

TOWARD CONTINUOUS QUALITY IMPROVEMENT IN TRAUMA CARE

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Trauma care providers have led the way in developing systems of care that provide the most efficient resources to injured patients in a timely manner. The effectiveness of trauma systems in reducing mortality has been demonstrated.^{6, 19} Now, as trauma care providers face the reality of poor reimbursement and the possibility of financial demise, the adoption of the best methods to improve quality while reducing cost is as critical as ever.⁹ Traditional quality assurance (QA) techniques consume costly resources for questionable gains. Various indicators and audit filters promulgated by organizations like the American College of Surgeons Committee on Trauma (ASCOT) and The Joint Commission on the Accreditation of HealthCare Organizations (JCAHO) have had limited effectiveness in yielding substantive changes and improvements in trauma care.^{13, 17, 20} The tools of Continuous Quality Improvement (CQI) hold promise in accomplishing the very goals mandated by today's competitive healthcare environment. This article demonstrates the use of CQI in trauma care to improve quality, efficiency, and patient outcome.

DEFINING THE DIFFERENCES: QA VERSUS CQI

A plethora of terms and models for improving quality have recently glutted the health-

care market. Continuous Quality Improvement (CQI), Total Quality Management (TQM), and Quality Improvement (QI) are used interchangeably and essentially embrace the same concepts. This article uses the term CQI.

The change from traditional Quality Assurance (QA) to CQI amounts to a revolution, not a name change. The movement to CQI represents a complete paradigmatic shift and significant cultural change for the health care organization.^{3, 5, 11, 16, 25} In the CQI environment, managers manage differently and staffs perform their work differently. The differences between QA and CQI can best be appreciated if they are compared and contrasted.

LIMITATIONS OF TRADITIONAL QA

Trauma care providers have been perplexed by the task of assuring quality and predictable outcomes in an unpredictable disease process. The tools of traditional QA are seemingly inadequate to assure quality and good patient outcomes. Traditional QA tends to focus on individuals, rather than on processes and on systems of care that impede quality. QA is a reactive process that evaluates issues retrospectively in an attempt to keep these events from reoccurring. QA decisions are often

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based on individuals' assumptions of the probable cause(s) of a problem rather than on data that indisputably prove the cause of a problem.^{23, 24} Therefore, QA encourages development of solutions that may not address the root cause of the problem, and thus, may not completely resolve it. Action in response to problems is swift, but problems seem to reoccur.²⁴ The very nature of QA does not encourage an organizational culture which revolves around quality and customer-service.

Unlike QA, CQI mandates a top-down promulgation of quality as well as a cultural change for the organization.^{2, 3, 5, 25} In the CQI environment, no process is immune to improvement. The organization is constantly evaluating processes and revising them to better meet the needs of the customer. Contrary to this, the QA environment encourages organizations to maintain the status quo. QA encourages mediocrity, because as long as performance matches that of the competitor, there is no need to improve.²⁴

KEEPING THE BEST OF QA AND INTEGRATING IT INTO CQI

When evaluating its inherent limitations, trauma centers might be inclined to abandon QA completely. This is neither the point of the comparison nor the recommendation. Instead, traditional QA activities such as indicator monitoring and evaluation can and should remain in place. The focus of these activities, however, should change. Traditional QA activities can be used as a stimulus for CQI activities.¹⁰ The model in Figure 1 describes this relationship. Traditional QA activities, such as peer review of mortality and morbidity, if conducted in the spirit of looking for breakdowns in systems of care rather than failure of individuals can be an ideal way to identify areas in need of improvement. The only way that physician buy-in for quality improvement activities can be obtained is to change the focus of peer review from punitive and accusatory to open and constructive.⁹ Evaluations of deaths, morbidity, and technical errors is a useful activity in that it allows for the collective knowledge and experience of multiple practitioners to evaluate care and to determine, based on combined experience, the best way to manage the trauma patient. Without these activities, there is no way to learn from the mistakes of others and to assimilate the best practices. Traditional peer review should

move toward a focus on *patterns* of performance rather than on individual physicians' performance in order for it to integrate well with the CQI model.¹⁴

