Improvement of Cycle Time for State Issuance of Emergency Medical Services Personnel Certification

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ABSTRACT

DEFINE: A core administrative process for almost every state and territorial emergency medical services (EMS) office is the credentialing of prehospital care personnel. The per event cycle time (how long it takes the state EMS office to issue each card) was selected by the Idaho EMS Bureau as a process improvement project. The charter developed during the Define phase revealed that the actual performance of the state EMS office from 1999-2001 was an average of 22.8 business days with a standard deviation of 21.9 days.
MEASURE: During the Measure phase, additional data was collected about applicants' and local EMS agency officials' expectations for performance and quality as part of a data collection plan.
ANALYZE: Reasons for delay in calendar year 2001 were evaluated, value analyses of process steps were performed, and baseline sigma on the same data indicated that with an upper specification limit of 10 days, the process was performing at 1.18 sigma and the average processing time was 16.2 days.
IMPROVE: Failure to determine root causes for delay using data analysis led the team to focus on process overhaul during the Improve phase. Results from a failure modes effects analysis as well as customer requirements guided configuration of the revised process.
CONTROL: Controls monitoring the performance of the process, once implemented statewide, included defined detailed procedures for staff and expectations for analysis. The resulting performance during calendar year 2003 was 2.2 days.
CONCLUSIONS: A detailed process and data analysis revealed that the process was riddled with non-value added steps, rework loops, and as such was unsalvageable. A dual-pronged approach of process analysis and data analysis moved the team away from old (and erroneous) beliefs and allowed for innovation with accountability.

Keywords: administration, certification, licensure, emergency medical services
Citation: Gainor D: Improvement of Cycle Time for State Issuance of Emergency Medical Services Personnel Certification. *EMS Mgmnt J* 2004 Jan-Mar 1(1):7-19.

DEFINE

A core administrative process for almost every state and territorial emergency medical services (EMS) office is the credentialing of prehospital care personnel. This activity is often grounded in a legislative mandate aimed at protecting the public through the assurance that a minimum level of knowledge and skill proficiency is possessed by every EMS provider, and may include other assessments associated with "fitness for practice," such as criminal background checks. Many states have administrative rules dictating the specifics of this requirement, as well as establishment of application process(es), fees, and other requirements.

In less populous states, the number of EMS certifications* issued per year may be as low as

*Throughout the health professions, "licensure" is the term most commonly used to refer to the credential issued to an individual health care provider. In EMS, however, most states refer to this credential as "certification". This term will be used throughout the article for consistency with state practices.

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Manuscript received: 18 October 2003; *Revisions Received:* 03 November 2003; *Accepted for publication:* 04 November 2003
Online Access: http://www.emsmj.com/v1n1/certification/default.htm

several hundred, while in states with larger populations, thousands of certifications may be issued every year. Regardless of the volume of certifications processed, this act is an essential component of state EMS systems' human resources deployment (i.e., making otherwise eligible providers available for local EMS agencies' use as soon as possible or desired). The exact methodology of process is centralized or decentralized.

Without regard to these state- and territorial-specific variations, a key characteristic of quality that is critical to the applicant is how long it will take to receive their card. How or if each state notifies the applicant of the anticipated wait time is unknown. In Idaho, where the improvement project described in this article was conducted, the actual anticipated performance of the certification processing system was unknown, although data was being captured on actual elapsed cycle time since January of 1999.

The Certification Cycle Time (CCT) improvement project began as an initiative of the Idaho EMS Bureau in January of 2002. This coincided with the author's fellowship at the Juran Institute in a four week Six Sigma Black Belt training program. 'Black Belt' is a term that Six Sigma leadership at General Electric, Motorola, and other corporations coined (Breyfogle et al [2001]) to describe the leader within a process improvement team following the Define-Measure-Analyze-Improve-Control (DMAIC) methodology .

A well-written charter was the essential first step of launching the CCT project. The format and development of the charter followed principles recommended by the Juran Institute and published templates and associated worksheets (Williams et al [2000]; Pande et al [2002]). A charter lists the business case, estimate of benefits, resources, scope, and boundaries of the project. Other essential statements in the charter included a problem statement, a goal statement, and deadlines for completion of each of the phases. It should be noted that not all Six Sigma or DMAIC-based texts address the utility or construct of a charter. This is an omission that causes important focus and definition to be lost on the team. The first draft charter for the CCT team was developed by the author both to gain approval for the project workload from the State Health Officer and to guide initial CCT team meetings.

The core of the charter was the following problem statement: "A retrospective review of processing time data for all applications for initial certification during calendar years 1999-2001 revealed that the elapsed time for the EMS Bureau to issue certification was an average of 22.8 business days with a standard deviation of 21.9 days. Fifty percent of all applications had an elapsed time of 18 business days or longer. The overall goal of this project was to reduce elapsed time from certification eligibility to deployment by reducing certification processing time to within 10 days of the date the application is received by the EMS Bureau. When processing time duration is longer than the expectations or business needs of the applicant or ambulance service, telephone inquiries to both the regional and central offices of the EMS Bureau result in interruption of work processes, internal conflict among employees, and frequently do not yield any additional information about or expediting of the application. Ambulance services in urban areas with a high demand for additional personnel and rural areas experiencing critical manpower shortages resort to attempts to circumvent or request special consideration during the application and certification processing phase. Unofficial feedback channels report the occasional use of unlicensed personnel, usually in a desperate or defiant mode, which is a violation of the laws and rules governing emergency medical services in Idaho, and ultimately could be prosecuted as a felony violation of the Medical Practice Act." The full project team charter document is shown in Appendix A.

The value in pursuing this project was immediately recognized among state EMS office staff. Not only was the actual processing time longer than previously perceived, this was a common source of dissatisfaction and contention between state EMS staff and anxious candidates for EMS certification or the local EMS agency officials waiting to deploy the personnel. Historical attempts appeared to have some success, but the changes made were little more than tampering. Typical approaches made in 2001 included asking individual employees involved in the process where the bottlenecks were and asking them to modify their procedures accordingly. Two examples of changes made were the discontinuation of lamination of certification cards, and no

longer making a photocopy of the certification card and letter for the applicant's local EMS agency. While the processing speed appeared to improve (Figure 1), there was no way to confirm if in fact that performance improvement was a result of those changes.

