

Quality Improvement in Athletic Health Care

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Context: Quality improvement (QI) is a health care concept that ensures patients receive high-quality (safe, timely, effective, efficient, equitable, patient-centered) and affordable care. Despite its importance, the application of QI in athletic health care has been limited.

Objectives: To describe the need for and define QI in health care, to describe how to measure quality in health care, and to present a QI case in athletic training.

Description: As the athletic training profession continues to grow, a widespread engagement in QI efforts is necessary to establish the value of athletic training services for the patients that we serve. A review of the importance of QI in health care,

historical perspectives of QI, tools to drive QI efforts, and examples of common QI initiatives is presented to assist clinicians in better understanding the value of QI for advancing athletic health care and the profession.

Clinical and Research Advantages: By engaging clinicians in strategies to measure outcomes and improve their patient care services, QI practice can help athletic trainers provide high-quality and affordable care to patients.

Key Words: patient safety, value, system measurement, Plan-Do-Study-Act cycles

Regulatory efforts resulting from health care reform require health care providers and organizations to focus on the value of care to ensure higher quality care with lower cost.^{1–3} Thus, quality improvement (QI) strategies are necessary to guide stakeholders, such as clinicians, educators, and researchers, to continuously improve care. *Quality care* is defined as “doing the right thing, at the right time, in the right way, for the right person—and having the best possible results.”⁴ Over the last 2 decades, QI initiatives have increased among the health care professions, primarily to ensure patient safety.⁵ However, application of the concepts and methods of QI in athletic training has been limited.

The majority of athletic trainers (ATs), like other health care professionals, lack the formal training required to engage in structured evaluations of their systems of care and to initiate QI efforts. However, as first described in the athletic training literature by Sauers in 2005,⁶ the Institute of Medicine developed 5 core competencies for all health care professions, regardless of discipline, that include the application of QI.⁷ Subsequently, the Commission on Accreditation of Athletic Training Education adopted standards for postprofessional core competencies that include QI efforts in both postprofessional degree programs⁸ and residency training programs.⁹ Furthermore, the proposed curricular content standards¹⁰ for Commission on Accreditation of Athletic Training Education-accredited professional programs require that they “Implement systems of quality assurance and improvement in the delivery of cost effective health care.” If these new standards for professional programs are implemented, they will significantly increase the demand for knowledge about QI in the athletic training profession.

Athletic trainers are the frontline providers of patient care within the athletic health care systems in which they

practice. Subsequently, ATs are well positioned to advance the quality of the care their patients receive by engaging in QI initiatives. However, the services provided by ATs and the systems in which they frequently provide care are poorly studied and poorly understood from value, quality, and cost perspectives. The athletic training profession does not have access to high-quality data detailing typical AT services, and limited data are available about the outcomes actually achieved through patient care. Many ATs work in nontraditional health care systems, such as secondary schools and intercollegiate athletics, which are poorly understood from a quality perspective. It is common for ATs to work in relatively isolated systems of care, such as high school athletic clinics, that do not function like typical health care systems. However, despite these differences, clinicians still need to define the desired, consistent, or expected patient outcomes and to implement methods for tracking those outcomes, regardless of setting. These isolated systems need to be better understood, and continuous efforts to improve them must be implemented. To provide high-quality patient care, individual clinicians need to establish their health care systems as ones that continually measure quality gaps and implement strategies to fill them.

Countless examples of QI efforts to improve the care provided within their athletic health care systems exist for ATs. For example, ATs could develop QI initiatives to improve and standardize documentation, reduce the incidence of superficial skin infections, define and improve desired outcomes for a particular injury, reduce the occurrence of a particular injury, improve patient compliance with patient education instructions or home exercise programs, and implement new best-practice recommendations for a specific injury or condition. Every aspect of athletic training services is amenable to QI. High-quality

health systems continually strive for improvement, no matter how well they are currently performing. Many ATs who feel that their care is of sufficient quality have likely never measured it before.

