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eHEALTH DATA SOLUTIONS

CONVERTING DATA TO ACTION

with CareWatch,® RiskWatch,® and UBWatch™

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INTRODUCTION

The abundance of data in the healthcare industry can overwhelm even the most astute practitioner. Data are created by thousands of patient events and analyzed in hundreds of ways by families, payers, accreditation agencies, and the Centers for Medicare and Medicaid Services.[1] Data are also used when physicians, nurses, and researchers develop and test new treatments or best practices. **Because data mirror each patient's care and share it as an aggregation that reflects provider and patient performance,** they are also employed when surveyors and auditors inspect facilities. As a result, both patients and providers need to understand how data are created and analyzed and learn to implement actions that lead to continuous improvement.

Learning and taking to heart the tools for quality improvement described in this white paper will help you meet your goals. The lessons and examples contained herein present tools which assist the profession to be ever striving for performance and quality improvement. Many health care professionals have long ago adopted the methods and processes of CQI. We are in an era of health care reform which has, and continues, to take the data and information gathered by long term care and make it visible to the public at large. The steps to convert data to action will result in improving the results you report and will help the entire profession prove that the services we provide are high quality.

Converting data to action begins with data confidence, a foundational understanding of what data are, what they mean, and why they are important. This paper examines the history of data in healthcare and the use of Statistical Process Control charts (SPC), an effective tool for examining data in a time series. The paper then outlines a series of six process improvement steps that can be applied within CareWatch, RiskWatch, and UBWatch to help administrators and enterprise managers direct the resources available in order to improve the care that is delivered.

eHealth Data Solutions staff strives to inspire quality improvement by describing how data can be used to effect positive outcomes. Therefore, this paper is designed to help nursing homes, assisted living facilities, home care, hospice, adult day services, community services, and other health care providers identify opportunities in their data and use these data to improve. It is our hope that this paper provides a foundation to assist long term care providers in their efforts to convert data into action.

1. For more uses of data in healthcare, see Carey xxiv-xxviii.

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FOUNDERS OF THE STATISTICAL PROCESS CONTROL MOVEMENT

The process steps outlined in this paper reference the work of three influential pioneers in the use of Statistical Process Control charts (SPC) and the use of SPC in health care.

Dr. Walter A. Shewhart

Shewhart is known as the "father of statistical process control" (American Society for Quality). In 1924, while working at the Western Electric Company, "Dr. Shewhart prepared a little memorandum… [that included] a simple diagram which we all recognize today as a schematic control chart" (The Porticus Centre). With that diagram, Shewhart established the methodology now known as process quality control. He also taught that, for long term success, companies should focus on quality, not price, when promoting value. Shewhart emphasized the importance of reducing variation in a manufacturing process to control quality. Shewhart recognized that defining quality was difficult, but thought it was a worthy exercise to establish quality standards (Kaluzny and McLaughlin 21).

Dr. William Edward Deming

Deming is widely credited with improving production in the United States during the Cold War, although he is known best for his work in Japan. From 1950, until his death in 1993; he taught top management how to improve design, service, product quality, testing and sales through various methods, including the application of statistical methods. Deming taught that by adopting appropriate principles of management, organizations can increase quality and simultaneously reduce cost. Dr. Deming's system for "Profound Knowledge" became one of the cornerstones of transformational leadership. Many of the elements of Statistical Process Control (SPC) are attributed to Deming's work. He widely publicized the distinction between "normal" variation and "special cause" that is discussed below as a key concept for understanding the variation displayed on statistical process control charts. The use of control charts and Deming's plan-do-check-act cycle has been instrumental in quality improvement in healthcare and many industries and areas around the world (Wikipedia contributors).

Dr. Raymond F. Carey

Dr. Carey is internationally known as a leader in the use of statistical process control and survey research methods in healthcare (Carey 190). Carey writes that healthcare professionals need to measure the effectiveness of clinical and operational quality improvement efforts in order to respond to the widespread use of data in the healthcare profession (xviii, xxiv-xxviii). In support of those efforts, he presents practical applications of SPC tools and techniques in a healthcare setting. In addition to publishing over 50 articles and books, Dr. Carey has conducted seminars for healthcare and management professionals around the world. He also served on the Joint Commission on Accreditation of Health Care Organizations' Council on Performance Measurement (Carey 190).

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HISTORICAL USE OF DATA IN HEALTHCARE

Following the work of Shewhart and Deming, statistical process control has been used to improve quality in many industries and areas around the world. However, widespread use of SPC methods in healthcare began in the mid 1980s. Hospital Corporation of America (HCA), Harvard Community Health Center, and the Intermountain Health System adopted the Deming approach to help foster Continuous Quality Improvement (CQI) within their organizations. They referred to it as the FOCUS-PDCA cycle. Using the HCA designated principles outlined by Deming as the FOCUS-PDCA cycle provided healthcare workers with common language that aided in implementing the method for continuous improvement (Kaluzny and McLaughlin 28).

The healthcare profession has become increasingly more familiar with the use of SPC methods. With the recent influence of healthcare executives that have previous backgrounds in the manufacturing field, healthcare is finding that correct application of data results in improved quality. In addition, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the Institute for Healthcare Improvement (IHI) have stressed the importance of using statistical process control when measuring improvement. In 1998, JCAHO furthered the SPC movement in healthcare by announcing its intention to use the methods in its accreditation guidelines. In 2001, JCAHO began using control charts in accreditation surveys. (Carey xix).

In *Continuous Quality Improvement in Healthcare,* Kaluzny and McLaughlin explain that what training in Deming methods adds is knowledge of how to build a new theory using insight about systems, variation and psychology." Deming's methods help to answer thefollowing basic questions:

1. What are we trying to accomplish?
2. How will we know when that change is an improvement?
3. What changes can we predict will make an improvement?
4. How shall we pilot test the predicted improvements?
5. What do we expect to learn from the pilot test?
6. As the data comes in, what have we learned?
7. If we get positive results, how do we hold onto the gains?
8. If we get negative results, what needs to be done next?
9. When we review the experience, what can we learn about doing a better job in the future?

(Kaluzny and McLaughlin 29).

Data continues to play an integral role in improving the quality of care. As we look towards the future in healthcare, it must be understood that success, both organizational and individual depends on our ability to continuously improve.

