

RWJF Final Narrative

1. What measurable goals did you set for this project and what indicators did you use to measure your performance? To what extent has your project achieved these goals and levels of performance?

The goals for this initiative were to pilot test positive deviance (PD), a new approach to addressing intractable quality and patient safety problems, and achieve:

1. A 75% decline in MRSA infection rates in pilot nursing units;
2. Expansion of the efforts in the participating hospitals beyond the initial pilot units;
3. Adoption of the PD methodology for MRSA prevention by other hospitals.

We used as indicators healthcare associated MRSA (HA MRSA) infections, number of new nursing units in the participating hospitals employing the PD process, and the number of hospitals that adopted PD to address MRSA prevention as a result of this project.

Six hospitals were selected as Beta Sites in the PD MRSA Prevention Partnership:

- Albert Einstein Medical Center, Philadelphia, PA
- Billings Clinic, Billings, MT
- Franklin Square Hospital Center, Baltimore, MD
- University of Louisville Hospital, Louisville, KY
- The Johns Hopkins Hospital, Baltimore, MD
- VA Pittsburgh Healthcare System, Pittsburgh, PA

The Beta Sites agreed to use positive deviance to engage staff in determining **How** to consistently employ the following evidence-based precautions in at least one pilot unit:

1. Active surveillance MRSA cultures on all patients on admission/discharge/transfer;
2. Hand hygiene before and after every patient contact;
3. Contact isolation precautions on all patients colonized or infected with MRSA;
4. Environmental cleaning.

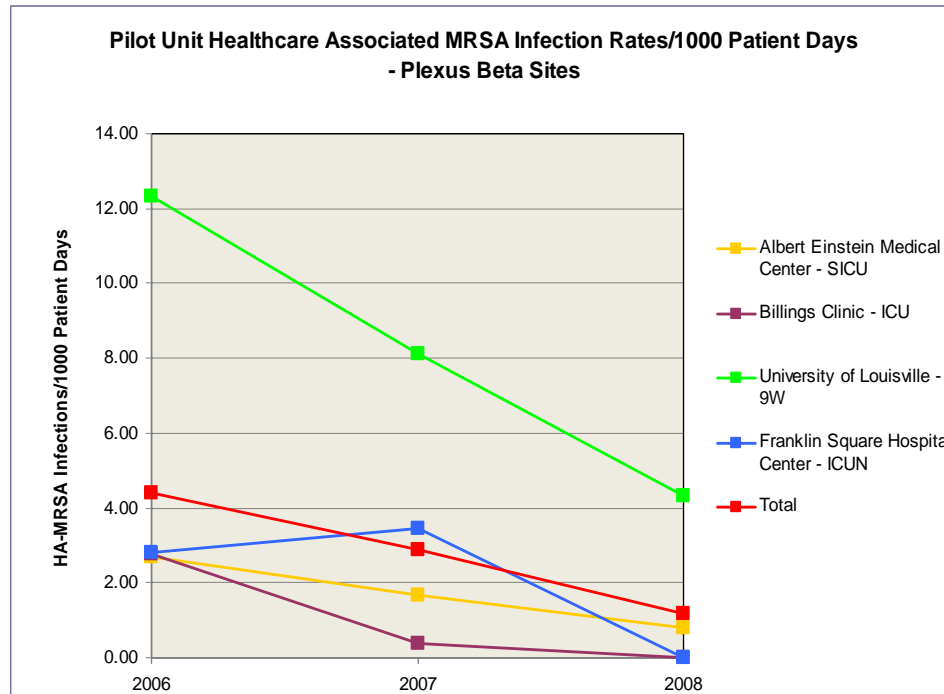
The following results were reported by the Beta Sites:

Pilot Unit Data

- The Surgical Intensive Care Unit at Albert Einstein Medical Center experienced a **70% drop** in the rate of HA MRSA infections from 2006 to 2008, yielding a 2008 rate of 0.81 infections/1000 patient days.
- The Intensive Care Unit at Billings Clinic experienced a **100% drop** in the rate of HA MRSA infections from 2006 to 2008, yielding a 2008 rate of 0.00 infections/1000 patient days.

- The Intensive Care Unit at Franklin Square Hospital Center experienced a **100% drop** in the rate of HA MRSA infections from 2006 to 2008, yielding a 2008 rate of 0.00 infections/1000 patient days.
- The Intensive Care Unit at University of Louisville Hospital experienced a **65% drop** in the rate of HA MRSA infections from 2006 to 2008, yielding a 2008 rate of 4.33 infections/1000 patient days.

