

Letting Go, Gaining Control: Positive Deviance and MRSA Prevention

Curt Lindberg DMan MHA

*Chief Learning and Science Officer
Plexus Institute*

Patricia Norstrand MS RN BC

*Senior Director
Department of Quality, Risk and Safety, Franklin Square Hospital Center*

Mark T Munger EdM CAS

*Senior Associate
The Positive Deviance Initiative*

Christine DeMarsico MS

*Teacher Leader
Asbury Park High School*

Prucia Buscell

*Communications Director
Plexus Institute*

Abstract

Diligent efforts by US hospitals, using traditional quality improvement methods, to turn around rising and epidemic MRSA rates have been distressingly unsuccessful. The article reports on the first significant application by hospitals of Positive Deviance, a novel social and behavioural change process and the results

achieved in MRSA reductions. It will introduce Positive Deviance, review the experience with the process on MRSA prevention in six hospitals, and illuminate the process with stories and reflections from Franklin Square Hospital Center.

Keywords

Positive Deviance, organisational change, social and behavioural change, quality improvement, patient safety, infection prevention, Methicillin-resistant *Staphylococcus aureus* (MRSA), hospital-acquired infections, medication reconciliation.

What plus how

If you do not wish to become a widower “buy a single kreutzer’s worth of Chloride of Lime” and force the doctor and midwife to wash their hands with it (Royal College of Surgeons of Ireland, 2009). So advised Ignaz Semmelwies over 160 years ago when he laid the foundation for infection prevention with his insights on hand washing and isolation. Some years later gowns and gloves were added to the array of infection prevention practices. More recently, active surveillance – testing patients for MRSA upon admission – was added. Yet, today in the United States, compliance with these basic measures remains abysmally low. Adherence with hand hygiene tracks at less than 50% among doctors, and only slightly better among other healthcare workers (Albert, 1981; Doebbeling et al, 1992; Graham, 1990; Jarvis, 1994; Pittet, 2001; Pittet and Boyce, 2001). This is despite diligent efforts

by many healthcare organisations, quality improvement specialists, and infection control practitioners to improve practices and prevent the spread of dangerous pathogens.

Healthcare-associated infections have risen relentlessly since 2000, causing almost 100,000 deaths in the US among the 2.1 million people who acquired infections while hospitalized in 2000 (Peterson et al, 2001). Alarming, 70% of hospital-acquired infections are caused by bacteria that are resistant to commonly used antibiotics (Diekema D J et al, 2000), with Methicillin resistant *Staphylococcus aureus* (MRSA) being the most rapidly proliferating and among the most virulent pathogens. For 2005 the US Centers for Disease Control and Prevention (CDC) estimated that 94,360 patients had invasive MRSA infections and of these patients 18,650 died (Klevens et al, 2007).

Recognising that many quality improvement strategies and educational campaigns have not been effective in changing behaviour of healthcare workers and halting the spread of MRSA, a network of organisations – six hospitals, Plexus Institute, Positive Deviance Initiative, and Centers for Disease Control and Prevention (CDC) – decided to try something different. This led to the first significant application of the social and behavioural change process Positive Deviance in hospitals and the formation of the PD MRSA Prevention Partnership. What distinguished this effort was that it married the ‘what’ of evidence-based infection prevention (hand hygiene before and after every patient encounter, active MRSA surveillance testing on targeted patient populations, contact isolation precautions for all patients known to be infected or colonized, and environmental cleaning) with the ‘how’ of Positive Deviance.

A short history of Positive Deviance

Positive Deviance (PD), as a change process, was first developed in 1990 to address serious health-related issues in the developing world. Its genesis was a daunting challenge posed to Jerry and Monique Sternin: demonstrate measurable improvement in nutrition among poor village children in Vietnam within six months. If this goal was not met the Sternins, then with Save the Children, were told they would be expelled from the country. Fortunately for the Vietnamese children, the Sternins had significant development know-how to draw upon and familiarity with the research method PD (Zeitlin, 2009; Zeitlin, Ghassemi and Mansour, 1990). In the nutrition field, PD was used by researchers to find poor children who were healthier than their peers and identify the behaviours and practices that generated this improved nutritional outcome. It occurred to the Sternins that if they could transform this research method into a social change process they might be able to meet their challenge. Drawing upon their experience in working on other difficult development issues, they recognised expertise from the community must be tapped and change must originate and be directed by the community.