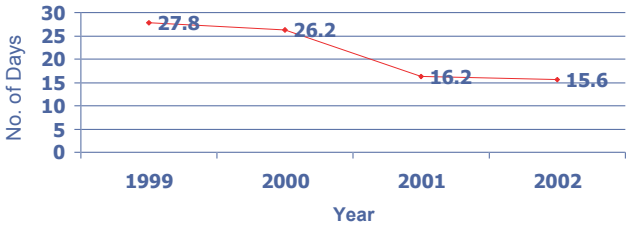

Figure 1 - Average Business Days to Certification by Year

Team member selection was congruent with the certification process. A representative of each of the types of positions which had any procedural or policy role in the state EMS office related to issuance of certifications were selected to participate: the Certification & Licensure Coordinator, a Technical Records Specialist from the Certification & Licensure Program, an EMS Regional Consultant, and a regional EMS office Administrative Assistant. The team was lead by the author, then a Black Belt in training, and staff of the State EMS Office Analysis & Planning Program who were undergoing Juran Institute DMAIC training through distance learning.

A work product of initial CCT team meetings included the creation of a SIPOC diagram that allowed the team to visualize and document the suppliers, inputs, processes, outputs, and customers in graphical form (Figure 2). The group also developed a high-level process map (Figure 3). Although team members were all familiar with the overall process associated with generating certification credentials for applicants, this activity created a valuable learning opportunity for team members, a tool to portray a simplified version of the process to stakeholders, and a means

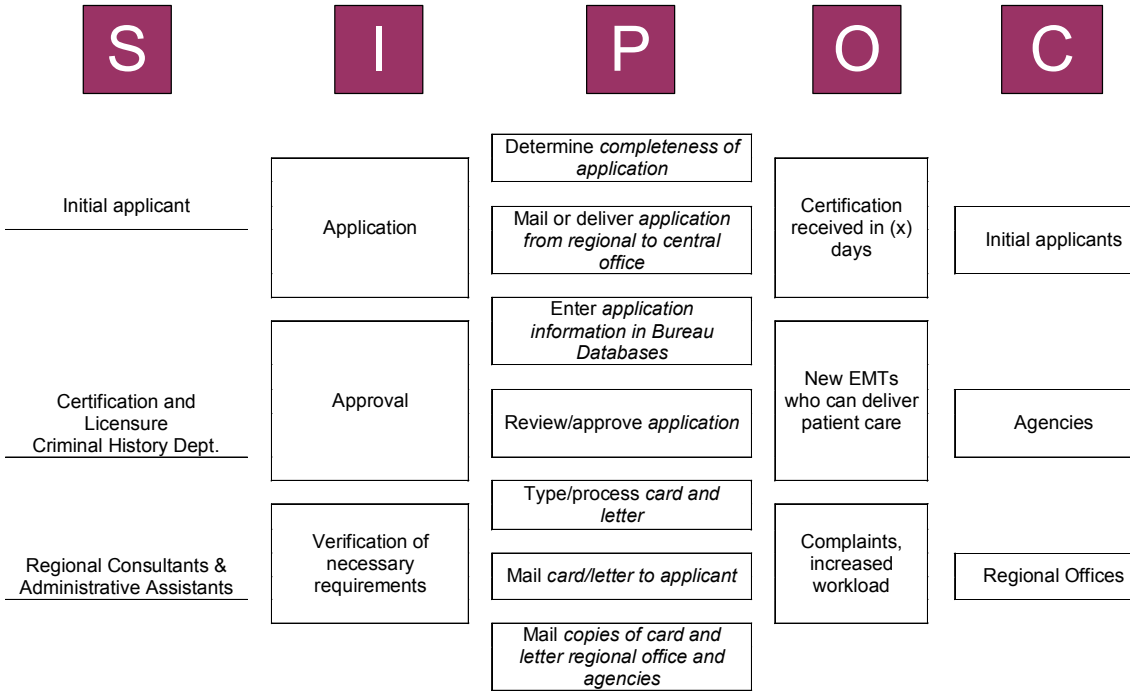

Figure 2 - SIPOC (Suppliers, Inputs, Process, Outputs, Customers) Diagram for certification process

for confirmation that the scope of the process being considered did not exceed the boundaries established in the charter.

The final resource developed in the Define phase was the "Voice of the Customer." Real conversations with the customer, in this case, applicants for EMS certification and their local EMS agency officials, were occurring on a regular basis throughout the state EMS office. Brassard & Ritter [2001] suggest that complaint information and interviews with these parties should form the basis of determining what characteristics are critical to quality ("CTQs") in the customer's view. The CTQs allow for the conversion of the team's opinion (at this phase) about the customers' preferences into measurable factors that can be used in later phases of the project.