ADAPTING THE PDCA CYCLE TO FOSTER CLINICAL IMPROVEMENT

Deming's Plan-Do-Check-Act cycle (PDCA) is a very cost effective tool used to guide improvement activities across a variety of industries, most notably healthcare. In *Quality in Healthcare: Theory, Application and Evolution,* Graham outlines the healthcare PDCA cycle. In the first stage, known as the **Plan**, members of a quality improvement team should become "system thinkers;" meaning they should start to apply process analysis and problem solving skills. The Plan stage requires using statistical tools, such as SPC charts, to help explain variation in care processes and system activity. The key first step is to define the current process, document it, measure the effectiveness of the process, and finally identify where process improvement opportunities exist (Graham 117).

The team will study the process and will discuss a myriad of questions, i.e., what needs be changed, are organizational roles defined, and what elements or personnel can be reformed? Most importantly the team will decide if the current process is effective, and if not, what can be eliminated or integrated into the process to achieve the goal. In the Plan stage, the goal is to challenge the current processes and identify areas where process improvement initiatives are needed. In addition, where best practices do not exist, the team should establish them in the Plan stage so that the practices may be implemented in later stages of the PDCA cycle.[2]

Once opportunities for improvement are identified, the team moves into the **Do** stage. The first step in the Do stage is to stop and think about the suggested process improvement. The team needs to decide upon and define a measurable goal. If the goal is not defined, measurement of the team and the process success is difficult. After the team defines the goal and measures that will be used to determine success, they should pick a unit or area of the facility where implementation of the process improvement is most likely to succeed (118).

Implementation involves decisions about who, what, when, where and how improvements will be made. The first time the team implements the new process, it is vitally important that the team control implementation by following all of the steps outlined in the Plan stage correctly. After implementing the plan in the Do stage, the team must check the process by identifying, monitoring and measuring the results.

In the **Check** stage, the desired process outcomes outlined in the previous stages of the cycle are used to measure and determine the success of the process improvement. In this stage, the team must carefully measure the actual results of the process improvement and compare those to the desired results. To accurately assess improvement, the team needs to document any process interventions that occurred during implementation that may have positively or negatively affected the results.

Ultimately, the goal in the check stage is to determine the improvement's effectiveness. If established goals have been achieved or significant progress has been made towards these goals, the Act stage may begin. (118).

The **Act** stage is the final stage in the PDCA cycle. Here, the team works to standardize the new process and repeat the process throughout the organization. The Act stage may require some modification. In healthcare, standardization of the process can sometimes become problematic because many facilities, units, and job functions are unique. When it seems that the improvement is not transferable: reapply the PDCA cycle to that particular unit or function (120).

The PDCA cycle in healthcare creates an organizational culture of continuous improvement. It provides the common ground that improving the health status of the residents (or patients) is assuring the viability of the organization.

2. Graham suggests special considerations be taken in the Plan stage when attempting to improve clinical processes. She recommends that the plan stage be expanded to include environmental mapping, the collection and analysis of external and internal data, and designing best practices (Graham 117).

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APPLYING DATA IN LONG TERM CARE

Converting data to action is still fundamental to the practice of delivering quality healthcare. In fact, the Institute of Medicine defines quality health care as, "The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Lohr 21). Knowing whether an action or practice increases the likelihood of a favorable outcome requires the analysis of data.

Using data for decisions is also endorsed by national organizations and campaigns directed at long term care. The American Association for Homes and Services for the Aged (AAHSA) compiles industry data and creates reports that members can use for benchmarking and understanding best practices (AAHSA). The American Healthcare Association (AHCA) website also displays research and data for long term care. These two associations have joined with The Alliance for Quality Nursing Home Care to sponsor the Quality First program, a response to the 2002 launch of the Nursing Home Quality Initiative by the federal government (American Health Care Association). The program lists continuous quality improvement as one of the fundamental components of quality in long term care. AAHSA's Quality First website pages define continuous quality improvement as "using CQI methods to enhance existing programs, improve effectiveness and foster a collaborative work environment" (AAHSA).

Advancing Excellence in America's Nursing Homes, supported by both AHCA and AAHSA, is another campaign that encourages facilities to set quality goals and provides evidence-based resources to help facilities meet their targets (NH Quality Campaign). The American College of Health Care Administrators (ACHCA) promotes facility leadership and offers educational programming concerning CQI and SPC. Using data for decisions is not only an effective management technique and industry standard, it helps facilities meet current regulations. In the Medicare State Operations Manual defining skilled nursing facility conditions for participation in Medicare and Medicaid, F-520 states that a facility must have a quality assessment and assurance committee that "…identifies quality deficiencies and develops and implements plans of action to correct these quality deficiencies, including monitoring the effect of implemented changes and making needed revisions to the action plans" (Centers for Medicare & Medicaid Services 584). Identifying deficiencies and monitoring improvement require the collection and analysis of data.

Consistent with the recommendations of the Institute of Medicine and the guidance given to State and Federal skilled nursing facility and assisted living facility surveyors, and incorporating themes from the PDCA cycle, eHDS proposes this general process for affecting improvement in your facility.

1. Ensure data are complete and accurate
2. Identify opportunities for improvement
3. Look for root cause of the current state (and determine if the process is stable)
4. Set measurable goals
5. Develop an action plan
6. Follow-up to evaluate the effectiveness of your action plan

The use of SPC charts has been shown to be an effective method of identifying opportunities, assessing root cause, and measuring progress in healthcare. In their study of the use of SPC for healthcare improvement, Thor et al., reviewed articles from a variety of disciplines and organizations and found that "SPC can indeed be a powerful and versatile tool for managing changes in healthcare through QI" (Thor, Lundberg and Ask 389). Though SPC does have limitations, factors that can make using SPC more effective included using information technology, continuing education, and using "literature and experts" to help apply SPC correctly (397). An example of the use of SPC in nursing homes is Schnelle, et al.'s discussion of incontinence. By monitoring patient wetness and using SPC, they developed a "technology to describe and set work performance standards related to urinary incontinence care." (Schnelle, Newman and Fogarty 633).

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SOURCES OF DATA IN LONG TERM CARE

To help lower cost and improve care in medicine, scientific and social innovations brought about the use of electronic recording of data. Long term care providers have a valuable set of data on items that are identified as elements of care that reflect quality.

Minimum Data Set, Quality Indicators / Quality Measures, and Case Mix

The Minimum Data Set 2.0 (MDS) or MDS is "A core set of screening, clinical and functional status elements...forms the foundation of the comprehensive assessment for all residents of long-term care facilities certified to participate in Medicare or Medicaid" (CMS, RAI Manual 2.0 1-4). Hundreds of points of MDS data are used to generate measures of nursing home quality and to determine Medicare and, in some states, Medicaid reimbursement (1-4). Additionally, electronic submission of MDS information to state databases is mandated for all facilities who receive Medicare or Medicaid (1-7, 1-10). This requirement means most long term care providers have valuable sets of data available electronically on both the items that compose reimbursement and those identified as elements of care that reflect quality.