With these principles in mind, the Sternins trained villagers to uncover families who, despite their impoverished circumstances, were raising well-nourished children. Once these discoveries were made, they sought out – again with guidance from the Sternins – what enabled these families to achieve these unusually successful outcomes. Feeding their children more frequently and adding fresh

water shrimp, crabs and the sweet potato greens to the traditional rice diet were among the successful practices. The typical village diet consisted of rice alone. From their experience, the Sternins knew that simply educating the villagers about these discoveries was unlikely to result in the needed changes. Instead, they helped villagers design a process that gave them opportunities to practice these new behaviours. Family members were invited to gather the new foodstuffs every day and join in feeding their children in the homes of the positive deviant families, using the newly found PD strategies. Over the course of six months, more than 60% of the malnourished children gained weight; after 24 months, 85% were adequately nourished (Sternin, Sternin and Marsh, 1997). A follow-up study conducted by Rollins School of Public Health at Emory University showed the next generation of children in the targeted villages were well nourished (Mackintosh, Marsh, and Schroeder, 2002). The community had discovered hidden solutions, made them visible, and adapted the new behaviour through repeated practice. And this community-driven change was sustained.

The four basic steps in the PD process emerged from this first application (Bertels, 2003; Sternin, 2003):

Define the problem and establish a measurable outcome goal.

Determine if there are certain people or groups, positive deviants, who are achieving better outcomes than is the norm.

Discover the behaviours and strategies that enable the positive deviants to achieve the better outcomes. These are labeled PD practices.

Design a process for people to practice PD practices and behaviours.

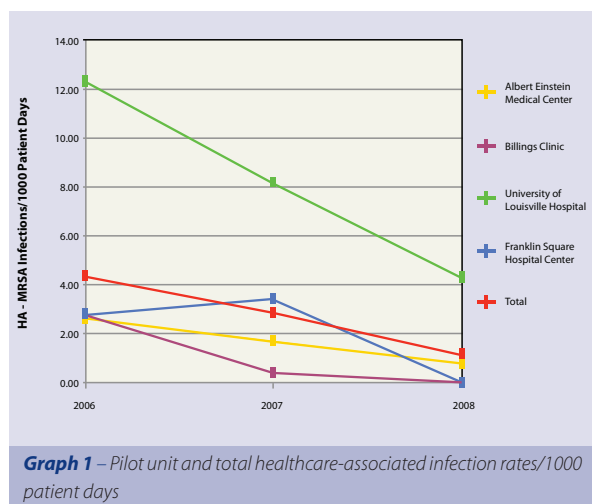
Now we have a change process that assumes communities usually have individuals or groups (positive deviants) whose practices or strategies enable them to achieve better outcomes than their peers with the same resources. The PD process helps a community identify and diffuse these uncommon and effective practices. It is grounded in the belief that solutions to challenging problems are best generated by those with intimate knowledge of the practices and norms of the community, and whose everyday actions affect the problem. Citizens in a community must be offered the opportunity to embrace ownership of the process and shape plans informed by the four steps. Pascale and Sternin called this making “the group the guru” (Pascale, R and Sternin, 2005). Before its introduction into healthcare, PD was used in

many countries to address childhood malnutrition. It was also used to address such challenging health-related issues as female genital cutting, safe sex among commercial sex workers, and retention of impoverished students in rural schools (Marsh et al, 2004; United Nations University Press, 2002).

Results from PD pioneers in healthcare

The potential value of PD in US healthcare was first recognised by a group of physicians, healthcare executives, nurses, and quality improvement leaders who learned of PD at a workshop on complexity science and quality organised by Plexus Institute and Harvard University Interfaculty Program for Health Systems Improvement. Conversations among participants led to projects on medication reconciliation and MRSA prevention, the first known uses of Positive Deviance by hospitals. These leaders intuitively understood the observation by Macklis that complex patient safety problems are a result of organisational culture, traditions, and processes created by the staff and, thus, best addressed by staff (Macklis, 2001).