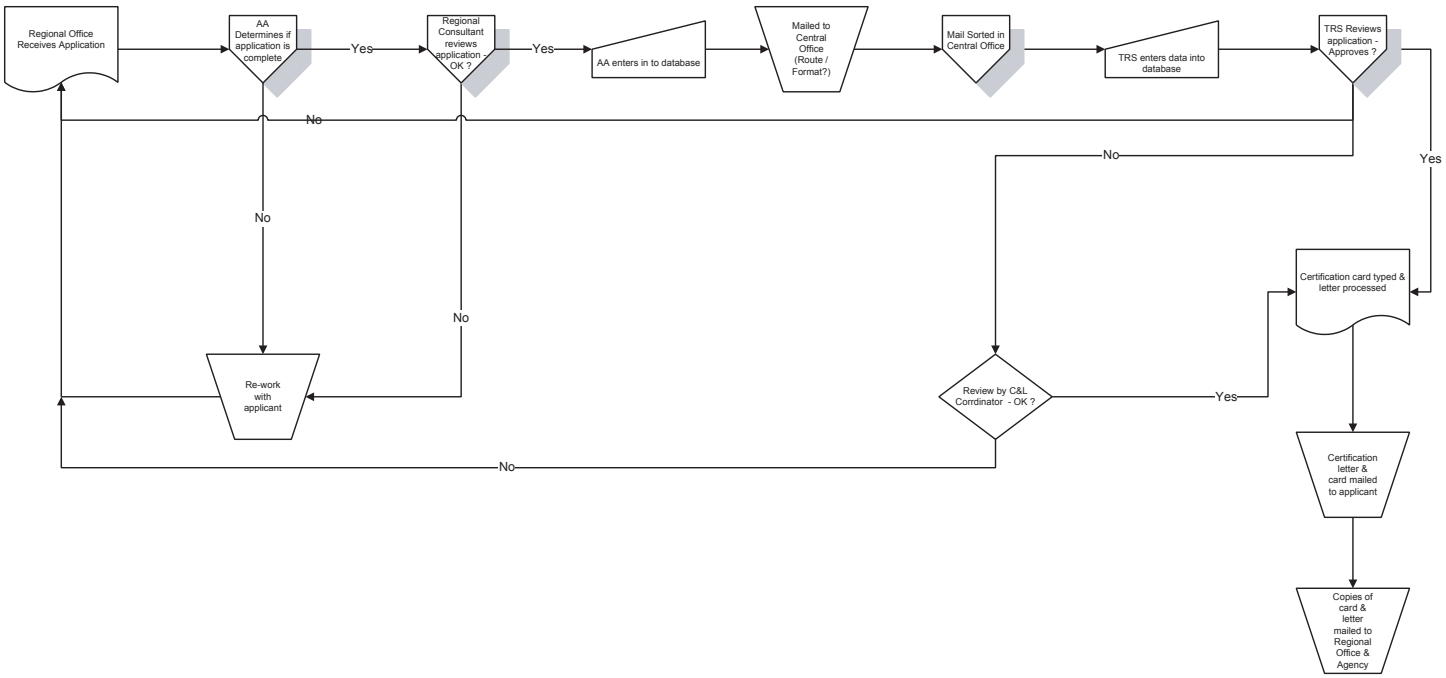

Figure 3 - Certification Application Process Map - AA = Administrative assitant; TRS = Technical records specialist; C&L = Certification & Licensure Program; *(Editor's Note: Use a higher level of magnification in your PDF viewer (e.g., Acrobat) to see details in this figure.)*

MEASURE

The state EMS office had several apparent advantages that were expected to serve as resources to the CCT project team:

1. Data and several variables of interest were already being collected upon issuance of each certification;
2. The regional EMS office staff, through whom applications were submitted by candidates, had initiated a project in mid-2001 to collect data on "reasons for delay"; and
3. The state EMS office had control over applications and other tallying points to be able to introduce temporary data collection as needed.

The team chose to utilize calendar year 2001 data (the entire population of applicants for the year) for analysis of cycle time.

Bertels [2003] acknowledges that while DMAIC is a linear process, discoveries in a given phase may cause a revisit to the decisions or assumptions made in earlier ones; this project was no exception. Each team meeting was started with "Just-in-Time" training (JITT) about methods or tools that would be used at each meeting. The same text also acknowledges that Just-in-Time is a failed American industry quality effort of the 1980s, but the phrase lent itself well to the adult learning event that needed to take place in order for all team members to understand and participate fully in CCT project meetings. An example of one of the first JITT sessions was an overview of the uses and characteristics of control charts. Since the team was assessing performance over time, the control chart was a far more revealing graphical method of display than the historical approach of showing a monthly mean in a bar chart (Figure 4). The control chart of calendar year 2001 indicated multiple instances of "special cause variation" (Breyfogle et al [2001]) indicated by multiple points above the upper control limit. This indicated that the certification issuance process itself was unstable (Figure 5).

The data collection plan developed by the CCT team included the following activities and decisions:

- Validate historical data in hand
- Confirm that key stratification variables were part of each record
- Validate ability to retrieve, access and sort data

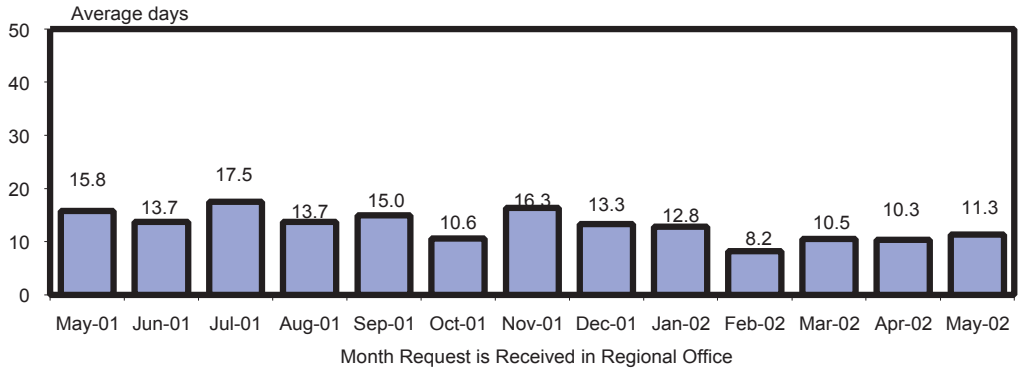

Figure 4 - Certification Cycle Time Bar Chart - Average number of days from receipt of a certification request in the Regional Office to the date mailed from the Central Office to requestor. Data are revised monthly to reflect certifications completed after the previous management indicator reporting month

- Verify rules used by collector to count days
- All analysis and graphical display would be done in Minitab™ statistical software

Measurement system analysis of the "reasons for delay" data determined that it was unusable. The methods used to classify reasons for delay, and a lack of underlying definitions as these conditions were tracked by ten different people in five regional offices throughout the state compromised the data for accuracy, repeatability, and reproducibility (Williams et al [2000]). The CCT team knew, however, that identifying reasons for delay among recently processed applications could yield important insights about failure points or problematic policies in an objective fashion.