The MDS determines the quality measure score provided to the public and the Quality Indicator reports that are used in the CASPER system and are available to state and federal health care surveyors. These quality metrics from the MDS include the 19 Quality Measures displayed on **www.medicare.gov,** in the Nursing Home Compare reports and the 34 Quality Indicators / Quality Measures (QI/QMs) that are used by surveyors. Both CMS and the state regulators extract the quality metrics from residents' MDS data.

The MDS is also used to determine Medicare and, in some states, Medicaid reimbursement. According to the RAI manual, the MDS is completed for Medicare residents, subject to grace days, at days 5, 14, 30, 60, 90, 100 of the benefit period and every 30 days thereafter (CMS, RAI Manual 2.0 2-27). In 2004, the MDS was also the basis for Medicaid reimbursement levels in 25 states (Bellows and Halpin, 326). For non-Medicare residents the MDS is recorded on admission, every 90-92 days, and/or on significant change of condition (CMS, RAI Manual 2.0 2-1 - 2-17). Each RUG is assigned a case mix value weighted to reflect the variable amount of resources needed to care for different residents (InterRAI).

The MDS 3.0, scheduled for implementation in October 2010, offers a new resident assessment process intended to improve MDS reliability, data accuracy, and relevance to current clinical practice (CMS RAI Manual 3.0 1-1, 1-10). By helping to standardize protocols, methods for problem-solving, and communication, this tool will also function to support an evidence-based nursing process (1-1 - 1-10). Like the MDS 2.0, the 3.0 will be a powerful source of data to determine reimbursement, measure quality, and communicate with consumers (1-5 - 1-6). Unlike the 2.0, the MDS 3.0 also collects data from the perspective of the resident (1-1).

Incident and Occurrence Reports

Incident and occurrence reports are another type of data that are collected in long term care. F-226 requires facilities to report incidents of "alleged violations and all substantiated incidents" to state and other agencies, investigate the occurrences, and analyze them to identify need for facility changes (Centers for Medicare & Medicaid Services 66). F-323 also requires "evaluating hazard and risk data" and investigating occurrences such as falls (237). Tracking incident reports is also noted under F-520 as a source of data for quality assurance and assessment committees. To meet these regulations, most facilities complete incident and occurrence reports and keep an occurrence log. Types of occurrences recorded include falls, skin issues, injuries of unknown origin, wounds, and medication errors, instances of alleged abuse, theft, behavior problems, elopement, and others. However, many facilities still do not compile this type of data in a database to facilitate analysis.

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APPLYING STATISTICAL PROCESS CONTROL TO LTC IMPROVEMENT

Statistical Process Control charts (SPC) can appear to be intimidating. Yet, the charts tell a story about performance that should not be ignored. To become data confident, each individual manager of care processes must develop their own ability to use data and securely apply it when teaching associated care givers how care needs to change to improve outcomes. Understanding SPC is a good first step in gaining this data confidence.

SPC is a philosophy, a strategy, and a set of methods for ongoing improvement of systems, processes, and outcomes. The SPC approach is based on learning through data and has its foundation in the theories of variation espoused by Shewhart and Deming: understanding common and special causes (Carey 7-8) (Kaluzny and McLaughlin). The SPC strategy incorporates the concepts of an analytic study, process thinking, prevention, stratification, stability, capability, and prediction. SPC incorporates measurement, data collection methods, and planned experimentation (Carey xviii).

SPC charts represent data as a process that changes over time. Measuring a QI/QM in SPC charts then presents the item measured by the QI/QM as a process. Using SPC as a tool to apply to Falls or Occurrence of Pressure Ulcers in High Risk Populations over time presents an important view of outcome information. These charts can aid in deciding whether the variation in QI/QM scores is due to chance or because of a special cause or meaningful changes. By applying what is learned through the SPC effort, this information can be utilized to decide which areas to target for improvement and when intervention is necessary.

In *Improving Healthcare with Control Charts*, Carey describes several types of SPC charts (21-22).[3] The p-chart or np-chart is applied to items measured as proportions or percentages. Because many of the examples in this paper apply to percent data as defined by the QI/QM score, the p-chart is used. When SPC is applied to Case Mix Index (CMI), the i-chart might be a more appropriate way to measure performance. The i-chart, or XmR chart, applies when each element measured in the SPC chart can be measured individually, such as quarterly CMI. Occurrences could be measured using a u-chart to account for events per patient day, or using a c-chart to trend number of occurrences over time independent of patient days. For a detailed discussion of each chart type, please see Carey 2003. CareWatch and RiskWatch calculate SPC charts for QI/QMs and incidents/occurrences. Basic trend charts are generated for CMI.

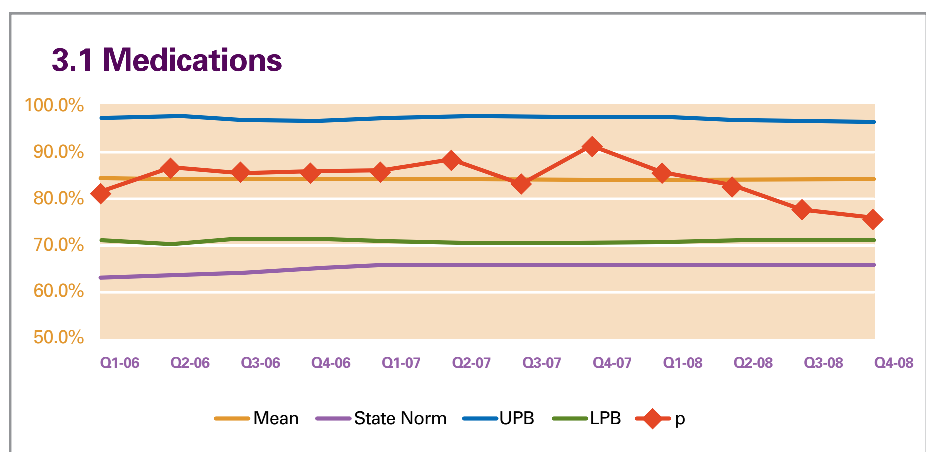
With SPC charts, it is desired that a minimum 12-15 points of data (months or quarters) is used. With 12-15 data points, the upper and lower limit, special cause and gap take on more significance (Carey and Lloyd 54); each chart displays a period of time related to the facility's data and has the following elements:

- **p-values:** The percent of residents that triggers a QI/QM each month or quarter
- **Mean:** Average facility percent for the period of time
- **State Norm:** Average percent of a QI/QM across your state (this info can be obtained from a CASPER report). You can choose another benchmark if desired.
- **Upper Performance Boundary (UPB):** +3 standard deviations from the mean (adjusted based on number of residents)
- **Lower Performance Boundary (LPB):** -3 standard deviations from the mean

When reviewing an SPC chart, ask yourself the following questions:

What is the Gap, or the distance between the Upper and Lower Performance Boundaries (UPB-LPB)?