Outcomes from these initial healthcare applications have been successful and encouraging. Waterbury Hospital, Waterbury, Connecticut, achieved a 66% improvement in medication reconciliation – adherence to medication regimes by patients following hospitalization – generated by consistent use of a previously underutilized medication communication procedure (Cusano et al, 2006). These improvements have been sustained for four years since the completion of the PD cycle with no further intervention (Cusano, 2009). Impressive gains were also achieved by hospitals employing PD to prevent MRSA infections. Aggregate data from four hospitals reporting

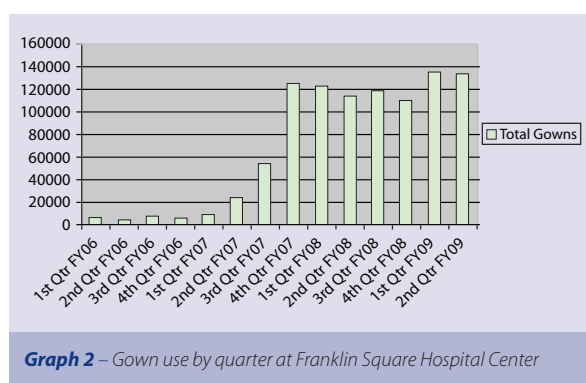


Graph 1 – Pilot unit and total healthcare-associated infection rates/1000 patient days

data for intensive care PD pilot units documented a drop in hospital-acquired MRSA infections of 73% over three years.

While the PD process began in these pilot units, participation in the process spread to other units and departments. This led to hospital-wide reductions in MRSA infections from 33% to 84% (Lindberg and Lloyd, 2008). Electronic laboratory data from three hospitals analyzed by CDC documented a “significant intervention associated reduction in incidence density (a surrogate measure for transmissions developed by the CDC) which ranged from 26% to 62% and a decline in the proportion of *Staphylococcus aureus* infections caused by methicillin-resistant bacteria” (Ellingson et al, 2009). These outcomes were rooted in changes in healthcare worker behaviour. Statistics reported by partnership hospitals to the CDC’s National Healthcare Safety Network (NHSN) for medical-surgical intensive care pilot units showed adherence to proper gown and glove use by staff increased from 68% to 94%, an improvement of 39%, and proper hand hygiene precautions upon entry to patient rooms rose 95%, from 41% to 80% (Lindberg and Lloyd, 2008).

Hospitals also tracked use of gowns, gloves and hand sanitizer gel as indicators of change in infection prevention practices by staff. Notable improvements were documented. At Franklin Square Hospital Center, the use of gowns increased from a baseline of 9600 gowns per quarter to 125,000 per quarter following the implementation of PD.



Graph 2 – Gown use by quarter at Franklin Square Hospital Center

The emergent process in hospitals

Because PD had not been used before in hospitals, it was not clear at the beginning of the application process how it would unfold. What emerged, a creation of the hospitals and the PD consultants associated with the initiative, involved four phases.

- Getting started
- Engaging the organisation
- Fueling change
- Making sense and diffusing

These phases and the hospital experience with PD will be illuminated through the stories from one member of the PD MRSA Prevention Partnership, Franklin Square Hospital Center. The facility, located in Baltimore, Maryland, operates 380 beds, is a member of an eight hospital system called MedStar Health, has 600 physicians on its medical staff, and employs 3200 healthcare professionals.

In the Getting started phase senior leaders, infection control and quality improvement staff, and several front line staff members learned about the PD process at an orientation session sponsored by Plexus Institute. Because they recognised previous efforts to prevent MRSA infections had yielded only temporary improvement and PD seemed to give new emphasis to wide-spread staff engagement, they thought this new process might generate lasting improvement in infection prevention. This possibility, along with encouragement from colleagues, led to the decision to adopt PD to advance the hospital's MRSA prevention work and embrace the PD MRSA Prevention Partnership's goal of a 75% reduction in hospital-acquired MRSA infections in PD pilot units. To begin they formed a small co-ordinating group that built interest in the organisation and made plans for a hospital-wide kick-off meeting.