The aggregate decline in the HA MRSA infection rate in these pilot units was 73%. The aggregate rate/1000 patient days dropped from 4.36 in 2006 to 1.17 in 2008.



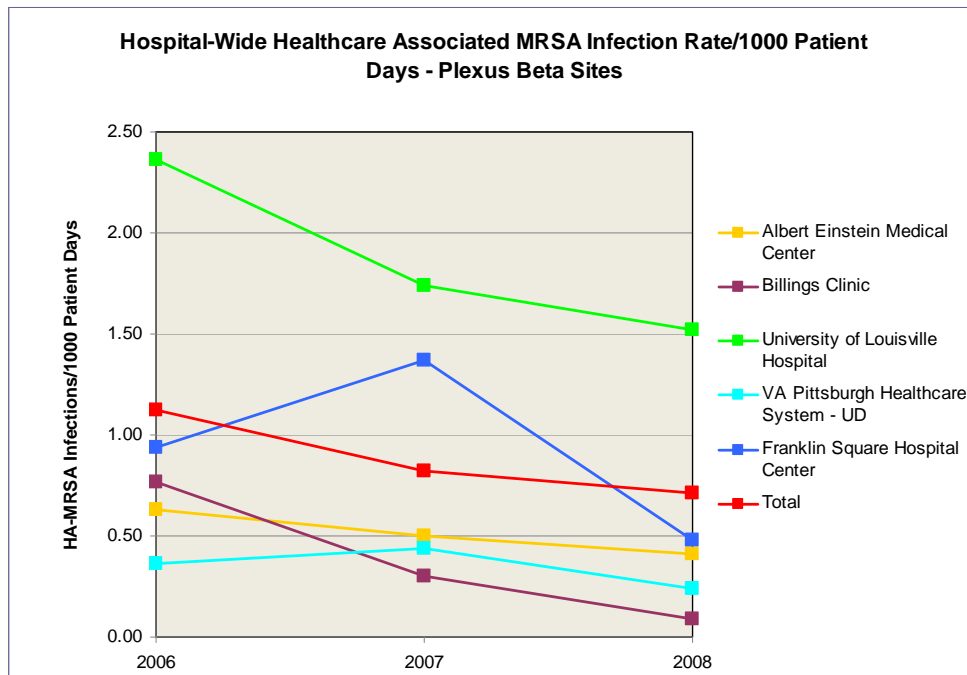
Because of Institutional Review Board concerns information from The Johns Hopkins Hospital was not reported. Additionally, pilot unit data for VA Pittsburgh Healthcare System is not included because the hospital began its PD effort on a facility-wide basis.

Hospital Wide Data

The PD process and success on the pilot units stimulated MRSA prevention efforts in other nursing units and departments in each of the Beta Sites. This brought improvements in hospital wide HA MRSA infection rates from 2006 to 2008:

- Albert Einstein Medical Center – down **35%**
- Billings Clinic – down **89%**
- Franklin Square Hospital Center – down **49%**
- University of Louisville Hospital – down **36%**
- VA Pittsburgh Healthcare System – down **33%**

The aggregate decline in rates from 2006 to 2008 was 37%.



As noted above, the most significant improvement was reported by Billings Clinic, where from data from 1999 through June, 2008 showed that MRSA rates reached a peak in 2005 and began a steady decline in 2006, the year the PD process was introduced. Through the first half of 2008 the hospital recorded two HA MRSA infections. In 2005, the figure was 35. This change in the trend line in 2006 at Billings was also experienced at the other Beta Sites.

The Beta Site hospitals have achieved significant improvements in MRSA rates because they successfully tackled the “How” of putting known infection prevention principles into practice. This challenge was highlighted in an October 9, 2008 article by Kevin Sack in *The New York Times*. The following are observations from his reporting:

- “Epidemiologists contend that the challenge in reducing hospital infections, which are said to attack one of every 22 patients, has not been a dearth of guidelines but a lack of adherence.
- ‘Too often where we fail is not in the knowledge but in the execution,’ said Dr. Patrick J. Brennan, chairman of the federal Healthcare Infection Control Practices Advisory Committee.
- A survey of hospitals last year by The Leapfrog Group, which advocates for health-care quality, found that 87 percent did not consistently follow infection-control guidelines. Studies have found that half of hospital workers do not follow hand-washing protocols.”