The **Gap** helps you answer the question, is this process stable? The larger the Gap, the less predictable (stable) the QI/QM score or CMI will be from quarter to quarter. Conversely, a small Gap means that performance has been consistent over time. In the chart below,



3. For calculation instructions, see Carey and Lloyd, 2001 (183-186).

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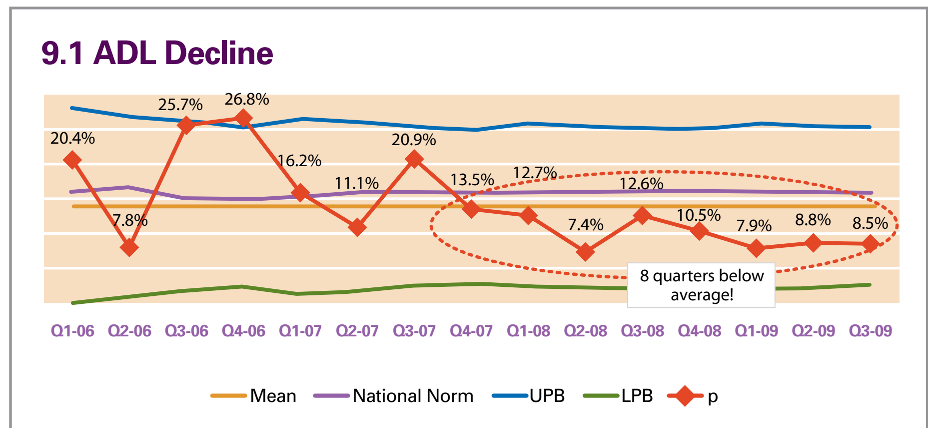

9+ Meds had an upper bound around 98% and a lower bound around 70%. More than 99 percent of the time the QI/QM will be in this range, and the Gap is 28%. This Gap means the process is less predictable than with a Gap of 10%, but more predictable than with a gap of 40%. The Gap is also a measure of process capability. Viewing the GAP as a measure of process capability and use of SPC analysis and tools, along with the PDCA cycle, helps managers target improvement to attain a higher state of performance (eHealth Data Solutions 49-53).

Is your facility mean for the QI/QM higher (worse) than the state or national norm?

eHDS suggests the **"traffic light approach"** to help facilities choose an improvement strategy based on the distance between current performance and a benchmark, such as the state norm (51). In the Medications example on the previous page, not only is the facility mean higher, it is below the lower performance boundary. This indicator is "in the red", because it is statistically unlikely that any quarter will be below the state norm without fundamental process change. Pay close attention to those QI/QMs that are consistently performing above the national norm (i.e. in the red). Similarly, processes "in the green" are predictably better than the state norm. This signifies that you are either lucky, or you should apply what you have learned by improving those QI/QMs to other processes or facilities. All other processes are "in the yellow," meaning you should pursue a strategy of education and monitoring to effect process improvement. QI/QMs flagged as yellow may either be above or below the national norm on average, but the norm is not outside of the upper and lower bounds of the QI/QM (the difference is not as significant).

What is the slope, or the overall pattern?

Slope is one way of describing the trend or direction which can be measured from the quality indicator. To calculate this value, we first establish a trend line to fit the graph of the QM. Then we calculate the ratio of the change in the QI/QM to the number of quarters that have elapsed. Therefore, the slope is the measure of improvement or worsening of a quality measure. A positive slope indicates that a given QM is worsening, while a negative slope indicates improvement. For CMI, positive slope indicates an increase and negative a decrease, the steeper the slope, the greater the improvement or decline. In the chart on the previous page, the slope can be calculated as -0.5%, meaning that the rate of Medications is decreasing by 0.5% per quarter.

When should we be concerned or celebrate?

In an SPC chart, a **trend** is defined as five or more points in a row in which the measure increases, decreases or is above or below a pre-determined benchmark.[4] For example, if an increase in the QI/QM indicates deterioration and the control chart shows a row of upward points, this indicates the need for investigation so the trend may be reversed. In the case of the ADL Decline above, we should be on alert because an increase of five points in a row warrants sufficient concern to motivate investigation and action. In contrast, when looking at the control chart of CMI, an upward trend may be an improvement if the facility is capable of providing the level of care needed for more acute residents. The source of this trend should be investigated so it may be celebrated and so that the higher CMI may be sustained.

When interpreting SPC charts, look for 5-7 quarters in a row when the percentage (p-value) or CMI increases or decreases; these are significant trends.

4. Experts do not agree on how many points in a row make a trend (Carey 10). Carey suggests a minimum of six consecutive points for a trend and eight consecutive points for an increased or decreased average (17). Because of the length of time needed to collect meaningful QI/QM data, eHDS uses a more liberal approach to foster early detection of problematic trends.

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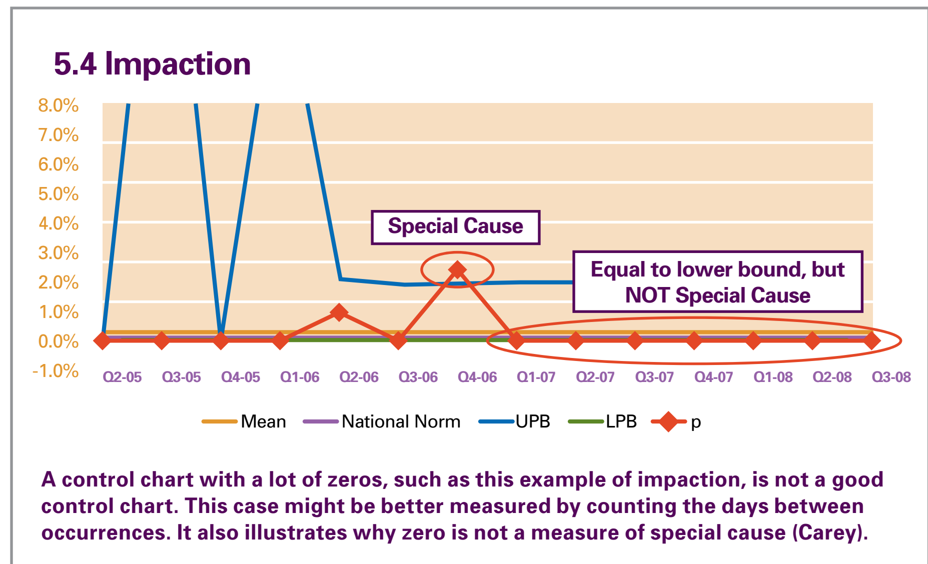
It is also notable when 5-7 quarters in a row are above or below the facility average because that pattern indicates that the average has gone up or down. For example, the ADL chart on page 9 illustrates a favorable trend: the rate of ADL decline, one of the 5 Star Measures, has been below average for eight quarters. If you have eight or more points in a row this indicates a shift in the process and is an indication to make a new control chart (Carey).

