informed consent process.

4. "Standard care process" refers to usual care in the MS mental health clinic without the shared decision making component.

5. "VDA" = Depression video decision aid with educational brochure (as described in the abstract).

Figure 2. Questionnaire Results

Figure 2a. Participant Characteristics Pre- and Post-Video Decision Aid (VDA) Exposure (n=16)

	DA Loans N (%)	Returned Ques N (%)
Total	**26 100%**	**16 62%**
Patient characteristics		
% Female	22 85%	13 81%
Average Age (SD)	45.8 (9.0)	44.5 (10.0)

Decision Making	Before DA	After DA
How bothered by symptoms?		
A lot	5 31%	-
Some	4 25%	-
A little	5 31%	-
Not at all	1 6%	-
	Tried last mo	**Plan to discuss**
Antidepressant medicine	8 50%	14 88%
Depression counseling	6 38%	9 56%
St. John's wort	0 0%	2 13%
Exercise	7 44%	12 75%
Relaxation techniques	3 19%	11 69%
Other	0 0%	
Treatment intention		
Taking antidepressant meds	6 38%	9 56%
Not taking medicine	3 19%	3 19%
I am not sure	7 44%	2 13%
How far are you with this decision		
Not thought about the options	4 25%	2 13%
Considering the different options	4 25%	3 19%
Close to choosing an option	3 19%	3 19%
Already chose an option	5 31%	7 44%
Who should make the decision		
Totally the patient	0 0%	0 0%
Patient and provider share decision	15 94%	14 88%
Totally the health care provider	1 6%	1 6%

Patient Knowledge	After DA (N % correct)	
Potential causes of depression		
Way brain works	12	75%
Stresses in life	14	88%
A bad day at work	6	38%
Argument with a friend	6	38%
Can be caused by depression		
Changes in weight	14	88%
Hair loss	4	25%
Feeling tired or lacking energy	14	88%
High blood pressure	2	13%
Feeling sad down irritable or hopeless	14	88%
When should a person consider stopping antidepressant medicine	9	56%
Common side effects of Rx		
Sexual problems	14	88%
Dry mouth	14	88%
Weight gain	14	88%
Hair loss	5	31%
Upset stomach	13	81%
Between 25-49 of 100 will feel better without treatment	2	13%
Mean score	**2.6 / 5**	**52%**

Value scores (n=15) (0 not important - 10 most important	Post DA Mean	(min - max)
How important is it for you to . . .		
Get relief from depression symptoms	9.3	(6 - 10)
Return to regular activities	9.0	(5 - 10)
Feel better as quickly as possible	8.6	(4 - 10)
Avoid side effects of medicine	7.1	(0 - 10)
Avoid counseling	2.6	(0 - 10)

Figure 2b. Post-VDA Participant Feedback (n=14)

DA video and booklet feedback

Question	N	None	Some	Most	All
How much of the DVD/video did you watch?	14	7%	14%	0%	79%
How much of the booklet did you read?	14	7%	21%	7%	64%

Considering the DVD/video and the booklet as a complete program, how useful as it in helping you	N	Not at all	Somewhat	Very	Extremely
Understand depression?	14	7%	42%	50%	0%
Understand the different ways people manage symptoms ?	14	0%	64%	29%	7%
Understand what is important to you so you can make a decision about how to manage your symptoms ?	14	8%	54%	31%	8%
Prepare to talk to your health care provider about managing your symptoms ?	14	0%	54%	38%	8%
How important is it that health care providers give programs like this to their patients?	14	0%	29%	64%	7%

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Improving the Safety and Effectiveness of Heparin Infusions at a Large Academic Hospital

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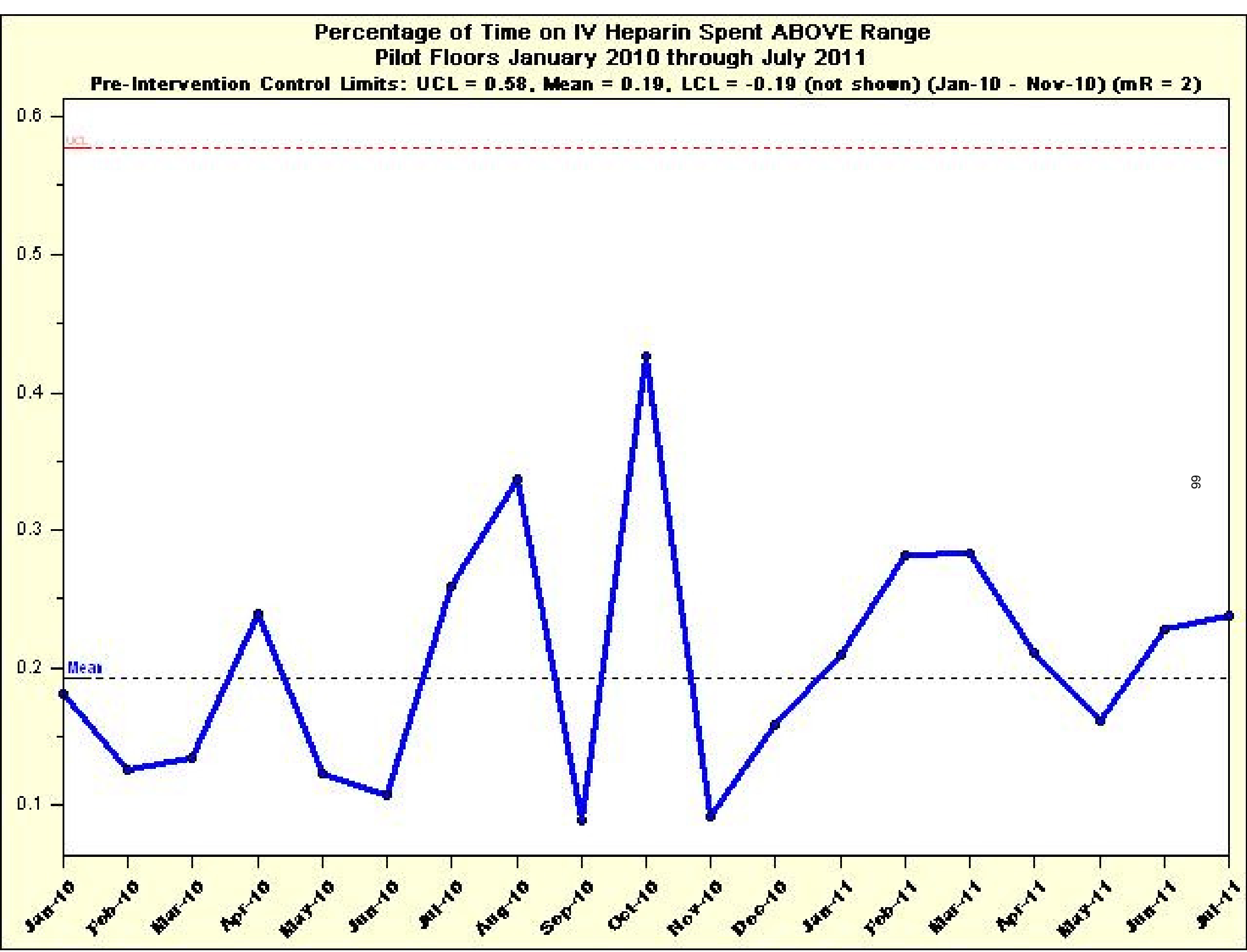
Background:
Anticoagulants were the third most commonly reported class of medications in our electronic safety event reporting system (SERS) from May 2008 to September 2009. Intravenous heparin constituted 90% of the anticoagulant reports, making it the single most commonly reported drug. Previously reported metrics for evaluation of the quality and safety of heparin therapy focused only on the first 24 hours of therapy and did not include measures of safety.