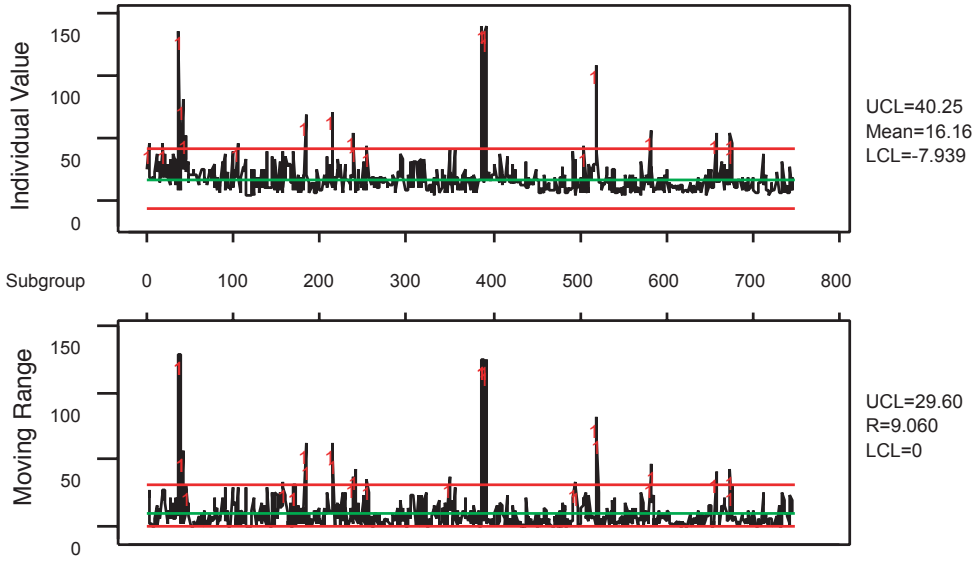

Figure 5 - 2001 Certification Cycle Time Statistical Process Control Charts

The CCT team had no problem developing the VOC and CTQs, yet at the outset of the measure phase they recognized that they had no idea how the process was performing as it related to those customer-specific characteristics, nor which (if any) of those CTQs carried more weight for the customer. It was essential for the team to transcend the fact that these customers were beholden to a monopoly, and as such were not selecting the provider of this service. The primary CTQ, believed to be speed of processing at the time, could serve as a proxy for cost and value to the customer by translating other high scoring characteristics as ones for which the customer would presumably be willing to wait longer. Planning and measuring process performance (against customer requirements), along with the establishment of defect measures by which to determine a baseline about the process itself (Pande et al [2002]) became the focus of the CCT team activities during this phase.

Identification of variables of interest for use in the Improve Phase was conducted to conclude the CCT team members' estimation of applicant CTQs. The team brainstormed what, if any, CTQs

may have been overlooked during the define phase and determined which requirements should be actively assessed to determine their relative priority for customers. Additional key measures were determined (e.g., classification of respondents by whether or not they were an EMS volunteer, assessment of the waiting time the customer expected, etc.) and built into a survey instrument (*Link to survey instrument [MS Word document format; 39K])*. The plan also identified state EMS office staff that would conduct the interviews as well as the inclusion criteria for customers to be surveyed.

The regional staff of the state EMS office was provided with instructions and a script to use during telephone interviews with each applicant certified by the state in the prior two months. An additional telephone interview was attempted with the chief administrative official of the service with which the applicant was affiliated using a similar instrument. Results were tabulated and presented graphically in the form of stacked bar charts (Figures 6 and 7). The most striking finding was that lamination of cards and copies of certification materials being sent to the local EMS agency had a higher median value than processing speed among provider responses. The CCT team made the significant observation that if the results were construed as representative of all applicants' CTQs, the state's prior tampering with the certification process actually eliminated key characteristics of quality in the blind attempt to increase processing speed.

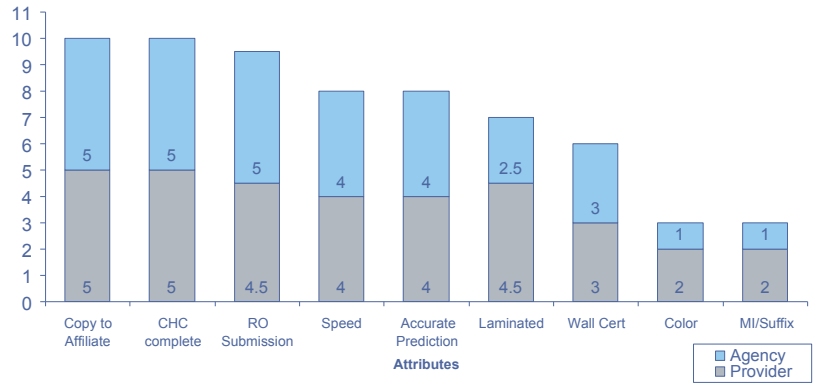

Figure 6 - Perceived Quality of Certification Services in 2002. CHC = criminal history check; RO = regional office; Wall Cert = wall certificate; MI = middle initial

The team migrated to process mapping in a more detailed fashion than what was displayed in the SIPOC. Although this was a labor-intensive activity, it yielded considerable insight into the procedures, and more importantly the variation, among the staff that had any role in generating certifications for EMS personnel (Figures 8 and 9). In addition to defining the concrete steps, hand-offs, and re-work loops, the process map provided a valuable baseline measure about the function: each individual certification event was executed in 30 (or more) steps, 6 inspections, and surprisingly, 15 sorting events. Sorting events included points in the process where applications were manually regrouped alphabetically, in the order received, or by level of certification. The process maps were then set aside for use in the Analyze Phase.

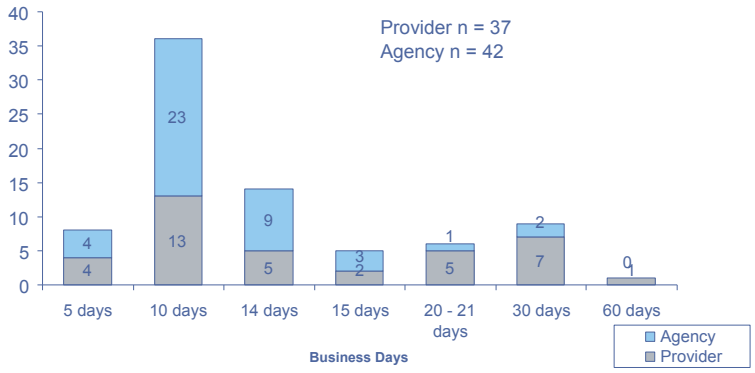

Figure 7 - Process Time Expectations

The final deliverable of the Measure Phase was to calculate baseline sigma of the certification processing speed. Capability analysis, a method of graphic and statistical assessment of process performance against a specification limit, was performed using Minitab™ on 2001 data. The CTQ survey results indicated that 63% of applicants and chief administrative officials expected the certification to be processed within 10-14 days, so the CCT team selected 10 days as an upper specification limit. The lower bound of values was set at zero.