Convincing evidence of progress on the “How” can be seen in data on infection prevention precautions reported by the Beta Sites to the CDC’s National Healthcare Safety Network

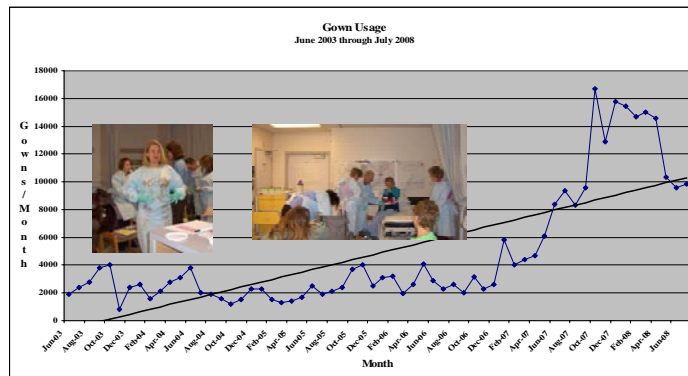
(NHSN). This data demonstrates the strong impact of PD process on behavior change by healthcare workers.

- In the medical-surgical intensive care pilot units adherence to proper gown and glove use by staff increased from 68% to 94%, an improvement of **39%**
- In the medical-surgical intensive care pilot units adherence to hand hygiene precautions upon entry to patient rooms increased from 41% to 80%, an improvement of **95%**

Hospitals also tracked use of gowns, gloves and hand sanitizer gel as indicators of changes in infection prevention practices by staff. These indicators also showed significant improvements. Data on gown purchases at Billings Clinic is shown below.



Gown Use February 2006 – July 2008



The improvements reported here on MRSA infection rates and adherence to infection prevention principles are impressive given rising nationwide MRSA rates.

Expansion to Additional Units

Based upon internal evaluations of the PD process, **all six Beta Sites hospitals expanded their PD informed MRSA prevention efforts beyond the initial pilot units.**

- University of Louisville expanded to 4 units
- Franklin Square Hospital Center expanded to 2 units
- Albert Einstein Medical Center expanded to the entire hospital
- VA Pittsburgh Healthcare System expanded to the entire hospital
- Billings Clinic expanded to the entire hospital
- The Johns Hopkins Hospital expanded to 3 units and to another hospital in its system

Expansion to New Hospitals

The results achieved by the Beta Sites inspired 53 additional hospitals to adopt PD in their drives to prevent MRSA transmissions.

- 5 Veterans Administration hospitals
- 35 healthcare facilities in a state wide collaborative led by the Maryland Patient Safety Center/Delmarva Foundation
- 6 hospitals participating in a regional MRSA collaborative led by Indiana University
- 2 hospitals in Colombia, South America
- 5 hospitals in a MRSA collaborative sponsored by Canada's Safer Healthcare Now Campaign

2. Did the project encounter internal or external challenges? How were they addressed? Was there something RWJF could have done to assist you?

Yes, there were two: (1) development and use of reliable reporting systems on MRSA infections and infection prevention process measures for use internally and for external comparisons; (2) helping infection control leaders, quality managers, and hospital executives partially relinquish their "expert" role and to engage staff at all levels in infection prevention;

Soon after the project began it became apparent that existing hospital information systems did not capture and report comprehensive MRSA infection and infection prevention process measures in a manner that fostered learning and engagement by front line staff. Also, what was collected was not consistent across the Beta Sites, so comparison and learning across the hospitals was hindered. To address this challenge, the Beta Sites in collaboration with John Jernigan, MD, and his staff at the CDC, developed and implemented a MRSA Surveillance System.

Effective use of PD requires that leaders engage frontline workers to identify and diffuse existing good practices and to create new practices appropriate to the various contexts in which care is delivered. To do so leaders and infection prevention professionals had to emphasize their roles as facilitators of staff engagement over their roles as infection control authorities. Mary Beth Their, RN, infection control practitioner at Franklin Square Hospital Center put it this way: *"With PD you have to get comfortable with discomfort. The initial discomfort comes from having to give up control and dealing with the messiness of the process."* Nancy Iversen, RN, Director of Patient Safety and Infection Control, Billings Clinic, said, *"There is more dialogue, more discussion, and people ask questions of each other. When I round now, there is different bonding, because we have learned together. The conversations are different. This is especially good for us in infection control, because sometimes we have felt like police. Now we feel like partners."*

With assistance from Plexus PD coaches, through practice of PD facilitation, and interaction with their peers at PD MRSA Prevention Partnership meetings and conference calls, PD facilitators, infection control staff and managers in all Beta Sites came to embrace the new roles.

