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A How-To Guide for Improvement for the AHA/HRET HEN Partnership for Patients

IMPLEMENTATION GUIDE Part II

Advanced Topics

American Hospital Association

HRET
HEALTH RESEARCH & EDUCATIONAL TRUST
In Partnership with AHA

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The AHA/HRET HEN would like to acknowledge our partner, Cynosure Health, for their work in developing the Implementation Guides Part I and Part II.

Introduction

Earlier this year, we released the *Implementation Guide, Part I*, a how-to improvement guide for AHA/HRET HEN hospitals in their quest to improve care for patients. We are now pleased to share Part II of the *Implementation Guide* that has been designed to offer supplemental tools for improving quality and accelerating success.

We are confident that as one of the roughly 1,500 participating hospitals, you remain steadfast in your pursuit of the Partnership for Patients goals of reducing harm by 40 percent and readmissions by 20 percent and we want to help you in recognizing those goals. This guide includes advanced tools and a framework to guide your improvement work that focuses on the implementation of evidence-based approaches and the elimination of barriers to improving quality.

We are proud of the progress that has been made to date, translating into significant cost savings but more importantly preventing harm to more than 160,000 patients. Building on that success, it is imperative that we strengthen the infrastructure for sustainability. True change takes time so we must be vigilant in enhancing peer-to-peer networking opportunities, working collaboratively to be more productive and spreading best practices within you facility, among your health system and with other providers.

High reliability organizations must be committed to a long-term journey of continuous improvement at all levels and must embed quality as a top priority and guiding principle in all activities. We hope the advance tools included in this guide will be helpful in your quality journey and we encourage you to continue identifying opportunities to improve the safety and care provided to the patients you serve.

Maulik Joshi, Dr.P.H.
Senior Vice President Research, AHA
President, HRET

Charisse Coulombe, MS, MBA, CPHQ
Vice President, Clinical Quality
HRET

PERFORMANCE IMPROVEMENT

Part I of the *Implementation Guide* summarized the history and foundation of performance improvement and the various key factors leading up to the current focus on quality improvement in health care. The Guide presents the important background, mission, and goals of quality improvement, and provides readers with the basic principles and knowledge necessary to develop, launch, and lead performance improvement efforts in the health care setting.

Part II of the *Implementation Guide* is intended to provide readers with additional knowledge and advanced tools that will promote the success and sustainability of a health care institution's quality improvement initiatives.

Collaborative Work, Peer-to-Peer Learning

It takes an average of 17 years for new evidence-based findings to reach clinical practice. (Balas EA, 2000) Medical errors are responsible for the deaths of approximately 100,000 people every year in hospitals (Institute of Medicine, 2000). To reduce the number of preventable tragedies, front-line health professionals delivering health care must become better connected with the research community be able to understand, adopt, and adapt evidence-based best practices into everyday practice.

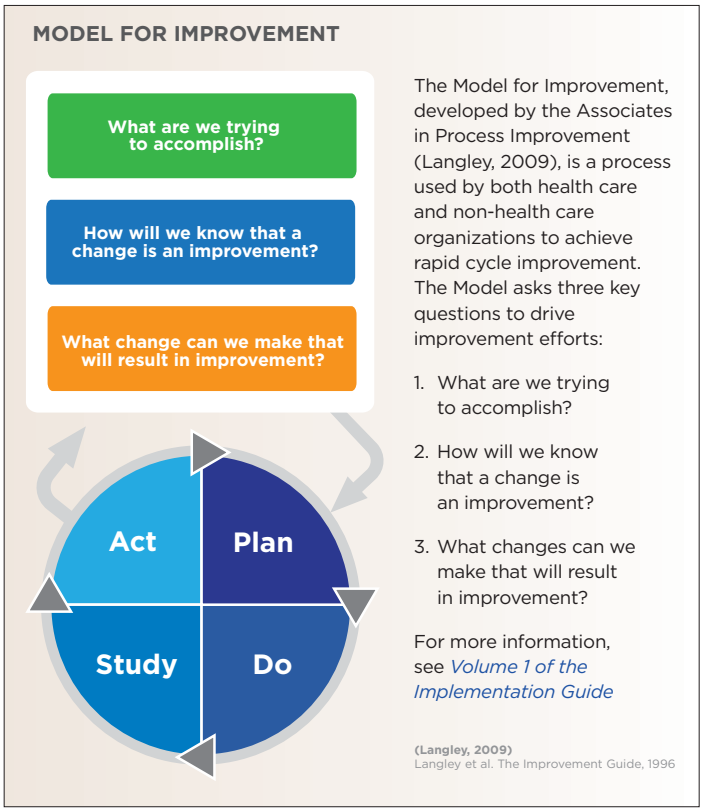
In 1995, the Institute for Healthcare Improvement (IHI) conceptualized the idea of collaborative peer-to-peer learning sessions as a way to accelerate performance improvement in health services (Institute for Healthcare Improvement, 2003). Learning from and with colleagues and peers was identified as a proven way to foster rapid improvement. The resulting Improvement Collaboratives became an innovative method to engage multiple organizations, who might otherwise be competitors, in working together towards the same goal of performance improvement in health care. Hospitals may continue to compete on the business side, but quality of care and patient safety have become a shared mission and model for all health care organizations today.

An Improvement Collaborative based on the IHI model combines subject matter experts in specific clinical areas with key contacts in the organizations working together to improve outcomes in specific topic areas. For example, several hospitals may join together to work on reducing mortality rates from severe sepsis in their organizations. The subject matter expert (SME) selected may be a nationally-known physician who has led research on sepsis treatment bundles. The key contacts in this example may be frontline nurses, physicians, nurse leaders, quality department staff, or other clinical staff involved in the care of sepsis patients. It is important that the key contacts be able to understand the chosen issues and topics and to effect change at the appropriate levels in their organizations.

After subject matter experts and key contacts have been identified, an initial learning session is held at which the topic's subject matter experts can present the most recent evidence-based information about ideal care, best practices, and successful methods for improvement, such as care bundles. Improvement Advisors, experts in the improvement and implementation processes, also present information about improvement methodology so the key contacts and other team members from each hospital will have a framework from which they can implement and test the recommendations provided in the session. The Model for Improvement (see sidebar) is one example of improvement methodology that could be used as a framework for improvement initiatives. Following the initial learning session, teams are encouraged to implement and test what they have learned in small trials at their hospitals while collecting data to measure the impact of the changes. If the tested changes achieve the designated positive outcomes, the implementation can be disseminated to additional hospital units.

Subsequent training sessions focus less on lectures from subject matter experts, and more on collaboration among team members to share what they have learned in the initial tests at their organizations. This sharing is facilitated via short project descriptions called storyboards, panel presentations, and informal dialogue among the participants. Hearing about successes, failures, and lessons learned from peers working towards the same objectives builds synergy and promotes success. This is known as the "How To, How To" of collaboration, i.e. the practical knowledge-sharing among peers of exactly how an organization implemented an idea that led to a good outcome. As teams continue to test and implement changes within their organizations, Peer Mentors will emerge within the collaboration. Peer Mentors are those individuals and teams that have successfully achieved good outcomes in the topic areas, and are willing and able to teach others how to do the same.

Peer-to-peer collaborations can take place on very large or very small scales. The 100,000 Lives Campaign and the Partnership for Patients Hospital Engagement Networks are two examples of very large-scale peer-to-peer learning collaboratives. There are many



more examples of smaller-scale collaboratives across the nation which involve a few hospitals within one city, region or state that have successfully impacted patient outcomes. Sharing of ideas, innovations, and best practices among peers is vital to promoting and achieving improvement, and the collaborative model of peer-to-peer learning is a successful method of improving outcomes.

FACILITATING SUCCESSFULLY

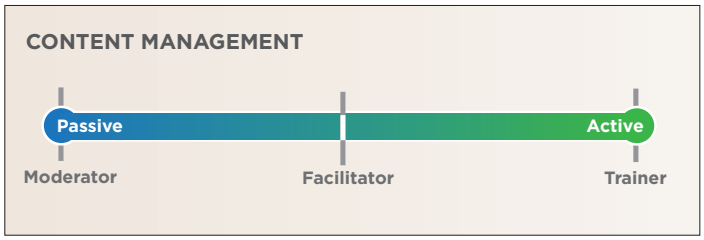
Facilitation means making a process easier, helping something move forward, and breaking through barriers. The facilitator's role is to make it easier for individuals and improvement teams of all sizes to accomplish their designated goals. Some processes or projects may not need facilitators if the expertise and capacity exist to build momentum and keep progress on track at a rapid rate. If a group or process is stuck or is only making halting progress, however, an effective facilitator can have a huge positive impact. Facilitation is analogous to the adage, "the right tool for the right job." When to engage a facilitator, or be one, depends on the "right" situation.

When thinking about enlisting a facilitator, ask these crucial questions:

- Does the activity or project I'm planning to facilitate need help? If so, what specifically are the obstacles, challenges, or issues of concern? What are the potential opportunities?
- Are common goals in place, or do they need to be developed?
- What are the interpersonal, organizational, and other dynamics of the group, internally and externally? In other words, what is the "context" in which the activity is taking place? For example, is there a major controversy associated with it? Was someone just terminated? Is there a labor action threat? Has there been bad press as a result?

One way to discover the secrets of successful facilitation is to ask "who are the effective facilitators?" What did they specifically do that was helpful? How did they make it look so easy? What would have happened had they not been involved? Why?

Facilitating is different than moderating or training. Moderating is analogous to the role and activities of a traffic officer: introductions, timing, handoffs, transitions, and closure. A moderator "presides" over an activity, keeps the work moving from a logistical/operational standpoint, and is usually not meaningfully involved in content development. Training implies that an individual or team have knowledge, information, or skills that they will teach or pass on to others; trainees will be supported in achieving specific skills or learning outcomes. The three roles can be identified on a spectrum of content management from passive to active:



Of course, the content management diagram above does not instruct moderators to be passive, but identifies their roles as primarily to promote team operation without providing significant input for content development. Trainers, on the other hand, frequently provide almost all of the content in their sessions. A facilitator serves both functions, i.e. coordinating and directing the agenda and discussions, while encouraging participants to be actively contributing and engaged. A good facilitator walks a tightrope that echoes the tale of Goldilocks and the Three Bears' porridge – to guide just enough without guiding too much.

A Quality Improvement leader may need to facilitate in a variety of ways, depending on the phase of a project and the composition of and functional stage of the quality improvement team. Tasks may include coordinating question and answer sessions and discussions, providing or suggesting references and resources, and bringing a group of colleagues to a consensus.

Principles for Effective Facilitation

Because facilitation opportunities exist in multiple settings, there are no "rules" that can be applied to all groups or all sessions. In some cases, introducing new ideas based on the experiences of colleagues can encourage hesitant group members to participate. In other cases, the group as a whole needs to agree on procedures and decisions that can help accomplish common goals. However, a few helpful principles have been identified that can support effective facilitation.

Facilitation for Teaching

Principle #1 – *The best solutions are those that come from the participants.*

Growing solutions

One purpose of facilitation is to help others adopt new ideas, perspectives, and practices or actions. Participants are much more likely to accept an idea, answer, or solution if it originates from them and not from the facilitator. Before offering a solution yourself as a facilitator, promote discussion and exploration of a topic among the group so that a solution can "emerge" from the participants. But, it never hurts to have a few possible solutions "up your sleeve," to seed into the conversation in case the group gets stuck.

- **Danger #1 –** The too-wise-by-half facilitator. The best words a facilitator can use to respond to a question from the audience are "Does anyone have an answer to the issue?"– even if you have the best answer. You may have to redirect the group if, based on your understanding of the problem and experience, a solution from someone in the audience is completely unworkable, but first encourage the audience to come up with workable ideas, or to offer constructive reasons why the solution may not be viable at this time.

Principle #2 – *More participation is better than less participation.*

Now we're talking

If people contribute, or feel like they have contributed, to a discussion, they are more likely to 1) feel good about their participation and, 2) listen better to others. But, some individuals need assistance to speak up. "Breakout sessions" may help by decreasing the size of the "audience" and increasing the comfort level of quieter participants. Another option is to go around the table and ask for input from each participant on the topic of discussion. Finally, it's important to guide participants in the etiquette of contributing, which includes avoiding negative comments and non-constructive criticism, and maintaining a professional demeanor in the sessions.

- **Danger #2 –** "Experts" in the group. You may have experts, or at least very experienced participants, in your group. Encourage them to contribute, but limit their domination of the conversation. There is a fine line between informing others based on experience and expertise, and intimidating them if one's skills or knowledge are more developed. Keep everyone talking, even novice participants.

Principle #3 – *A more concrete solution is always better than ambiguous ones.*

Tension expected

It's far easier to agree on lofty, well-meaning ideas in concept, than to agree on the methods or details of their implementation. Usually, early agreement (or, at least, head nodding) occurs when a topic is ambiguous since differences of perspective may be less obvious. But, new ideas, practices, processes, and solutions need to be concrete before they can be adopted and implemented. The more specific the discussions become, the more likely that they'll engender controversy or disagreement. However, these conflicts can often highlight and clarify issues which need to be addressed and resolved before implementation. Guided and courteous disagreements can move a team closer to a functional solution.

- **Danger #3 –** Overly happy participants. Participants can believe that the group has come to an agreement on a decision or action. But if the procedures or processes are vague, or open to variable interpretation, challenges may appear during implementation that may undermine the process or trigger a backlash.

Principle #4 – *Drawing on and utilizing the diversity of the group will yield more sustainable/actionable solutions.*

I'm OK, You're OK

One of the most challenging tasks for a facilitator is to bring together the diverse perspectives, skills, and experiences of the group. But these diverse perspectives can be very valuable in contributing to an effective solution to a problem. Helping the group to identify and explore the similarities and dissimilarities of ideas under discussion can lead to a consensus about what is needed for quality improvement. An example is the medication delivery system from the perspectives of the front line nurse and the pharmacists. They both have a version of the truth and getting those versions on the table helps to reduce the blame-game. Acknowledging the diversity of needs and expectations can also help groups and organizations choose which elements of a QI initiative are appropriate to adopt or implement for their institution.

- **Danger #4 –** Assuming one-size fits all-that one solution or approach meets the needs of a diverse group, or that one perspective is accepted without input from others.

Facilitating for Consensus

Principle #5 – *A better solution that takes longer to develop is more desirable than a weaker solution quickly obtained.*

Slow is fast

The social process of "norming" or coming to consensus often requires individuals to let go of some beliefs and attitudes, adopt new beliefs or attitudes, and internalize and maintain those new opinions or perspectives. Depending on the issue, this process can take time, especially if the beliefs and attitudes needed for successful change are markedly different among the participants. Allowing consensus to evolve over time can promote long-term buy-in.

- **Danger #5 –** Celebrating victory too soon. Consensus may build over several sessions as individuals adapt to evolving realities. But, some people adapt more quickly than others. A classic facilitation mistake is to claim success before crucial, thought-leading participants have been enlisted. When they learn of a group decision, process, or solution, they may undermine it or reject it. Calling an idea a "provisional or draft solution" can allow critical individuals the opportunity to consider it, test drive it, and/or become more comfortable with it before finalization.

Principle #6 – *Tackle the easiest issues first.*

Success begets success

As with the small Tests of Change when trying to promote a consensus, a facilitator can build momentum from small victories. Finding areas of agreement among a group's participants builds team bonding, and makes members more willing to strive for agreement on issues down the road for which the distances between perspectives may be greater or the stakes may be higher.

- **Danger #6 –** Starting with the "elephant in the room." Participants are often anxious to get major controversies on the table because they feel strongly about these issues. But, if the controversial topic emerges before the team has learned to work together, major conflicts may arise. Ask the group to shelve "the elephant" until some of the other, less controversial issues have been worked out. Then, if necessary, "the elephant" can be discussed after the group has achieved consensus on the other issues.

Principle #7 – *Repeating, reframing and simplifying an issue.*

I never thought of it that way

One of the best services a facilitator can provide is to restate a proposed idea in a new way that more people can understand and accept. This usually means simplifying the statement or topic without oversimplifying it. Get in the habit of taking the key ideas or points made by participants and coalescing and summarizing them build consensus. It's also a good idea to ask the audience if you have summarizing their points accurately so that you can correct misinterpretations – yours and theirs. Reframing an issue can make it more palatable and can open the door for compromise. In fact, reframing is, in essence, diplomacy – a way to help everyone get "on the same page," and find common ground.