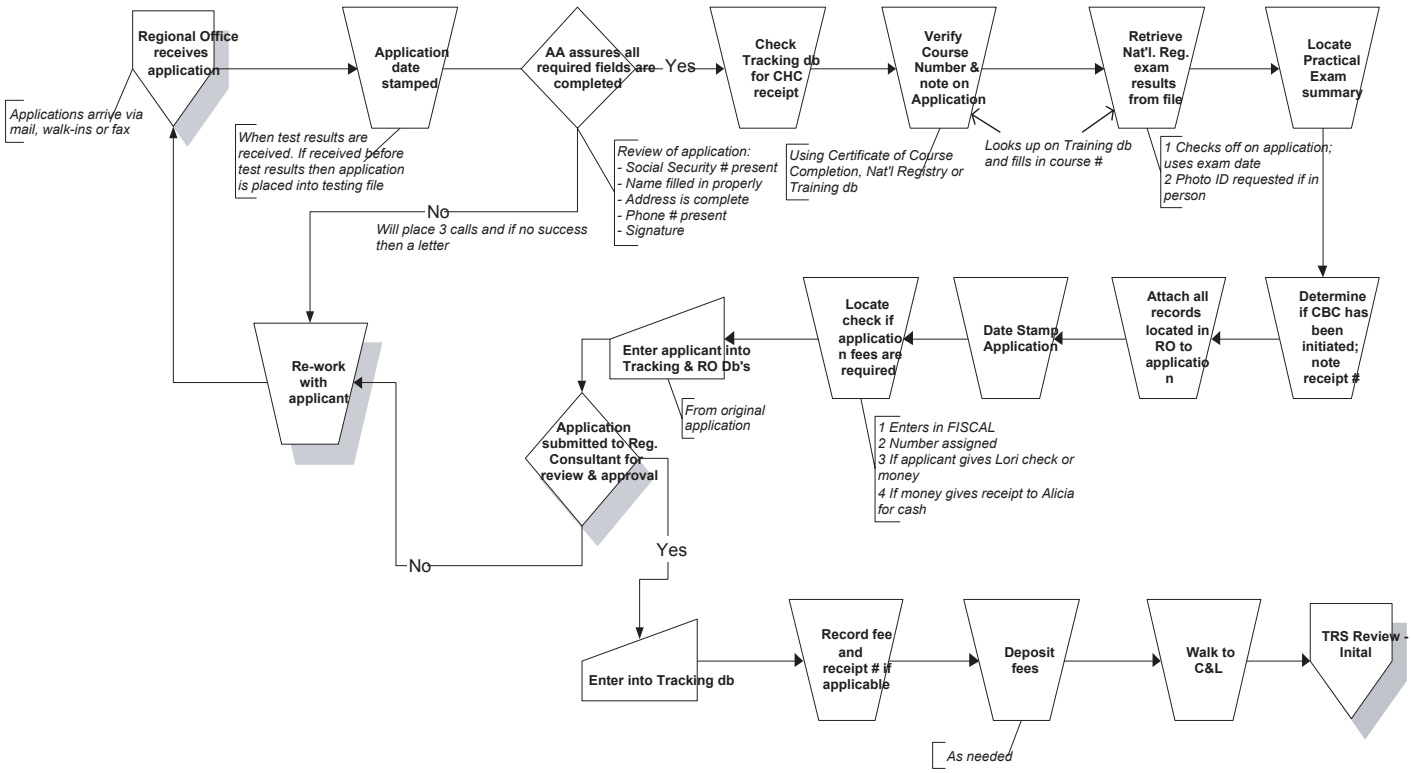

Figure 8 - Process Map Details for Certification Processing at Regional EMS Offices by the Administrative Assistant Position

Capability analysis findings were that in 2001, the certification issuance speed was performing at 1.18 sigma*. Only 37% of all applications resulted in certification issuance within that 10 day goal . Actual performance was actually worse, since the outliers were removed to simulate the process capability once special cause variation was eliminated.

Armed with acute awareness about the overall performance of the certification processing speed, the CCT team proceeded with analysis.

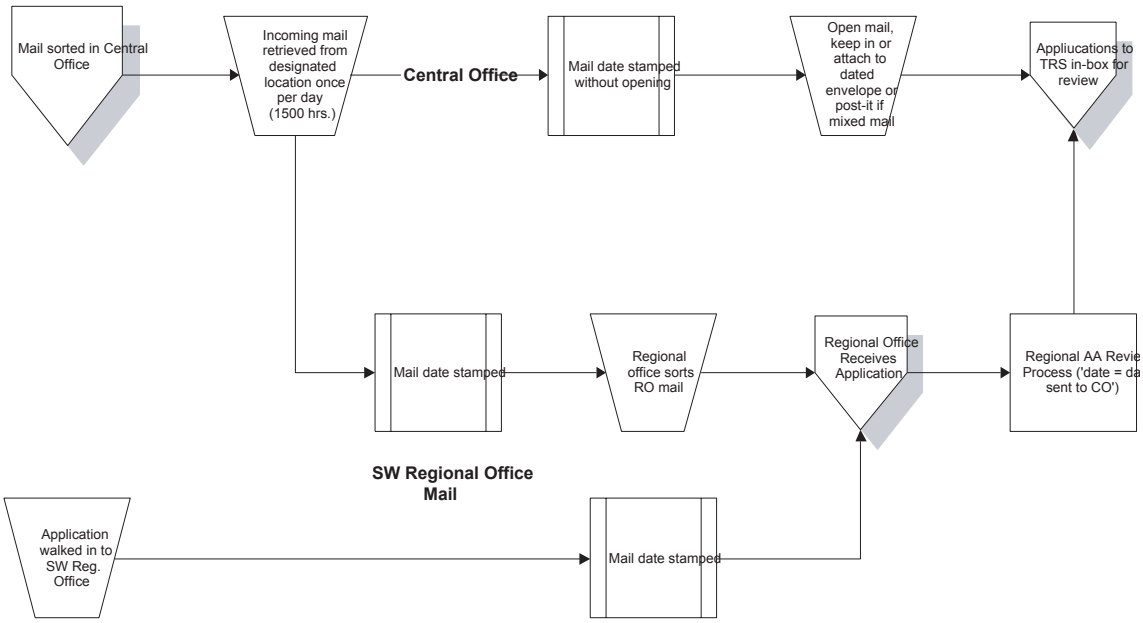

Figure 9 - Process Map Details for Sorting and Routing of Certification Application at the Central EMS Office

* Sigma is a metric for the rate of defects that come out of a process. A proces that operates at 6 sigma has 3.4 defectcs per million opportunities (DPMO). A 1.18 sigma process operates with approximately 630,000 DPMO. More information...

ANALYZE

The Analyze Phase proceedings were a combination of data analysis and process analysis approaches. The data analysis objectives were to use stratification to quantify for root cause, test for normality and perform analysis of variance/test for equal variances correlation.