Trauma programs can also evaluate and refine indicators to improve their sensitivity and specificity for identifying substantive issues.¹⁷ For example, if the trauma program uses the indicator (audit screen) "unanticipated returns to the operating room (OR)," it might yield a number of cases that meet the criteria of being unanticipated returns to the OR. These cases, however, might be caused by deterioration in the patient's condition such that a return to the OR is completely appropriate. What the trauma program is really interested in is capturing those cases in which the unanticipated return to the OR was because of an undiagnosed injury or provider-related mishap such as vascular injury from a central line or an inadvertent enterotomy from a diagnostic peritoneal lavage. Therefore, if the indicator is revised to read "unanticipated returns to the OR because of delayed diagnosis, missed injury, or iatrogenic complication," it will yield much more useful data.

The trauma coordinator and trauma medical director can then look at all of the cases which "fall out" under this indicator, analyze any common aspects among these cases, and determine if a failure of the system is causing these events to occur. By refining indicators to be more sensitive and specific, much less time is wasted in reviewing charts to determine if there was indeed a problem. More time can be focused on eliminating the cause of the variation.

ORGANIZING MONITORING EFFORTS

Trauma coordinators and trauma medical directors often become bogged down in indicator monitoring and responding to isolated incidents that have little or no impact on the actual quality of trauma care. One way to organize the indicator workload is to develop a monitoring protocol. A monitoring protocol is an organizational tool which lists all of the indicators to be evaluated in a given year. Indicators are categorized as either sentinel events or rate-based events. *Sentinel events* are those which have serious consequences for patient outcome and warrant case-by-case review. *Rate-based events* are occurrences that do not require immediate action and are indica-

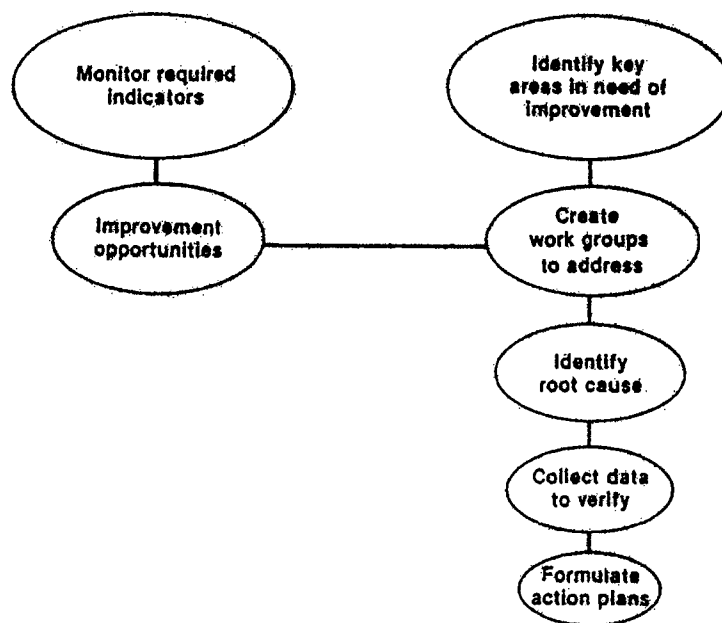


Figure 1. QA/CQI integration model

tors that can be evaluated as an aggregate over time.¹² The method for monitoring the indicator is clearly defined as well as the frequency for doing so. Table 1 shows sample headings for the monitoring protocol.