Purpose of the Study:
The purpose of this study was to design, implement and monitor a set of strategies to improve the effectiveness and safety of IV heparin therapy. Specifically, we aimed to increase the percentage of total time on therapy when patients' partial thromboplastin times (PTT) were inside the therapeutic range without increasing the percentage of time PTTs were above range.

Methods:
We first designed an electronic automated anticoagulation monitoring tool (AAMT) to capture electronic pharmacy and laboratory data and calculate the percentage of time each patient spent below, inside and above the therapeutic PTT range. Three sources of information were used to identify areas of highest risk for process failure 1) events from SERS 2) expert opinion of cardiovascular pharmacists and physicians 3) results from AAMT. Evaluation of this information led to the following process changes: **Ordering** Simplification of the electronic order from text based to radio buttons requiring a definitive affirmation or refusal of an initial bolus. **Dosing** Change from weight based dosing for only the initial bolus and infusion to weight based dosing for all dose changes. Change from a complex and visually cluttered table for calculating dose changes to a simple electronic calculator embedded within the nursing medication administration record (MAR). Change in MAR documentation such that nurses must acknowledge an order not to give an initial bolus. **Administration** Change to programmable infusion pumps that locked out at preset limits. **Monitoring** Designation of a new laboratory order for monitoring heparin (PTTAC). Change in phlebotomy process from scheduled PTTAC draws to timed draws.

Results:
Pre-intervention hospital data showed 51%/35%/14% in the below/inside/above therapeutic ranges. The process changes were piloted in November and December 2010 on two floors and an ICU with an improvement from 48%/34%/18% to 36%/45%/19%. Detailed analysis of episodes <55% indicated poor MAR documentation and continued incorrect dosing as problems. Consequently, a policy of dual nursing sign off for all starts, stops and dose changes was initiated before hospital wide implementation on 6/21/2011. Follow up data at 6 weeks has not yet shown special cause improvement.

Conclusions and Implications:
Creation of a clinically meaningful metric which captured the full spectrum of effectiveness and safety outcomes was imperative for choosing the most high yield interventions and monitoring their performance after implementation. The ability to gather electronic data in an automated manner was essential to monitoring the large volume of patients receiving IV heparin at our institution. The interventions described are both feasible and practical at any institution with an electronic medical record and computerized provider order entry.


Percentage of Time on IV Heparin Spent ABOVE Range
Pilot Floors January 2010 through July 2011
Pre-Intervention Control Limits: UCL = 0.58, Mean = 0.19, LCL = -0.19 (not shown) (Jan-10 - Nov-10) (mR = 2)
0.6
0.5
0.4
0.3
0.2
0.1
UCL
Mean
99
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10
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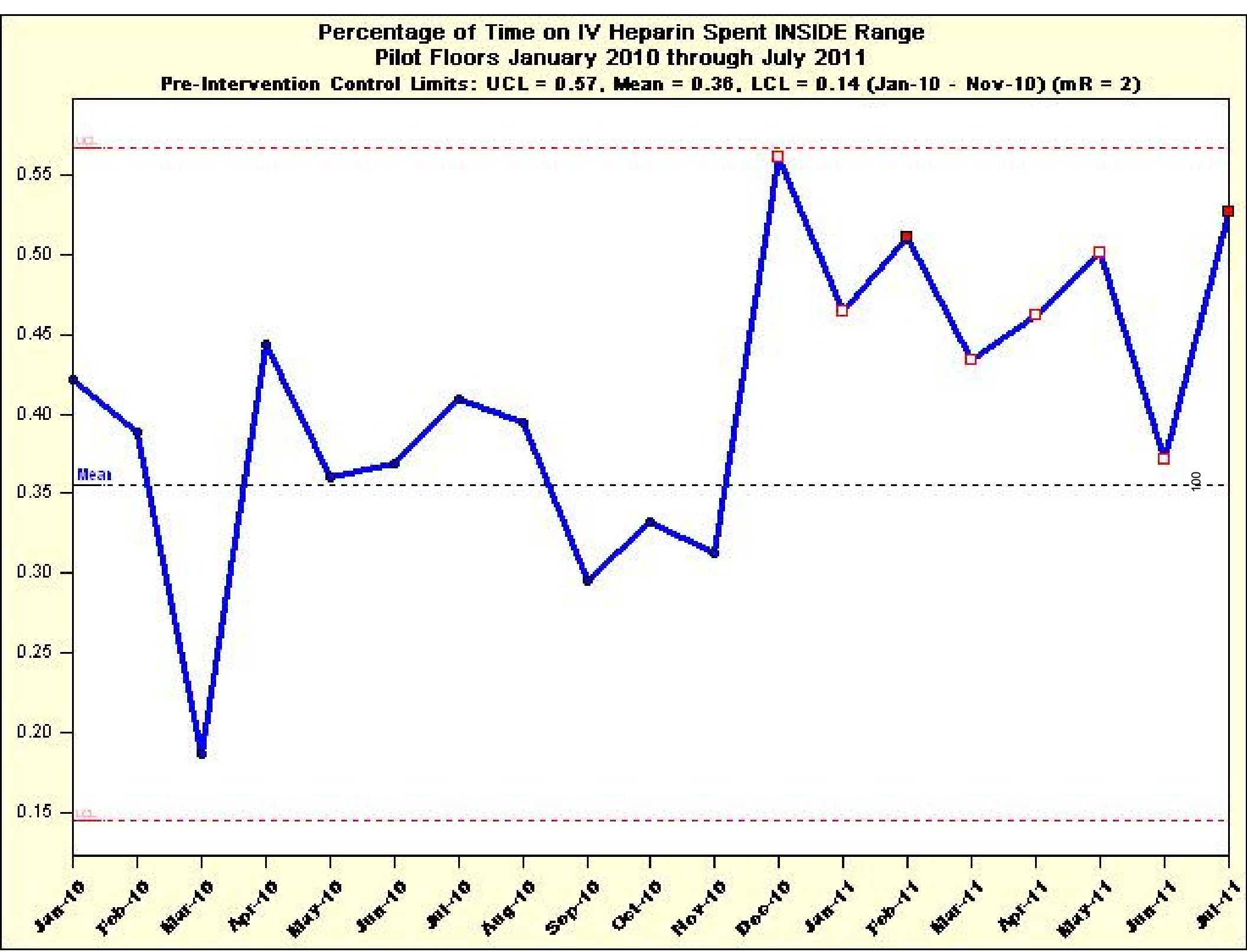
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11