The process analysis objectives included:

- Identify differences among regional offices and those due to lack of defined procedure
- Value added/non-value added assessment of the detailed process maps generated in the measure phase
- Prioritization of the contributors to delay displayed on an Ishikawa diagram

In an effort to identify and eliminate special cause variation within the current process, let alone any improved process, assessment of the applications that resulted in processing time in excess of the upper control limit was done. Even though the population being studied was small (n=16). a data collection plan was devised and agreed to by the CCT team members, including selection of the individual to assess the records, operational definitions of the categories expected to be found, and a process defined to classify findings that were not anticipated. Findings indicated that 62.5% of the applications with excessive elapsed times were related to incomplete applications and 25% were the result of applicants initiating their criminal history checks late. This information was later used in the Improve Phase in order to introduce corrective actions to prevent both special causes from occurring.

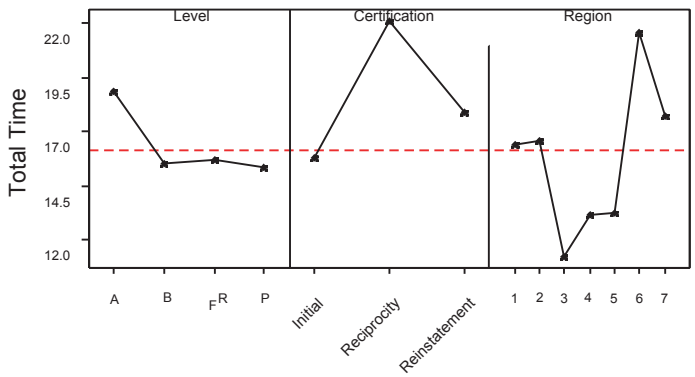

Figure 10 -Graphical Display of Data Means for Total Certification Processing Time. Includes stratifications by leve of certification, certification process type and region where the certification was applied for. A= Advanced EMT; B = EMT-Basic; FR = First responder; P = Paramedic

The CCT team had been energetically proposing theories (in layman's terms) throughout the meetings in the preceding phases about the presumed causes of delays in processing certifications; the Analyze Phase became the time to declare them in the form of hypotheses. Four (4) hypotheses were proposed to subject to statistical analysis:

1. There is no difference in processing speed among the regional offices
2. There is no difference in processing speed among levels of certification (e.g., Emergency Medical Technician, Paramedic, etc.)
3. There is no difference in processing speed among types of certification (e.g., initial, reciprocity, etc.)
4. There is no relationship between processing speed and the volume of applications received.

Formally stated in the "null" voice as in the list above, these hypotheses occlude the fact that the CCT team members firmly believed that statistical analysis would reveal that the alternate hypotheses should be accepted. In other words, team members' perceptions were that in reality there were differences within the stratification of applications that were the culprits, and this analysis would reveal where the "problem children" were found. In part, this belief was spurned by the historical practice of comparing means in a graphical way (Figure 10). Calculation of group averages for processing time historically indicated that the Advanced EMT, reciprocity candidates, and one regional office had means higher than the other groups, therefore these were the areas warranting improvement focus.

The variables contained within the hypotheses above were believed to be critical to understand or predict the performance of certification processing speed. But as the analysis of data to

test the hypotheses proceeded, those with statistical significance (indicating that the CCT team should accept the alternate hypothesis) didn't necessarily have practical significance. As a result, the team members were forced to dismiss some long held beliefs about delays being the result of poor performance in certain regions, out of state applicants slowing down the process for everyone, or a certain level of certification being fraught with policy problems.

The CCT team returned to the process maps generated in the measure phase and conducted a value-added analysis (Pande et al [2002]). It was essential to use a classification system that included "value-enabling" as a category, since meeting regulatory requirements set in state law or rules would not normally meet value-added criteria, but were nonetheless essential for the team to consider. The findings are noted as self-explanatory abbreviations within each symbol on the process diagrams.

A cause-and-effect, also known as an Ishikawa, or "fishbone" diagram was developed (Figure 11). In addition to filling the fields with the myriad factors that contribute to delay in processing, the team chose to use multi-voting among team members to select 10 most critical factors from the Ishikawa diagram. The team then conducted a failure mode effects analysis (FMEA) to explore and prioritize those 10 factors which resulted in 40 scenarios with indications of great enough risk to single out the causes and create preventive or corrective action plans. An FMEA allows for ranking of all predicted or potential errors or problems and associated causes by scoring each on its severity, frequency (of occurrence), and degree to which detection mecha-