- **Danger #7 –** Participants who ramble on or have an axe to grind. Interrupting may be uncomfortable, but it is a skill a good facilitator needs to employ occasionally in order to maintain momentum or re-focus discussion back onto important topics. Participants may wittingly or un-wittingly direct a conversation down an unproductive path. Keep in mind, however, that an "unproductive path" may sometimes be the necessary side street that can unlock compromise. Give the participants enough leash to explore the side streets, but not so much freedom that they wander aimlessly.

Tips for Facilitation:

Preparation

- Understand your audience – learn as much as possible about the background, expertise, diversity, hopes, desires, and past failures and successes of your team members.
- Create an agenda and framework, but not a rigid plan, for each session.
- Determine meeting goals and teaching points in advance.
- Anticipate as many challenges/controversies as you can.
- Develop and prioritize at least ten stimulating questions for every 30 minutes of allotted discussion time, even though you may only have time to get to a few.
- Have suggested proposals/ideas/answers ready, but don't use them unless you have to.

During the Session

- Set the ground rules and meeting etiquette.
- Break ice or not? Your choice.
- Do you need a scribe?
- Walk among the audience as you facilitate – to create engagement.

- Drill down on each topic from the general to the specific.
- Ask others how they implement a process; don't assume that everyone works identically.
- Park the "elephants" in the "parking lot," i.e. hold certain ideas until the right time to introduce them.
- Stay flexible as a meeting coordinator – emerging ideas may be the best, and/or may trigger new thoughts, receptivity, or willingness to compromise.

General Tips

- Disagreement is expected, conflict is managed, and disrespect is not tolerated.
- Most people are in the group because they welcome new ideas, solutions, and support.
- A few people may attend meetings, because they want attention. Their contributions may not be constructive.
- The more fun the group has, the more they will open up – the environment has to feel safe.
- Maintaining a brisk pace in discussions and agenda items holds participants' attention more effectively and improves productivity.
- Always end on time. Period.

COACHING FOR IMPROVEMENT

All of the necessary tasks to produce and promote quality improvement in an organization enterprise-wide cannot be performed by one individual, even if he or she is a dedicated contemporary quality improvement leader. Therefore, many individuals and teams must be involved in driving health care change. As QI pioneer Paul Batalden notes, "Everyone has two jobs when they come to work: to do their job and to improve it."

When an improvement team is just starting out, struggling, or not able to sustain gains, targeted coaching can help. Coaching differs from facilitation because, when interacting with participants, coaches are trying to introduce issues and processes that may be new, and will be giving supportive training and specific, focused feedback.

However, good coaching provides much more than feedback. Coaching is more intentional and prescriptive than giving simple feedback on performance. Coaching is also more interactive, and includes give-and-take communications wherein the recipient can test ideas and strategies with the coach.

The most important rule of effective coaching is "*Know your team.*" Many of the approaches in this guide depend on a coach having a thorough understanding of the knowledge, capabilities, attitudes, assumptions, strengths, and challenges of the people working on the designated improvement projects. What may be an effective coaching method for one person may not work with another. Adapting your management and communication style, as well as your coaching strategy, from person to person is a fundamental requirement for good coaching. Success may depend on taking the time to meet and work with each individual face-to-face.

Much of the literature on coaching references the sports world, but the concepts may equally apply to other settings such as health care. Executive coaching, a popular method to help people advance in their careers, also bears some similarities to QI coaching, but is missing some of the models, vocabulary, and technical items germane to quality improvement. A hybrid approach that is easy-to-understand and implement in the QI environment is Strategy-Skills-Motivation.

Strategy-Skills-Motivation

This model for coaching breaks down coaching topics into three categories:

- **Strategy –** Having a plan for improvement, or at least a conceptual approach, is crucial for success. The improvement plan identifies the intended targets and the major elements that will drive the ultimate outcome. Strategies evolve as projects/programs progress, and leaders and teams must adapt. Periodically returning to strategy discussions with the people you are coaching is important to maintaining momentum, uncovering obstacles and barriers, and promote flexibility and timely adaptation to the evolving environment, leaders should periodically return to and engage in strategic discussions with their teams.
- **Skills –** What are the strengths and challenges of the individuals you are coaching? Are there gaps in individuals' or the team's capabilities? Is the team functioning well? Do front-line staff understand the basic terminology for improvement and the concepts and plans presented? Can staff measure and analyze the data sufficiently? Developing employee skills requires that leaders understand personnel capabilities. Unfortunately, there are few standardized tests available to help a coach evaluate and assess what skills are present or missing; therefore, personal contact and involvement can assist coaching in getting to know their mentees. Additionally, even if a staff member is capable of performing certain skills, they may not do so on a regular basis. Most employees will emphasize their strengths and minimize their challenges; an effective coach should be able to determine the capabilities and needs of employees, and encourage individual and team skills development.

- **Motivation –** Motivation literature notes the overriding importance of internal motivation as the dominant source of employee dedication. A successful QI leader and coach will be aware of and understand the factors that drive individuals in the workplace. Taking the time to identify specific motivating items for each individual promotes engagement. Unfortunately, addressing and re-addressing only a single motivator can produce waning results over time.

The following table illustrates practical applications of this approach in health care settings:

COACHING CATEGORY	HIGH LEVERAGE CONCEPT	PRACTICAL APPLICATION
Strategy	• What do your data indicate are high opportunity areas for QI initiatives? • What areas of the hospital are struggling or may struggle? • What external influences may be helping/hurting the QI efforts in each area?	• Align all units with the project aim. • Identify the right physician champions. • Target units and populations most likely to succeed early on. • Identify and understand the successful elements of "bright spots." • Share these elements with struggling units.
Skills	• Engage front-line staff • Develop "change muscles" in employees. • Grow communication and teamwork skills. • Teach sophisticated data analysis and reporting.	• Teach and then practice the Model for Improvement. • Understand communication styles and preferences, and help teams adapt to them. • Develop deeper Excel for Quality skills. • Use data and information to diagnose issues and guide solutions.
Motivation	• Being part of something bigger than yourself (or your organization). • Understanding the impact on patients and families. • Tracking progress. • Finding joy in work.	• Make it personal, e.g. pride. • Use an employee's professional identity to promote engagement. • Share the voices and perspectives of patients • Display data to interest and inspire employees. • Drive to reach quantitative goals. • Implement reward and recognition programs. • Celebrate success.

Timing

Coaching would be easy, perhaps even unnecessary, if everyone followed the same set of behavioral rules when they came to work every day. Coaching principles are valuable to know, but the ability to apply them at the right time, with the right mix of approaches, with the correct intensity for the topic, and the best style for the person/group at hand is what distinguishes average from exceptional coaches.

No one technique or category of coaching tools is sufficient. There is scant information about the order in which coaching tools may be applied. Most coaches talk strategy in the beginning (when setting up the plan), and emphasize motivation towards the end, but finding the right combination for each unique individual remains a constant challenge throughout the duration of the coaching term.

Dedicated coaches consider the 'what,' 'when,' and 'how' with every coaching intervention, work with enthusiasm, but realize and accept that reaching perfection is not possible.

Coaching Readiness

One challenge with coaching at the right time and in the right way is the readiness of the recipient. Some individuals can't hear feedback or accept coaching when they are exhausted, insecure, uncertain about their future, or when stressed by issues beyond the job. Coaches must determine employee readiness for coaching. If the bucket is full, adding more water in terms of feedback, just causes the water to overflow and creates a big mess. Finding the right time and place is a key skill. One caveat though, rarely does a "perfect time" for coaching exist. So, you need to balance readiness with the need to provide feedback and create behavior change in a timely manner.

One method of establishing readiness is to create a systematic process for coaching – at a specific time, after a specific event, when results come back, etc. – so that an expectation of readiness is established early on. Another technique is to give the mentee a heads-up that you will be calling or visiting at a specific time to provide some coaching, and that you would like them to help you prioritize the discussion topics for the session.

Conclusion

Effective facilitating and coaching, skills that every improvement leader needs to successfully implement interventions, require lifelong active learning. Quality improvement expectations and demands from multiple stakeholders are ever increasing, and these leadership skills have become critical to success. Additional resources for training in facilitation and coaching, such as books, webinars, and workshops are available and listed in the Resources section at the end of this *Implementation Guide*.

SPREAD: SPREADING BEST PRACTICES OF IMPROVEMENT EFFORTS

Spread is a key part of every quality improvement effort. Without spread, best practices would remain local in a facility or organization or system. Spread in a facility means filling all the organization's nooks and crannies with best practices, as if pastry chef was creating a beautiful mold of chocolate mousse. Visualize the elaborately scalloped dish being filled with the creamy rich chocolate suspension. As the chocolate is poured into the pan, it spreads out along the bottom, rising up and filling in all of the curves, nooks, and crannies until the entire dish is full. Spread of improvement work is like that. After testing and implementation has occurred, spread is necessary so that the best practice "fills" the entire facility.

Example: A hospital needs to spread the practice for timely urinary catheter removal to help reduce catheter-associated urinary tract infections (CAUTI). Medical-surgical unit "A" tested and implemented a daily process to review all patients who have a urinary catheter to determine continuing necessity for catheterization and, as appropriate, to implement a nurse-driven removal protocol. This practice resulted in a significant decrease in the catheter days for patients in the unit and a reduced CAUTI rate. Leadership is now initiating efforts to spread the practice to every unit that cares for patients with urinary catheters so that "all the curves, nooks, and crannies" are filled with the best practice.

"How do I know we are ready for spread?"

This is a frequently asked question. A better question may be, "When should I plan for spread?" Answer: at the beginning! Experience tells us that spread needs to be planned and prepared for during the initial testing phase. Early planning for eventual spread, provides time and opportunity to identify potential roadblocks for best practice dissemination and how to overcome them. It also allows for a well-formed plan to be developed that includes executive leadership support, identification of a leader for the spread phase, a spread plan (where and how to spread), and a communication plan. Before a spread plan is carried out, the following key factors need to be in place: widespread acknowledgement by leadership that the improvement project is a key strategic initiative of the organization; the designation of both executive sponsorship and day-to-day leadership; the existence and identification of sites that have successfully tested the specific ideas to be spread; and evidence that the best practices have resulted in the desired outcomes (Massoud, Nielsen, Nolan, Schall, Sevin, 2006).

Establish an Aim

As in the PDSA process, the spread process requires the development of an aim to guide the planning effort. The spread aim should address the "who, what, where, and by when" (Massoud, Nielsen, Nolan, Schall, Sevin, 2006).

Example: To reduce harm from falls with injury by 40 percent by December 8, 2014, the fall injury prevention protocol will be spread to all patient care units by October 8, 2014.

Develop an Initial Spread Plan

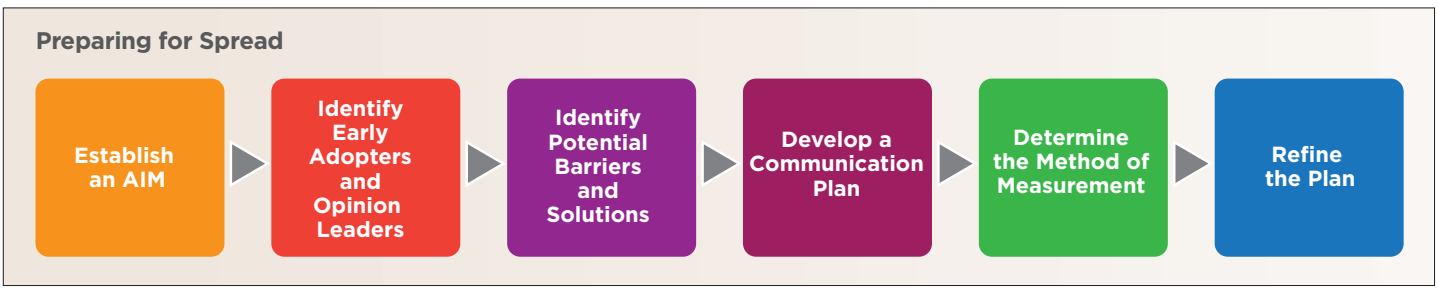
The spread plan provides a framework for how the spread will occur to achieve the designated aim (Nolan, Schall, Erb, & Nolan, 2005). Potential barriers and possible solutions to those barriers as well as other transition issues will need to be considered as the plan is being developed (Massoud, Nielsen, Nolan, Schall, Sevin, 2006). The spread should include a communication plan, and the identification of early adopters and opinion leaders in the areas for spread. Methods of measurement should be determined to assess if the spread has been effective (Nolan, Schall, Erb, & Nolan, 2005).

Identify Early Adopters and Opinion Leaders

Engage key individuals in the spread areas who are early adopters and opinion leaders; they can be catalysts for successful diffusion (Ibanez de Opcua, 2013). These champions should be influential with their peers, willing to adopt and support the practice being spread, and effective peer communicators.

Identify Potential Barriers and Possible Solutions

Consider what potential roadblocks may get in the way of the spread, e.g. staff reluctance to adopt the new practice. Leaders should evaluate and account for local culture and workflow in the various spread areas. Will small Tests of Change (PDSA) be needed



in each adopting unit in order to best promote practice adoption? Who will facilitate the testing and implementation of the practice? Who will be the day-to-day leader of the process?

Involve the local champions in these planning efforts to help identify barriers and develop strategies to address them. The champions' role will be to communicate and model the change, and to help educate peers and colleagues on the benefits of the change. "Persons who are influencers or opinion leaders in the social system serve as the best messengers" (Nolan, Schall, Erb, & Nolan, 2005).

Anticipate potential infrastructure changes that may be needed (Nolan, Schall, Erb, & Nolan, 2005). For example, the pilot unit may have had a place to store a central line cart containing all of the equipment needed to comply with the central line insertion bundle. However, spread units may need to construct locations for their central line carts or adapt areas to conveniently store the required equipment.

Develop a Communication Plan

Communication can either make or break a quality improvement effort. There are many issues and items to consider in developing a communication plan. For a more in-depth review of this topic, please see "Promoting the Work: Creating A Communication Plan" in *The Implementation Guide, Volume I.*

Other important considerations, as presented by Nolan, Schall, Erb and Nolan (2005) in their key article regarding communication and knowledge transfer in spreads, are:

- "How will awareness of the initiative be communicated?" – A communication plan should be developed that reviews the specific needs of the target audience, identifies the benefits for stakeholders of adopting this initiative, gathers and shares comparative data that demonstrate the initiative's value and effectiveness, and establishes ongoing communication channels to promote implementation via spread.

"How will technical knowledge be communicated to facilitate the adoption of the changes?" – As noted above, selection of the best messenger to deliver the message, as well as to provide education and training, is critical. The use of influential unit champions who are actively and willingly involved, and engage in peer-to-peer interactions, coaching, and technical support will determine how effectively technical knowledge is communicated during a spread.

Communication points to consider for spread:

- The "how to" technical knowledge is best communicated through interaction among colleagues (Nolan, Schall, Erb, & Nolan, 2005). Utilize pilot unit staff to communicate the "why, what, how," and the results and benefits of the intervention(s).

For Example:

A hospital in Northern California used "roadshows" to spread the use of the ventilator associated pneumonia (VAP) bundle from one intensive care unit (ICU) to two others. The pilot ICU's nurse champions conducted these mobile mini-in-services to demonstrate "why" the bundle is important, what it consists of, and how it was incorporated into daily care. The nurses shared the results demonstrating a significant drop in VAP rates, and described how the effort benefitted both the nursing and respiratory therapy staff that collaborated on the initiative.

Example Approach:

The pilot unit's nurse champion can work with the spread unit's nurse champion to help formulate action plans, identify and mitigate barriers, and decide on communication methods. The pilot unit champion and the spread unit champion can co-present at staff meetings the "why, what, how," of the initiative and its results and benefits. The pilot unit champion gives a firsthand account of his testing experience and how the adopted practice has reduced harm.

Example Approach:

Utilize the pilot unit physician champion(s) to share with her physician colleagues the "why, what, how," of the initiative and the results and benefits for both patients and physicians.