If indicators do yield substantive issues in need of improvement, they can direct the trauma coordinator and trauma medical director where to focus CQI efforts. An example of this deals with the indicator of spinal injuries. The indicator or audit screen reads: "Spinal column injuries with or without neurologic deficits not diagnosed during first 24 hours of hospitalization." The trauma coordinator and trauma medical director identify an alarming trend in which, over a period of 1 year, there are several occurrences of patients with delayed or missed spinal injuries on the trauma service. Each occurrence is reviewed by the trauma director who develops action plans for each event. Despite these actions, however,

the trend of missed injuries continues. The trauma medical director identifies the need for a CQI team to work on this issue.

CASE MANAGEMENT AND CRITICAL PATHS AS A CQI TOOL IN TRAUMA CARE

Case management and critical paths have received a great deal of attention in the health care literature.²¹ Unfortunately, case management has as many definitions as there are people using it. In this article, *trauma case management* is defined as a process of providing clinical oversight to the trauma patient's entire hospital course in order to decrease length of stay (LOS) and cost, while maintaining quality care and customer satisfaction.^{4, 21, 26}

Case management is not only an excellent fiscal tool to better manage the resources of a trauma center, but it is also an effective method to identify and quantify systems and processes within the trauma program that impede the progress of patients toward discharge (increase LOS), cause re-admissions to the trauma center for the same episode or injury, or cause patients or their families to be dissatisfied with the care and services they receive.⁷ Reduction or elimination of these factors is the goal for all trauma CQI activities.

Table 1. SAMPLE HEADINGS FROM MONITORING PROTOCOL

Aspect
Benchmark
Sentinel or Rate-Based Event
Collection Schedule/Method
Collection Responsibility
Collaborating Department/Division/Program
Dates of Study

Therefore, case management and CQI are integrally related.

Trauma programs that use case management have an inherent mechanism in place to concurrently identify systems of trauma care that are "broken" and in need of repair or to identify areas in which performance can be improved. Unlike traditional QA methods of using indicators or audit filters to identify issues retrospectively, trauma case management allows for recognition of impediments and at-the-moment intervention to decrease variation in trauma care.²⁶

Along with case management, critical paths are tools useful to trauma CQI. Critical paths are timelines for certain events during the patient's hospitalization. They make patient care more predictable for both the caregivers and the patient by standardizing patient care activities according to diagnosis.^{1, 22, 26} Patients with single system injuries such as limb fractures, pelvic fractures, spinal fractures, minor isolated closed head injuries, and isolated single-organ abdominal injuries are amenable to critical paths. Patients with complex multisystem injuries are more difficult to place on a critical path. Anytime a patient's hospital course varies from the critical path, this is known as a *variance*. Variance analysis is the identification of common factors or trends that cause the patient to vary from the standardized plan of care. Through variance analysis, trauma personnel can identify impediments to quality and efficiency in their system.²⁶ Together, case management and critical paths are invaluable tools to quantify concurrently and correct factors which adversely affect patient outcome, cost, or satisfaction.

CQI IN TRAUMA CARE: WHERE TO GET STARTED

In addition to using traditional QA activities and variance analysis from case management, quality planning is a method that sets priorities on where to focus CQI efforts. All systems of trauma care cannot be addressed and improved at once. By using the techniques of brainstorming, decision matrixes, and Pareto diagrams, the trauma program can attack the most critical areas first.

Quality planning can be done annually, semi-annually, or quarterly. It is best done by an oversight committee with operational accountability for the trauma program. The process is initiated with a brainstorming session in which ideas of the group are generated

and recorded. Rules for brainstorming should be set forth at the beginning of the session.¹⁸

Once brainstorming is exhausted, the group uses the decision matrix to set priorities for ideas (Table 2). Committee members can assign a value or weight to various issues to determine which ones warrant action first.