Are occasions of special cause present?

Special Cause is a non random, identifiable event that can be tracked to a particular source, i.e. a time period that is abnormally high or low (Carey 16). When a measure changes from month to month or quarter to quarter, these ups and downs are known as "variation." Quality improvement requires recognizing the difference between normal variation (or common cause) and special cause (or uncommon variation). Special Causes can indicate positive and negative changes in quality performance. When positive changes are found, managers will move the entire QM process to repeat the special cause. When negative changes are found, managers will investigate to find the cause and, when found, target the root cause for correction. In addition to paying attention to special cause, you can also better manage quality by working to improve and control normal variation.



A control chart with a lot of zeros, such as this example of impaction, is not a good control chart. This case might be better measured by counting the days between occurrences. It also illustrates why zero is not a measure of special cause (Carey).

Normal variation is improved by changing the overall process.

A quarter in which the p-value (the percentage of residents triggering a given QI/QM) is greater than or equal to the upper performance boundary (UPB) is counted as a special cause because the statistical pattern predicts that more than 99% of the time the value will be lower. A quarter in which the p-value of a QM or an individual point in the CMI trend is less than or equal to the lower performance boundary (LPB) is also counted as a special cause because the foregoing process predicts that more than 99% of the time the value will be higher.

The exception to special cause is when the LPB equals zero (see impaction example above). In this case, the p-value for a QM score cannot fall below the LPB because there can never be a percent less than zero. Additionally, we cannot calculate an LPB less than zero even when the mean is very close to zero. For QI/QMs with historically low p-values (impaction and dehydration are two examples), a p-value of zero that matches the LPB should not be considered a special cause because such a value would be expected from that QI/QM. Therefore, we exclude from the special cause list, quarters with a p-value of zero that equals the 0% LPB. The zero exception is another example where judgment and planning should be applied by managers in order to understand and adopt SPC thinking.

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CONVERTING DATA TO ACTION WITH CAREWATCH, RISKWATCH, AND UBWATCH

Quality Improvement and CareWatch

eHealth Data Solutions believes in using data for decisions, so we have designed our products to help you convert data to action and support continuous quality improvement.

CareWatch uses the hundreds of data points found on the Minimum Data Set (MDS) to populate Watch pages for quality and reimbursement, and provides Statistical Process Control charts and other trend charts to help you interpret these data. CareWatch extracts the quality metrics from your MDS data that show how the care provided by your staff is measured by CMS, including the 19 Quality Measures on Medicare Compare and the 34 Quality Indicators / Quality Measures used by surveyors. CareWatch also computes the RUG score for each assessment using the MDS 2.0 RUGs 34, 44, 53 and 66 grouper algorithms.

Ensure data are complete and accurate.

The first step in the process of using CareWatch to help convert your data to action is ensuring your data are complete and accurate. CareWatch can provide a roadmap to help you understand where you are and see where you are headed. Just like you would not set off on a cross-country trek with a map that is out of date or wrong, you should not make decisions based on data in which you are not confident. To become more data confident, send all MDS assessments to CareWatch before you send them to CMS. View logic flags and make corrections as needed in your MDS entry product. Then re-submit to CareWatch, viewing logic flags again if desired, and send to CMS. CareWatch logic flags will alert you to the presence of inconsistencies in the MDS that could lead to inappropriate care, trigger QI/QMs or survey tags, or could cause inappropriate reimbursement. Logic flags may indicate spots where you may need to update care plans or check for appropriate documentation. Checking for data integrity in CareWatch helps solve the GIGO (Garbage In / Garbage Out) trap found in many data collection efforts. By checking these flags prior to transmission to CMS, you will ensure that the most accurate data are sent to the state and that the data you use for decisions are the best reflection of what is actually occurring in your facility. By checking your data, you and your staff increase data confidence.

When embarking on any program for improvement, you should also be sure that you know the rules so you are able to interpret the data correctly (Loeb). For example, review the QI/QM technical specifications to make sure that you understand how the measures are calculated (Centers for Medicare & Medicaid Services).

Identify opportunities.

Now that you are confident in your data, you may begin process improvement by identifying your opportunities. The CareWatch **Home** page and the **SPC Summary** help you identify QI/QMs that are in the red as compared to the state and national norm. You may also visit the **QI/QM Benchmark** page to view a graphical comparison of all of your indicators with state, national, facility, or organizational averages. If any of your indicators are much higher than your chosen benchmark, the next step is to learn the pattern of the indicator. Establish the pattern or slope using the **SPC charts** and review the chart to determine:

1. What is the Gap; is this process predictable?
2. If the process is predictable, is it acceptable?
   a. What is your traffic light strategy (red, yellow, or green)?
   b. What is the distance from your mean to your benchmark?
3. Is any change normal variation, or are there real trends or special causes?
   a. Use the control limits to "filter out the noise" (Wheeler 30) and find out which months or quarters need investigation.

You may also want to periodically scan through all of the **QI/QM SPC charts** to look for any problematic trends; sometimes an indicator may be in the yellow or green as compared to your benchmark, but still show a definite unfavorable trend. The SPC charts give you a chance to notice this trend and take action before the trend leads to negative facility outcomes like survey tags.

When you identify some opportunities for improvement, choose a few to pursue, but be careful of the silo approach. Recognize that many problems have interdisciplinary causes and solutions. One example is the relationship between falls and pressure ulcers. On the surface, these may seem to be clinically distinct areas. However, one cause of both may be declining mobility.

Look for the root cause.