Example Approach:

Use nationally-produced videos depicting real hospital staff, physicians, and leadership promoting the intervention, such as this video demonstrating the Teach Back method of patient education *(http://www.youtube.com/watch?v=rJXojVfGdng).*

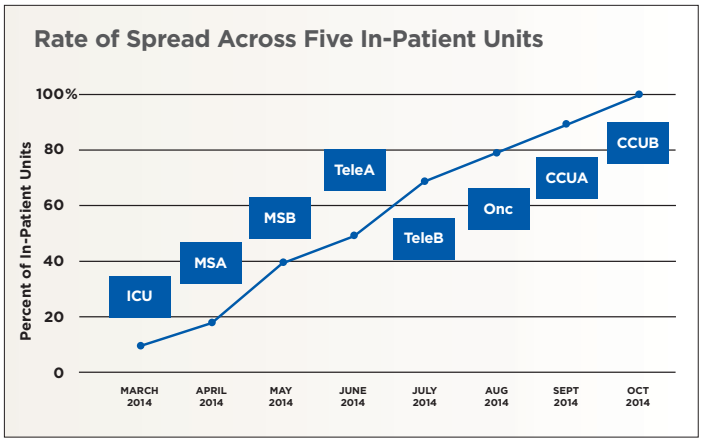
Determine a Method of Measurement

Measurement and feedback are necessary to assess whether a spread and its adopted practices are successfully implemented. The appropriate measures should be selected, i.e. (a) measures that evaluate the extent of the spread, and (b) measures that evaluate the outcomes of the changes implemented (Nolan, Schall, Erb, & Nolan, 2005) (Massoud, Nielsen, Nolan, Schall, Sevin, 2006). The data and information collected can be analyzed and lead to recommendations, revisions, and refinement of the

spread plan as per the "Study" and "Act" of the PDSA cycle. See the "Measurement and Reporting" section of *The Implementation Guide, Volume I* for an in-depth review of measurement.

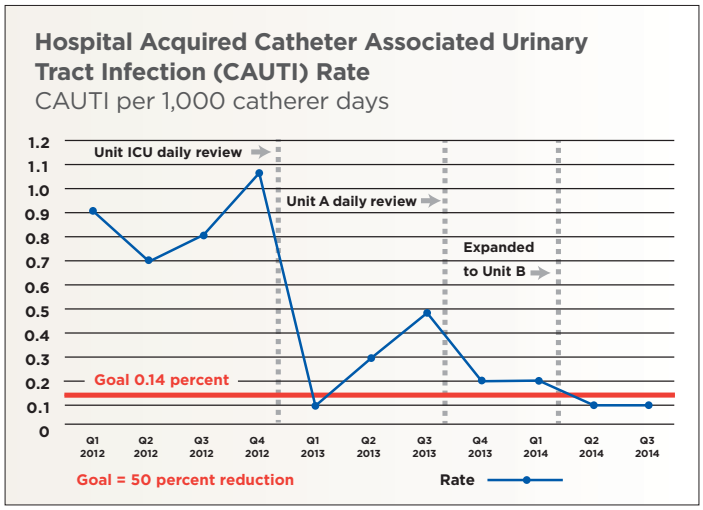
Measurement of the extent of spread

Data from measurement of the extent of spread may be presented in the form of a line graph which shows the rate of spread of the adopted practice or intervention across time and across units. Annotations indicating the onset of the adoption in each unit may be added.



Measurement of adopted practices

These measurement data reveal the outcome and process results. The same outcome and process measures used for the pilot unit may be used to measure the impact of the change during a spread. The expanded measurement set would include the measures for each spread unit, e.g. outcome data on falls with injury for the ICU only, for medical-surgical "Unit A" only, and for medical-surgical unit B only; along with a combined measurement set that incorporates aggregated data from all the involved units, e.g. ICU and medical-surgical units A and B.



Other important considerations, as presented by Nolan, Schall, Erb and Nolan (2005) in their key article on spread measurement, feedback, and knowledge management systems, are:

- Identify who will be responsible for collecting, reviewing, analyzing, and summarizing the data.
- Determine how the information will be shared. How will data and analyses be reported to staff and leadership?
- How will the analyses be utilized? Develop a mechanism to review the collected evidence and feedback and to develop recommendations for revisions and changes to improve or refine the initiative, and, if necessary, the spread strategy.

Refine the Plan

As a recommended practice spreads, monitor the progress being made toward the spread aim and assess if refinements to the plan are needed. Continue refining the process via PDSA cycles until spread into all the desired areas and successful adoption of the new processes are complete. See the "Sustainability" section of this guide for guidance on sustaining outcome gains and achieved aims.

HARM ACROSS THE BOARD

The Partnership for Patients initiatives that have become Hospital Engagement Networks (HENs) topics can reduce harm and improve care for many patients in hospitals across the country. But improving performance in a handful of these 11 areas will not address the needs of significant numbers of patients. The greatest challenge is to successfully improve in all of the topic areas, i.e. to achieve and surpass the 40 percent reduction targets for Hospital Acquired Conditions (HACs) and lower readmission rates by 20 percent. Addressing all of the HACs and readmissions simultaneously requires a more global view of safety issues and harm to patients. The term "Harm Across the Board" was coined to describe this comprehensive meta-approach to safety as contrasted with single-issue improvement efforts.

Some leaders use the term "Safety Across the Board" to describe this approach. This more positive language captures the activities involved with the HEN. Yet, the term "Harm Across the Board" alerts and activates clinicians by triggering and acknowledging their desire to reduce and prevent harm to patients. The well-known phrase "First do no harm" is a core principle for health care professionals and generates more interest than the equally desirable but more ambitious concept of "safety." HAB is a composite approach to patient safety which promotes a "whole system" view of the current work of the HENs and the additional improvement

programs projected for the future. Other methods of taking a whole system view are Vincent's dimensions of patient safety (Vincent 2013) and the IHI global trigger tool (IHI 2009). Each has a role and no single measurement approach is sufficient to describe or quantify the notion of safety. HAB is valuable because all of the topics have a strong record of improvement and do not have inter-observer variation issues. Each has its own weakness and for HAB, readmissions are so common and prevalent that the topic can dwarf some of the less frequent adverse events, such as falls with injuries.

As described in the quantitative analysis below, HAB provides a unifying umbrella over diverse issues in hospitals. Though it does not itemize all potential opportunities for improvement or descriptions of patient harm, it does provide hospitals with a way to evaluate progress on a substantial group of issues with known improvement potential. It can be a particularly useful model for senior management and governing bodies to consider when asking the question – is our hospital safer now then it was 1 or 2 years ago. In fact, the use of HAB as qualitatively as a vision statement and quantitatively as a reporting mechanism has become an effective method to engage senior/executive leaders, whose primary responsibility is to protect the community via a more global approach.

One caveat about HAB – harm can still happen to patients in areas that are not currently included. Therefore, HAB should evolve over time to include new areas that are discovered to generate harm to patients. When results become sustainable in an active improvement area, new areas with opportunities for improvement should be added and focused on.

A description of the Harm Across the Board report, utilized by the AHA-HRET Hospital Engagement Network, is provided later in this volume of the *Implementation Guide*.

HIGH RELIABILITY ORGANIZATIONS

Introduction

As preventable harm is being reduced by health care organizations, some are venturing to discuss and promote the concept of "perfect care." This phrase is now being included in mission statements and even in corporate names. Perfect care can be defined as care that is without defect; care where all avoidable harms have been prevented; and care that is consistent with the six aims of the Institute of Medicine, i.e. it is safe, timely, effective, efficient, patient centered, and equitable.

But how can we achieve perfect care? James Reason stated that most medical errors occurred at the human-system interface and that processes that had the most frequent and critical human-system contact were the most likely to fail. (Reason, 2000) For years process improvement methods such as the Model for Improvement, LEAN, Six Sigma and others have been applied to help identify and redesign these critical error-prone junctions in order to design away or minimize error. These efforts have helped to make many processes less prone to suboptimal results, and thus have assisted in reducing harm in health care.

But can we attain "perfect care" by simply continuing to improve processes? Not likely. In order to reach such lofty care goals we must not only continue to improve predictable high-volume, high-risk processes, but we must plan, expect, and manage the unexpected. Organizations that achieve this level of perfection or near-perfection have been dubbed "High Reliability Organizations" (HROs) by Karlene Roberts, Gene Rochlin, and Todd LaPorte. (Rochlin, LaPorte, & Roberts, 1987)

In 1984, Roberts, working with her colleagues at the University of California, Berkeley, began to study the commonalities of operations among an aircraft carrier, a Federal Aviation Administration air traffic control center, and a nuclear power generation plant. According to Weick & Sutcliffe (2007), Rochlin, LaPorte, and Roberts found that "these organizations, which work in unforgiving environments, do the following to avoid disaster:

- pursue safety as a priority objective,
- build in redundancy,
- decentralize decision making,
- shape culture toward reliable performance,
- invest heavily in training and simulation,
- learn from close calls,
- aggressively seek to know what they do not know,
- emphasize communication of the big picture and where people fit into it, and
- reward those who report failures."

Building on the work of Roberts, Rochlin, and LaPorte, Karl Weick and Kathleen Sutcliffe of the Ross School of Business at the University of Michigan studied organizations that had developed ways of acting and styles of learning that enabled them to "manage the unexpected" better than others. From this work emerged the currently-accepted model of a high reliability organization (HRO). (Weick & Sutcliffe, 2007) Mark Chassin and Jerod Loeb of the

Joint Commission have built on the Weick and Sutcliffe model in an attempt to adapt it to health care and to promote the transformation of health care organizations into HROs. (Chassin & Loeb, 2011)

Weick and Sutcliffe

Patrick Lagadec (1993) wrote, "the ability to deal with a crisis situation is largely dependent on the structures that have been developed before the crisis arrives. The event can in some ways be considered as an abrupt and brutal audit; at a moment's notice, everything that was left unprepared becomes a complex problem, and every weakness comes rushing to the forefront."

Unexpected events come in three forms:
1. An event that is expected to happen fails to happen.
2. An event not expected to happen happens.
3. An event simply unthought of, happens.

Two key human traits make it hard for us to realize when one of the above has, in fact, happened. *Confirmation bias* occurs when we "see what we are looking for," even when it is not really there. (Olson, Roese & Zanna, 1996) This causes us to mis-identify critical clues early on. The *disqualification heuristic*, according to Lee (1993), states that "people disqualify dis-confirming information, highlight confirming information, and neglect information that contradicts a conviction, all in the interest of reducing uncertainty and increasing their sense of control."

TABLE 1
Examples of Confirmation Bias and the Disqualification Heuristic in Healthcare

Confirmation Bias	Since common diseases occur commonly, findings consistent with a common diagnosis are confirmatory whereas other information is ignored.
Disqualification Heuristic	"Healthy" adults often attribute chest pain to muscular sources rather than considering the possibility that the chest pain could be due to heart disease.

The Weick and Sutcliffe Model focuses on the following 5 principles:
1. Preoccupation with Failure
2. Reluctance to Simplify
3. Sensitivity to Operations
4. Commitment to Resilience
5. Deference to Expertise

Preoccupation with Failure

High Reliability Organizations embrace failure. First, they expect and look for failure, as failure is a latent part of the design of every system. "Latent" means that the system design allows or actively promotes the possibility that the error will eventually occur. For example, building a highway without a median barrier "designs in" the eventuality that a head-on crash will someday occur.

In order to expect and identify potential failures, HROs pay close attention to weak signals that may indicate the possibility of failure down the road, or that could be representative of broader problems on a larger scale. HROs define mistakes that have not happened, and do their best to re-design their system so that these mistakes cannot happen.

TABLE 2
Examples of Pre-Occupation with Failure in Healthcare

Look for Failure	• Expect that the medication in the automated drug cabinet may be in the wrong cabinet. • Look and verify that the medication taken from the drawer is the medication that was ordered. • Verify with scanning where possible. • Don't assume!
Design Out/Prevent Failure	• Separate all sound alike/look alike medications away from each other so that the wrong medication cannot be accidentally administered.
Report Small Failures	• A simple reporting system of medication errors/near misses leads to the identification of interruptions as a key cause, and to the design of systems to minimize interruptions.

Finding failure is not enough, however. Failure discovered must be reported. Research reveals that staff are unlikely to report small failures unless they believe it is safe, easy, and meaningful to do so. An organization with a rigid and blaming culture or a laborious bureaucracy is likely to receive fewer failure reports from the front lines. Additionally, if staff do not see system improvements over time as a result of their communication efforts, reporting will wane.

Simplify, but Don't Over-Simplify

Humans seem to have a natural tendency to label and categorize most events. While this may help us understand and cope with the complex world around us, key details may be lost during this process. The organizational theorist Gerardo Patriotta explained (2004), "we see in the world what our stock of interpretations allows us to see. The variety in these interpretations determine how much variation we can sense." This tendency creates over-simplification.

Over-simplification causes us to the miss the small, but critical nuances. Details get lost in generics. The use of specific language to describe a situation and discussion, which incorporates others' perspectives and interpretations can help reduce over-simplification. One example occurred with wildfires. In 2007, in California, dispatchers' delayed up to nine minutes in sending out fire teams, believing that a reported fire was a controlled burn. This delay undermined firefighters' efforts to prevent a wind-driven wildfire from spreading and destroying over 250 homes. Advance preparation by anticipating such a failure and avoiding over-simplification might have led to a different outcome.

Sensitivity to Operations

Weick and Sutcliffe state simply that to be sensitive to operations is to see "what we are actually doing, regardless of what we are supposed to do based on intentions, designs, and plans." Many factors work to dull our sensitivity to operations. These include "mindless" routines, and an over- estimation of the soundness of our processes. Assuming that a routine activity will always be done correctly regardless of the situation can be a trap. In neonatal intensive care units in Indiana, Texas, and California, between 2006 and 2008, several babies died because the "mindless" routine tasks of (a) placing neonatal heparin in the automatic drug cabinet, and (b) retrieving it and administering it…both failed. Adult heparin had been placed accidentally in those medication cabinet drawers, and was retrieved and administered to the infants by the NICU nurses. Despite national publicity after the first incident occurred in 2006, the second and third incidents followed (at different institutions) over the next two years.

Commitment to Resilience

No matter how well an HRO masters the three principles, failures will still occur. Resilience can be defined as the capability of a system to maintain its function and structure in the face of internal external changes. (Weick & Sutcliffe, 2007) Resilient organizations do not lose control in the face of failure, but rather continue with improvement efforts, and rebound. For example, one hospital was observing a much higher-than-average infection rate for its elective joint arthroplasties. Efforts to reduce this infection rate had been unsuccessful, so the Chief Executive Officer called for a moratorium on all elective arthroplasties for 30 days. During the next 30 days, staff "dug deep" into the system processes in an attempt to understand why and how failure was occurring in order to better redesign those failures. After the 30 day moratorium, the hospital resumed the procedures with redesigned processes. The infection rates dramatically improved and the improvement was sustained. The institution's resiliency led to the improved rates, which were then used to market for new patients.

Deference to Expertise

Expertise is not to be confused with hierarchy. Researchers have shown that the farther managers work from the front-lines, the safer they believe the systems are. The authority hierarchy does not correspond reliably with the knowledge hierarchy. While expertise may be nested higher up in the organization, it can be a critical error to assume that that is the case. Front-line staff are often the most familiar with processes and procedures within a system. If an unexpected event begins to occur, the early warning signs are most likely to be observed by the front-line workers in the area of concern.

High Reliability Organizations have mastered the ability to recognize when leaders should acknowledge, respect, and defer to the front-line workers performing the tasks; and have created environments and communication pathways through which front-line workers can speak up safely. They have also provided workers with an understanding of "the big picture," their relevant roles as part of the team, and the importance of small diversions from the expected. To quote Weick and Sutcliffe, "organizations that live or die by their hierarchy are seldom in a position to know all they can about a problem."

Decisions in an HRO migrate up as well as migrate down. Workers at all levels in HRO ask for help when they're in a situation that they do not fully understand. This help comes from colleagues with the necessary expertise, regardless of their position in the organization.

In the Comprehensive Unit-Based Safety Program, a common question asked of staff in order to identify where failures may be likely to occur is "How will we harm the next patient?" Research has shown that the staff is more likely to have this knowledge than their managers – and can help design the process revisions necessary to prevent this identified potential harm.

Chassin and Loeb

In 2011, Mark Chassin and Jerod Loeb published an approach adapting the Weick and Sutcliffe model to health care organizations. Leadership, safety culture, and robust process improvement, if applied, could assist organizations in their move towards becoming an HRO.