Finally, an adjunct to the decision matrix is the *Pareto diagram*. This tool is frequently used not only in the quality planning process but also in the actual data collection process of CQI teams. A Pareto diagram is a bar chart which displays the frequency of events in descending order.¹⁵ The following hypothetical example illustrates the use of the Pareto diagram:

The trauma committee brainstorms 23 potential issues to address through CQI. After using the decision matrix, the five highest ranking issues include: (1) missed injuries because of late official reading by the radiologist; (2) failure to notify family members of trauma patient in a timely manner; (3) unavailability of adequate nursing staff during peak ICU admission times, causing the trauma program to divert patients; (4) inadequate notification of the operating room (OR) of patient's arrival; and (5) poor communication between patients and attending physicians. In order to set further priorities for these five issues, the committee decides to collect data for each of them over the next month to delineate further the frequency of occurrence and their potential impact on patient outcome or satisfaction.

Taking the time to complete further data collection and analysis is beneficial to the trauma program's CQI efforts in order to keep efforts from focusing on isolated events which are unlikely to reoccur and to eliminate tremendous CQI efforts focused on one individual's "pet issues."

The trauma committee, after analyzing these five issues over 30 days, develops the Pareto diagram, displaying the relative frequency of these events. The radiology issue was the most frequently occurring event as well as the one impacting patient outcome most significantly (Fig. 2). After evaluating the potential impact of these issues, the first CQI team is formed to address the missed injury/radiology issue.

TOOLS OF CQI

CQI is much more analytic than traditional QA. The CQI "equipment" includes both problem solving/diagnostic tools and statisti-

Table 2. DECISION MATRIX

Process Chosen for Improvement	Patient Outcomes	Patient Satisfaction	Patient/Staff Safety	MD/Nursing/Ancillary Personnel Satisfaction	Continuity of Care	Cost Savings	Total
Trauma response —duplication of personnel —unnecessary staff —modified response —variable surcharge for transfer patients —expectations regarding levels of care	1	2	1	3	1	4	12
Visitors lost on-campus (signage not user friendly)	2	4	1	2	1	1	11
Effective triage system for ICU —Concrete guidelines on use of postanesthesia care unit	1	1	1	4	1	3	11
Patient satisfaction with follow-up care, discharge planning, and so forth	1	4	3	3	3	1	15
Duplication of roentgenograms, lost roentgenograms	2	1	1	3	3	2	12
Communication within trauma program —physician teams —coordination between physician teams —physicians and families —nursing units —transport team/units	4	3	4	4	4	4	23
Preservation of evidence —disposition of clothes, and so forth —police acceptance of 1st draw of blood for alcohol	2	1	2	2	2	2	11
Care of patients in ICU when RN must accompany another patient to diagnostic area outside ICU	2	2	2	2	2	2	12
Collaboration of review efforts between utilization review and trauma coordinators	4	1	2	3	3	3	16

Rating 4 = High/significant improvements will occur if we make changes in the process
 3 = Medium improvements will occur if we make changes in the process
 2 = Low/minimal improvements will occur if we make changes in the process
 1 = Changes in the process will not affect this area

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cal tools. CQI mimics the scientific process more closely than QA.

Diagnostic Tools

The *Cause and Effect Diagram*, also known as the "fishbone" diagram is a key CQI

diagnostic tool. It displays all the possible relationships between an outcome or effect and the cause(s).¹⁵ The cause and effect diagram is a fundamental tool for any CQI team to use in brainstorming all of the possible root causes of a problem. Figure 3 shows a sample fishbone diagram that deals with