The Engaging the organisation phase began with a kick-off meeting in August 2006 attended by over 250 staff. Attendees learned about Positive Deviance, the epidemiology of MRSA and its devastating impact on patients, and the science of infection prevention. They also discovered how they could contribute to the institution's drive to eliminate hospital-acquired infections. The session opened and closed with stories from people who were harmed by MRSA. Closing remarks were offered by Carl Schindelar, Franklin Square President. He issued a "call to action" and invited everyone who wanted to join the hospital's MRSA elimination effort to attend a planning meeting the next day.

To the surprise of the organisers, over 60 staff members – nurses, chaplains, patient transporters, environmental service workers, laboratory technicians, and physicians – came and volunteered to help. They raised a number of important questions: how do we know which patients are colonized with MRSA; how should we address the need

for patient and staff education; what data do we need to guide the initiative; and what strategies should we employ to engage hundreds of people in acting to prevent MRSA transmissions. They then decided how to begin addressing these issues. This manner of starting a quality improvement effort is different than the approach taken by many hospitals. Typically, a small group of experts and informal leaders would be appointed to a committee by senior leaders.

Fueling change was the third and most important phase. This is when the front-line staff got actively involved in identifying positive deviant behaviours and strategies, and generating new positive deviant practices. They also identified system barriers to good infection prevention practice, brought other staff members on board and – the critically essential step of taking action – diffused PD practices and adopted ideas from colleagues. Senior leaders, quality improvement staff and infection control experts were encouraged to deal with system barriers raised by front-line staff and facilitate staff engagement. Genuine engagement required leaders and staff who could relinquish their roles as experts and problem solvers and take on the role of catalysts, conveners, and facilitators. Switching from the traditional roles proved a challenge. Mary Beth Their, ICU nurse educator at Franklin Square observed, "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."

The primary vehicle created by the hospitals and the PD consultants for engaging front line staff was the Discovery and Action Dialogue (DAD). These dialogues were small group conversations facilitated by trained staff. They were relatively short and often impromptu sessions convened at staff convenience. They were created in response to one of the common difficulties in hospitals – gathering front line staff for frequent scheduled meetings given the fast pace and unpredictable nature of work in busy hospitals. DAD facilitators used the following questions to spur creative conversations:

1. How do you know if your patient is MRSA positive?
2. In your own practices, what do you do to prevent MRSA transmissions – to yourself or patients or other providers?
3. What stops you from doing these things all the time?
4. Is there anyone who has a way of doing things that helps them overcome these barriers?
5. Do you have any ideas about what to do next?

6. What can we do now – any volunteers?
7. Who else needs to be involved?

One can see the relationship to key PD steps and principles in these questions. For example, discussion of the questions led to identification of positive deviants and their practices (what do you do, is there anyone), creation of new practices (any ideas), and ownership of the process (who else). After repeated group sessions, participants trained themselves to ask the questions and have data ready to discuss. Individual units also created their own scoreboards to measure progress and motivate more improvement. These short meetings became a useful habit and inspired staff to have more work-related conversations and get things done quickly.

The PD process and DADs directly and indirectly reached hundreds of Franklin Square professionals, the very people whose actions and interactions with patients affect the transmission of MRSA and create the institutional norms for infection prevention. Intensive care unit staff noted the reason they were taking their own stethoscopes into isolation rooms even though they were potential vectors for transmission. Equipment supplied by the hospital for use with individual patients in isolation was of inferior quality. With help from the purchasing department, a comparably priced stethoscope was found to be of far superior quality. Use of the hospital-supplied stethoscopes rose from six to 88 per month.

During a DAD in the critical care step-down unit, the nurse educator reported data that showed compliance with active surveillance testing at discharge was not satisfactory. One of the participants, unit secretary Lauren Perkins, volunteered that when she gives a nurse the discharge paperwork to be completed she also hands out a culture swab. She then checks to make sure the culture has been obtained before giving the chart to the patient transporter. This PD practice has now been adopted unit-wide.