Leadership

Leaders and boards must be committed to a long-term journey towards high reliability by making it their highest priority and by enlisting a similar commitment from all levels of management throughout the organization. This commitment requires embedding the aim of high reliability into the mission and vision statements of health care organizations, including measurable quality goals in the strategic plan, and implementing accountability for the achievement of these strategic quality objectives.

Safety Culture

As discussed in the Weick and Sutcliffe model above, trust among co-workers and between front line staff and management is crucial to proper information flow. Without the free flow of information about errors and events, systems cannot be sufficiently be redesigned to make them safer and less error-prone.

Robust Process Improvement

Organizations must adopt a systemic approach to improvement. "Today, some health care organizations are adopting the new generation of industrial quality methods and applying them to issues of clinical safety and quality. The new approaches – Six Sigma, lean management, and change management – are far more robust in their ability to solve difficult safety and quality problems.

"The power of these tools lies in their systematic approach, which involves the following: reliably measuring the magnitude of a problem; identifying root causes of the problem and measuring the importance of each cause; finding solutions for the most important causes; proving the effectiveness of those solutions; and deploying programs to ensure sustained improvements over time. Robust process improvement enables health care organizations to avoid crucial failures common in many efforts to improve clinical quality." (Chassin & Loeb, 2011)

Putting It All Together: Mindfulness

Mindfulness is an enriched awareness: one that acknowledges that our expectations may be wrong, that unexpected events might be unfolding, that failure may be occurring, and that recovery, with deference to expertise, not authority, must be initiated. Mindfulness resists confirmation bias (seeing only what confirms our expectations) and the disqualification heuristic (denying what does not confirm our expectations). Sometimes mindfulness is simply called "situational awareness."

We have all experienced times when we are very mindful, and times when we have been mindless. We are generally very mindful when we are walking in a strange neighborhood or city, especially at night. We are sometimes very mindless when driving on freeways, especially over long distances. The trap is the familiar and the routine.

Becoming an HRO requires leadership, a culture of safety, and a robust improvement process. These must be built around an organization that seeks out failure, refuses to over-simplify, is sensitive to operations, is resilient, and defers to expertise, not authority. Most of all…the organization and its employees must be mindful.

How can an organization determine where on the path it is traveling, or if it is already an HRO? Weick and Sutcliffe offer nine audit tools in their 2007 book, *Managing the Unexpected*. These are listed in the Key Tools section below and can be found in their copyrighted book. Additional resources are noted in the Reference list.

Key Reliability Tools:

The following audit tools, which can be found in Weick and Sutcliffe's text (2007, pp. 85-107), will allow you to inventory your organization's practices, and assist your organization in improving its capabilities.

1. A Starting Point for Assessing Your Firm's Mindfulness.
2. Assessing Your Firm's Vulnerability to Mindlessness.
3. Assessing Where Mindfulness is Most Required.
4. Assessing Your Firm's Preoccupation with Failure.
5. Assessing Your Firm's Reluctance to Simplify.
6. Assessing Your Firm's Sensitivity to Operations.
7. Assessing Your Firm's Commitment to Resilience.
8. Assessing the Deference to Expertise in Your Firm.
9. The Mindfulness Organizing Scale.

SUSTAINABILITY

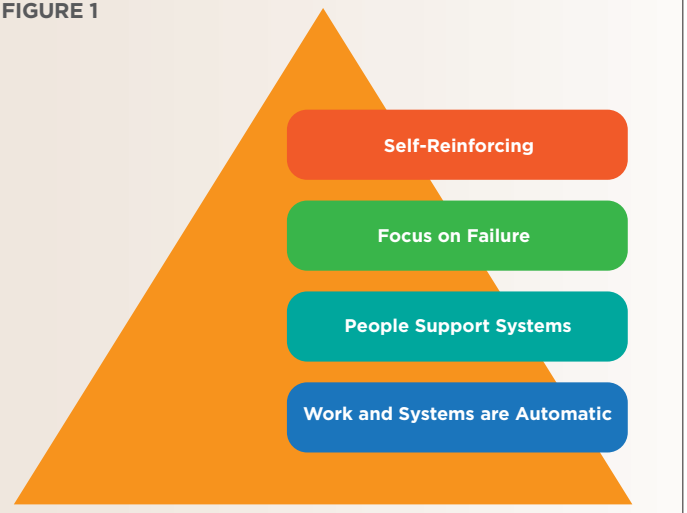
Sustainability

Sustaining gains achieved to reduce harm and improve care delivery is as important as achieving the designated aims. Organizations have long memories about improvement projects that began enthusiastically, then fizzled, only to be labeled the "flavor of the month." A history of abandoned or fizzled projects can negatively influence the perception of and willingness to engage in future projects by undermining an organization's credibility and commitment to improvement.

Sustainability by design

Achieving a sustainable improvement project requires consideration and planning **on the front end** to build a solid infrastructure that will support ongoing adoption and utilization of new processes that create positive change. Figure 1 outlines the four categories of attributes of sustainable improvement projects that promote success and longevity. It is important to start with the foundation of the pyramid and build upon each level, to create sustainability that ultimately becomes standard work and self-reinforcing.

FIGURE 1



Work and Systems are Automatic

Incorporating changes into routine practice can help to promote their sustainability. Understanding and applying human factor principles is necessary to develop efficient work processes that support this sustained behavior change. Human factors are defined as the characteristics or traits that need to be addressed to do work "the right way." (World Health Organization, 2009). Examples of the application of human factors in designing reliable, sustainable processes include the following:

Avoid reliance on memory	• Use standard protocols/order sets. • Use checklists. • Use technology to prompt correct decisions, send alerts, and use a "hard stop" for high risk procedures/decisions.
Make processes visible	• Use pictorial reminders to show how to use new, infrequently used, or complex equipment.
Review and simplify processes. Remove waste.	• Reduce the number of different dosages or preparations of drugs that are made available. • Remove potentially unsafe selections from order sets or supply carts. • Use procedure trays with all the necessary items bundled into one grab-and-go pack. • Remove abandoned or obsolete order sets, equipment, and protocols to prevent staff from returning to old habits.
Decrease reliance on vigilance	• Use technology to prompt safe choices – e.g. provide alerts when two medications in same drug class are ordered, or when drug dosages exceed recommended ranges. • Use equipment which includes safety precautions engineering. e.g. an enteral feeding port which cannot be connected to an IV cannula.

Ultimately, by addressing human factors in the design of new or improved practices, a return to less effective or obsolete processes can be prevented. Leadership oversight in monitoring newly adopted routines is crucial during the transition period. Leaders and managers should observe for and prohibit work-arounds; drill down, to understand why the work-around occurred; and work together to revise and improve the procedures.

New processes that are assigned to a role or function, rather than a specific individual, are more likely to be sustainable. When a process is person-dependent, failure can occur when that individual is not present or leaves the organization. For example, assigning the task of validating urinary catheter use rationales daily to the position of charge nurse or unit supervisor (operational 24/7) is more effective than assigning the task to a specific infection control practitioner who only works Monday through Friday. Additionally, if the key individual, e.g. the infection control practitioner, leaves the organization, the strategy is less likely to be abandoned.

People support systems

Engaging staff at all levels of an organization promotes sustainability. Leadership support is crucial, especially at level of the middle manager who is responsible for the day to day operations of the unit where the change is being implemented. A common misconception is that executive support is the most important factor in improvement success and sustainability. While support at this level is beneficial, it is not as important as the support of a committed middle manager, who engages front line staff and oversees and monitors the new processes until they are hard-wired, and long-term.

Front-line staff that carry out the improvement must also have clear roles and responsibilities. Including staff in mapping out the new work flows allows the collection of valuable input and the encouragement of ownership, promoting sustainability. After new workflows have been implemented, managers should solicit and be receptive to staff feedback and challenges so that the necessary revisions and modifications can be made via the Plan-Do-Study-Act model (NHS Sustainability Guide, 2009).

To best manage employee resistance to changing roles and duties, leaders should highlight the benefits of the changes beyond those to the patients. How will the new work flow improve efficiency? How will new processes ease the workload of the front-line staff? Use anecdotes from peers, data, supportive stories, and process maps to communicate and demonstrate these benefits and to engage staff at all levels. (NHS Sustainability Guide, 2009)

By creating a culture of learning and improvement, leaders can build and develop improvement capacity among staff. Staff should be offered training and education in quality improvement methodology and benefits at orientation and via frequent and ongoing continuing education programs and workshops. These efforts will encourage staff receptivity to new initiatives and changes and may prevent recidivism to old practices if turnover occurs at any level of the organization.

Focus on Failure

Preoccupation with failure is one of the hallmarks of high reliability organizations. This mindset supports sustainability by encouraging and rewarding the reporting of vulnerabilities and errors. Organizations can use these reports and data to learn from practice drift, near-misses, and mistakes, and to implement improvements in procedures and processes. Unfortunately, after project aims have been met, organizations often reduce their focus on the successful processes, settle into complacency, and miss alerts and signals of impending adverse events. (Weick and Sutcliffe, 2001)

To combat this phenomenon, several approaches can be employed which promote sustainability when the organization moves on to new projects and initiatives.

1. Make failures obvious. Establish mechanisms to easily recognize an error. For example, use a surgical sponge dispensing device that allows each sponge to be replaced into its original package at the end of surgery. Check if any packages remain empty before closure.
2. Look for weak signals of failure. Complete audits using sampling methodology to spot check for practice drift. Audits can be done via documentation, clinical practice observation, or by interviewing a sample of the relevant staff.
3. Track failure rates instead of success rates. Instead of reporting a 95 percent compliance rate with a process measure, report the percent failure rate and drill down on these failures to determine their root causes.

Additional examples of preoccupation with failure are outlined in the Reliability section, Table 2: Examples of Pre-Occupation with Failure in Healthcare on page 12.

Self-Reinforcing

The benefits of these newly adopted processes increase as more individuals adopt the new behaviors. As individuals ascend the learning curve of a new behavior, skill levels increase, leading to improved efficiency, less wasted time, and fewer errors. Once the majority of the staff have shifted to the new procedures and become more skilled, they may find it less appealing to return to old habits or routines. (Weick and Sutcliffe, 2012)

To promote improved skills, fewer errors, and, ultimately, sustainability; organizations and workgroups can testify to the self-reinforcing power of effectively adopting these changes via the strategies below:

1. Publicize successes to promote pride in accomplishment, and encourage movement towards new social norms and standard operating procedures.
2. Recognize early adopters at the both the individual and team level. Promote the spread of adoption by sharing stories of success from influential stakeholders.
3. Learn from both successes and failures. Don't be afraid to be wrong. Adjust and revise the working plan as new information becomes available, following the Plan-Do-Study-Act methodology.
4. Promote peer pressure regarding the new social norms. Once standard work has been established, create and communicate ground rules and expectations that individuals speak up when observing challenges so as to promote continued progress and success.

By including long-term sustainability when designing and implementing an improvement plan, greater efficiency, teamwork and organizational capacity to improve can be achieved. Accomplishing a sustainable improvement also creates a culture of achievement for the accountable leaders and front-line staff that will serve as a self-reinforcing force to promote success with future projects.

MEASUREMENT AND DATA – ADVANCED

Excel, Use of Pivot Tables, and Access for Quality

Data management and data analysis are key components in any performance improvement activity. Data management in health care is the method of controlling and organizing the data necessary for a project, process, facility, or system. Data analysis is the process of transforming raw data into useable information. Data analysis is often performed to gauge performance relative to internal and/or external benchmarks and to determine the effectiveness of performance improvement efforts. Software frequently used in data management and data analysis includes Microsoft Excel and Microsoft Access. An overview and brief introduction to these applications follow.

Microsoft Excel

Microsoft Excel is a spreadsheet tool organized into files called workbooks. Each workbook can contain multiple worksheets and chart sheets. Data worksheets store and organize data, as well as perform calculations. Chart sheets display data in a variety of ways, e.g. pie chart, line (or run) charts, etc.

Formulas

In the data worksheet, calculations are performed within each cell using formulae. The basic construction of a standard Excel formula is:

= action(location:location)

=	The use of an equal sign alerts Excel that a calculation/function is to be performed.
Action	The action is a keyword that communicates what function is to be performed. E.g. Sum, Average.
Location	Within the parentheses lies the location of the cells upon which the action is to be performed. The start and end points are separated by a colon. Worksheets are organized like map coordinates; along the top are letters denoting columns and along the left-hand side are numbers denoting rows.

For example, =sum(A2:A10) calculates the sum of the values located in cells A2 through A10 (the first column, rows 2 through 10). Likewise, =median(A2:A10) is going to calculate the median of the values located in cells A2 through A10.

Additional entries may be necessary for a function. For example, =countif(A2:A10,">=7") counts the values in cells A2 through A10, *only* if they meet the criteria designated in quotes after the location entries. In this example, the criterion is "is greater than or equal to 7."

Excel can execute many functions within a formula. Frequently used functions in performance improvement activities include:

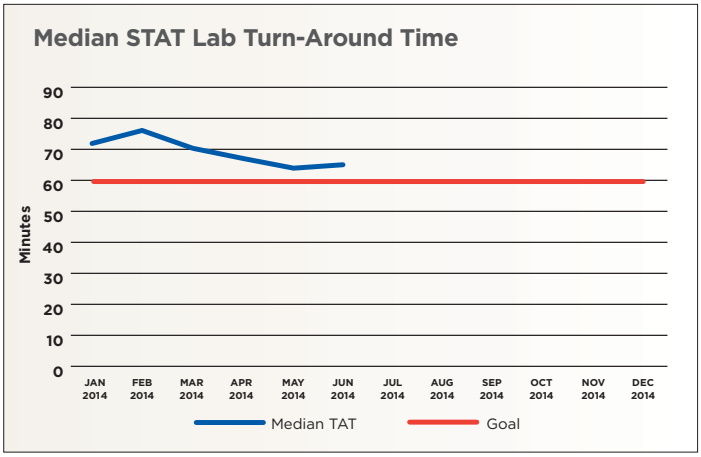
EXCEL FUNCTION/ KEYWORD	RETURNS	EXAMPLE OF USE IN PI PROJECT TO IMPROVE STAT LAB TURN-AROUND TIME
sum	sum	Adding up the time intervals for a lab test (order to draw + draw to receipt in lab + receipt to result).
average	average	Averaging the total turn-around time.
count	count	Counting the number of records in the sample.
countif	count of values that meet stated criteria	Counting the number of STAT labs with a total turn-around time of less than 60 minutes.
max	maximum value	Finding the maximum total turn-around time for a lab/test.
min	minimum value	Finding the minimum total turn-around time for a lab/test.
median	median	Finding the median (middle value) turn-around time for a lab/test.
stdev	standard deviation	Finding the standard deviation for turn-around time to identify statistical outliers (+/- 3 standard deviations from average).

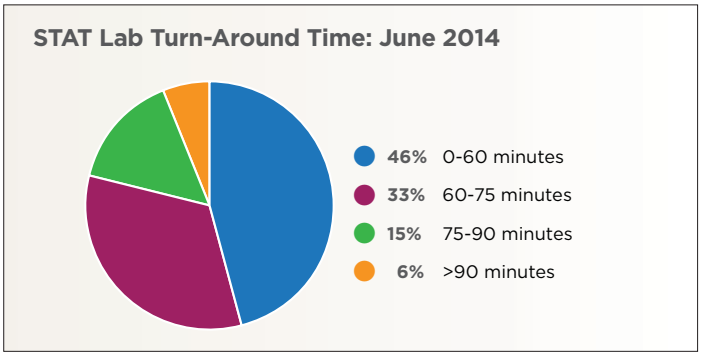
Charts

Interpreting the data is often easier when it is summarized using graphs and charts. To create a chart in Microsoft Excel 2003 (and earlier), there is a Chart Wizard that walks you through the four steps of creating a chart. In later versions of Excel (2007+), one simply inserts the type of chart desired. To enhance a chart, predefined styles and layouts are provided and may be used. Modification of titles, legends, and chart areas are also possible.

Below are examples of two charts used to display STAT lab turn-around time data. The first chart shows the median turn-around time in a line/run chart, which illustrates progress over time

towards achieving the goal of 60 minutes or less. The second chart is a pie chart that displays a snapshot in time, illustrating the breakdown of turn-around times into four categories.





For further discussion on the use of different types of charts, see *Displaying Data in the Implementation Guide, Part I.*

Pivot Tables

Pivot tables in Excel are a data summarization tool. In Excel, data are organized and stored in *flat* tables, i.e. data worksheets that have only columns and rows, such as the example shown below.