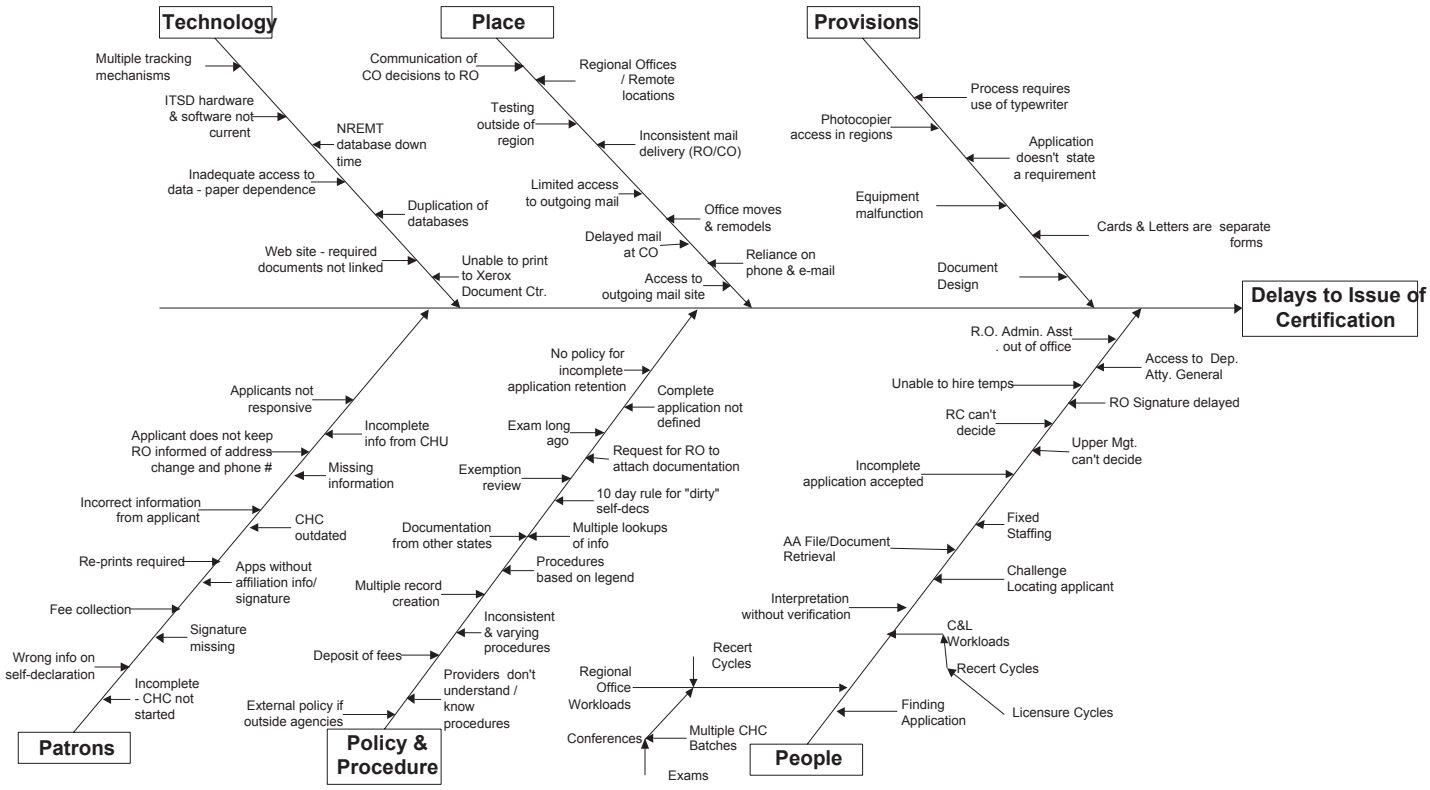

Figure 11 - Ishikawa (Cause and Effect) Diagram of Factors Contributing to Delays in Certification. RO = Regional Office; CO = Central Office; RC = Regional Consultant; CHC = Criminal History Check

nisms are in place. Four out of the five highest scoring failure modes depend on detailed written procedures to standardize practices and prevent excessive variation.

The CCT team concluded that the existing process was unsalvageable. Instead of attempting to repair the existing process, the team chose to enter the improve phase with the goal of re-engineering the entire process, centered on the CTQs.

IMPROVE

The charter specified boundaries for any improvements or solutions created by the CCT team: no new staff, no fees, and no disregard for regulatory requirements. The first obstacle tackled was the result of findings from the CTQ survey that indicated that the applicants were not getting information about the application requirements and associated processes from credible (i.e., state EMS office) sources. So the team crafted informational materials to be sent directly to potential applicants while they were still in training courses as an educational tool and to establish a relationship between the potential applicant and an authoritative resource. The application itself was overhauled to minimize any chance for the applicant to miss required sections and to include key data collection fields related to reasons for delay and other variables of interest.

The other root cause contributing to delays was obviously grounded in the often over-simplified and occasionally unwritten guidance for the state office employees to use when processing certifications. As a starting point for designing revised procedures, the CCT team revisited the process diagrams developed in the measure phase. The historical process involved a handoff of applicant materials from the regional office to the central office; the team was unable to identify what value was added as a result. A new SIPOC and high level process map was crafted through team consensus and as a communication tool for state EMS office staff about the proposed change.

New comprehensive guidance and procedures were written; specific attention was paid to the failure modes identified in the Analyze Phase in order to address what were now predictable poor quality or unacceptable scenarios and resolution instructions for the staff. The CCT team routinely revisited the content, even after the initiation of the pilot to assure that the work instructions and foreseeable consequence with associated procedures for handling them were as complete as possible. A regional office not directly involved in the CCT team proceedings was selected for the pilot to minimize any chance of detailed knowledge resulting from months of inspection of and deliberation about the process to overlook any omissions in the written guidance or materials provided. Nominal capital equipment purchases in the form of identical printers and standardization of core correspondence was also accomplished by the CCT team.

A date was selected for initiation of the pilot, and a CCT team member trained the regional office staff in the new procedures. The revised process was reassessed to quantify the steps, sorting events, and inspections and compare the values to the existing process. A new data collection plan specified the location and method for information management to confirm the performance of the revised process and indicators where additional tweaking of the written guidance, applications, correspondence, or the data collection instrument should be made. The CCT team reviewed actual performance of the pilot at what became weekly team meetings at this point to facilitate rapid refinements and policy decisions as the new certification process was being tested. The team also reviewed overall processing speed by reviewing the data on a control chart.

The regional office conducting the pilot researched and reported on all outliers, and the CCT team verified that the new procedures or new applications and correspondence addressed the factors contributing to the delays. Only 190 applications were expected in the first three months following the initiation of the pilot, so data submission and review of every event was essential. Once all identified change needs were addressed, rollout of the new process occurred statewide, with training provided by the same CCT member.

CONTROL

The Control Phase had a defined endpoint, but in fact key control activities continue beyond the life span of the project. Pande et al [2002] aptly points out that discipline is a key characteristic for this phase. Human desire to check that the process is working and then walk away to the next crisis must be overcome. The goal for this project as set forth in the original charter was to achieve 2.0 sigma (this process was performing at 1.18 sigma initially), which would be a 69.5% improvement. At 2.0 sigma, almost 70% of all applications would be processed in less than 11 days. Instead, as of data collected through the end of August, 2003, the process is performing at

3.44 sigma (a 192% improvement with 97% of all applications being processed in less than 11 days). In an effort to push the sigma value even higher, analysis of certification processing data occurs monthly, with immediate investigation of outliers to determine cause. Pareto analysis of delay data readily prioritizes corrective actions, and staff can analyze which methods of resolution for incomplete applications are most effective. A process dashboard is still under development.

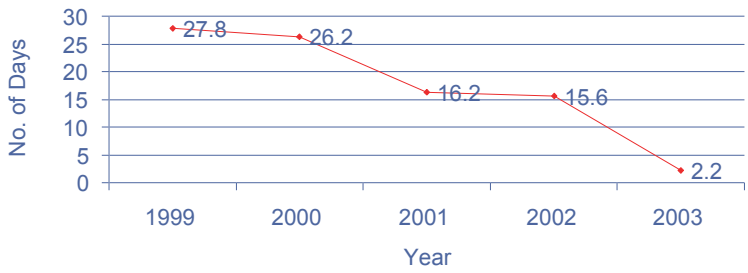

Figure 12 - Average Business Days to Certification by Year

Identification of an on-going process owner is essential, as well as responsibility in a process management plan, or Process Control Plan. Brassard & Ritter [2002] identify a "Plan-Do-Check-Act Cycle" as a method to execute during the control phase when variation or other unexpected outcomes occur. The team celebrated the improved performance (Figure 12), returned oversight to the process owner, and dissolved.