Franklin Square discovered increased staff participation in infection prevention and new connections among staff members in different departments and professional roles. All hospitals in the Prevention Partnership had similar experiences. This is evident in two social network maps from VA Pittsburgh Healthcare System. Staff on four units were asked, "With whom did you work on MRSA reduction before and after the initiation of the PD process"?

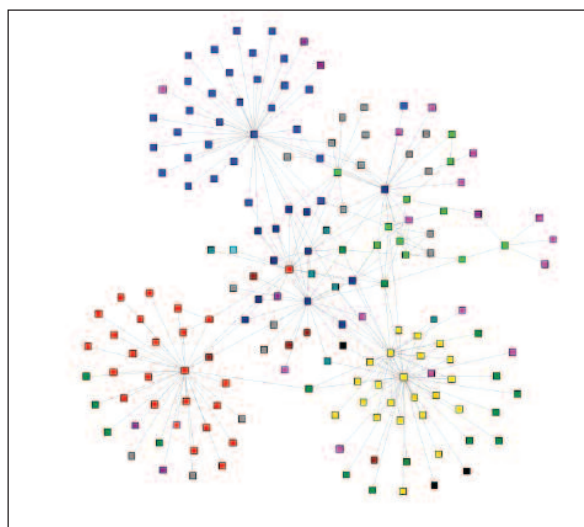


Illustration 1 – Network of MRSA prevention relationships in July 2005

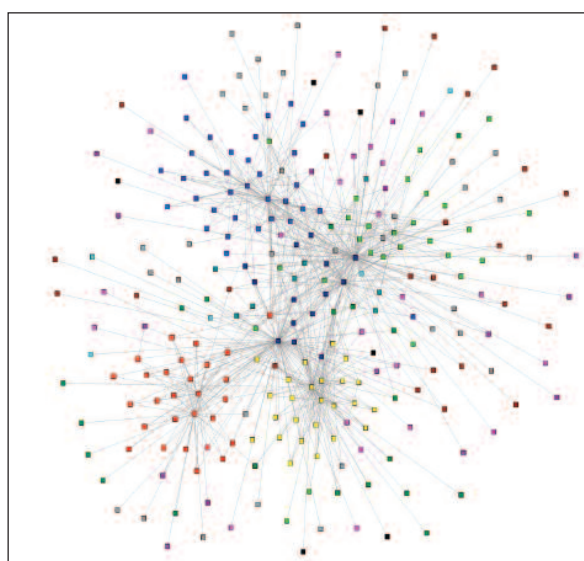


Illustration 2 – Network of MRSA prevention relationships in June 2007

Staff came to see that expertise was more widely distributed than commonly realised. At one facility, an environmental services worker recognised for his dedication and expertise in eliminating infection was asked to facilitate a meeting on MRSA prevention attended by the hospital medical director, chief of infectious diseases, chief nursing officer, and nursing unit staff.

The focus of the [Making Sense and Diffusing Phase](#) was on deriving insights from the PD experience, using experience to plan next steps, expanding the effort to other parts of the hospital, and exploring how lessons learned could be tapped to address other quality and patient safety issues.

These phases unfolded over the course of about 18 months in each of the hospitals. It is our expectation that

given experience gained in the implementation process, this period could be shortened.

Hospitals were assisted by PD coaches skilled in organisational development and mentored by the Sternins. This assistance was provided during several onsite visits, regular conference calls and online exchanges. Considerable learning came from regular interactions among teams from the hospitals. These interactions took the forms of biannual face-to-face meetings, biweekly conference calls, online conversations, and multiple individual communications and collaborations.

This support helped everyone cope with what was commonly called a 'messy' process, with new plans and directions emerging constantly.