The ability to use and share health information is an accepted method for improving the quality and delivery of care in health care professions.¹¹ For example, the physical therapy profession developed the National Orthopaedic Physical Therapy Outcomes Database to provide clinicians with a tool to assess their clinical performance.¹² In addition, information accumulated in this database can be used to describe orthopaedic physical therapy practice and provide evidence of the value of orthopaedic physical therapy.¹² In athletic training, the Athletic Training Practice-Based Research Network (AT-PBRN) was developed to improve the quality of care and patient outcomes for those treated by ATs.¹³ Data generated from participating AT-PBRN clinicians can be used to characterize athletic training practice, measure the quality of patient outcomes, and estimate the costs of care associated with athletic training services.¹⁴ The technology-driven infrastructure of the AT-PBRN enables the collection of large-scale datasets that can be used to demonstrate the value of athletic training services and conduct multisite comparative effectiveness studies for determining best practices and engaging in QI initiatives that continually improve athletic training care.¹³

As the athletic training profession continues to grow, widespread engagement in QI efforts is necessary to establish the value of athletic training services for the patients that we serve. Therefore, the purpose of this paper was to describe the need for and define QI in health care, discuss how to measure quality in health care, and present a QI case in athletic training.

THE QUALITY IMPERATIVE IN HEALTH CARE

Health care delivery is often slow to follow the rapid advances in medical science and technology and to translate knowledge into practice.¹⁵ The principles necessary to ensure high-quality, safe, and effective care are embedded in the principles of evidence-based practice and patient outcomes.^{16–18} However, health care practice has not kept pace with evolving science to ensure that practice is evidence based. To correct quality problems in health care, variations in services should be reduced to decrease the gap between what is known and what is done.¹⁹

The focus of health care reform in the United States is on the delivery of quality health care services at reasonable costs.³ The Institute for Healthcare Improvement developed the Triple Aim framework, which was designed to enhance the patient care experience and health of populations and to decrease the cost of health care.^{1,20} The overall purpose of the Triple Aim is to optimize the performance of health care systems.^{1,20}

The current shift away from traditional fee-for-service payment models toward value-based health care and reimbursement models determined by provider performance and patient outcomes creates a tremendous opportunity for ATs. Value in health care can be defined using the simple equation of quality divided by cost.^{2,21} This value can be positively affected by raising the quality of care or by lowering the cost of care. In essence, the higher

the quality and the lower the cost of care, the greater the value. Characterizing the value of athletic training services requires data detailing both the quality and cost of these services. A challenge for the athletic training profession is that scant data are available that speak directly to the quality and costs of athletic training services. Regrettably, the value of athletic training services to the patients we serve has not been well established. In the absence of direct measures of health care quality and costs, it is difficult to make informed statements about the value of athletic training services.

Measures of quality health care systems are numerous and emphasize clinical, functional, cost, and satisfaction factors from a variety of stakeholder perspectives.² Unfortunately, data that directly measure these quality factors in athletic health care are extremely limited, even though assessing quality in the delivery of athletic training services and participating in continuous QI activities are required components of the “Board of Certification Standards of Professional Practice for ATs.”²² A major challenge for the athletic training profession is demonstrating the quality of care provided to our patients by means of a purposeful and systematic process. Because athletic training services are frequently provided outside of third-party reimbursement, the majority of clinicians have not been required to objectively track measures of quality related to the services they deliver. Discussions of quality in the delivery of athletic training services are all too infrequent. Furthermore, peer-reviewed literature measuring the quality of athletic training services is almost nonexistent. As a health care profession, we must place greater emphasis on defining and measuring the quality of the health care services we provide.

Our goal as athletic training clinicians, educators, and researchers is to improve the delivery of care to produce the best possible patient outcomes. To do this, we must have the knowledge and tools to understand and improve the quality of the systems in which clinicians work. A *system of care* is the setting in which care is actually delivered.²³ The idea of systems of care is worth highlighting because, in QI efforts, the focus is on improving the quality of the health care system,¹⁹ which should produce better patient outcomes. Improvement requires an understanding of our current health system and being prepared to measure changes within that system.^{19,23} Although this philosophy has a strong focus on the individual clinician, the ability of clinicians to deliver quality patient care and achieve optimal patient outcomes is directly affected by the quality of the system of care in which they work. A familiar example of a system of care is a hospital with different patient care units, such as a pediatric clinic, surgical center, emergency room, and administrative branches (including billing and administration departments), under a single entity. System components can vary, with some systems including multiple clinics or other health care components, such as a nurse’s office at a secondary school complementing the athletic training services provided. Athletic health care systems are frequently different from traditional hospital and clinical systems. A secondary school athletic training clinic with the associated directing physician, ATs, school nurses, administrators, coaches, parents, and athletes is an example of a common athletic training system of care.