Given the magnitude of these two challenges and the substantial learning required to modify PD for use in hospitals, the level of support needed from Plexus Institute, Positive Deviance Initiative (PDI), CDC, and PD coaches was much greater than anticipated. Given the resources provided through the grant, staff and coaches volunteered considerable time. There was nothing RWJF could have done to assist with these challenges beyond providing additional resources.

3. Have there been other sources of support?

Everyone involved in this effort, from Beta Sites personnel, Plexus Institute and PDI staff, PD coaches and CDC personnel invested considerable time, effort, and resources to achieve the results reported here. The CDC hired additional staff and brought in an expert consultant.

4. When considering the design and implementation of this project, what lessons did you learn that might help other grantees implement similar work in this field?

While Leadership Support is Essential, Engagement of Front-line Staff is More Essential.

Senior leaders were actively involved in the PD process. They initiated the PD process, made it possible for interested staff members to be trained as PD facilitators, established a climate that encouraged staff members to implement solutions locally, and dealt quickly with system issues identified by staff as hindering good infection prevention practices. Trish Perl, MD, Hospital Epidemiologist, Johns Hopkins Medical Institutions and University, noted, *“Yes, PD has created a huge change. Unit and hospital leaders are more engaged in infection prevention.”* Yet, PD did not gain real traction in the Beta Sites until staff on units and departments became engaged. Their engagement depended on a host of factors such as how staff was invited, what opportunities were provided for their participation, other priorities, the culture of the hospital and unit, and how they responded to the invitation. Such complexities made it difficult to predict when PD would really take hold and likely accounted for the variability in timing of uptake of PD across the hospitals.

Habitual Behaviors that Lead to Transmissions Can Change. PD is based on the idea that in every community there are individuals or groups who solve problems better than colleagues who have exactly the same resources. PD enabled the Beta Sites to achieve reductions in their MRSA infection rates by tapping the expertise of frontline staff and eliciting a sense of ownership of the problem and its solutions. As a result of her experience with PD, Linda Goss, RN, Director of Infection Control and Infusion Services at University of Louisville Hospital, observed, *“I now notice and appreciate creative and nontraditional infection control practices employed by hospital staff.”*

Although evidence-based infection prevention precautions have been known for decades, consistent adherence is low. In most healthcare facilities there are nurses, physicians and support staff who forget to wash their hands, reuse contaminated gowns, use the same gloves when caring for different patients and touch environmental surfaces with contaminated gloves. Non-compliant healthcare workers don't intend harm but help sustain patterns of poor infection practice. Using discovery and action dialogues, a PD process created with the Beta Sites, new habits were created. Hundreds of front line workers in each Beta Site were asked for their ideas on how to stop transmissions, who among them was practicing good infection control, and what actions they could take to improve adherence to precautions.

During this project we were constantly reminded that knowledge alone does not change behavior. The improvements in precaution adherence were not the product of “in-services” or educational campaigns; they came through involvement of front line staff, and their increasingly

deep sense of ownership of the problem and the solutions. This sense of ownership was captured when a group from Indianapolis hospitals visited several Beta Sites to see PD in action. During one visit they saw a physician entering an isolation room without washing his hands or donning gown and gloves. A housekeeper politely reminded the physician to wash his hands and handed him a gown and gloves. The physician complied. One of the visitors whispered, *“I want that...I want to see that happen in my hospital.”*

Moving Beyond Doctors and Nurses. Everyone who interacts with patients is important in MRSA prevention. This includes family, clergy, housekeepers, volunteers, transporters, radiologic technologists, unit clerks, social workers, nurses and doctors. These are the people who touch patients, the equipment used to treat them, and their immediate environments hundreds of times every day. They know how, when and where transmissions could occur. Giving front line staff opportunities to share ideas, create plans and then act on their ideas, unleashed thousands of small solutions. Previously overlooked avenues for MRSA transmission were discovered and a vastly expanded reservoir of talent and creativity was generated.