Much of the individual and group learning came from making sense of new and evolving information. While obvious attention was paid to evidence-based practices and procedures, units created their own particular paths to innovation. There was constant cycling back and forth among the steps associated with Positive Deviance. Adjustments were made to the process by the staff to accommodate the culture of the hospitals and various units, as new plans were generated by an ever-increasing number of staff, and as lessons were learned. Gradually those facilitating the process came to view the 'mess' and uncertainty as a natural and healthy result of staff engagement. They became more and more comfortable with the emergent nature of the process, one being constantly shaped by the owners of the process, the staff.

And, in what emerged as a surprise, the roles of infection control professionals began to change from enforcers to collaborators. Instead of being apprehensive about infection control 'inspections' departmental and unit staff began to seek help from their colleagues and responsibility for infection prevention broadened. The movement from control to collaboration took on a healthy momentum of its own.

Conclusion

The experience of the six hospitals in the Prevention Partnership demonstrated Positive Deviance can be an effective strategy for tackling complex patient safety and quality challenges that depend on social and behavioural change. The process effectively engaged entire staffs in

uncovering practices that were preventing infections, spreading these practices, and creating new ones; effectively translating evidence-based infection control measures into action. Barriers to infection prevention were removed. The process helped create a culture of strong infection prevention illustrated by this final story from Franklin Square.

Carl Schindelar, President, stopped by a patient room to see a friend. Being in a hurry, he did not notice the isolation sign and walked into the room. A few minutes later he was approached by a staff member who quietly reminded him to put on an isolation gown. At first, he was upset with himself for missing the isolation sign, but he soon felt pride that a member of his staff would point out his mistake. He came to appreciate the encounter as a marker of the organisation's progress and the extent of staff ownership of infection prevention. This incident also uncovered the need to improve isolation signage, a process now being led by the staff with assistance from infection control staff.

Ignaz Semmelweis was way ahead of his time. He persisted in his views on poor hygiene as a cause of infection even though his insights about hand washing and isolations were controversial and ridiculed by many mid-nineteenth century colleagues. If he were alive today, he might well realise that 160 years of 'force' directives and campaigns have not gotten healthcare workers to wash their hands consistently. He might even look to behavioural change processes such as Positive Deviance and agree that "nothing else has worked, and this [PD] is the most fascinating idea" anyone has had in a century to solve the problem (Gawande, A, 2007, p 27).

"Somewhere in your organization, groups of people are already doing things better. To create lasting change, find these areas of Positive Deviance and fan their flames" (Pascale, R and Sternin, 2005).

Notes

- Hospital members of the PD MRSA Prevention Partnership: Albert Einstein Medical Center, Philadelphia, PA; Billings Clinic, Billings, MT; Franklin Square Hospital Center, Baltimore, MD; The Johns Hopkins Hospital, Baltimore, MD; University of Louisville Hospital, Louisville, KY; VA Pittsburgh Healthcare System, Pittsburgh, PA.

- Resources on Positive Deviance and MRSA prevention can be found on the websites of Plexus Institute (www.plexusinstitute.org under Complexity in Action themes of Positive Deviance and Positive Deviance and MRSA) and Positive Deviance Initiative (www.positivedeviance.org).

References

Albert, R, (1981) 'Hand-washing patterns in medical intensive-care units', *New England Journal of Medicine*, **24**, 1465-1455.

Bertels, T, (2003) *Rath & Strong's six sigma leadership handbook*, Wiley.

Cusano, A, (2009) Update on positive deviance guided medication reconciliation initiative at Waterbury Hospital. 5-6-0009, Personal Communication.

Cusano, A, Sturdevant, B, Milfort, M, Sternin, J, Sternin, M, Rezak, A, Kenkare, J, Baran, K, Windish, D, Blackburn, T, Potrepka, V, and Lindberg, C, (2006) 'Positive deviance: a new process for improving professional performance for quality and safety in health care setting', Unpublished Work.

Diekema, D J, Pfaller, M A, Turnidge, J, et al, (2000) 'Genetic relatedness of multidrug-resistant, methicillin-resistant *Staphylococcus aureus* bloodstream isolates', *Epidemiology and Disease*, **6**.