Percentage of Time on IV Heparin Spent INSIDE Range
Pilot Floors January 2010 through July 2011
Pre-Intervention Control Limits: UCL = 0.57, Mean = 0.36, LCL = 0.14 (Jan-10 - Nov-10) (mR = 2)
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
Mean
100
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11

Family Medicine Residency Improvement Curriculum: Development, Evaluation and Improvement

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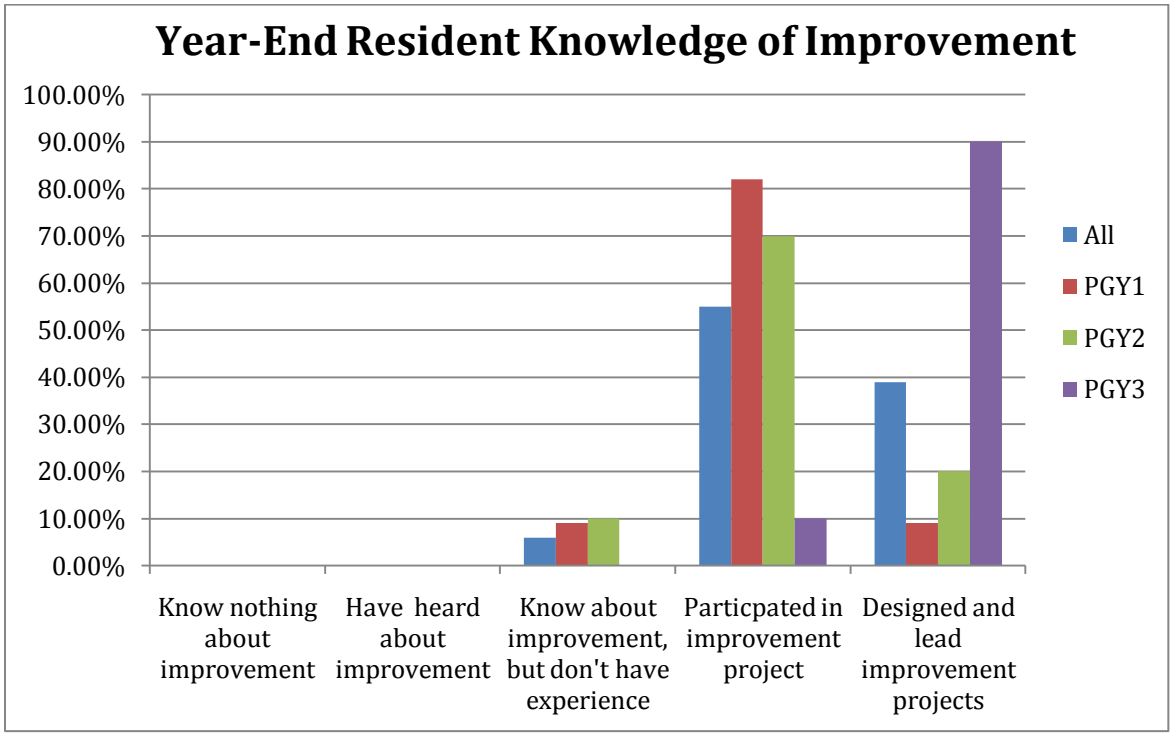
Background:
Knowledge of quality improvement methods is essential for physicians, and is an ACGME Residency Review Committee (RRC) requirement. In order to develop resident knowledge and skills in quality improvement, the OHSU Family Medicine Residency Program developed an improvement curriculum composed of didactic sessions, personal quality improvement projects, clinic-based improvement projects, and leadership development. The program is entering its seventh year, with each previous year comprising a cycle of curricular development, evaluation and improvement.

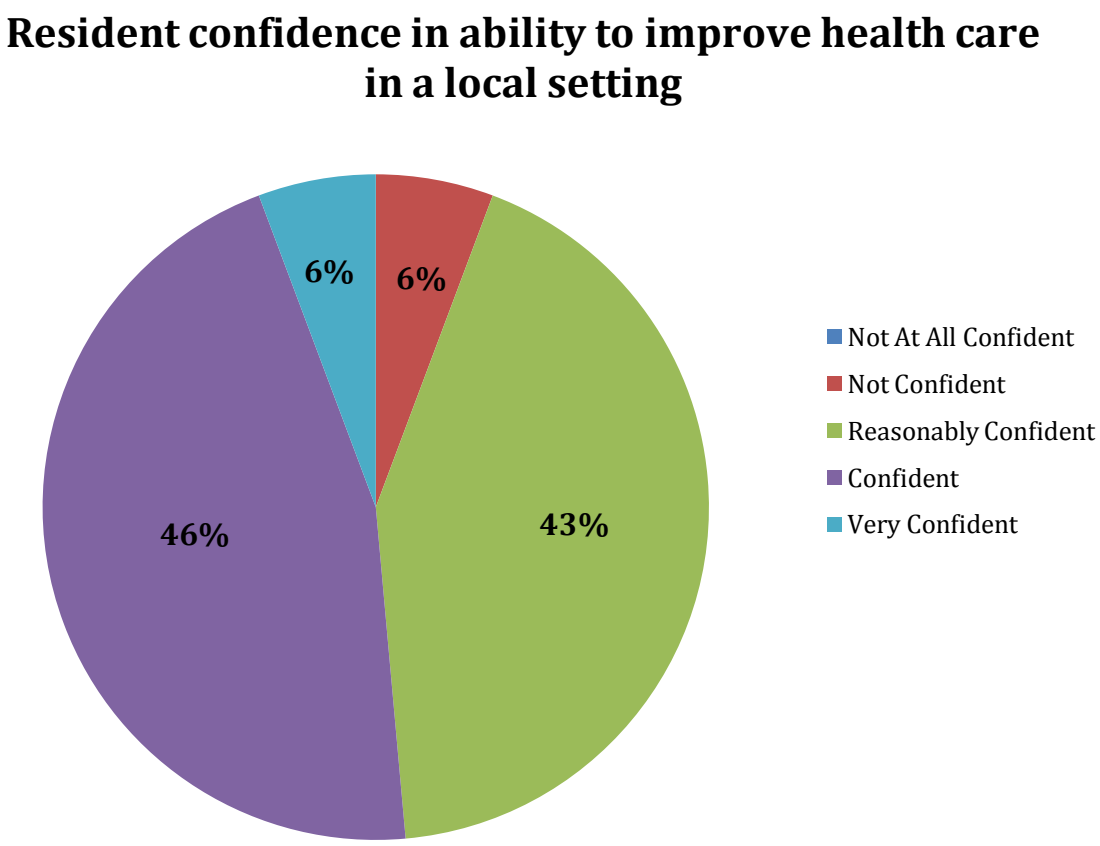
Purpose of the Study:
The purpose of this study was to evaluate the attitudes, satisfaction, and self-assessed competency of residents in quality improvement, compare the results to previous evaluations, and identify opportunities for curricular improvements for 2011-2012.

Methods:
Residents completed a paper-based evaluation at the end of the academic year 2010-2011. Thirty-four first, second, and third year residents (97% response) completed the survey which explored baseline and year-end quality improvement knowledge and curricular experience, attitudes toward quality improvement, competence and confidence with quality improvement skills, and overall satisfaction. The data were analyzed using Microsoft Excel.