One patient escort employee realized existing guidelines from the CDC and other professional sources did not address specific situations he experienced in transporting isolation patients to support services. He, his colleagues and clinicians developed a series of precautions that included performing hand hygiene and donning personal protective equipment (PPE) before moving the patient onto a gurney and wrapping the patient in a clean sheet. They then remove their PPEs, sanitize their hands and the hand rail, place a previously prepared clean plastic bag containing PPE and a small bottle of hand gel on the gurney and transport the patient. The receiving department gets verbal instructions and the necessary supplies to adhere to precautions. This new process is now part of everyone’s routine.

No infection control department or the handful of nurses and doctors with official responsibility for infection prevention can develop protocols for the thousands of interactions that can cause transmissions and control the behavior of staff involved in these interactions; only the people involved can discover these infections-causing interactions and take action to prevent them.

Success in Preventing HA MRSA Infections is Relational and Collaborative. The Beta Sites all agree that reductions in MRSA infection rates and the cultural changes they achieved could not have happened had they been working alone. This recognition became explicit when the Institute for Healthcare Improvement invited them to offer a Learning Lab at its National Forum. Nancy Iversen said *“It would be inconceivable for any one of the Beta Sites to facilitate this alone because we all depend on each other so much and we’re so intensely interconnected professionally and personally. None of us could have accomplished what we are doing without these relationships.”* Beta Sites took turns facilitating biweekly conference calls, and individual calls and emails among participants became more frequent as trust and relationships developed. Beta Sites had regular face-to-face meetings to share experiences, ideas and data. It is our sense that the degree of participation in these PD MRSA Prevention Partnership activities accounted for some of the variation in PD implementation and results achieved by the Beta Sites.

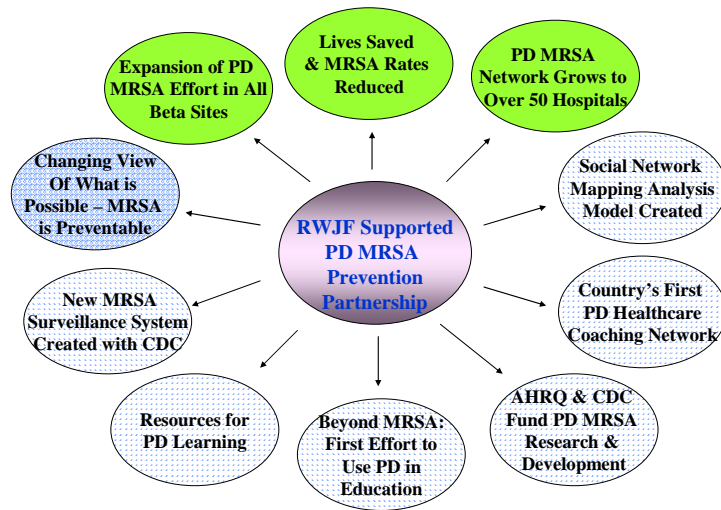
More Intensive, Early PD Coaching and Use of Process Indicators Would Have Speeded PD Implementation. As the Beta Site leaders and their PD coaches looked back on the PD

implementation process they realized that more intense PD coaching in the beginning of the effort would have helped the process move along more rapidly. Use of selected PD process measures, such as number of Discovery and Action Dialogues held, number of staff engaged, and the diversity of participants (referred to in PD parlance as unusual suspects), would also have supported a more rapid uptake of PD and served as indicators of how they were doing. Attention in the beginning of the PD process was on outcome data (MRSA infections and transmissions) and infection control process (hand hygiene, gloving, gowning). Upon reflection, this focus should have been married with one that included PD process measures.

Informal and Formal Social Networks are Accelerators. PD tapped and created networks devoted to MRSA prevention. The activation of these networks, which emphasized diverse contributions and participation, appeared to underlie the surprising speed and scope of changes in MRSA prevention practices. Many workers, volunteers and patients began to view infection prevention as an important priority. Realizing that terminal cleaning of isolation was being done in an ad hoc fashion, in spite of detailed written protocols, housekeepers at VA Pittsburgh Healthcare System collaborated to create an illustrated, text-free guide on surfaces to be cleaned daily and when preparing the room for a new patient. One of the VA housekeepers observed, *“We see that when doctors put in central lines they use a checklist. Now we have our own checklist. Not every patient needs a central line, but all patients need a clean room.”*

5. What impact do you think the project has had to date?

This project met its major goals for pilot testing positive deviance and achieving significant declines in MRSA infection rates in participating hospitals, an expansion of the efforts beyond the initial pilot units, and adoption of PD by other hospitals. It also achieved a wide range of important unexpected benefits that will likely contribute to further progress on MRSA prevention in this country.