Before you can improve a process, you need to identify the causal factors of the current state. Causal factors are those contributors… "that, if eliminated, would have either prevented the occurrence or reduced its severity" of an identified quality issue (Rooney and Heuvel). Ask yourself and your staff, "What happened,

when, and how often? Which residents were affected? What are the barriers to improvement?" By asking these questions, you are on your way to identifying the root cause.

"A root cause is an initiating cause of a causal chain which leads to an outcome or effect of interest. Commonly, root cause is used to describe the depth in the causal chain where an **intervention could reasonably be implemented** to change performance and prevent an undesirable outcome" (emphasis added) (Wikipedia contributors).

When you are searching for root cause, do not rely on assumptions and do not stop with one causal factor. Instead, look at the facts. Drill down from QI/QM reports in CareWatch and use the Watch Pages to help investigate. In this way, by drilling down to look at individual residents and the cause of that resident triggering a QI/QM factor, profound knowledge is gained. The places where a resident triggers a QM indicate a potential failure in care or an unavoidable circumstance in which a resident's disease or condition is worsened. Compassion may require both palliation and active treatment to stop the decline. This too is a difference in the PDCA cycle, namely in healthcare, the finding of an issue and the application of the principle "first do no harm and when found eliminate harm" applies. In effect, one may view healthcare delivery as one enormous PDCA cycle.

Set goals.

When you have identified your opportunities for improvement and the causal factors that will need to be addressed, you may find it helpful to set goals for your facility or organization. You should be able to measure your progress towards these goals to determine if your action plan is working. It is important not to choose arbitrary or unreasonable numbers for those goals, as they may be detrimental (Wheeler 18) (Carey, Improving Healthcare with Control Charts: Basic and Advanced SPC Methods and Case Studies 104). Instead, examine the process and engage your staff in setting achievable goals, then give staff the support they need to meet them (Carey, Improving Healthcare with Control Charts: Basic and Advanced SPC Methods and Case Studies 104).

For example, the organizational average for prevalence of high risk residents developing pressure ulcers (QI/QM 12.1) is 17%. Their lower control limit is 5%. The organization sets a goal of 0%. While this is an admirable target, it is not achievable in their current process. Furthermore, because some residents are admitted from the hospital with ulcers and do not heal before their first quarterly MDS measurement of ulcers, that goal may not be realistic and may be very frustrating for facilities that are berated for not achieving it. Arbitrary goals may also lead to under-reporting of issues (Wheeler) and subsequent problems on survey. The Advancing Excellence national goal for high risk pressure ulcers is 6% (Quality Partners). This value is included in the organization's process limits and meets the national standard, so it may be a better goal. For an example of how a real facility used SPC thinking and processes to target and use the PDCA cycle to reduce their prevalence of pressure ulcers, see Appendix A.

Once you set your goals, you can record them on the **Advancing Excellence** tracking reports in CareWatch and then monitor your facility or organizational process towards these goals. Just go to Advancing Excellence and click "Help This Page" for more detailed instructions on using these features.

Develop an action plan.

As both Carey and Wheeler observe, goals by themselves do not cause change (Carey, Improving Healthcare with Control Charts: Basic and Advanced SPC Methods and Case Studies) (Wheeler). You, with input from your staff, must develop an action plan and commit the necessary resources to make the change (Carey, Improving Healthcare with Control Charts: Basic and Advanced SPC Methods and Case Studies 104). Remember, time is an important resource, so consider how much time you plan to commit to a program and how your staff can fit the program in with their current workflow.

First, ask how far you are from your goal: is your goal low-hanging fruit that can be attained with small behavior changes, or does meeting your goal require a fundamental process change? Your SPC charts can help you address these questions and to make this distinction. Remember, a QI/QM process that is in the red will, by definition, require a fundamental change to drop below the state or national norm.

Next, consider what corrective actions are needed to address the root cause and include them in a plan of action. Each step should be assigned to

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someone on the team, and you should plan follow-up to ensure that each action is completed and assess its effectiveness. Include all appropriate staff when developing your plans; getting buy-in or acceptance is a key component for success. As you develop your action plan, an interdisciplinary approach may be essential. Communication among departments allows you to use "all the expertise and knowledge of team members" to improve resident care (Committee on Quality Health Care in America, Institute of Medicine 83).

At the facility level, think about changes to policy, process, oversight/enforcement of policy and process. Make sure that you know both what the policy is and what staff is actually doing (Wurster, Lichtenstein and Hodgeboom). If the policy is a good idea, but is not followed, identify compliance barriers, such as confusion, and remove them if possible (i.e. with additional training). If you cannot remove the barriers or the policy is unrealistic, you may need to change the policy.

Sometimes, changes must happen at the resident level as well as the facility level. Use the clinical watch page (on the Analysis Menu) associated with the clinical topic that you are trying to improve to identify facility patterns and included residents. View the **Resident Summary Report** of affected residents to identify related conditions. Also view care plans and decide if added therapies, restorative care, or other nursing services would help improve resident condition or avoid further declines. Paradoxically, taking action on behalf of individual residents sometimes starts with the implementation of new facility processes of systematic review, such as Resident Focused Review (Schmidt, Fedyk and Daniels).

Your action plan should include a test period. You must consider the length of time needed for action steps, implementation and validation, provide a system to track action steps, and decide who will verify plan compliance. Determine evaluation criteria (your goals), and schedule a time for an initial review of the action plan, or you may delegate this review to your QA committee and/or to outside consultants.

Follow up.

A crucial aspect of any QI endeavor is follow-up. Now that you have implemented a plan of action, you must ask yourself "is it working?" To answer this question, do not guess, or you are managing by 'superstition' (Wheeler). Instead, track facility and resident-specific interventions, monitor changes in condition of affected residents, and code the MDS accurately so it best represents resident condition. Then, return to CareWatch and monitor your **SPC charts**. Often a period of after five to seven weeks, months, and/or quarters with improved results is required to have passed to judge a change as an improvement. Do not assume that a small change after one month indicates an overall improvement or that no apparent change after one month means that the intervention has failed. Remember, five to seven data points are needed to indicate a trend. Use the rules outlined in the sections above to determine if improvements have occurred and if any changes have been coincidental (common cause) or if the intervention was successful (special cause).

In evaluating the success of your action plan, use data wisely: be careful not to let the data wag the dog. A facility was reviewing their SPC charts during CareWatch training, and staff was alarmed to see an increase in falls. They attributed this increase to a change in staffing during the affected period. After a few minutes of looking at the chart and rationalizing the pattern, they discovered that they had been looking at the pattern for Pain the entire time. When you look past the first "right" answer, you will usually find a better answer (von Oech). One other note, in the example above, the DON tracked weight loss month to month. With MDS data, you may also want to consider a trend of quarters because every resident will have an assessment each quarter. However, use of the Residents option in CareWatch allows viewing monthly data. Use of quarterly data has greater application if your facility is small or has a larger short-stay population.