Doebbeling, B, Stanley, G, Sheetz, C, Pfaller, M, Houston, L, and Ning, L W R, (1992) Comparative efficacy of alternative hand-washing agents in reducing nosocomial infections in intensive care units', *New England Journal of Medicine*, **327**, 88-93.

Ellingson, K, Iversen, N, Zuckerman, J, Borton, D, Goss, L, Lloyd, K, Chang, P, Stelling, J, Kallen, A, Sternin, M., Lindberg, C, Lloyd, J, and Toth, M, (2009) *A successful multi-center intervention to prevent transmission of methicillin-resistant Staphylococcus aureus (MRSA)*, Society for Healthcare Epidemiology of America.

Gawande, A, (2007) *Better: a surgeon's notes on performance*, Henry Holt & Company.

Graham, M, (1990) 'Frequency and duration of handwashing in intensive care units', *American Journal of Infection Control*, **18**, 77-80.

Jarvis, W, (1994) 'Handwashing - the Semmelweis lesson forgotten', *Lancet*, **344**, 1311-1312.

Klevens, R, Morrison, M, Nadle, J, Petit, S, Gershman, K, Ray, S, Harrison, L, Lynfield, R, Dumyati, G, Townes, J, Craig, A, Zell, E, Fosheim, G, McDougal, L, Carey, R, and Fridkin, S, (2007) 'Invasive Methicillin-resistant *Staphylococcus aureus* infections in the United States', *Journal of the American Medical Association*, **298**, 15, 1763-1771.

Lindberg, C, and Lloyd, J (2008) 'RWJF final report on PD MRSA Prevention Partnership', 30 April 2009, Unpublished Work.

Mackintosh, U, Marsh, D, and Schroeder, D, (2002) 'Sustained positive deviant child care practices and their effects on child growth in Viet Nam', *Food and Nutrition Bulletin*, **23**, 4, 16-25.

Macklis, R, (2001), 'Successful patient safety initiatives: driven from within', *Group Practice Journal*.

Marsh, D, Schroeder, D, Sternin, J, and Sternin, M, (2004) 'The power of positive deviance', *British Medical Journal*, **329**, 13, 1177-1179.

Pascale, R, and Sternin, J, (2005) 'Your company's secret change agents', *Harvard Business Review*.

Peterson et al, (2001) 'New technology for detecting multi-resistant pathogens in the clinical microbiology laboratory', *Emerging Infectious Diseases*, **7**, 2.

Pittet, D, (2001) 'Improving adherence to hand hygiene practice: a multidisciplinary approach', *Emerging Infectious Diseases*, **7**, 2, 234-244.

Pittet, D and Boyce, J, (2001) 'Hand hygiene and patient care: pursuing the Semmelweis legacy', *The Lancet Infectious Diseases*, p 9-20.

Royal College of Surgeons of Ireland, (2009) 'Infection and germ therapy' Royal College of Surgeons in Ireland website, www.rcsi.ie. Accessed 19 May 2009.

Sternin, J, (2003) 'Practice positive deviance for extraordinary social and organizational change', in *The change champion's fieldguide*, Ulrich, D et al, (eds), Best Practice Publications.

Sternin, M, Sternin, J, and Marsh, D, (1997) 'Rapid, sustained childhood malnutrition alleviation through a positive

deviance approach in rural Vietnam: preliminary findings', in *The Hearth nutrition model: applications in Haiti, Vietnam, and Bangladesh*, Wollinka, O, et al, (eds), BASICS.

United Nations University Press. (2002) *Food and Nutrition Bulletin*, **23**,4.

Zeitlin, M, (2009) 'Nutritional resilience in a hostile environment: positive deviance in child nutrition', *Nutrition Reviews*, **49**, 2, 259-268.

Zeitlin, M, Ghassemi, H, and Mansour, M, (1990) *Positive deviance in child nutrition - with emphasis on psychosocial and behavioral aspects and implications for development* United Nations University Press.

Corresponding Author

Curt Lindberg
Plexus Institute
101 Farnsworth Avenue
Bordentown, NJ 08505
609-298-2140
Email: Curt@PlexusInstitute.org