The expected and unexpected benefits are shown green and blue respectively in the above graphic and described more fully below.

Expected Benefits

Lives Saved, and MRSA Rates Reduced. While national HA MRSA infection rates continue to rise to epidemic levels, the Beta Sites achieved an aggregate reduction of 73% in MRSA

infections on their pilot units and a 37% reduction hospital wide. These lower rates are not just numbers or lines on a graph, they represent patients' lives. Jeff Cohn, MD, Chief Quality Officer at Albert Einstein Medical Center told a gathering of health care professionals in November 2007 that there were 106 MRSA infections in his hospital 2006, and 85 were expected for 2007. He recounted the reaction of an oncology nurse. *"That's 20 patients who left the hospital earlier than they would have, 20 patients who returned to their lives 5 days earlier than they would have, and seven who are not dead due to an infection we gave them."*

Expansion of PD MRSA Effort in All Beta Sites. Every Beta Site expanded its PD MRSA initiative to more units and in three cases to the entire hospital.

PD MRSA Network Grows to over 50 Hospitals. The accomplishments of the Beta Sites have led to the adoption of the PD methodology for MRSA prevention in 53 hospitals in three countries – the United States, Colombia, and Canada.

Unexpected Benefits

Changing the View of What is Possible in Infection Control – MRSA is Preventable. For too long and in too many healthcare organizations MRSA was viewed as an unavoidable consequence of modern healthcare. This project and efforts by several other hospitals and professional associations across the country have begun to change this perception by demonstrating that MRSA infections are indeed preventable. With growing recognition of the MRSA epidemic, this movement has triggered more aggressive efforts in many hospitals, adoption of new infection prevention standards by the Joint Commission on Accreditation of Healthcare Organizations, many statewide legislative efforts, vigorous campaigns by professional organizations like the Association for Professionals in Infection Control, support from the CDC and Agency for Healthcare Research and Quality for expansion of and research into PD MRSA prevention efforts, and new policies by Medicare and other insurers to limit reimbursement for treating certain hospital acquired infections.

The project has expanded general knowledge about preventing MRSA infections, fostered new prevention approaches, and changed the way healthcare professionals think about infection control. Within each Beta Site there is a growing appreciation of the importance of engaging all healthcare workers in MRSA prevention. As Patricia Norstrand MS, RN BC, Senior Director, Department of Quality, Risk and Safety at Franklin Square Hospital Center, observed, *"When we began this project, we felt that we were a very open and inclusive organization. We have successfully implemented many projects with clinical level staff leading the way. We did find out during this project that we had much opportunity for additional involvement of staff and family. We continue to use concepts of PD in other projects."*

New MRSA Surveillance System Created with CDC. In collaboration with the CDC and for the purpose of creating an online system that enabled the Beta Sites to evaluate their performance on MRSA prevention and facilitate comparison with the other Beta Sites, a new MRSA Surveillance System was developed. This first of its kind system is an important breakthrough in the country's fight against healthcare acquired infections and as such has been incorporated into the CDC's National Healthcare Safety Network (NHSN), making it available

to all hospitals in the U.S. A novel addition to this system, also developed with CDC, is a clinical incidence density measure. It was created to enable rapid evaluation of the impact of PD on MRSA rates and insure comparability of data among the participating Beta Sites. The data represent a surrogate measure for HA MRSA infections.

Social Network Analysis (SNA) Model Created. To assess the effectiveness of PD implementation a new SNA methodology was developed. It was piloted in VA Pittsburgh Healthcare System and Billings Clinic. It will be used in the near future by hospitals in the Maryland Patient Safety Center and Indiana University AHRQ Action MRSA Collaboratives.

Country's First PD Healthcare Coaching Network. An outgrowth of the PD MRSA prevention work in the Beta Sites, is the country's only network of coaches skilled in PD in healthcare.