LAB TEST	DATE	TOTAL TURN-AROUND TIME
Ca	5/12/2014	68
Glucose	5/12/2014	64
CBC	5/12/2014	63
Electrolytes	5/13/2014	75
PT/PTT	5/13/2014	38
Lactic Acid	5/13/2014	58
BUN	5/14/2014	65
CMP	5/14/2014	75
BMP	5/14/2014	64
Ca	5/15/2014	62
BMP	5/15/2014	57
CMP	5/15/2014	56
CBC	5/15/2014	48
PT/PTT	5/15/2014	47

The data above can be summarized quickly by inserting a pivot table into the Excel workbook. The average turn-around times are displayed for each of the days listed in the data set.

ROW LABELS	AVERAGE OF TOTAL TURN-AROUND TIME
5/14/2014	68
5/12/2014	65
5/13/2014	57
5/15/2014	54
Grand Total	60

The use of pivot tables makes it easy to organize and extract information from large data sets without the use of formulae. Pivot tables are also used to easily view data in different ways. For example, falls data may be analyzed by unit, then by time of day – or – by time of day, then by unit, depending upon which factor (unit or time of day) is deemed more relevant.

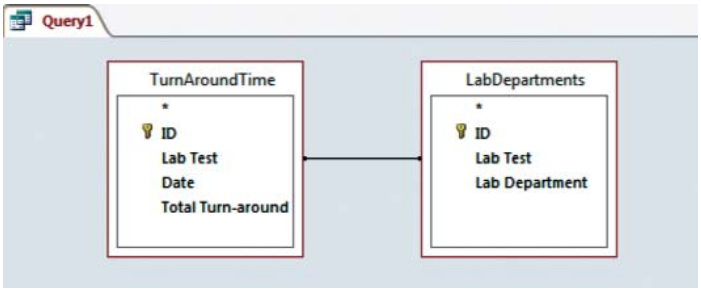
Appendix II provides detailed notes for Common Microsoft Excel Actions (Excel 2003)

Appendix III provides detailed notes for Common Microsoft Excel Actions (Excel 2007)

Microsoft Access

Unlike Excel, which stores data in flat worksheets, Access is a relational database management system that allows the storage of data across multiple tables. In Access, data are stored in Tables, and either inputted directly into Access or imported from other applications. Forms in Access are used to input or display data. Access Queries retrieve information from tables or other queries, and also have the capability to analyze the data using expressions (similar to formulas in Excel). Reports in Access generate output in specified formats.

In the example below, the lab turn-around time data are linked with lab department data through a query. The two tables are linked using the variable 'Lab Test'. For every value of 'Lab Test' in the 'TurnAroundTime' table, an associated 'Lab Department' value is assigned through this linkage.



LAB TEST	LAB DEPARTMENT
BMP	Chemistry
BUN	Chemistry
Ca	Chemistry
CBC	Hematology
CMP	Chemistry
Electrolytes	Chemistry
Glucose	Chemistry
Lactic Acid	Chemistry
PT/PTT	Hematology

This query produced a table that added lab departments to the previous turn-around tables, which enabled analysis of turn-around time by lab department.

LAB TEST	LAB DEPARTMENT	DATE	TOTAL TURN-AROUND TIME
Ca	Chemistry	5/12/2014	68
CBC	Hematology	5/12/2014	63
Glucose	Chemistry	5/12/2014	64
Electrolytes	Chemistry	5/13/2014	75
Lactic Acid	Chemistry	5/13/2014	58
PT/PTT	Hematology	5/13/2014	38
BMP	Chemistry	5/14/2014	64
BUN	Chemistry	5/14/2014	65
CMP	Chemistry	5/14/2014	75
BMP	Chemistry	5/15/2014	57
Ca	Chemistry	5/15/2014	62
CBC	Hematology	5/15/2014	48
CMP	Chemistry	5/15/2014	56
PT/PTT	Hematology	5/15/2014	47

LAB DEPARTMENT	AVERAGE OF TOTAL TURNAROUND TIME
Chemistry	64.4
Hematology	49

Because the data for lab turn-around times are stored separately from the list of tests by lab department, it is easier to combine and review these data in Access than in Excel.

Summary

Microsoft Access and Microsoft Excel are powerful tools for managing, displaying, and analyzing data. Use of one or both of these applications will likely aid performance improvement efforts.

Statistical Process Control

Data, Data, Data. Health care today seems to have an overabundance of data. Data collection can be cumbersome and if not captured and presented correctly, can cause misinterpretation of the results. This misinterpretation can lead to work and rework for staff who are already maxed out on work responsibilities. The data you collect should answer a question. That question might be: What is my Readmission Rate or is my Readmission Rate improving? How many adverse events have occurred and is the frequency, or how often the adverse events are occurring, going down? How do you capture data that is both meaningful and relevant to the question you are looking to have answered?

Just collecting data for the sake of collecting data will not advance your efforts in performance improvement. Data collection alone will not improve performance, you need to know when changes you have made have had an impact. Through the use of Statistical Process Control, you will be able to track data and turn it into useful information and meaningful knowledge in order to obtain the improvement results to ensure the utmost in quality of care.

In order to achieve quality results, you first need to ensure *accuracy* and *consistency* of your data. Once you are able to achieve this, you can better sustain your results and exceed your benchmarks year after year.

Accuracy is the extent to which a given measurement agrees with the "gold standard," true value for that measurement.

Consistency is the reliability or uniformity of successive results or events.

Change, or fluctuation in data, month to month or quarter to quarter, is called variation. There will always be natural variations in health care data, from the tracking of a patient's daily temperature to the auditing of readmissions or adverse events. Walter Shewhart suggested two reasons why variation occurs because: (1) something has actually changed (Special Cause Variation) or (2) the data varied by chance (Common Cause Variation) and no real change occurred. *Common cause variation* occurs as a result of the process and is also called *normal process variation*. Being able to distinguish between these two causes of variation is a critical step in performance improvement efforts.

By plotting measures over time, you will begin to see variation and try to determine if the variation is due to a change you implemented or if it is random, or naturally occurring, process variation. There are many ways to display your data on graphs. The most common data display to identify variation in the health care setting is a control chart, also known as a Shewhart chart. A control chart is a run chart, which plots data over time, with an overlay of additional statistics. There are different types of control charts for different types of data.

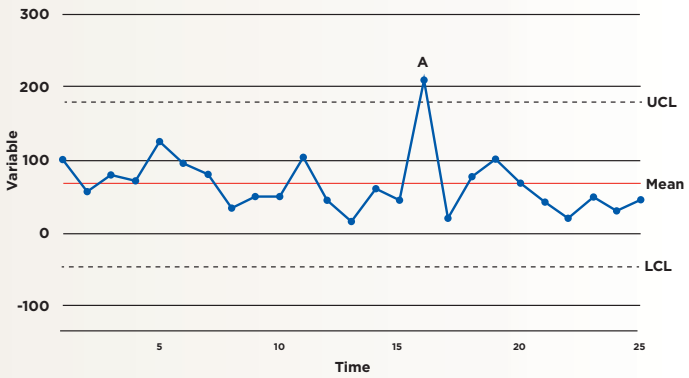
Data Type	Detect Definition	Subgroup Size	Chart
Attribute Data • Counted as Discrete Events	Defect Data — Number of defects, not number of defective units	Constant Subgroup Size	c Chart Number of Defects
		Variable Subgroup Size	u Chart Number of Defects
	Defective Unit Data	Constant Subgroup Size, Usually >=50	np Chart Number of Defective Units
		Variable Subgroup Size, Usually >=50	p Chart Fraction of Defective Units
Variable Data • Measured on a Continuous Scale		Subgroup Size = 1	X and R_m Moving Range
		Subgroup Size < 10	$\bar{X}$ and R
		Subgroup Size >= 10	$\bar{X}$ and s

The data plotted over time may be a mean (average), range, proportion, or a rate. The mean of the data (mean of the means, mean of the ranges, mean of the proportions or rates) is plotted on a control chart as the central line (CL). Additional statistics are calculated when creating a control chart include:

- The *standard error*, e.g. the standard deviation divided by the square root of the sample size, is used to define control limits.
- The *upper control limit (UCL)* is usually the mean (CL) plus three times the standard error.
- The *lower control limit (LCL)* is usually the mean (CL) minus three times standard error.
- Additional *warning or control limits* may be calculated using plus/minus one and two times the standard error.

The upper and lower control limits are typically the point at which the data is "statistically unlikely," and thus would be deemed special cause variation or indicates data error. The additional control limits are used to determine unlikely patterns in the data. Figure 2 provides an example of a control chart.

FIGURE 2
Sample Control Chart (Hart, 2007)

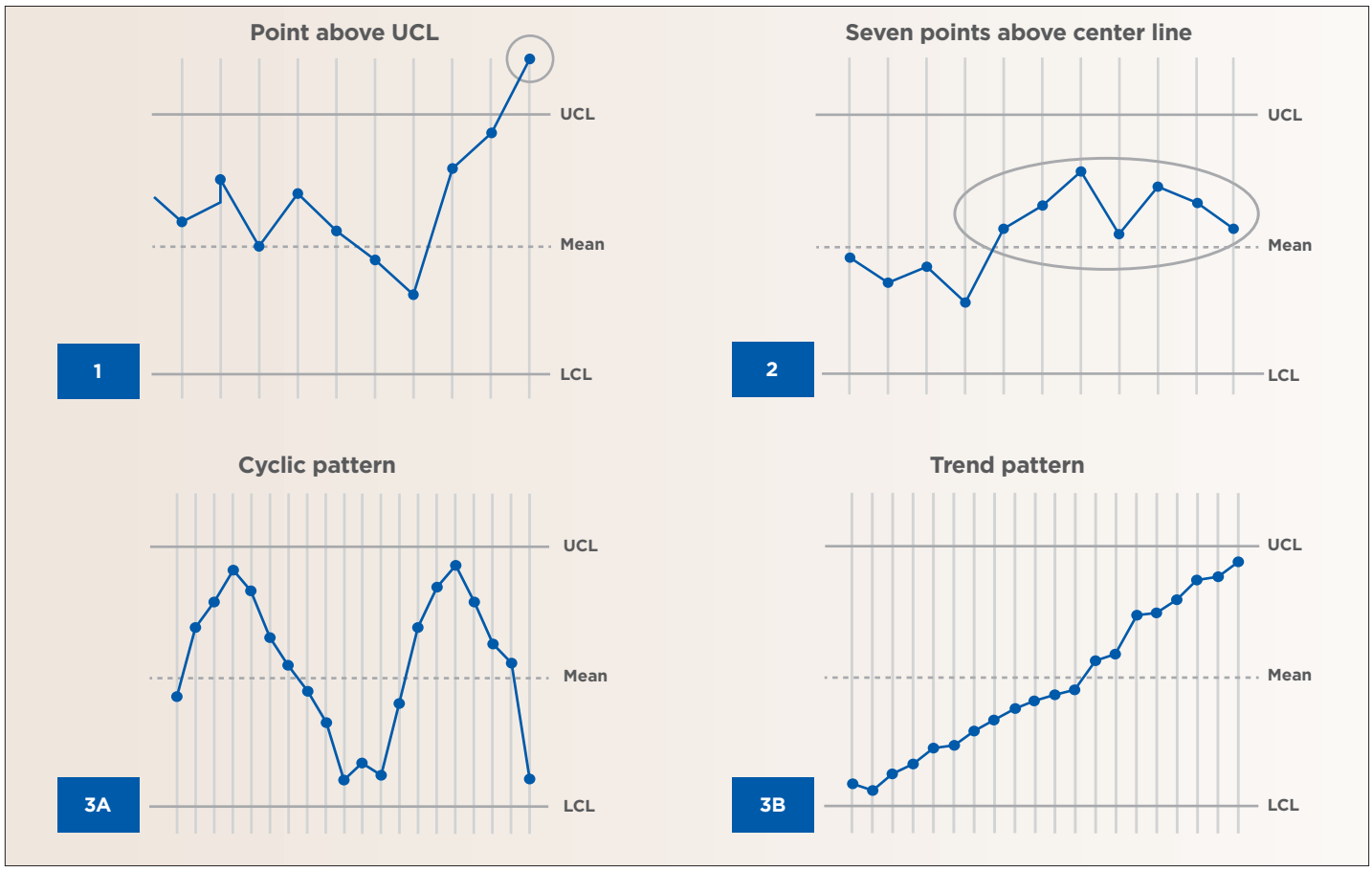


Control charts show the variation in a measurement during the time period that the process is observed.

It is easy to interpret results that trend prominently upwards or downwards over several months or quarters. It is much more difficult to analyze data points that have only minor fluctuations. It becomes very important to look at the variation that occurred before the change was implemented and then after the change was implemented. Does the data trend follow the same path, and show the same variation from data point to data point? If the answer is yes, then additional changes are needed to bring about improvement in your results.

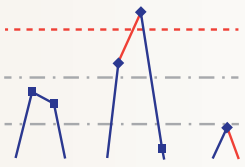
How can you tell if you are looking at Special Cause Variation? There are three (3) basic patterns that are visible on the graphs. (Examples are shown below.)

1. Any point above or below the Control Limit
2. A run of 7 data points, all above/below the center (mean) line or if all 7 points are either increasing or decreasing
3. Any trend or pattern



There are software programs avialble to help you identify these patterns. One example is QI Macros for Excel, software that works through Excel to create control charts, using a control chart wizard, and detects unlikely patterns in the data. The rules available in this software program: *www.qimacros.com/*

Stability Analysis Rule Sets Available in Q1 Macros



Control Chart Rules	n (points)	Westgard	Nelson-Juran	AIAG	Montgomery	Western Electric	Healthcare
1. Points above UCL or Below LCL	1	1	1	1	1	1	1
2. Zone A *n* of *n* + 1 points above/below 2 sigma	2	2	2	2	2	2	2
3. Zone B *n* of *n* + 1 points above/below 1 sigma	4		4	4	4	4	
4. *n* points in a row above or below center line	8	8	9	7	8	8	8
5. Trends of *n* points in a row increasing or decreasing	6	7	6	6	6		6
6. Zone C – *n* points in a row inside Zone C (hugging)	15		15	15	15		15
7. *n* points in a row alternating up and down	14		14	14	14		
8. Zone C – *n* points in a row outside Zone C	8		8	8	8		
9. Zone B *n* points above/below 1 sigma; 2 points one above, one below 2 sigma		4					

ELECTRONIC HEALTHCARE RECORDS (EHR) – ROLE AND LIMITATIONS IN SUPPORTING IMPROVEMENT

EHRs are more than digital (computerized) versions of patients' paper charts. EHRs, when fully implemented, are real-time, patient-centered records, and have the potential to make information available instantly, "whenever and wherever it is needed." This generation of health records brings together in one place everything about a patient's health with the goals of:

- Improved quality, safety, and efficiency.
- Reduction of health disparities.
- Engagement of patients and family.
- Improved patient care coordination.
- Improved public health.
- Maintenance of privacy and security of patient health information.
- Multiple additional uses, e.g.
  - — Identify populations at risk.
  - — Collect and analyze data.
  - — Develop policies and programs.
  - — Implement hard-stops and alerts.
  - — Measure program effectiveness.

In 2010, the Centers for Medicare and Medicaid Services (CMS) launched incentive programs to support and encourage the implementation and use of EHRs. The objectives of the incentive programs included the simplification and standardization of EHRs and other technology to **improve quality of care, improve health outcomes,** and **reduce costs.**

Role of the EHR

Electronic Healthcare Records are an inevitable evolution for our health care systems, which allow for safe, secure, and easy data exchange. Secure data exchange increases coordination of care and quality. Additionally, EHRs facilitate healthcare reform through value-based modifiers and Accountable Care Organizations (ACOs).

To improve care providers' decision-making and patient outcomes, the Centers for Medicare & Medicaid Systems have developed regulations and incentives that encourage the Meaningful Use (MU) of EHRs.

The key components of the Meaningful Use regulations include:

- Use of a certified EHR in a meaningful manner (e.g. e-prescribing)
- Use of certified EHR technology for the electronic exchange of health information to improve the quality of health care
- Use of certified EHR technology to submit clinical quality measures (CQM)

(Centers for Medicare and Medicaid Services, 2010).