Attaining Appropriate Reimbursement with CareWatch and UBWatch

These process improvement steps can also be used to monitor and improve case mix.

1. **Ensure the data is complete and accurate** by regularly submitting MDSs to CareWatch, reviewing logic flags, and responding as needed. Also submit Universal Billing claims to UBWatch. UBWatch will look for coding errors (called Exceptions) in the claims that could potentially result in delayed or denied payment or recoupment of Medicare funds by Recovery Audit Contractors.

   It is imperative you understand the factors that contribute to your reimbursement. Without this foundation, your efforts and results can be likened to trying to play a game without knowing the rules. Hence, the more you understand the rules and regulations,

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Case Study: Weight Loss*

When reviewing the QI/QM SPC charts in CareWatch, the Director of Nursing noticed the number of residents with **weight loss had increased** over the last 15 months. She drilled down into the Weight Watch page and found that most of these residents were not receiving supplements.

She could have whipped off a memo reminding the nurse managers to get orders for supplements for all residents with weight loss, but she asked herself, (the Plan stage) "Why aren't these residents receiving supplements? Is this a facility-wide problem? Is it lack of physician orders for supplements, lack of documentation of supplements being given, a medical counter indication to supplement therapy or something else?"

Returning to the Weight Watch list of residents with Weight Loss, she found that the MDS submissions for residents without supplements were all within a few days of each other. With the help of the Unit Coordinators, the charts were checked for documentation and it was discovered that orders were in place but supplements were not recorded the third week of the month, the same week of the MDS look back period for these residents. The DON wondered why that would be. By interviewing the staff it was found that the **root cause** was that supplement supplies were stocked once a month and were frequently not available during the third week of the month.

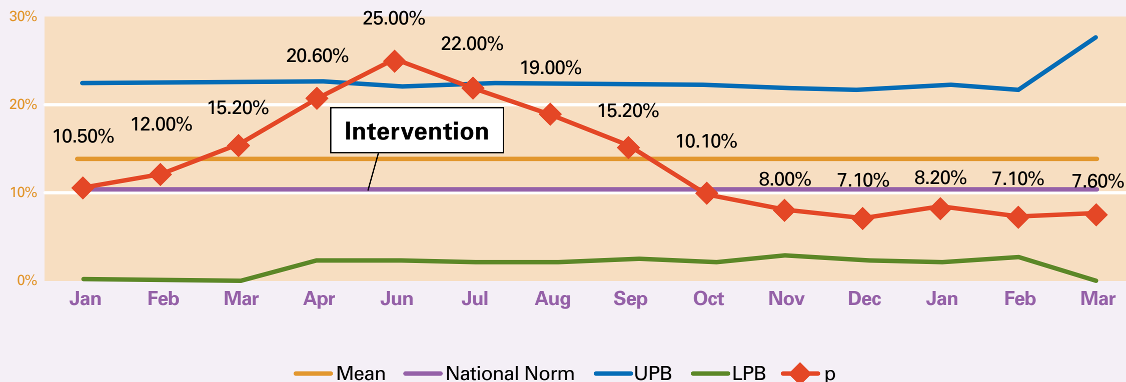
The DON set a **short term goal** of staff using proper procedures in supplement stocking and delivery of supplements to the residents during the next week. The **long range goal** was to decrease the average percent of residents with weight loss to 10% (the national norm) or lower over the next six months.

The DON collaborated with the Dietary Manager and developed an **action plan** to revise the policies surrounding delivery and documentation of supplements. A new delivery system was put in place to assure that supplements were always available. The DON also consulted with the Staff Developer and scheduled an in-service for staff on documenting supplements, as well as the procedure to follow if supplements are not available.

The month after the DON implemented her action plan, she looked at the SPC chart and saw that weight loss had increased by 4.4% and had moved above the upper performance boundary. The Administrator called the DON in concern about the increasing numbers, but the DON was able to explain that action had been taken, and weight loss could be expected to decrease. The next month, the numbers did decrease, and the percentage continued to improve for the next five months.

By avoiding the mistake of implementing the first option that came to mind and taking the time to do a thorough root cause analysis, the DON was able to identify an unusual cause to weight loss for the residents- one that would not have been solved by ordering supplements. Developing a thoughtful action plan and evaluating its effectiveness over several months led to a reduction in the prevalence of weight loss.

7.1 Weight Loss



**special thanks to Joyce Rutherford-Donner for her contributions in preparing this case study.*

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the better your chances of being successful. Review the Medicare Benefit Manual (Centers for Medicare & Medicaid Services) and any state manuals regarding Medicaid calculations.

2. **Identify opportunities** by viewing **CMI Trend Charts** to see if your Case Mix is increasing or decreasing, if there are any exceptionally high or low quarters, and if the acuity level represented in your CMI process is consistent with both your knowledge of your residents and the skill level of your staff. Also view your **RUG Trends** and **Top Exceptions** in UBWatch to search for unintended billing patterns that can be remedied.

3. If you decide that you need a change, **look for the causes** behind your current CMI. Consider the following questions: Is your facility admitting the right mix of residents? Are resident deficits care-planned appropriately? Is resident assistance appropriately captured on the MDS (view **Medicare RUG Tending** or **Medicaid RUG Watch**)? Are therapies and related diagnoses recorded on the UB Claims? Does the facility have the staff and does staff have the time to administer and document all planned services? Is restorative staff pulled to the floor and unable to complete these tasks?

4. **Set realistic and measurable goals.** For example, average CMI will increase by 5% over the next year, or CMI will stop declining, i.e. stay above the lower bound set by the current process without that boundary changing. Remember, goals do not cause changes.

5. **Develop an action plan** to address the issues identified in number 3 above. Use **Medicare Watch** and **State Watch** pages to identify residents in RUG categories that are not appropriate for the actual care the resident receives. Look for residents who could benefit from restorative programming, added therapy, and other care. Identifying residents who need therapy and restorative care helps to improve the QM scores for ADL Decline and Mobility. Plan ahead for assessments (Schmidt, Fedyk and Daniels) and re-educate staff on coding.

6. **Follow up** on the initiative to make sure actions have been completed, and measure whether your plan has been effective. Revisit your **CMI Trend Charts** and UBWatch **RUG Trends** to see if the pattern has changed, and view **Medicare RUG Tending** to assess if fewer opportunities are missed.