Elaboration of Positive Deviance Process. Given the skills of the PD coaches and capabilities in the Beta Sites, the PD process was enhanced for its use in healthcare. A methodology for rapidly engaging busy hospital staff in the process, called Discovery and Action Dialogues, was created and applied in all Beta Sites. To enable staff to practice effective MRSA prevention strategies and learn in a reflective manner about the realities of preventing infections, Improvisational Theatre was incorporated into the PD process in several facilities. Other processes, like Open Space Technology, that facilitated staff involvement were also utilized.

AHRQ and CDC Fund PD MRSA Research and Development. Because of its potential utility and to enable comparison with other hospitals, CDC recently funded the development of a refined SNA protocol for use by healthcare organizations across the country interested in employing PD in MRSA prevention. In September 2008 AHRQ awarded a grant to Indiana University to advance MRSA prevention and research. This effort will involve Plexus Institute, 5 to 10 hospitals and include developments of new methodologies for MRSA prevention.

Beyond MRSA – First US Effort to Apply PD in Public Education. Attracted by the success of PD in the Beta Sites, the New Jersey Department of Education sponsored the first US-based PD public education initiative. Plexus and the Positive Deviance Initiative began a PD informed effort in 2008 with four troubled schools in Asbury Park, Jersey City, Elizabeth and Bridgeton to help them address their most intractable problems. In addition, with support from the Rockefeller Foundation, the Positive Deviance Initiative is beginning an effort to expand the applications of PD in healthcare. Clinical leaders, complexity scientists and national patient safety experts from the CDC and leading healthcare organizations are meeting on November 6, 2008 to explore “PD beyond MRSA.” Plexus is helping with this initiative.

Who can be contacted a few years from now to follow up on the project? Jon Lloyd, MD, Senior Clinical Advisor, MRSA Prevention, and Curt Lindberg, President, Plexus Institute.

6. What are the post-grant plans for the project if it does not conclude with the grant?

Plexus Institute is committed to building on the work initiated with this project. Jon Lloyd, MD, has joined Plexus as Senior Clinical Advisor, MRSA Prevention, to help maintain and grow the

network of organizations devoted to PD and MRSA prevention. This effort is intended to reach more healthcare organizations, to further refine PD for use in healthcare, to integrate SNA into the PD implementation and evaluation process, to conduct research on the impact of PD on the culture and infection control practices in healthcare organizations, and introduce PD and other complexity science based processes for use by healthcare organizations in addressing other challenging health and healthcare quality issues.

Names of other institutions you expect to involve.

- Positive Deviance Initiative
- CDC
- AHRQ MRSA ACTION Network led by Indiana University
- Delmarva Foundation and Maryland Patient Safety Center
- Safe Healthcare Now (Canada)

Plans to support the project financially, including grants you are seeking or have received and/or a business plan to become self-supporting. AHRQ awarded a \$1,800,000 grant to Indiana University for MRSA prevention and research. Plexus will serve as a major subcontractor. Also in September, the CDC contracted with Delmarva Foundation to develop and implement a protocol for SNA in hospitals using PD in MRSA prevention efforts. This \$300,000 grant is renewable for four years. Plexus is serving as a partner with Delmarva Foundation. In addition, Plexus has engaged the National Executive Service Corps to develop a business plan for expanding the PD MRSA initiative nationally.

7. With a perspective on the entire project, what have been its key publications and national/regional communications activities? Did the project meet its communications goals?

National and regional communication activities have included workshops, webinars, conferences, website information, newspaper and TV features, and articles in professional journals. All are detailed in the bibliography. We worked diligently to communicate the work of the PD MRSA Prevention Partnership with the Association of Professionals in Infection Control (APIC), an organization that represents the country's 11,000 infection control practitioners. Plenary talks have been given at APIC's annual meetings and articles on the work of the Beta Sites have been published in the association's journal *Prevention Strategist*. PD has been incorporated into APIC's "Guide to the Elimination of Methicillin-Resistant Staphylococcus Aureus Transmission in Hospital Settings". We have also captured stories about the use of PD in several Beta Sites. These and other resources have been made available on the Plexus Institute and Safe Care Campaign's websites. In December 2008, representatives of all the Beta Sites will share their stories in a Learning Lab session at the Institute for Healthcare Improvements annual forum.

"I've seen more change at Einstein in the last six months than in my 16 year career in infection control."

Jerry Zuckerman, MD, Medical Director of Infection Prevention and Control, Albert Einstein Medical Center