There are 14 Core Objectives for hospitals participating in the EHR Meaningful Use program:

1. Computerized provider order entry (CPOE).
2. Check drug-drug and drug-allergy interactions.
3. Record demographics.
4. Implement one clinical decision-support rule.
5. Maintain an up-to-date problem list of current and active diagnoses.
6. Maintain an active medication list.
7. Maintain an active medication allergy list.
8. Record and chart changes in vital signs.
9. Record smoking status for patients 13 years or older.
10. Report hospital clinical quality measures to CMS or States.
11. Provide patients with an electronic copy of their health information, upon request.
12. Provide patients with an electronic copy of their discharge instructions at time of discharge, upon request.
13. Capability to exchange key clinical information among providers of care and patient- authorized entities electronically.
14. Protect electronic health information.

EHRs are multifaceted tools that support improved health care via functions outlined in the core objectives above. These functions include the creation and secure storage of patient medical records, and document demographics, vital signs, allergies and active medications, current problem lists, active diagnoses, and smoking status. Additionally the core objectives encourage providers to use EHR features to **improve safety, quality and efficiency of care** and to make better clinical decisions and avoid preventable errors. (Blumenthal & Tavenner, 2010)

Benefits and Limitations of the EHR

The benefits of EHRs are undeniable. Not only can digital records contain information about a patient's medical history, diagnoses, medications, immunization dates, allergies, radiology images, and laboratory and test results, EHRs offer access to evidence-based tools that providers can use in making decisions about a patient's care. Other benefits are the automation and streamlining of providers' workflow, and improvements in the organization,

accuracy, and accessibility of stored patient information. EHRs can support changes in payer requirements and meet consumer demands and expectations for improved accessibility of their personal health information. Additional benefits continue to be identified as the systems' software/programs evolve.

Limitations of the EHR

While EHRs may be designed to support evidence based practice and may include patient safety mechanisms such as dose, medication allergy, drug interaction and duplicate therapy warnings, they have also been implicated in medication, treatment and documentation errors. Unfortunately, orders entered into a patient's record incorrectly (wrong: patient, medication/treatment, dose, frequency, parameters, etc.) may be more difficult to detect. Documentation shortcuts (copying and pasting notes, pre-charting, etc.) and errors (order entry, omission) are problematic from not only a medico-legal perspective, but may contribute to patient safety errors.

EHRs have definite limitations, yet these challenges reveal opportunities for improvement efforts to use clinical quality measures to inform policy decisions, clinical processes and clinical decision support. EHRs can help to emphasize the national quality strategy priorities through alignment of quality indicators and provision of standard mechanisms for reporting those quality measures. (Centers for Medicare & Medicaid Services, 2013)

Some of the barriers to effective EHR use have included the lag in physician adoption. However, a recent report suggests that nearly 50 percent of eligible physicians and providers, and 80 percent of hospitals have implemented EHRs. The number one reason for the delay in physician groups' and private practitioners' adoption of EHR is the initial expense of purchasing a system. Primary Care Providers are paying for a portion of the health information technology systems they use in their practices, but other entities such as hospital systems and insurers derive a substantial portion of the cost savings from the EHR use. The hesitancy in making the investment is compounded by an uncertain financial benefit. Strong public support for physicians to have easy access to all medical records will work to spread EHR utilization despite the unfunded and unreimbursed costs. (American Hospital Association, 2007). (U.S. Department of Health & Human Services, 2013).

Additional limitations of the EHR focus on the information stored in the electronic system and how it is best used. If information is missing, there could be a high risk of delay in patient care or interventions, or there may be unnecessary duplication of services, increasing costs. (American Hospital Association, 2007) The amount of data documented in an EHR can also be overwhelming; it may be difficult to determine the best way to mine the information to improve quality and outcomes. In addition, EHR users often develop work-around mechanisms to improve their personal efficiency with the software; these work-arounds can by-pass or minimize the built-in safety mechanisms or alerts. These limitations beg the controversial question: Is the EHR driving practice or is practice driving the EHR?

ANALYSIS OF DATA

Charts, data tables, diagrams, and graphs are widely used in health care to depict performance of structures, processes and outcomes. Through a rigorous process of data analysis, these data can be understood: variation can be evaluated and performance to goal can be determined. The process of analysis calls upon us to: collect, clean, aggregate, and analyze our data with the goal of eliciting useful information. In this section, we will describe how to take raw data and turn them into information that you and your teams can act upon.

As noted above, data are collected for a variety of reasons. In quality improvement, different types of data are collected depending on the phase of the improvement journey. When we are running Plan, Do, Study, Act cycles, we will most likely be collecting qualitative data which describes what we are observing or experiencing.

For example, if we were testing a new readmission risk tool we might collect qualitative data such as:

- How easy or hard was it to complete the risk assessment?
- Did the information in the assessment follow the order in which the information appears in the medical record?
- Does the person testing the tool have any suggestions about how the risk tool could be simplified?

After the risk tool is refined for use in our organization through our PDSA cycles, we would implement it in one location within our hospital. At that point, we would begin to collect compliance data. These data might include process measures, such as how often was a designated risk assessment completed within the first shift, or the rate at which the designated assessment was completed. If our goal is to improve readmission rates by using this risk assessment tool, we would also want to collect outcome data about our number of readmissions.

Before any data are collected, we must agree upon our definitions, so that if different people are collecting these data they will all be doing so in the same way. Let's take an easy example. If we wanted

to collect data about the percentage of blue candies in a set of five different candy bowls, we would first need to count the total number of candies in each bowl. The total number of candies would be our denominator. We would then count the number of blue candies in the bowl and this would be our numerator. To determine the percentage of blue candies in the bowl, we would divide the number of blue candies (our numerator) by the total number of candies (our denominator). The following data table illustrates this example.

BOWL	NUMERATOR (#BLUE)	DENOMINATOR (#TOTAL)	PERCENTAGE
A	12	240	5%
B	120	240	50%
C	125	250	50%
D	130	250	52%
E	115	230	50%

Unfortunately not every situation in health care is as straight forward as the above example. Much of the data we collect in health care is subject to exclusions.

For example, if we are collecting data on our readmissions…

- Are we including all adults or only those with a specific primary diagnosis or over a certain age?
- Are we excluding patients who die in the hospital, who are transferred to another acute care facility, or who leave against medical advice?

Once we know what data we need to collect, we need to answer additional questions, such as who will collect these data, how often will they be collected, what sources will be used to locate these data, to whom will they be submitted and shared with, etc.? After we have developed our measurement plan and addressed all of the above questions, our data collection process can begin. The next step would be to review these data and "clean" or validate them. In looking at the above data table, do any of the data look odd or out of place to you? If so, you would want to go back and check those data to make sure that they are valid. One way to look for potential errors in your data is to look at variation on a month to month basis, or, in this situation, a bowl to bowl basis. We can see that in all of the bowls the total number of candies is fairly consistent, but in bowl A the number of blue candies is very different than it is in the other bowls. Was the number of blue candies truly so low or was there a data entry error? Since there is such a large discrepancy, it would be important to validate that the numerator (the number of blue candies in bowl A) is correct. If the numerator were incorrect, it would need to be corrected to avoid drawing incorrect conclusions in our subsequent analysis.

One way to analyze data is by using descriptive statistics. If the data in our table were correct we could describe our data set in the following ways:

The **mean** or **average** of our data set is the sum of the numerators divided by the sum of the denominators.

(12+120+125+130+115)/(240+240+250+250+230) = 42 percent of the candies in the bowl are blue on average.

Since we have an outlier in this data set, a number that is distant from the remainder of the data set, we might be more inclined to use the median to describe this data set.

To determine a **median**, we organize the data in descending value and select the actual mid data point. In our example we have 52%, 50%, 50%, 50%, 2%. The middle number in this series is 50%, so that value is the median we would use to describe what this data set looks like.

Let's leave this simple example, and move to a more complex example of analysis. Let's say that your organization has been tracking its readmission rates and wants to reduce them. Before you decide how to do so, it would be helpful to analyze your data to learn from them, so that you can channel your resources where they will make the most difference for your patients.

For example, you might want to look at the total number of live discharges (exclusions: transfers, deceased, <18 yrs. old, or OB). You might also want to look at the total number of patients. You would then gather data about the total number of 30-day readmissions.

Gathering these data will tell you different pieces of information. While the total number of discharges will help you understand your overall readmission rate, the total number of patients will allow you to see if your rate is being impacted by a smaller sub-set of patients who are readmitted more frequently. This differentiation is important, because the strategies you might use to reduce your overall readmission rate such as Teach Back, post-discharge calls, making appointments prior to discharge, and medication reconciliation might need to be augmented or revised for the sub-group of more frequently readmitted patients.

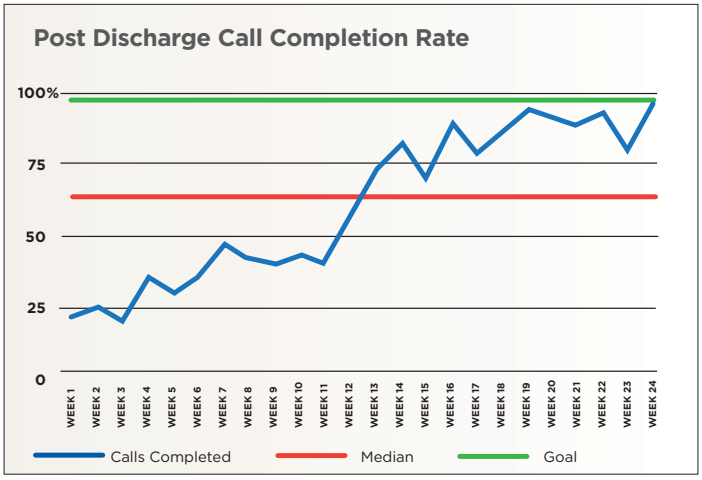
Likewise, it would be useful to *sort your data by discharge disposition* to learn the answers to questions such as: Are more patients being readmitted from skilled nursing facilities (SNFs), home health, or homes with no services? If you found that, in your organization,

more patients were being readmitted from SNFs, you might develop a strategy to collaborate with the SNFs in your community. If, on the other hand, you discovered that the majority of your readmitted patients were those who went home without home health care, your strategy might be to find and link these patients to support services in your community. As we see from the example above, a primary reason to perform a data analysis is to determine your priorities, and understand what you should focus on.

Now let's imagine our goal is to reduce our readmission rate by 20 percent. Our current rate or baseline is 10 percent, therefore our goal would be to reduce our readmission rate to 8 percent. After having done the analysis of our actual readmissions data described above, we would select those strategies that would likely reduce our rate.

We would then want to collect data for our desired outcome, which in this case is our readmission rate, as well as some of the key processes that we believe will help to reduce that rate, e.g. the numbers of post-discharge phone calls completed and post-discharge appointments made prior to discharge.

We would then analyze our data to see if the changes we are making in our processes are resulting in the improvement we desire. Per the example above, let's say we collected data about our compliance with the key process of post-discharge phone calls. In this situation, our denominator would be the number of patients who should have received a post-discharge phone call, and our numerator would be the number of patients from that group who actually received a post discharge phone call. The collected data would then be displayed in a simple run chart, in which time is on the X, or horizontal axis, and the compliance rate is on the Y, or vertical axis, as in the sample below.



We could then use the run chart analysis rules to determine if we had made a positive change. These rules are:

Shift – Six or more consecutive points, either all above or all below the median,

Trend – Five or more consecutive points all going up or all going down,

Runs – A non-random pattern is signaled by too few or too many runs, or crossings of the median line. A run is a series of points in a row on one side of the median,

Astronomical data point – An astronomical data point is one that is obviously very different from the rest.

Using these run chart rules to analyze our data we can see both a shift and a trend. This is telling us that a change is actually occurring and that the variation in data is not happening by chance. We can also see that, on a few occasions, we are reaching our goal, so that we know that it is achievable.

In conclusion, data analysis allows us to transform raw numbers into meaningful analyses that can be used to guide our improvement efforts. By analyzing our data, we are able to learn if our improvement strategies are effective, where we need to make improvements, and which improvements we need to make.

Finally, these reports and analyses should be communicated to the improvement team(s) as well as to the relevant leaders and the governing board to highlight the successes and underscore the commitment to quality improvement. Communicating with stakeholders about assessments, analyses, and conclusions can be facilitated through the use of specific templates that summarize the progress made by the improvement teams.

ELIMINATING HARM ACROSS THE BOARD (HAB) TEMPLATE

The AHA/HRET has adopted a modified Harm Across the Board template, initially developed by CMS/NCD. *(Appendix IV)* The key goal of the HAB template is to support transparency in improvement efforts and efficiently demonstrate the results of successful quality initiatives. The templates can be used to engage hospital improvement leaders and hospital executives to commit to reducing "harm across the board" and to adopt a quality action plan. The templates can also promote the sharing of results and lessons learned with other hospitals to inspire and guide peers and colleagues in these efforts. A seven slide PowerPoint file provides a concise summary of this tool and is described below:

Cover slide: Includes photos of the hospital, the safety team, and the CEO; and lists the names of the safety team members to provide recognition. Includes the hospital's safety motto.

Total Harms: Includes a run chart that displays the total harms per discharges over time (monthly). By adding up all harm events, it captures the overall harm in the hospital.

Topic-Specific Run Chart: In the form of a run chart, displays progress on one of the 11 topics for which the hospital would like to highlight improvement progress.

Risk Profile: Displays the estimated number of risk opportunities patients encounter in a hospital.

Improving Harm Rates: To determine improvement status, calculates the topic-specific harm per discharge rates for the baseline and the current measurement, as compared to the target rate.

Hospital Risk Score Card: The summary slide displays harm risk per patient, the number of applicable areas of harm that have been adopted, and tracks progress across topics. Areas of success and improvement opportunities are shown.

Pearls: A bulleted list of the greatest insights about which improvement strategies worked and why.

By completing these HABs, hospitals will be able to shift their organizational cultures, put a face on harm, tell compelling stories to support change, promote transparency, help track overall harm per discharge, and identify areas with the greatest opportunities for improvement.

The messages conveyed in the HABs can be enhanced if the authors focus on the "5 C's of Quality Writing." Communication should be Clear, Concise, Compelling, Consistent and Correct. For the AHA/HRET HEN HABs, a sixth "C" of "Complete" could be added.

- **"Clear"** data and language are understandable, avoid jargon, and are careful to explain abbreviations, to ensure that content will be understandable by readers who are unfamiliar with the project.
- **"Concise"** writing is precise and conveys meaning by using as few words as possible. Specifically, the Pearls slide should provide enough detail, but in a brief, bulleted manner.
- **"Compelling"** addresses communicating the importance and value of the improvement efforts, i.e. why is the project important and why should resources be expended in this area. Slide titles are a great way to tell your story. The cover slide that includes your hospital's safety motto is another way to reinforce the importance of the project.
- **"Consistent"** refers to the flow across slides. The reader should understand the PDSA Tests of Change, and if tests are being evaluated, adapted, abandoned or adopted. How are the tests being linked to lessons learned and next steps? Include the strategies that worked in the Pearls slide.
- **"Correct"** reflects the accuracy of the content. Are the data accurate? Any typographical errors?
- **"Complete"** references the provision of information. Is relevant information provided in each slide? Do the data include a baseline or a notation that baseline data was not available? Is there any missing information? Annotations are a great way to complete your improvement story.