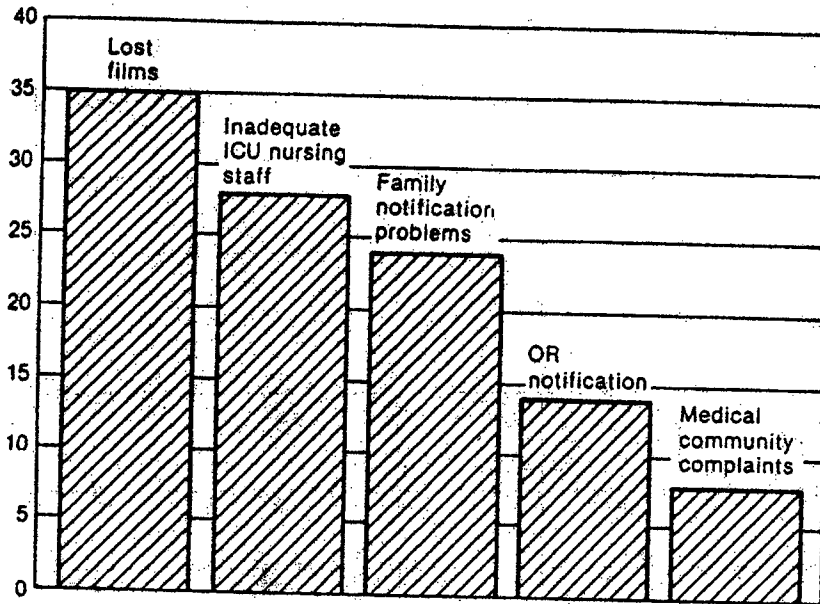


Figure 2. Pareto diagram.

the problem of prolonged emergency department (ED) times in critical trauma patients.

Cause and effect diagrams typically have four to six generic headings. While an individual

QI team can develop headings to meet its particular needs, depending on the problem being studied, some sample headings include the four ps: people, provisions (equipment), policies, and procedures.²³

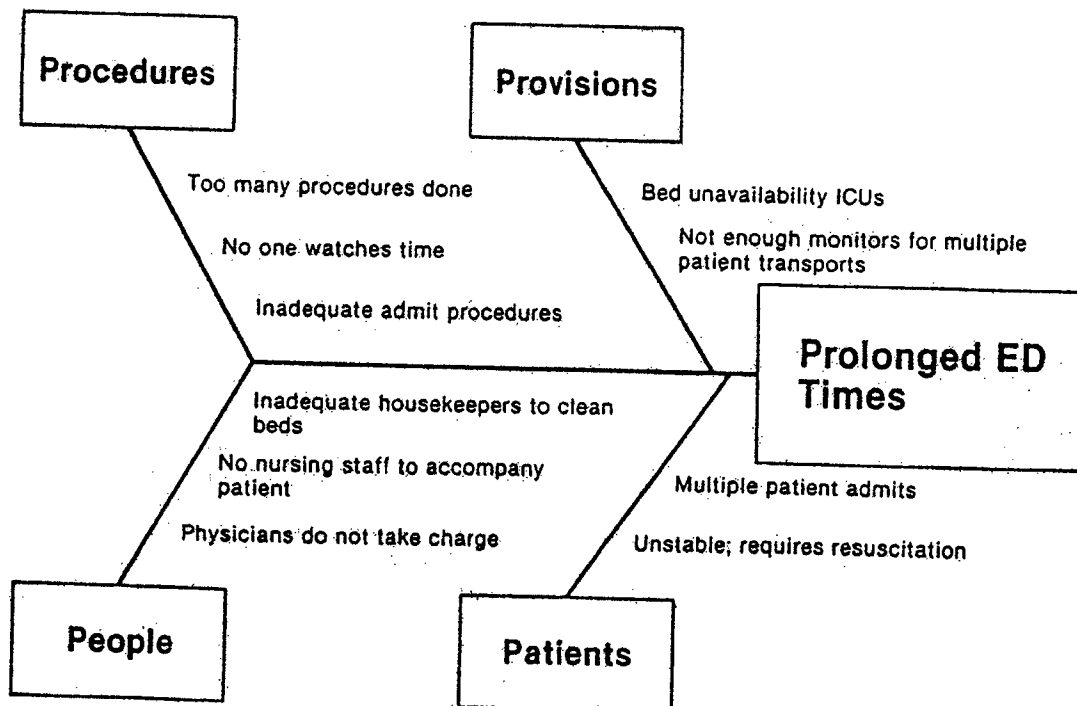


Figure 3. Sample fishbone diagram.