Results:
At year-end, 94% of residents believed that improvement theory was essential or very essential to their future work, improved from 83% the year prior. 80% of residents believed they could apply theories and principles of improvement as a result of their participation in clinic-based improvement projects, and 94% of residents indicated they were at least reasonably confident they could make a change to health care in a local setting. Satisfaction in learning about the big picture of improvement in health care increased from 19% to 51%. 54% of residents were satisfied with their learning of specific applications of improvement relevant to their work day, improved from 19% the year prior. Resident satisfaction with the integration of their learning into ongoing clinic-specific improvement efforts varied from 27% to 77% at the clinic sites, perhaps due to the variable size of resident teams at each clinic. Residents want more faculty participation and encouragement with clinic-based improvement efforts.

Conclusions and Implications:
The results demonstrate that improvements made in the 2010-2011 curriculum improved resident satisfaction and confidence with the material. Clinic-based brief didactic sessions on elements of improvement theory were initiated, and residents were given greater autonomy in clinic-based improvement efforts. Modifications are being made to the improvement curriculum for the 2011-2012 year based on survey results. Interns continue to focus on personal improvement and basic improvement knowledge. Second-year residents are learning quality improvement methods related to patient panel management to integrate clinic-based provider rating tools and increase the practical relevance of subject matter. Third-year residents explore opportunities to assume leadership for improvement. Clinic managers are more involved in integrating resident improvement projects into ongoing clinic projects. Residents will present their work to the Family Medicine Department mid-year in addition to the end of year to better integrate resident projects with the goals of the department and combat aim drift. The evaluation will be repeated at the end of academic year 2012.


Year-End Resident Knowledge of Improvement
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Know nothing about improvement
Have heard about improvement
Know about improvement, but don't have experience
Particpated in improvement project
Designed and lead improvement projects
All
PGY1
PGY2
PGY3


Resident confidence in ability to improve health care in a local setting
6%
6%
43%
46%
Not At All Confident
Not Confident
Reasonably Confident
Confident
Very Confident

Making Improvement Science Mainstream

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Background:
An on-going debate exists regarding the credibility of quality improvement as a scientific discipline, torn between the pragmatism of improvement and the rigour of science (Auerbach 2007, Berwick 2008) - a continual tension that both plagues and defines the science of improvement. If improvement science is to be adopted into mainstream working practice within healthcare we cannot afford to ignore these epistemological tensions. It is essential to recognise and address different perspectives if we are to secure buy-in from the healthcare community.

Purpose of the Study:
1. To demonstrate that a science continuum exists and that randomised controlled trials (RCT)and quality improvement (QI) methodologies both make important and synergistic contributions to that continuum. 2. To draw lessons and implications for the emergent discipline of improvement science from traditional scientific disciplines.

Methods:
A critical review of the drug development process was performed using literature review, comparative analysis and thematic identification of common scientific principles. This exemplar demonstrates a research continuum that is of direct relevance to healthcare and integrates multiple academic disciplines and scientific approaches.

Results:
Review of the drug development process identified five distinct phases corresponding to five major academic disciplines (See Figure). Comparative thematic analysis of the different phases identified a set of common principles of scientific method. Principles that bear particular relevance to the epistemological debate regarding improvement science include: 1. Use of iterative experimental learning cycles analogous to the scientific method or PDSA cycles. 2. Scale of testing and evaluation is proportional to the amount of previous evidence supporting a hypothesis. 3. Scientific method is utilised continuously within and between phases. As an illustration, the RCT sits within a continuum of experimental cycles that constitute the clinical trial phase. As clinical trials progress from Phase 1 to Phase 4 the scale of the experiments and extent of the evaluation increases, from initial safety tests to post-marketing research. Neither step is more or less important than another. All steps are necessary as part of continuous learning and scientific reflection to ensure that for example drugs are effective and safe. The basic scientific experimental approach demonstrates that every small change in the context or mechanism of an experiment has the potential to significantly change the outcome, and so the utilisation of scientific method is continuously employed.

These findings demonstrate that Improvement Science adheres to established scientific principles and methods. Acceptance of this continuum of science will support further buy-in and mainstreaming of Improvement Science. Findings also demonstrate that all experiments are contextually dependent and that results from one study will not guarantee success in another. Within the complexity of healthcare these findings are significant, implying that it is the very conduct of Improvement Science and deployment of scientific method that will support successful improvement in varying contexts.

Conclusions and Implications:
RCTs and QI methods are part of a continuum of science and therefore should be viewed as synergistic methods. Comparative analysis of a range of biomedical academic disciplines indentifies a series of common principles that both support acceptance of QI as a scientific discipline and highlight the challenge of ensuring the continuous conduct of scientifically rigorous improvement.

Drug Development Process

	Drug Synthesis	In-vitro Testing	In-vivo Testing	Clinical Trials	Medical Use
Academic Discipline	Chemistry	Biochemistry	Biomedical Animal Testing	Clinical Drug Trials	Improvement Science
When Established	1600	1900	1900	1900	1990-2000
(Historical connections)	(Alchemy 3000 BC)	(Metabolism 1600)	(Surgical Animal Testing 1100)	(James Lind 1750)	(Clinical Governance 1995 Industrial Improvement Science 1920)

Implementation of a Distress Screening Instrument into Routine Care for Head and Neck Cancer Patients: A Mental Health Quality Improvement Project

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Background:
Heightened distress with cancer is common and may include symptoms of moderate to severe depression or anxiety. These symptoms can be associated with poorer quality of life and increased risk for suicide, especially in head and neck cancer (HNC). While mental health treatment is effective, at risk patients are not always identified. Screening tools are recommended as standards of care, but use among cancer centers is inconsistent.

Purpose of the Study:
HNC Medical Oncology at Norris Cotton Cancer Center, Lebanon, NH provides care for roughly 550 HNC patients a year whose disease status ranges from active to remission. Staff includes clinical providers, support staff and ancillary services. While the clinic strives to provide patients with comprehensive care, a reliable system for distress screening and treatment is not in place which concerns patients and providers. We aim to improve mental health care in HNC Medical Oncology by ensuring that all patients are screened for distress and if indicated, are offered evidence-based mental health treatment.

Methods:
Using quality improvement tools including plan-do-study-act cycles and process maps, mental health care in HNC Medical Oncology was evaluated and revised between November 2010 and July 2011. In January 2011, a two-component intervention was implemented into routine care including: 1) a validated distress screening instrument, the National Cancer Network Distress Thermometer (NCCN-DT) (Range: 0-10) and 2) a treatment decision algorithm. The NCCN-DT cutoff score of 4 or greater was used to identify heightened distress. Associations between categorical variables were determined through Fischer 's exact test. Qualitative interviews were utilized to assess patient and provider satisfaction with process changes.