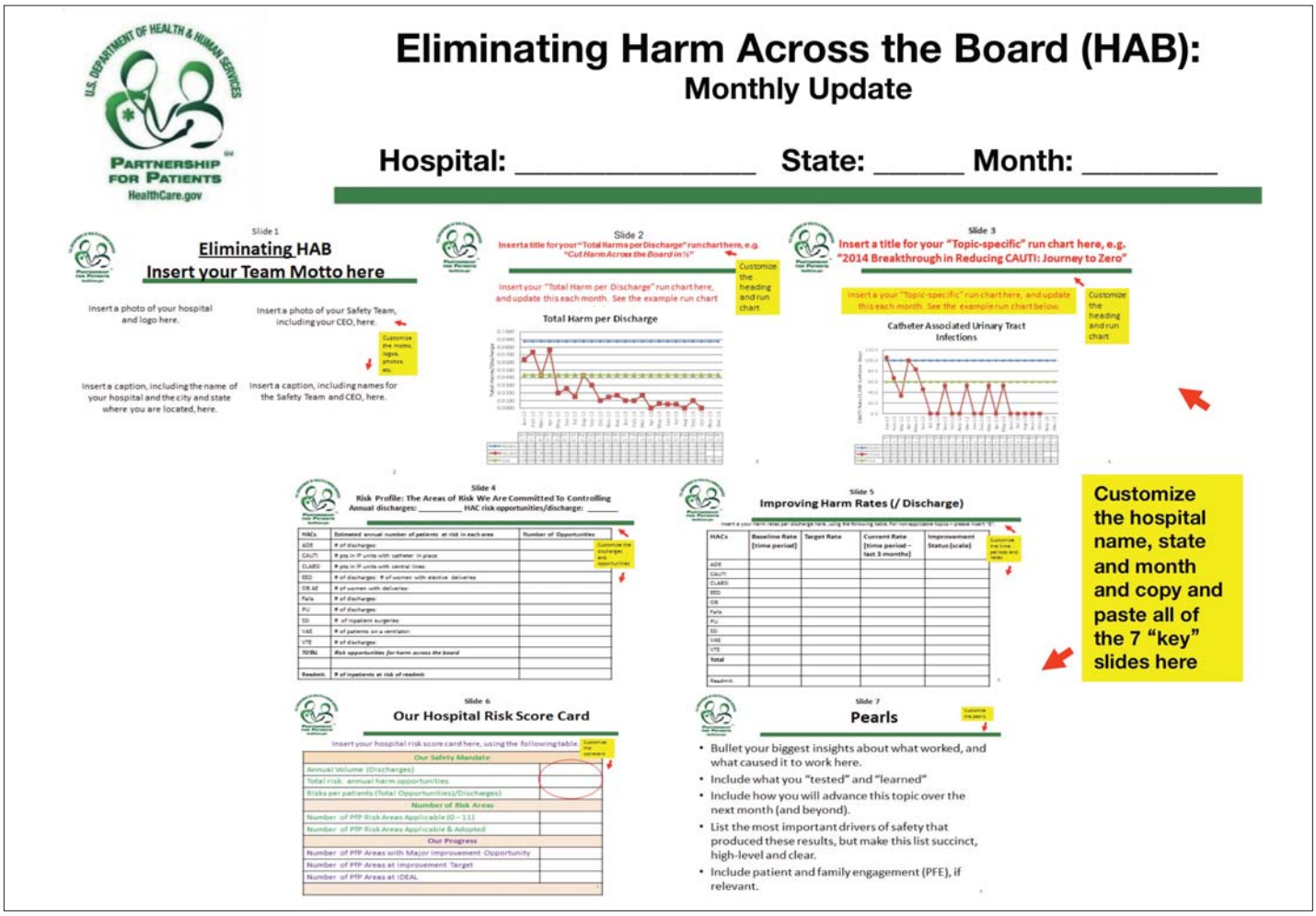
HABs should be updated regularly and can serve as a record that allows readers to follow the hospital's quality journey. Questions answered could include:

- What challenges have been faced?
- Which solutions were implemented?
- Which interventions or improvement strategies were modified?
- Who was engaged in the efforts?
- Was the quality improvement team multi-disciplinary?
- Did it include an executive leader, a physician champion, front-line staff, patients or family members?

Summary

The effectiveness of performance and quality improvement projects can be assessed through specific performance and outcome measures. Data collected from Tests of Change should be analyzed to identify positive impact and variations, and disseminated to regulatory agencies, governing boards and other stakeholders via periodic and specific Harm Across the Board Templates.
(See The Implementation Guide, Volume I section on Communication)

Exhibit 1 – Eliminating Harm Across The Board Template
(see also Appendix IV)

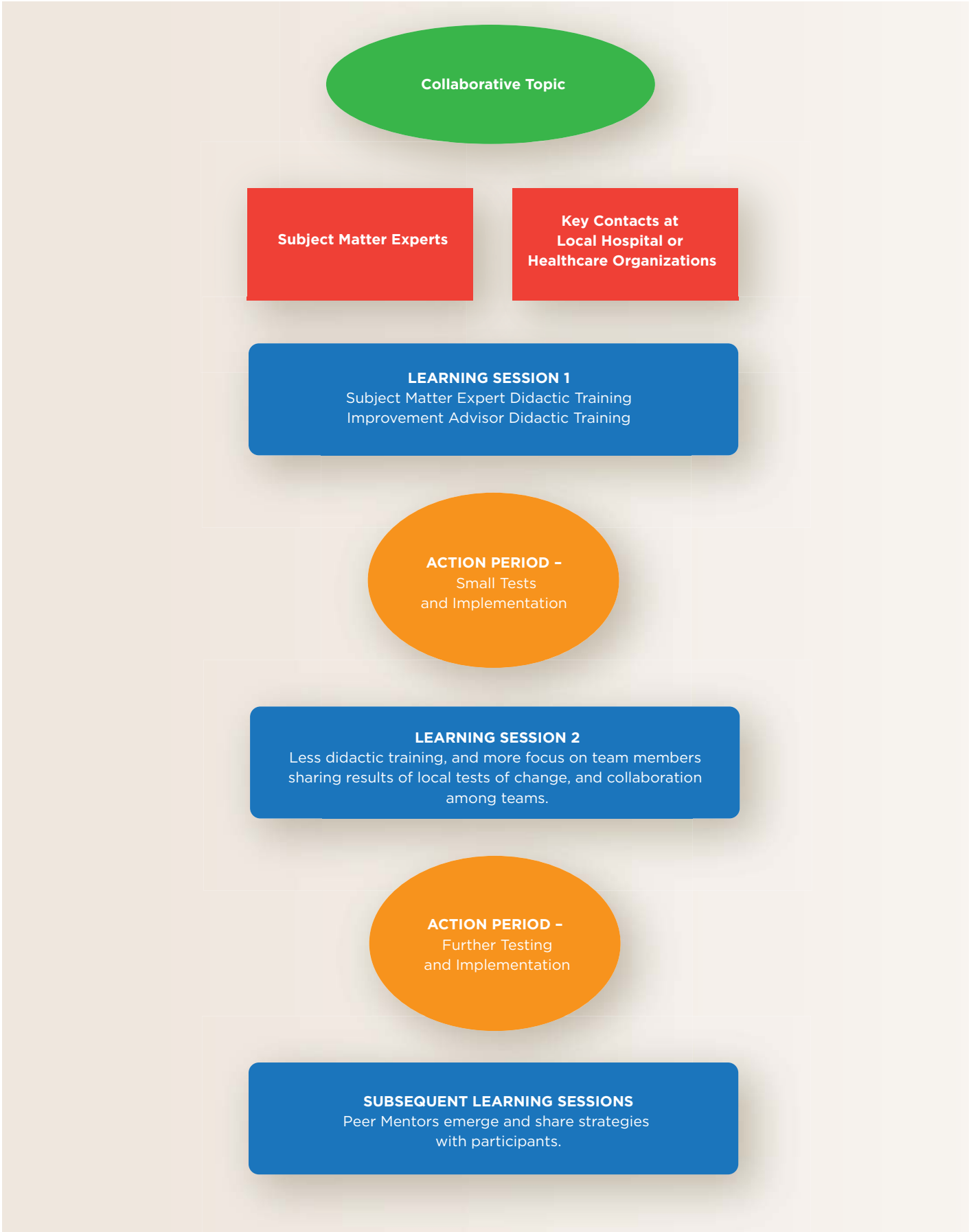


Summary

Performance improvement programs are a cornerstone of quality of care. Successful performance improvement requires an ongoing commitment to active personal and institutional learning through a rigorous process of strategic planning, initiative implementation, data collection and analysis, procedural revision, and continuous assessment. Part I of the *Implementation Guide* outlined the history and fundamentals of health care quality, patient safety, and organizational responsibility; and provided an overview of and guide to the most effective "best practices" that can promote and ensure a strong quality improvement initiative. Part II supplements Part I's foundation by providing specific content and guidelines for the establishment of a successful quality improvement program which implements these best practices in a high-quality, person- and family-centered environment. PART II includes key approaches and tools to support continuous and sustained performance improvement in your and your health-care organization's life-enhancing and life-saving work.

> "We are ready. And what can bridge us from the reality to hope is clear: it is change. It's deep change — change in what we do and change in what we think. But it is all possible. It requires only that we think again."
>
> — **DON BERWICK**

Appendix I: Collaborative Model



Appendix II: Common Microsoft Excel Actions (EXCEL 2003, PAGE 1 OF 3)

Microsoft Excel 2003	
Topic	**Notes**
Cell location	Just like a map. Use the coordinates along the top and left side. Letters denotes columns; numbers denote rows. This cell is B2: column B, row 2.
Rename worksheet	Right click on worksheet tab. You will see rename as an option, Select it with your left mouse key and type the new name of your worksheet. Double click on worksheet name (e.g. Sheet1), then type new name.
Insert Column	Right click on the letter of the column, and choose insert (left click). Select entire column by left clicking on the letter of the column. Use 'Insert' drop down menu and select (left click) column.
Insert Row	Right click on the number of the row, and choose insert (left click). Select entire row by left clicking on the number of the row. Use 'Insert' drop down menu and select (left click) row.
Drag and copy (or autofill)	Select the cell(s) you wish to copy. Move your mouse to the bottom right-hand corner of the cell, until you see a "skinny cross", then left click and drag the information over (or down).
Copy and paste	Right click on the cell(s) you wish to copy. Select copy. Select cell where you'd like to paste the information. Right click and select paste. Select the cell(s) you wish to copy. Use 'Edit' drop-down menu, select Copy. Select cell where you'd like to paste the information. Use 'Edit' drop-down menu, select Paste. Select the cell(s) you wish to copy. Hit Ctrl+C. Select cell where you'd like to paste the information. Hit Ctrl+V. Select the cell(s) you wish to copy. Click Copy button (two sheets of paper) on Standard toolbar. Select cell where you'd like to paste the information. Click paste button (clipboard) on Standard toolbar.
Adding button on toolbar	Move mouse to far right of the Standard or Formatting toolbar. Left click on the arrow pointing down, select the button you would like to add.
Add a worksheet	Using 'Insert' drop-down menu, select Worksheet. Right click on a worksheet tab. Select Insert.
SUM	=SUM(beginning cell:ending cell), e.g., =SUM(A2:A6)

Microsoft Excel 2003	
Topic	**Notes**
Average	=AVERAGE(beginning cell:ending cell), e.g., =AVERAGE(B2:B6)
Count if	=COUNTIF(beginning cell: ending cell,"criteria"), e.g., =COUNTIF(C2:C6,"<2")
Percentage	There is no function for percent. The formula is: =numerator/denominator, e.g., D2/D3
Using the Function wizard	Select the cell where you want the answer returned. Click the 'fx' button in front of the formula bar. Using the drop down category menu, select all. Scroll down until you reach the function you want. Enter all arguments required.
Create Data Collection Sheet	-Use Row 1 as a header row (variable names). The data will be entered in rows. -The first column(s) should be demographic data (try to include unique identifier). -Keep the headers and unique identifiers visible while entering data by using 'Window' drop-down menu, select freeze panes.
Add formulas	All formulas start with an =. The basic formula construct is: =WHAT(cell location:cell location).
Add data	Enter data into a cell then hit the 'tab' button. Continue (left to right) until you reach the last data point for that row. Then hit enter.
Auto filter	Used to view only a portion of your data. Grab your data by selecting (left-click) all rows of your data. Use the 'Data' drop down menu, select filter, then autofilter. Use drop downs to filter data. To turn off auto-filter, repeat process: use the 'Data' drop down menu, select filter, then deselect (left-click) autofilter.
Sort	Grab your data by selecting (left-click) all rows of your data. Using the 'Data' toolbar, select sort. This opens a dialogue box. Choose (using drop downs) up to three columns on which to sort the data. Select ascending or descending sort.

Microsoft Excel 2003	
Topic	**Notes**
Using the Chart wizard	Grab your data. Using the 'Insert' drop-down menu, select Chart. Grab your data. Click the chart button on the Standard tool bar. Step 1 of 4: Select chart type, e.g. column. By grabbing data first, you are able to preview each chart type. Step 2 of 4: Source data. If you grabbed your data first, here is where you verify that it is the data you want. Step 3 of 4: Chart Options. Here you walk through multiple tabs: title, axes, gridlines, legend, data labels, data table to format your table. Step 4 of 4: Location. Here you choose where to place your chart. Select 'as a new sheet' or 'as an object in' (current sheet).
Format graph to your style	Right click on the white space to get back into any of the four steps of the chart wizard: Chart type, Source data, Chart Options, Location. Double-click to format any part of the chart: title, legend, axes, bars, plot area, etc.

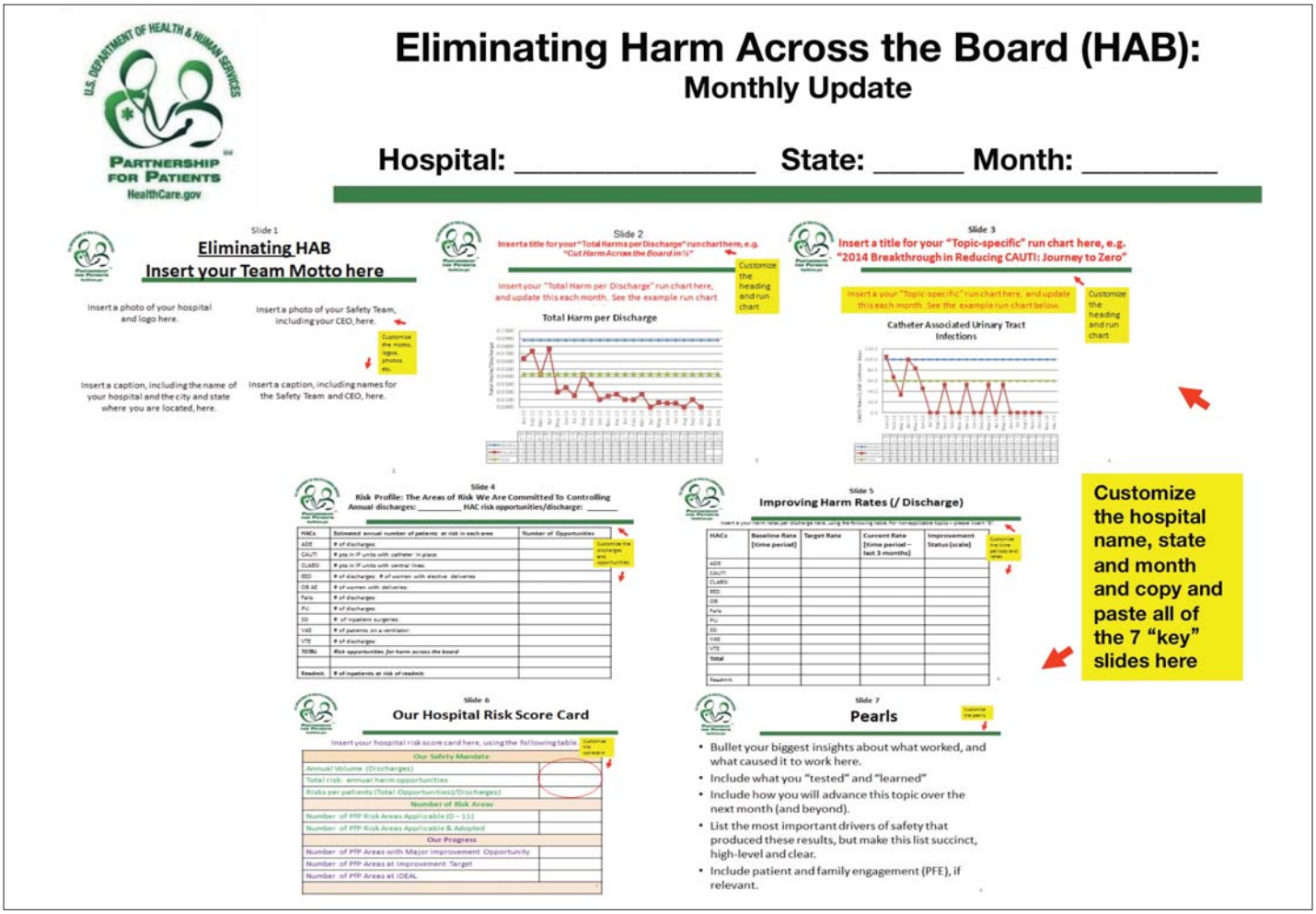
Appendix III – Common Microsoft Excel Actions (EXCEL 2007, PAGE 1 OF 3)