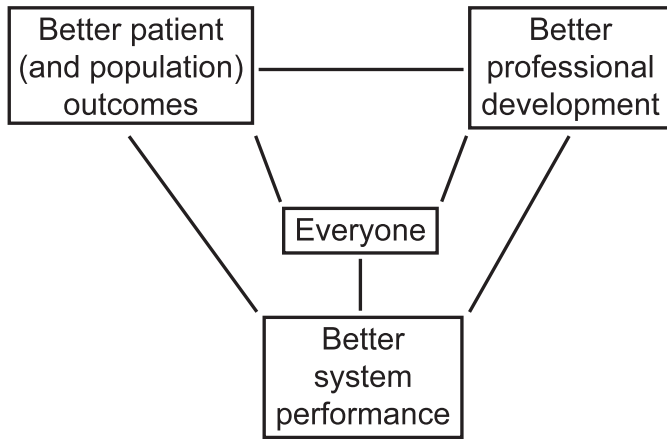


Figure 1. Quality improvement linked aims. Adapted with permission from *Quality and Safety in Health Care, What is “quality improvement” and how can it transform healthcare?* Batalden PB, Davidoff F, volume 16, pages 2–3, © 2007, with permission from BMJ Publishing Group Limited.²³

The best way to understand a system’s performance is to use data from the system to describe how it is working.¹⁹ A primary source of data from health care systems is the patient care documentation, or patient records entered by clinicians.²⁴ However, many systems of documentation, while useful for tracking the outcome of a single patient, were not designed to enable systems-level analyses of health care quality and outcomes. We can provide individual clinicians with all the tools needed to employ evidence-based practice and measure patient outcomes, but if we place them in a clinical environment that fails to support these efforts at a systems level, then true QI will be difficult. Subsequently, large-scale efforts are necessary so that ATs can begin assessing the quality of their patient care services within their athletic health care systems.

QUALITY IMPROVEMENT IN HEALTH CARE

In the late 1800s, Florence Nightingale and Ernest Codman were pioneers of improving patient care by using data.^{25–27} Both examined poor patient outcomes and began to track the progress of care. However, they became frustrated with the end results of the care provided and created their own methods of collecting and analyzing data to better understand and improve their systems of care.^{19,28} Contemporary QI movements in health care are the result of a successful QI model developed and used by the Japanese automobile industry in the 1900s.²⁹ Instead of focusing on large production, this model focused on identifying customer preferences, managing the value stream, developing capabilities of flow production, and reducing waste.²⁹ These original efforts in health care and industry laid the groundwork for contemporary QI efforts.

Donabedian³⁰ created a model of care that divides quality care measurement into 3 categories: structure, process, and outcomes. *Structure* describes the context of care. For example, staff, infrastructure, financing, and equipment are types of structures. *Process* represents the transactions between patients and providers and can be considered in terms of what is done and how. Finally, *outcomes* refer to the end results of health care services. Outcomes are usually based on group results, not individual cases, and therefore

indicate the quality of care delivered in a health care system.³¹ According to Donabedian, health care professionals need to understand what they do (structure and process) and test ways of doing it better (outcomes).^{28,31}

In 2001, the Institute of Medicine published a report titled *Crossing the Quality Chasm*,¹⁵ which presented a comprehensive strategy for how health care systems can improve the delivery of care. The report lists 6 aims for improving health care. Care should be safe, timely, effective, efficient, equitable, and patient centered (STEEEP)¹⁵:

- Safe: avoiding injuries to patients while they are receiving care.
- Timely: reducing waiting time and delays for patients and providers.
- Effective: providing care based on scientific evidence.
- Efficient: avoiding waste, such as supplies, equipment, energy, and ideas.
- Equitable: providing care that is equal for everyone regardless of personal characteristics.
- Patient centered: providing care that is responsive to individual patient preferences and ensuring that patient values guide clinical decision making.¹⁵

The broader health care community has followed STEEEP for more than a decade, but these principles have not been used in the athletic training profession. To meet the STEEEP principles requires “buy-in” and effort at all levels of a health care system. Efforts aimed at QI are inherent in the delivery of care that aligns with STEEEP principles. For example, QI has been defined as (Figure 1):

[A] combined and unceasing effort of everyone—health care professionals, patients and their families, researchers, payers, planners, and educators—to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (learning).²³

A distinguishing feature of QI versus research is that QI initiatives drive change, whereas research generates new theories and knowledge. Furthermore, QI initiatives aim to describe how to, such as how to design a system that works well and is routinely effective and efficient; research aims to define what is, such as what is the best treatment after a concussion.¹⁹ However, QI initiatives may also determine how to implement and optimize best practices, such as postconcussion management protocols in an athletic health care system.