Results:
Between November 2010 and January 2011, distress identification in HNC Medical Oncology was based on provider 's clinical assessment. Of 104 patients seen during this period, 26 (25%) were diagnosed with heightened distress and 15 (58%) of these were prescribed antidepressants or referred for treatment. Providers and patients raised concerns for inconsistent diagnosis and lack of mental health resources for patients. After implementing process changes between January and July 2011, 180 patients were seen and rates of distress screening rose from 0 to 38%. Of the 68 screened, 32 (47%) had

heightened distress (NCCN-DT score >/= 4) and 17 (53%) of these described primarily emotional problems. Patients with primarily emotional problems were associated with receiving treatment for distress ($p < 0.01$) and specifically, antidepressants ($p < 0.01$). The mean NCCN-DT score was 3.4, corresponding to minimal or no distress. Patients and providers responded favorably to process changes and described the system as more comprehensive and patient-centered. Paper-based screening was identified as a barrier to consistent screening.

Conclusions and Implications:
Quality improvement methodology can be used to design systems that reliably identify and manage cancer related distress. Continuous quality improvement work, however, is necessary to ensure that distress screening consistently occurs. Cancer centers may benefit from using quality improvement methodologies as a means of applying evidence based treatment guidelines for distress to their local setting.

Medical Record Complexity and Adverse Events

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Background:
Patients in tertiary care hospitals are increasingly complex. The risk of cognitive error by providers increases with increasing patient, disease, and treatment complexity. However, rigorous study of complexity in medicine has been limited by the absence of a method to quantify patient complexity.

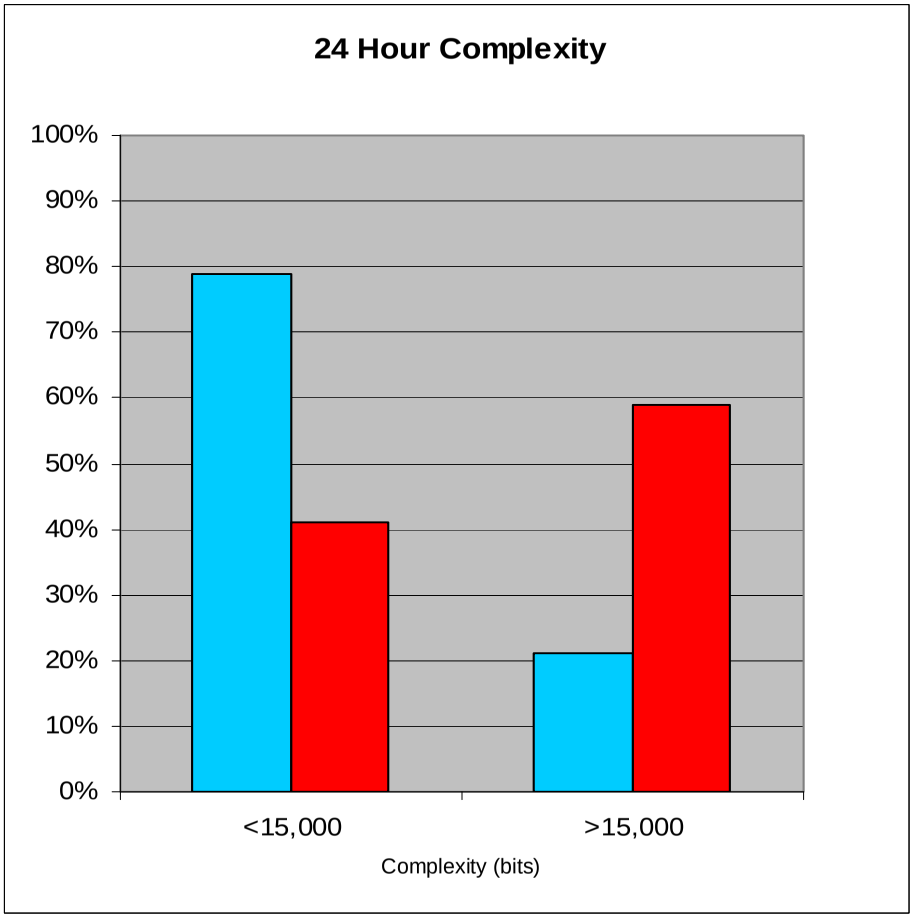
Purpose of the Study:
We developed and validated a tool, the complexity ruler, (CR) to quantify the cognitive complexity of the medical record (CCMR). Chart complexity is defined as the minimum number of bits (on a computer disk) required to store the chart information. We hypothesized that high medical record complexity would be a risk factor for cognitive errors and therefore adverse events.

Methods:
Conducted at Children's Hospital Boston, cases were all patients with major adverse events in 2005 and 2006 (n = 39) and controls were randomly selected from all admissions in 2005 and 2006 (n = 78). We directly measured the chart complexity for 24-hours prior to the major adverse event for each case and the 24-hours prior to a randomized date and time for each control. Cases and controls whose event occurred in the first 24 hours after admission were excluded from the 24-hour CCMR analysis. We estimated total lifetime complexity of cases and controls. All cases and controls were included in the lifetime CCMR analysis.

Results:
Mean 24-hour CCMR was higher for cases (31,323 bits) than controls (14,454 bits) (p = 0.008). Using empirically derived thresholds with best predictive values, patients whose CCMR was > 15,000 bits in 24-hours had an odds ratio of 5.3 (p = 0.008) for a major adverse event (Figure 1). Mean estimated lifetime CCMR was much higher for cases (736,033 bits) than controls (119,707 bits) ($p < 0.001$).Patients whose estimated lifetime CCMR was > 70,000 bits had an odds ratio of 6.5 ($p < 0.001$) for a major adverse event (Figure 2).

Conclusions and Implications:
24-hour complexity and lifetime chart complexity as measured by the CR gives meaningful information about the patient's risk of a major adverse event. Because physicians, especially trainees, are known to have trouble identifying when they are cognitively overwhelmed, we hypothesize that information about patient complexity in real time would aid doctors in identifying high risk situations and thus employing preventative strategies to reduce the likelihood of adverse events. Ultimately, we hope to see the CR built into commercially available electronic medical records, so that complexity-based risk stratification would be widely available.