Microsoft Excel 2007+	
Topic	**Notes**
Cell location	Just like a map. Use the coordinates along the top and left side. Letters denotes columns; numbers denote rows. This cell is B2: column B, row 2.
Rename worksheet	Right click on worksheet tab. You will see rename as an option, Select it with your left mouse key and type the new name of your worksheet. Double click on worksheet name (e.g. Sheet1), then type new name.
Insert Column	Right click on the letter of the column, and choose insert (left click). Select entire column by left clicking on the letter of the column. Use 'Insert' drop down menu (under Home Ribbon-Cells).
Insert Row	Right click on the number of the row, and choose insert (left click). Select entire row by left clicking on the number of the row. Use 'Insert' drop down menu (under Home Ribbon-Cells).
Drag and copy	Select the cell(s) you wish to copy. Move your mouse to the bottom right-hand corner of the cell, until you see a "skinny cross", then left click and drag the information over (or down).
Copy and paste	Right click on the cell(s) you wish to copy. Select copy. Select cell where you'd like to paste the information. Right click and select paste. Select the cell(s) you wish to copy. Left click Home-Clipboard-Copy. Select cell where you'd like to paste the information. Left click Home-Clipboard-Paste. Select the cell(s) you wish to copy. Hit Ctrl+C. Select cell where you'd like to paste the information. Hit Ctrl+V.
Add a worksheet	Left click the far most right tab (*). Select Home-Cells-Insert (drop down; choose worksheet).
Add formulas	All formulas start with an =. The basic formula construct is: =WHAT(cell location:cell location).
SUM	=SUM(beginning cell:ending cell), e.g., =SUM(A2:A6)
Average	=AVERAGE(beginning cell:ending cell), e.g., =AVERAGE(B2:B6)
Count if	=COUNTIF(beginning cell: ending cell,"criteria"), e.g., =COUNTIF(C2:C6,"<2")
Percentage	There is no function for percent. The formula is: =numerator/denominator, e.g., D2/D3

Microsoft Excel 2007+	
Topic	**Notes**
Using the Function wizard	Select the cell where you want the answer returned. Click the 'fx' button in front of the formula bar. Using the drop down category menu, select all. Scroll down until you reach the function you want. Enter all arguments required. Selet function under Formulas (using categories). Under formulas, click insert function.
Create Data Collection Sheet	-Use Row 1 as a header row (variable names). The data will be entered in rows. -The first column(s) should be demographic data (try to include unique identifier). -Keep the headers and unique identifiers visible while entering data by using View-Freeze Panes drop down menu.
Add data	Enter data into a cell then hit the 'tab' button. Continue (left to right) until you reach the last data point for that row. Then hit enter.
Auto filter	Used to view only a portion of your data. Grab your data by selecting (left-click) all rows of your data. Under Home Ribbon-Editing-Sort & Filter, select filter. To turn off auto-filter, repeat process: under Home Ribbon-Editing-Sort & Filter, deselect (left-click) filter.
Sort	Grab your data by selecting (left-click) all rows of your data. Home Ribbon-Editing-Sort & Filter, select sort. Selecting A to Z sorts data alphabetically by first column of selected data. Z to A sorts reverse alphabetically. Selecting Cusom sort opens a dialogue box. Choose (using drop downs) which column to use in sorting the data. Select ascending or descending sort. Add level to add a second layer of sorting. Check the box, if your data has header rows.
Conditional formatting	This is used to format cells only when the cells meet certain criteria. Select the cells you which to conditionally format. Under Home-Conditional formatting, use drop down menu. Select Highlight Cell Rules, select appropriate rule.
Insert graph	Grab your data. Using the 'Insert' Ribbon, select desired chart type.

Microsoft Excel 2007+	
Topic	**Notes**
Format graph to your style	When you are in your chart (left click), Go to Chart Tools. Design: Can change chart type, e.g. column. Can change source data color and location here. Layout: Here you format title, axes, gridlines, legend, data labels, data table. Format: Here is where you format borders/color fill.

Appendix IV – Eliminating Harm Across the Board Template



Slide 1

Eliminating HAB
Insert your Team Motto here

Insert a photo of your hospital and logo here.

Insert a photo of your Safety Team, including your CEO, here.

Customize the motto, logos, photos, etc.

Insert a caption, including the name of your hospital and the city and state where you are located, here.

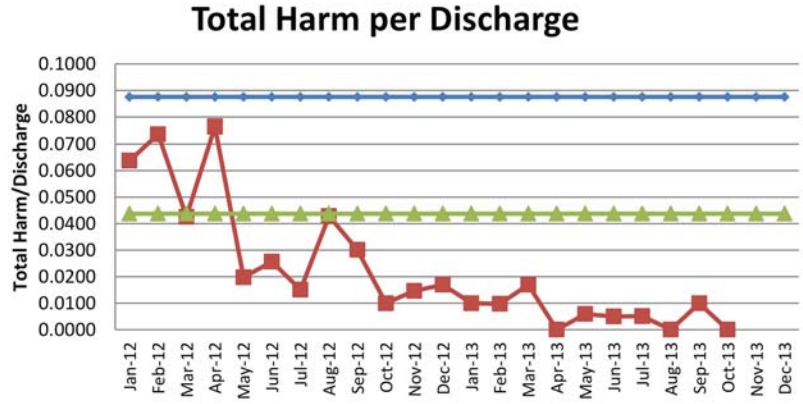
Insert a caption, including names for the Safety Team and CEO, here.

Slide 2

Insert a title for your "Total Harms per Discharge" run chart here, e.g. *"Cut Harm Across the Board in ½"*

Customize the heading and run chart

Insert your "Total Harm per Discharge" run chart here, and update this each month. See the example run chart below.



	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
Baseline	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Hospital	0.06	0.07	0.04	0.08	0.02	0.03	0.02	0.04	0.03	0.01	0.01	0.02	0.01	0.01	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.00		
Goal	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

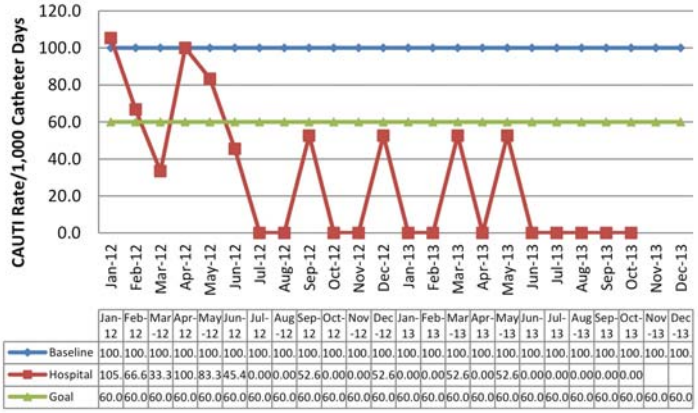
Slide 3

Insert a title for your "Topic-specific" run chart here, e.g. "2014 Breakthrough in Reducing CAUTI: Journey to Zero"

Insert a your "Topic-specific" run chart here, and update this each month. See the example run chart below.

Customize the heading and run chart

Catheter Associated Urinary Tract Infections



	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
Baseline	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Hospital	105	66.6	33.3	100	83.3	45.4	0.00	0.00	52.6	0.00	0.00	52.6	0.00	0.00	52.6	0.00	52.6	0.00	0.00	0.00	0.00	0.00		
Goal	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Slide 4

Risk Profile: The Areas of Risk We Are Committed To Controlling

Annual discharges: _____ HAC risk opportunities/discharge: _____

Customize the discharges and opportunities

HACs	Estimated annual number of patients at risk in each area	Number of Opportunities
ADE	# of discharges:	
CAUTI	# pts in IP units with catheter in place:	
CLABSI	# pts in IP units with central lines:	
EED	# of discharges: # of women with elective deliveries	
OB AE	# of women with deliveries:	
Falls	# of discharges:	
PU	# of discharges:	
SSI	# of inpatient surgeries:	
VAE	# of patients on a ventilator:	
VTE	# of discharges:	
TOTAL	***Risk opportunities for harm across the board***	
Readmit.	**# of inpatients at risk of readmit:**	

Slide 5

Improving Harm Rates (/ Discharge)

Insert a your harm rates per discharge here, using the following table. For non-applicable topics – please insert "Z".

HACs	Baseline Rate [time period]	Target Rate	Current Rate [time period – last 3 months]	Improvement Status (scale)
ADE				
CAUTI				
CLABSI				
EED				
OB				
Falls				
PU				
SSI				
VAE				
VTE				
Total				
Readmit.				

Customize the time periods and rates

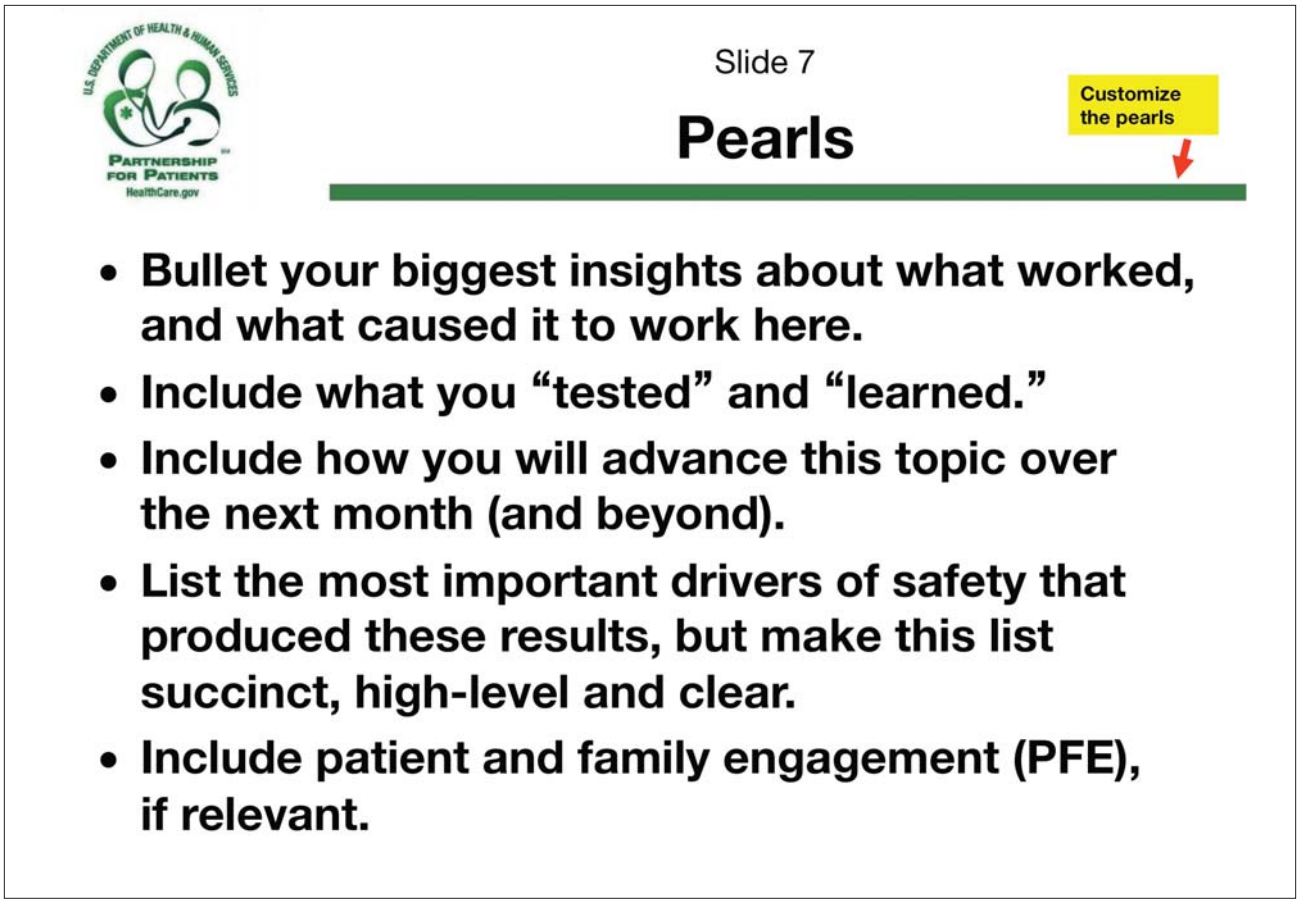
Slide 6

Our Hospital Risk Score Card

Insert your hospital risk score card here, using the following table.

Customize the scorecard

Our Safety Mandate	
Annual Volume (Discharges)	
Total risk: annual harm opportunities	
Risks per patients (Total Opportunities)/Discharges)	
Number of Risk Areas	
Number of PfP Risk Areas Applicable (0 – 11)	
Number of PfP Risk Areas Applicable & Adopted	
Our Progress	
Number of PfP Areas with Major Improvement Opportunity	
Number of PfP Areas at Improvement Target	
Number of PfP Areas at IDEAL	


Slide 7
Pearls
Customize the pearls
• Bullet your biggest insights about what worked, and what caused it to work here.
• Include what you "tested" and "learned."
• Include how you will advance this topic over the next month (and beyond).
• List the most important drivers of safety that produced these results, but make this list succinct, high-level and clear.
• Include patient and family engagement (PFE), if relevant.

Appendix V – Improvement Calculator

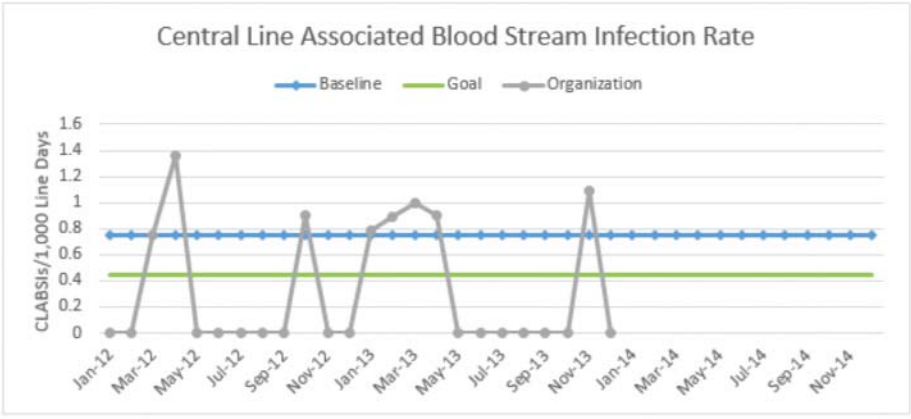
The Improvement Calculator is a tool that was developed by Cynosure Health to help "translate" raw data regarding hospital acquired conditions into meaningful information. It calculates the most current 3-month rate as well as the percent improvement compared to baseline. This information is utilized in creating the *Harm Across the Board presentations*.

The Improvement Calculator also provides an estimate of the harms prevented to-date in each topic area in addition to an overall harms-prevented. The number of harms prevented is a more concrete concept that is easier to comprehend than a rate and more importantly, it brings the discussion back to the patient. By also providing cost estimates for each hospital acquired condition, the Improvement Calculator estimates the cost-savings achieved, which can be useful when discussing improvement efforts with senior leadership and other stakeholders.

The Improvement Calculator can be downloaded at *www.hret-hen.org*

Sample Organization

Most Recent 3-Month CLABSIs/1,000 Line Days (% Improvement) Three month period ending:	0.4 (51.1%) Dec-13
Number of CLABSIs Prevented To-Date	12
Cost Savings To-Date (Based on average $17000 cost per CLABSI)	$ 204,000
Estimated Number of CLABSIs to Prevent in Order to be at Goal Rate by Next Month	0



Input for calculations		
	CLABSIs	Line Days
Baseline	1	1,338
Goal	40%	reduction
Cost	$17,000	/CLABSI
Jan-12	0	1,123
Feb-12	0	1,145
Mar-12	1	1,338
Apr-12	2	1,474
May-12	0	1,342
Jun-12	0	1,318
Jul-12	0	1,439
Aug-12	0	1,524
Sep-12	0	1469
Oct-12	1	1107
Nov-12	0	1215
Dec-12	0	1,281
Jan-13	1	1270
Feb-13	1	1116
Mar-13	1	1008
Apr-13	1	1106
May-13	0	1024
Jun-13	0	979
Jul-13	0	969
Aug-13	0	854
Sep-13	0	841
Oct-13	0	743
Nov-13	1	917
Dec-13	0	1077

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www.hhs.gov

www.cms.gov

www.ihi.org

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