DISCUSSION

A key limitation to the project design was that initial CCT project meetings were scheduled on monthly intervals. This proved to artificially delay the project progress as illustrated in the charter when comparing the target completion dates of each phase to the actual dates. Subsequent project designs have been modified to accelerate progress by holding team meetings more often. Another observation made too late in the project was that the regional office practices related to date stamping, which "started the clock" on measuring elapsed time varied slightly between offices, and the project did not include a freeze to assure that those practices did not change during the project. The biggest weakness in the project analysis was the inability to use the most robust means of analysis as a result of the continuous data not being normally distributed.

CONCLUSION

The CCT team acknowledged that the data analysis failed to identify root causes among variables believed to be critical. The corresponding process analysis drove the conclusion that the process was riddled with non-value added steps, rework loops, and as such was unsalvageable. A critical conclusion was that attempts to speed up the certification processing in the two years prior to the project had a negligible effect on improving processing time while the EMS bureau staff unwittingly compromised CTQs, which were unknown to the state EMS office at the time.

DMAIC offered a structured, thorough, and defensible approach to solving a persistent problem. The CCT team knew what to expect as the overall objectives of each phase and could measure its own performance against the target dates in the charter. Toll gate reviews at the end of each phase allowed organizational leadership to assess progress of the team as well. Most notable was manner in which the dual-pronged approach of process analysis and data analysis that moved the team off-center of old (and erroneous) beliefs and allowed for innovation with accountability.

APPENDIX A - CHARTER DOCUMENT FOR THE CERTIFICATION CYCLE TIME PROJECT TEAM

PROBLEM STATEMENT:
Customer concerns about the length of time required for an otherwise eligible provider to receive certification have been a persistent problem. A retrospective review of processing time data for all applicants for initial certification during calendar years 1999-2001 revealed that the averaged elapsed time for the EMS Bureau to issue certification was an average of 22.8 business days with a standard deviation of 21.9 days.

Fifty percent of all applications had an elapsed time of 18 business days or longer. When processing time duration is longer than the expectations or business needs of the applicant or ambulance service, telephone inquiries to both the regional and central offices of the EMS Bureau result in interruption of work processes, internal conflict among employees, and frequently do not yield any additional information about or expediting of the application. Ambulance services in urban areas with a high demand for additional personnel and rural areas experiencing critical manpower shortages resort to attempts to circumvent or request special consideration during the application and certification processing phase. Listening posts report the occasional use of unlicensed personnel, usually in a desperate or defiant mode, which is a violation of the laws and rules governing emergency medical services in Idaho, and ultimately could be prosecuted as felony violation of the Medical Practice Act.

BUSINESS CASE/EXPECTED BENEFITS:
Reduced elapsed time from certification eligibility to deployment. Reduction in net staff hours per certification event. Soft benefits include reduced internal and external customer inquiries about the expected issuance date/status of certification requests; reduced rework of applications, reduced customer complaints; improved customer satisfaction; incremental increases in capacity; and decreased interruptions for regional and central EMS Bureau staff. The consequences of not engaging this project are continued customer dissatisfaction and manpower compromises for local EMS agencies.

GOAL STATEMENT:
To reduce certification processing time to within 10 days of the date the application is received by the EMS Bureau by improving our process capability from the current rate of 781,657 defects per million opportunity to 2 sigma (a 69.5% improvement) by November 1, 2002.

PROJECT SCOPE:
The project team will focus on the initial certification process, which starts from the date an application is received in any EMS Bureau regional office and concludes on the date that certification documentation is mailed to the applicant. Augmentation of staff time available to certification activities and changes in state laws or rules governing EMS certification are beyond the scope of the project. All team members will continue to perform their regular duties during this project.

PROJECT CTQs:
- Timeliness of certification issuance
- Accuracy of certification documentation
- Laminated cards
- Documentation of certification provided to affiliation
- Accurate prediction of card issuance date

RESOURCES / TEAM MEMBERS:
- Black Belt-in-Training (will also serve as project team leader)
- Green Belts-in-Training
- Certification Program Manager and Technical Records Specialist
- EMS Regional Consultant and Administrative Assistant
- Subject Matter experts used as needed:
  - EMS Regional Operations Program Manager
  - Other EMS regional office staff

Once chartered, the team will meet on a monthly basis for 3 hours to review progress, analysis findings, plan next steps, and assign between-meeting objectives. DMAIC training will also be provided during these meetings.

PRELIMINARY PLAN	Target Date	Actual Date
Start Date	12-11-01	12-18-01
DEFINE	01-14-02	01-18-02
MEASURE	02-21-02	03-01-02
ANALYZE	03-29-02	05-31-02
IMPROVE	04-12-02	11-01-02
CONTROL	05-01-02	12-02-02
Completion Date	02-01-03	

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ADDITIONAL INFORMATION

- Survey document used to help determine certification applicant's 'critical to quality' factors (MS Word document format; 38K) [Link to document]
- PDF file generated from a PowerPoint file used by author for presentations on this project. Contains additional graphs, process diagrams and charts not used in this article (PDF format; 586 KB) [Link to document]
- Links to sites with additional information on six sigma methods, terminology and references:
  - American Society for Quality's Six Sigma Forum
  - General Electric's Six Sigma Resource Site
  - iSix Sigma Healthcare Portal

ACKNOWLEDGMENTS

Imagine having all of this statistical capability and not be able to quantify the gratitude and admiration I have for Master Black Belt Joe Duhig of the Juran Institute for teaching adeptly and bestowing passion for Six Sigma, both its tools and its merits. The entire team as listed on the charter is due extensive credit for their diligence and stamina. John Cramer, BS, and Kay Chicoine, MPA, of the state EMS office Analysis & Planning program were invaluable contributors of graphical support and selection and distribution of just-in-time training materials. The support of the entire Regional Operations Program, led by Jim Alter, was critical to the success of the project both through data collection and ultimate implementation of an effective new process that delights our customers!