Role of RiskWatch

RiskWatch is also designed to be a repository of data that can be analyzed and converted to action, and the program contains many tools to aid you in reducing risk and improving resident safety and quality of care. In the event of a resident experiencing an event, a facility occurrence, such as a fall, facility staff enters relevant details into RiskWatch. The event is then investigated, root cause is assessed, and recommendations made. Finally, each event is reviewed for compliance and appropriate facility response. All of the data collected during the process of report entry, investigation, and review are then available for analysis.

The process of reducing risk in your facility or organization is very similar to the process of improving quality. F-323 requires facilities to complete similar process steps to ensure resident safety including: "Identifying hazard(s) and risk(s); Evaluating and analyzing of hazard(s) and risk(s); Implementing interventions…; and Monitoring for effectiveness and modification of interventions when necessary" (Centers for Medicare & Medicaid Services 232). Therefore, you can employ the same process improvement steps to reduce the number of falls, medication errors, and other adverse events.

Ensure data are complete and accurate.

First, you must ensure your data are complete and accurate. This means that you have a method, such as RiskWatch, for capturing information about occurrences consistently and comprehensively and tracking this information over time. This information should be pertinent to the occurrence type and aid in quality improvement. For example, if you are tracking pressure ulcers, you should record whether each was present on admission or developed while the resident was at your facility.

Identify opportunities.

Reviewing occurrence patterns on the RiskWatch **Analysis** menu is the next step in converting RiskWatch data to action. Use your **Occurrence SPC charts** to assess if each type of event is increasing or decreasing and if there are any months or quarters that are abnormally high or low. Also compare your rate to an organizational benchmark, if available. Think about what areas you would like to target for improvement. For example, do you want to reduce the rate of falls across the entire population, or the number of residents that fall three or more times within a given period? Deciding what you set for the target for improvement has definite requirements for the steps and actions necessary to achieve the goal.

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Look for the root cause.

Now, you are ready to look for the root cause. According to *Crossing the Quality Chasm*, rather than blame specific individuals for their failures, it is important to identify the system or process that led to the error. In a culture where individual failure is the focus, errors may be underreported due to fear of punishment (Committee on Quality Health Care in America, Institute of Medicine). Therefore, when searching for a root cause, look below the surface for causal factors that management has the ability to fix, change, or care plan by developing actions for prevention. Use the **Occurrence Log** and Watch pages to identify areas of risk that may be addressed. What do your resident events have in common that could be the basis for action? This should not be a one-person job. For example, you should discuss the root cause of falls in your falls committee.

An increase in event/occurrence type or a high rate should have a root cause, and each individual event/occurrence will also have a root cause. For more information on selecting root causes in RiskWatch, review your training document, *RiskWatch Investigations: Recommendations, Root Cause Analysis, and Conclusions*. Some common root causes that have been identified for events/occurrences include: equipment failure, human error, internal risk factor (medical condition), external factor, environment factor, staff did not follow plan, process inefficiency, and resident action.

Set goals.

Now, set measurable and achievable goals for your facility or organization. One goal might be to reduce average falls per month by 10%, but be sure to look at your SPC chart to evaluate your current pattern and assess if this goal is appropriate and realistic.

Develop an action plan.

The action plan in RiskWatch goes beyond responding to an individual event/occurrence. It should include interdisciplinary steps to reduce the risk of future occurrences for individual residents and all residents. If your root cause is at the facility level, consider policy changes, (re)education, and improved communication. If resident risk factors contributed to the area you are targeting for improvement, view clinical information for affected residents and consider intervention at the resident level. Use the RiskWatch **Resident Event/Occurrence Report** and CareWatch **Resident Summary** to identify resident risk factors. You may also use the clinical Watch pages in CareWatch to identify residents who may be at risk for an event/occurrence. For example, the **Falls Risk Factors** page identifies risk factors such as impaired standing balance and unsteady gait; residents with these conditions may then be screened for therapy and/or restorative care. The best action plan may combine facility level changes with resident-level care planning.

Make sure that your action steps are concrete and specific so you will know they are done. For example, reminding staff to take care during transfers may not address an increase in falls due to improper transfers. Perhaps an in-service is needed on proper transfer techniques. Perhaps a period for practice of proper transfer techniques can help. Also include an evaluation period during which you reinforce the action steps and check that they are completed, and after which you follow-up to determine the effectiveness of your plan.

Follow up.

After your evaluation period is complete, follow up to see if your action plan improved the measure of risk that you chose. Do you have a lower incidence of falls? Are fewer of your residents falling multiple times? Refer to your **Occurrence SPC** charts and your **Falls Watch** or other Watch pages in RiskWatch to make this determination. However, beware Time 1 to Time 2 comparisons. If you have fewer falls in May than you did in January that may be a coincidence. By looking at your process over time (5-7 periods where improvement is recorded make a trend), you can learn whether changes mean your plan was successful, or whether a lower value was a blip on the radar.

CONCLUSION

A 2006 Hastings Center Special Report reasoned, "Safe, effective, patient-centered, timely, equitable and efficient health care…. requires and will continue to require systematic and self-conscious management of health care delivery expressly directed at improving care. … this means…the transformation of the culture of health care delivery into a culture that is committed to continuous quality improvement" (Baily, Bottrell and Lynn S8).

Our challenge as long term care leaders is to help each patient and staff member gain value from the vital information that data provide. We share in the responsibility not only to help our staff and patients examine data, but for leaders to bring their organizations to a better understanding of how and why data should be used to support improving facility performance. The goal is to help long term care staff and patients use data to improve quality of care, reimbursement, survey outcomes, resident and staff satisfaction, and other data-based measures of performance.

In long term care, data help us to plan. They allow us to look at the past and present, and if changes need to be made, data can be used to positively affect the future. Winston Churchill stated, "History will be kind to me for I intend to write it." For leaders in long term care, SPC charts record the history of your facility or organization's performance. Using the outlined process improvement steps supported by SPC methodology, you too may begin to write the history of your performance.

Acknowledgment

The content of this paper was developed by the eHealth Data Solutions team with primary authors Theresa Schmidt, MA, Candace Jeffers LaRochelle, MHA, JD and John Sheridan, MHSA, FACHE. We especially appreciate the diligent work and attention to detail provided by both Candace and Theresa.

"Safe, effective, patient-centered, timely, equitable and efficient health care…Requires and will continue to require systematic and self-conscious management of health care delivery expressly directed at improving care… This means…the transformation of the culture of health care delivery into a culture that is committed to continuous quality improvement."
(2006 Hastings Center Special Report)

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