Figure 1: 24-hour Complexity vs. Adverse Events



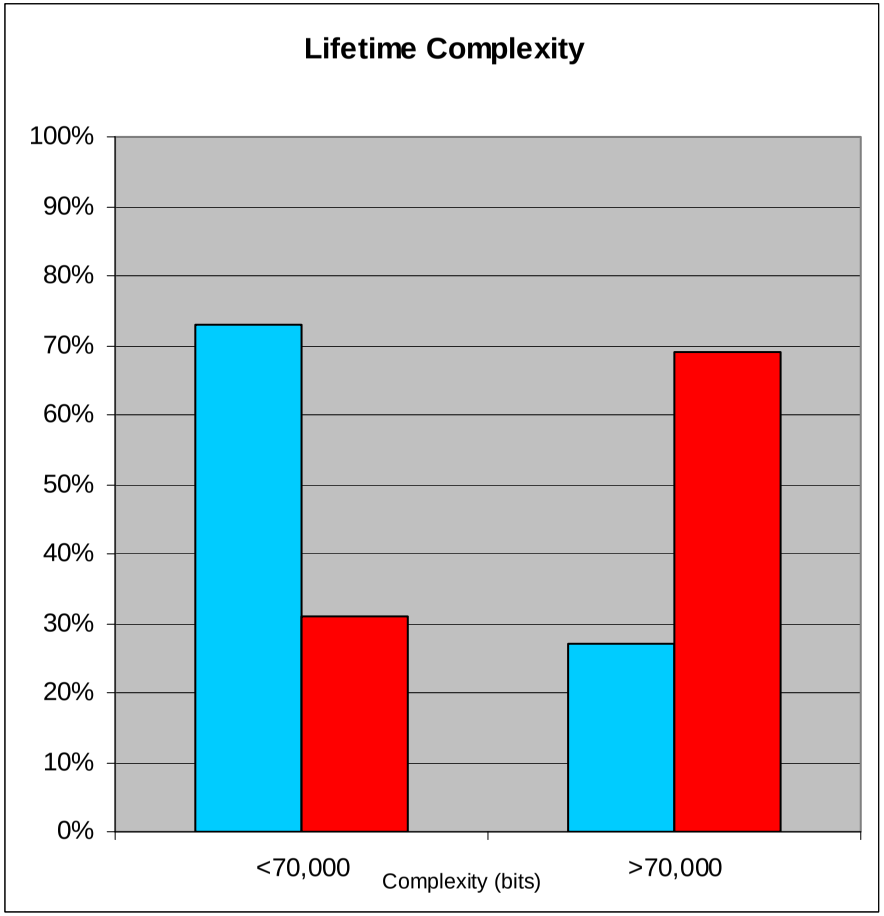
	<15,000 Bits	>15,000 Bits
AE	7	10
No AE	33	9

Odds Ratio = 5.24 p = .0008

LEFT: This graph presents patients who with less than 15,000 bits in 24-hours on the left and patients with more than 15,000 bits in 24-hours on the right. Red represents patients who had an AE and blue represents patients who did not have an AE.

RIGHT: From this chart and our odds ratio, patients who had greater than 15,000 bits in their chart in 24-hours had 5.24 times the risk of experiencing an AE when compared to those who had less than 15,000 bits in 24- hours.

Figure 2: Lifetime Complexity vs. Adverse Events



	<70,000 Bits	>70,000 Bits
AE	12	27
No AE	58	20

Odds Ratio = 6.53 $p < .0001$

LEFT: This graph presents patients who with less than 70,000 bits in their lifetime on the left and patients with more than 70,000 bits in their lifetime on the right. Red represents patients who had an AE and blue represents patients who did not have an AE.

RIGHT: From this chart and our odds ratio, patients who had greater than 70,000 bits in their chart in their lifetime had 6.53 times the risk of experiencing an AE when compared to those who had less than 70,000 bits in their lifetime.

Medication Errors in Hospital and Community Settings: Risk Factors in Eight Countries

Kim A. Sears, Queen's University, Kingston, Ontario, Andrea C. Scobie, Dalhousie University, Halifax, Nova Scotia, Neil J. MacKinnon, University of Arizona, Tucson, Arizona

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Background:
Medication errors can cause significant harm to patients and lead to significant costs in a health care system. As such, there is value in identifying patient-related risk factors for medication errors. While knowledge concerning system and patient-related factors related to medication errors in hospital is robust, research still remains limited the community setting. Evidence suggests that there is a significant issue of underreporting of medication errors particularly in the community setting. This underreporting thus impacts the opportunity to learn from these events and improve systems.

Purpose of the Study:
Our objectives were to: 1) identify patient-related risk factors associated with self-reported medication errors, and 2) determine whether the risk factors differ in the hospital and community settings.

Methods:
The Commonwealth Fund s 2008 International Health Policy Survey of chronically ill patients in eight countries was the primary data source. Univariate analyses were used to determine significant explanatory variables ($p < .05$) for inclusion in weighted logistic regression models. Two regression models were developed: one to identify overall patient- related risk factors and one to determine whether said factors differ in community and hospital settings. In addition, the odds ratio for each explanatory variable was calculated to determine the relative risk of experiencing an error given each potential explanatory factor. Goodness of fit was determined using the Hosmer and Lemeshow Test. Data analysis was performed using PASW Statistics version 18.0.

Results:
The final study population included 9,944 adults. In total among the 7,675 respondents taking medications regularly, 732 respondents self-reported medication errors over the 8 nations. Of these 732 self-reported medication errors, the percentage per country ranged from as low as 4.7% in Germany to a high of 14.2% in the United States. Patient- related risk factors for self-reported medication errors were: (1) the number of medications taken, (2) gender, (3) age, (4) country of residence, and (5) presence of a regular doctor. Approximately four out of every five reported medication errors occurred in the community setting.

Conclusions and Implications:
It is clear from the results of this study that a significant percentage of patients with chronic disease across multiple countries are experiencing medication errors, with the majority of errors occurring in the community setting. Greater emphasis on national incident reporting systems and sharing of knowledge across nations could help to identify strategies to overcome this. The adoption of reporting systems would not only identify common system issues that need to be changed to reduce the occurrence of medication errors in the community, but could also provide nations with information about trends in medication brands and age-related experiences. Strategies aimed at increasing reporting of and learning from medication errors, as well as education surrounding potential risk factors for patients, are recommended. Finally, acknowledgement of these patient-related characteristics can serve as a means to practice additional vigilance and alert health care providers to potential risks.

Factors Influencing Implementation of Knowledge Translation Strategies for Improving Paediatric Pain Practices in Hospitalized Children

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Background: Pain management in hospitalized children is inadequate despite robust research. Evidence-based strategies combining continuous quality improvement (CQI) methods and integrated knowledge translation (KT) strategies were used as part of the Evidence-based Practice for Improving Quality (EPIQ) intervention (Lee et al., 2009). Little is known about factors that hinder and facilitate implementing the EPIQ intervention.

Purpose of the Study: The primary aim was to determine the nature and frequency of KT strategies utilized to improve pain assessment and management practices using the EPIQ intervention. A secondary aim was to determine the factors that influenced the implementation of these strategies.

Methods: Thirty-two inpatient units across 8 Canadian children's hospitals participated: 16 units were allocated to the EPIQ intervention and 16 to standard care. The nature and frequency of KT strategies within EPIQ intervention units were assessed during 4 Plan-Do-Study-Act (PDSA) cycles over a 15-month period. Factors affecting KT strategy implementation were determined using open-ended questions within the Process Evaluation Checklist (Yamada, 2011). Qualitative data were coded using content analysis.

Results: A total of 575 KT strategies were used in the 16 EPIQ intervention units across the 4 PDSA cycles. Reminders were used most often (n=215) followed by audit and feedback (n=134), educational materials (n=131), and educational outreach (n=95). Key factors that hindered KT strategy implementation were: ineffective delivery of information, delivery location, excess information provided, and unappealing presentation of the information. Key factors that facilitated the successful delivery of the KT strategies included: appropriate location, aesthetics and medium of the strategy (e.g. concise, colourful reminders posted at the point of care), and unit staff and leadership support.

Conclusions and Implications: The most favourable KT strategies were appropriately located, visually appealing and contained the right balance of information. As the involvement and support of leadership and the unit staff played a key role in the success of a KT strategy, unit culture is an important consideration. Understanding and appreciating the factors that contribute to a successful KT strategy is instrumental when attempting to affect practice change on a hospital unit.

Transparency with Performance Measurement and Outcomes Reporting Drives Clinical Improvement in an Uncomplicated Essential Hypertension Disease Management Program

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Gundersen Lutheran Health System, La Crosse, Wisconsin

Background:
Hypertension is the leading cause of stroke and a major risk factor for heart disease and renal failure. Proper control can be achieved by actively managing medications and engaging patients in lifestyle modification. Appropriate treatment can prevent the catastrophic consequences of this disease.

Purpose of the Study:
In 2006, Gundersen Lutheran Health System ranked last amongst Wisconsin healthcare organizations reporting uncomplicated essential hypertension (UEH) control rates to the Wisconsin Collaborative for Healthcare Quality (WCHQ). Surprised by this ranking, medical leadership took the position that you cannot improve upon that which you do not measure. During 2007-2008, our Uncomplicated Essential Hypertension Disease Management Program established its roots. Objectives for the program include clinical decision support, clinical information system analytics, workflow redesign and patient self-management support.

Methods:
In 2008, a patient registry was built to support practices with proactive management of patients with uncomplicated essential hypertension. Clinicians and nursing staff can efficiently identify patients not achieving a blood pressure goal of <140/90 mmHg and coordinate targeted interventions that improve clinical outcomes and engage patients in their care. Interventions include nursing blood pressure re-checks, monthly provider visits until blood pressure is controlled and consultation with in-house hypertension specialists. Annually, senior leadership establishes an organizational blood pressure control target based on state and national benchmarks. During the past 3 years, the target has increased from 75% to 83%. To increase momentum toward the goal, the UEH Disease Management Committee delivers a performance packet and communication blitz monthly to relevant departments and clinicians intended to increase the transparency of performance measurement and motivate improvement efforts for better hypertension control. The UEH committee medical chairman kicks-off the blitz with an email to all primary care clinicians summarizing disease management program goals and performance updates. The letter includes best practices from literature, as well as a personal offering for consultation on difficult cases. The following week, all providers and medical and administrative leaders responsible for managing care for patients in the UEH registry, receive performance data drilled down to the department and provider-level. Providers and departments are ranked next to their peers to inspire shared

accountability for blood pressure outcomes between clinicians, support staff and management. Outcomes data is displayed and discussed during staff meetings and performance issues are proactively addressed. The final communication is a letter which is mailed monthly to each clinician summarizing individual performance for the blood pressure control metric (Figure 1), individual rank among their peer group, and additional treatment tips and clinical tools.

Results:
Feedback from clinicians, support staff and management has been positive and blood pressure rates continue to improve each month (Figure 2). Gundersen Lutheran Health System currently ranks 12 out of 19 health systems reporting UEH control rates to WCHQ.

Conclusions and Implications:
Transparent quality measurement and reporting practices are vital to successful operationalization of a disease management program for uncomplicated essential hypertension. The Gundersen Lutheran UEH Disease Management Program has added value to practices by aligning clinician and patient treatment goals and by establishing supportive infrastructure which promotes proactive management and accountability for hypertension outcomes. Gundersen Lutheran plans to apply this disease management approach to other chronic conditions in the years ahead.

Figure 1

Hypertension Disease Management

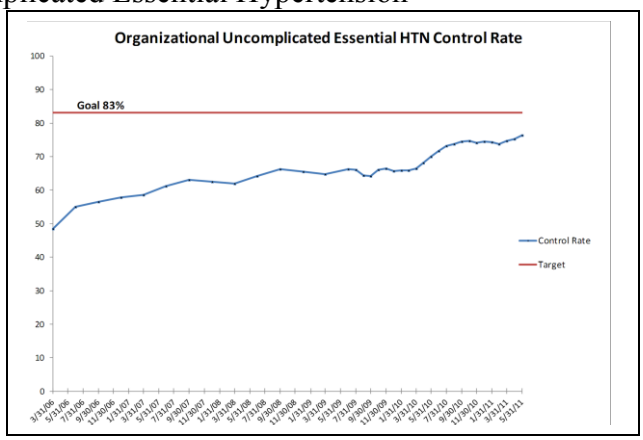
Hypertension is the leading cause of stroke and a major risk factor for heart disease and renal failure.

Proper control of hypertension can be achieved by actively managing medications and engaging patients in lifestyle modification.

Appropriate treatment can prevent the catastrophic consequences of this disease.

Short Term Goal

By December 31, 2011, 83% of our organization's Uncomplicated Essential Hypertension (UEH) patients will be controlled.



Organizational Outcome

For the 12 month period ending: **5/31/2011**
Percentage of patients controlled: **76.36 %**

Individual Outcome

Name: UEH Clinician, MD
Percentage of UEH patients controlled: **83.5 %**
Organizational Rank: **48** out of **145**

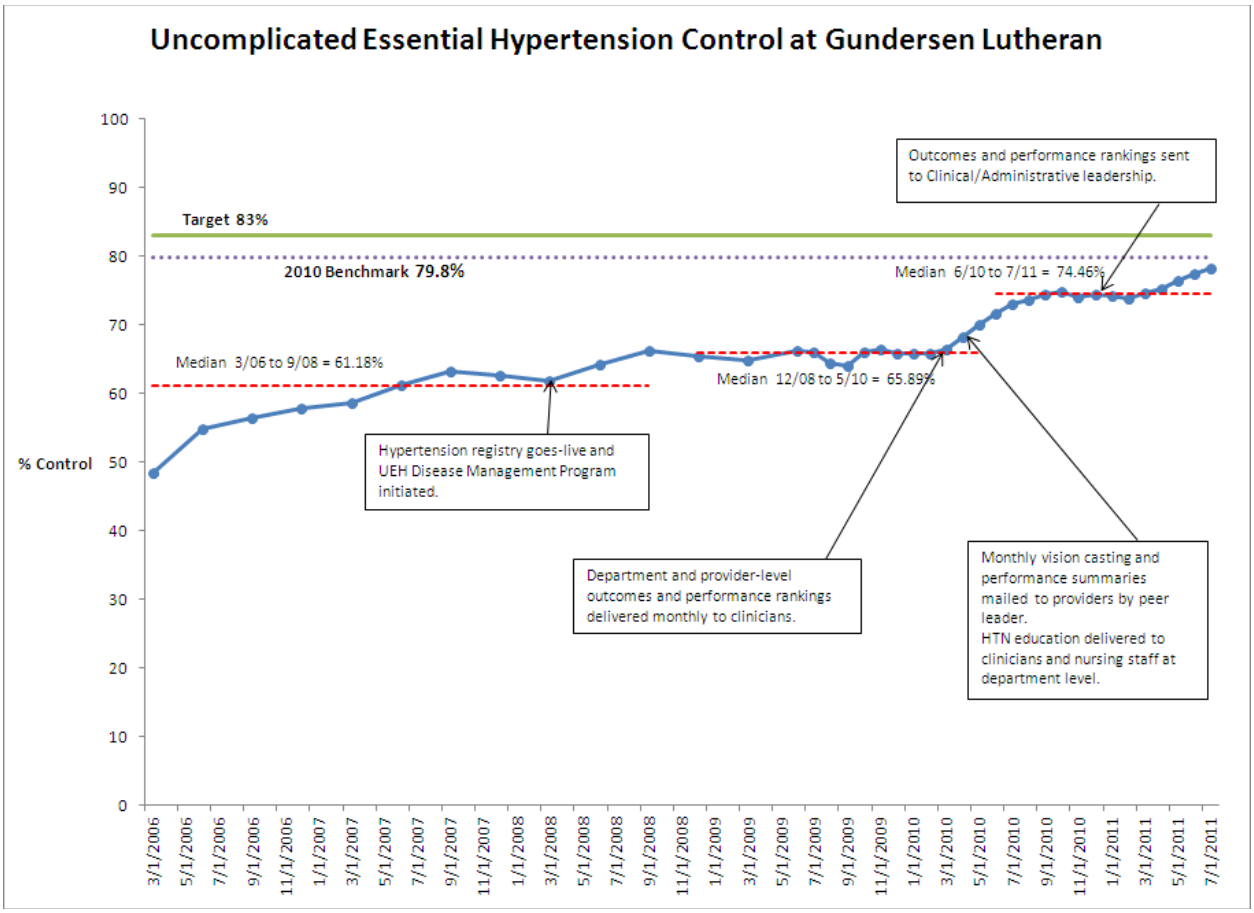
A few notes, tips and tricks:

- Under dosing and inadequate titration of blood pressure medications contributes significantly to patients not meeting their goals. Many patients will eventually require 3-4 medications at full doses to reach their goal.
- The effect of ACE-I is enhanced by diuretics and blunted by NSAIDS.
- A good rule of thumb is that any given BP medication at maximal dose will decrease blood pressure by **10/6 mm Hg**. (Lots of variables here of course, but typically 7-13/4-8 mm Hg)
- Home BP readings should not be included in the disease management database.
- Hypertension is the leading cause of stroke and a major risk factor for heart disease and renal failure.
- Proper control of hypertension can be achieved by actively managing medications and engaging patients in lifestyle modification.

Refs: Hypertension Primer, 2008, American Heart Association

If you have questions, please email Jon Zlabek MD, Hypertension Disease Management

Figure 2


Uncomplicated Essential Hypertension Control at Gundersen Lutheran
% Control
Target 83%
2010 Benchmark 79.8%
Median 3/06 to 9/08 = 61.18%
Median 12/08 to 5/10 = 65.89%
Median 6/10 to 7/11 = 74.46%
Outcomes and performance rankings sent to Clinical/Administrative leadership.
Hypertension registry goes-live and UEH Disease Management Program initiated.
Department and provider-level outcomes and performance rankings delivered monthly to clinicians.
Monthly vision casting and performance summaries mailed to providers by peer leader.
HTN education delivered to clinicians and nursing staff at department level.

Patterns in Patient-Centered Care Innovation in Washington State

Peter Reed, Duke University School of Medicine, Durham, NC, Douglas A. Conrad, University of Washington School of Public Health, Seattle, Washington, Susan E. Hernandez, University of Washington School of Public Health, Seattle, Washington, Carolyn Watts, Virginia Commonwealth University School of Allied Health ,Richmond, Virginia, Miriam S. Marcus-Smith, University of Washington School of Public Health, Seattle, Washington

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Background:
Healthcare professionals, researchers, and policymakers have diverse conceptions of patient-centered care, but virtually all agree that the U.S. healthcare system requires patient-centered care innovation to tackle quality deficits and uncontrolled costs. Consequently, numerous promising innovations and reinventions have emerged, including the patient-centered medical home, shared decision-making, payment reforms, and creative uses of health information technology. The Affordable Care Act of 2010 also pushes innovation through accountable care organizations and the Center for Medicare and Medicaid Innovation.

Purpose of the Study:
While the goals of patient-centered care innovation may be clear, the processes of adoption and implementation at the organizational level are murky. Furthermore, the effects of patient-centered care innovation on cost are unknown but critical to discover as policies continue to push innovation in the setting of rising costs. We sought to ascertain and illuminate the process of patient-centered care innovation undertaken by myriad health plans and healthcare organizations, from strategic planning to goal selection to implementation to maintenance.

Methods:
Five health plans (two state agencies, two private non-profit plans, one private for-profit Medicaid managed care and Medicare Advantage plan) and four provider organizations (two non-profit multi-hospital systems aligned with multispecialty groups, one for-profit multispecialty group without an aligned hospital, one independent practice association) in the Puget Sound region of Washington State participated in our study. We interviewed the senior medical and operations executives at each health plan and provider organization and at least two providers and the practice manager at each primary care clinic. The interviews were semi-structured. At least two readers of each interview transcript identified themes inductively; final themes were determined by consensus.

Results:
Innovation in patient-centered care was a strategic objective of nearly every organization in this study. However, other goals were more salient: cost containment, quality improvement, organization survival, and making better use of available data. Organizations commonly perceived effective chronic disease management (e.g., diabetes

registries, preventing emergency room visits for COPD and asthma patients) and integrated health information technology as key elements for successful patient-centered care innovation. Inertia, resource deficits, fee-for-service payment, and regulatory limits on scope of practice were cited as barriers to innovation, while organization leadership, human capital, and adaptive culture facilitated change.

Conclusions and Implications:
Patient-centered innovations reflected organizational perspectives: health plans focused on benefit design and cost-effectiveness, while providers emphasized healthcare delivery processes. Many objectives - particularly, better use of data - were shared by health plans and providers, yet the two groups rarely worked together on these areas of potentially productive cooperation. The process of innovation is heavily dependent on organizational culture and leadership. Healthcare organizations are attuned to the need for patient-centered innovation, but their objectives and methods vary widely and are infrequently coordinated. Policymakers can improve the pace and quality of patient-centered innovation not just by setting targets but also by addressing the conditions for innovation: leadership development (training), smart regulation (incentives and leeway for experimentation), and inter-organizational cooperation (innovation in payment, regulation, and information sharing).

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- ✓ Creating a research and education agenda for healthcare improvement
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In an ongoing effort to encourage the development and dissemination of original curricular materials pertaining to the teaching of improvement in healthcare, AHI is announcing the fourth annual Duncan Neuhauser Curricular Innovation Awards in Healthcare Improvement. This award, to be presented at the AHI Scientific Symposium in December, 2012, will recognize new curricular material that has potential for significant impact in teaching improvement in healthcare, is innovative in its educational approach, and has the ability to be adopted by other schools, institutions, or professions. A first prize of $500 will be awarded, with the second and third place awardees receiving $300 and $200 respectively.

Criteria for Award: Curricular material submitted should focus on the learning of improvement skills in health care. Submissions will be judged on the merits of:

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- Demonstration of how the material was used to advance the learning about healthcare improvement
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Submission deadline: October 1, 2012. Submit materials at: https://a4hi.org/review/.

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- Interprofessional collaboration
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Goal # 4: Networking/Relationships/Collaboration
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