Clearly, QI efforts require a team that is committed to continuously improving care.³² To achieve this, a team should have support from leadership and staff, experience in measuring improvement, a good working relationship among team members, and an accurate understanding of the system and patients.³² Identifying a team is an important initial step for all QI initiatives because system changes cannot be made by individuals working alone. In addition, a team should rely on the knowledge, skills, and experience of a wide range of people to solve problems and create ideas for change.¹⁹ For example, a QI team in a high school athletic training system may include ATs, team physicians, nurses, administrators, coaches, parents, and athletes.

In 1995, Rogers³³ developed a classification model for considering how change is undertaken and disseminated

within a system. In his theory, called Diffusion of Innovation, he described 5 patterns of responses to change: innovators, early adopters, early majority, late majority, and laggards.³³ Identifying these behaviors in teams can help implement an improvement strategy.¹⁹ The diffusion of innovation is considered a continuous process that starts with motivated developers of new ideas, usually a small group of creative and proactive individuals (*innovators*).¹⁹ *Early adopters* are very open to accepting and incorporating change.¹⁹ In general, they are the respected opinion leaders within a system, and their opinions matter to others.¹⁹ When a change is successfully implemented, the next group (*early majority*) is able to increase the rate of acceptance of the change.¹⁹ The *late majority* needs friendly pressure to take up an innovation.¹⁹ The last group is the *laggards*, who are the most resistant to adopting change and can be a barrier to implementing change.¹⁹ Sometimes people are unwilling to change, but we should not let them deter the planned improvements because changes can be made without them. When we attempt to implement QI initiatives, it is important to recognize the patterns of the health care team members.

Standard tools should be used to implement QI initiatives within a system. Similar to health professionals who are trained using standard methods to assess, diagnose, and treat individual patients, an improvement team should also assess, diagnose, and treat a system of care.¹⁹ Several improvement tools can be used to assess a system, identify a problem, and test changes, such as the Model for Improvement, the Six Sigma tool, and Lean Methodology.³¹ In the next section, we will focus on the Model for Improvement as the reference tool for measuring and improving the quality of care.

MEASURING QUALITY IN HEALTH CARE

The best way to understand a system's performance is to use data from the system to describe how it is working. A primary source of health care systems data is patient care documentation, or patient records that have been entered by clinicians. Therefore, having complete and accurate patient care documentation is imperative for measuring the quality of care. A lack of documentation of patient care services is a quality problem amenable to QI efforts. Previous studies^{24,34} of QI have demonstrated improvement in clinical documentation by adding simple interventions, such as cost-effective features in the documentation system and clinician education and training. However, these authors^{24,34} collected baseline measurements first to identify and understand how their quality problem was related to a lack of documentation. Thus, before implementing any change, the system should be analyzed in order to understand how it works and why it is failing.

Other important considerations when correcting quality problems in health care are to ensure the use of evidence-based practice and reduce variations in services. That is, we need to reduce the gap between what we know (evidence-based practice) and what we do in our clinical practices. Practitioners of continuous QI integrate knowledge of generalizable scientific evidence with the local clinical practice environment.³⁵ The Clinical Improvement Formula (Figure 2) can be used to translate and adapt general recommendations to the specific needs of

individual health care systems, from local settings to national care networks.^{23,35} The underlying principles for ensuring safe and effective patient care are embedded in the principles of evidence-based practice and patient-oriented research and include comparative effectiveness studies, cost-effectiveness analyses, and randomized clinical trials.¹³ However, finding ways to apply generalizable evidence to different systems of care can be challenging. Thus, translational research is important for converting research findings into usual clinical practice.¹³ According to Rubio et al,³⁶ "Translational research fosters the multidirectional integration of basic research, patient-oriented research, and population-based research, with the long-term aim of improving the health of the public."

Practice-based research networks (PBRNs) are fundamentally necessary to support this translation of research into practice.¹³ For instance, PBRNs provide the construct necessary for bringing clinicians and researchers together to conduct point-of-care research that serves as the transitional link between the laboratory and usual clinical practice.¹³

According to the Clinical Improvement Formula,^{23,35} the local system must be considered in order to improve care. Because people, processes, and structures are different among health care systems, such as between athletic training facilities at 2 high schools, the analysis of the system and changes to improve the outcomes differ among the systems. Take, for example, the Ottawa Ankle Rules for determining the use of radiography to rule out ankle fractures in acute injuries.^{37,38} For this example, the evidence available for the best course of patient care is the same, but the local system in which that evidence is incorporated is unique.¹⁹ If the local system is not given proper consideration, then the implementation of evidence-based practice and subsequent QI initiatives may fail.

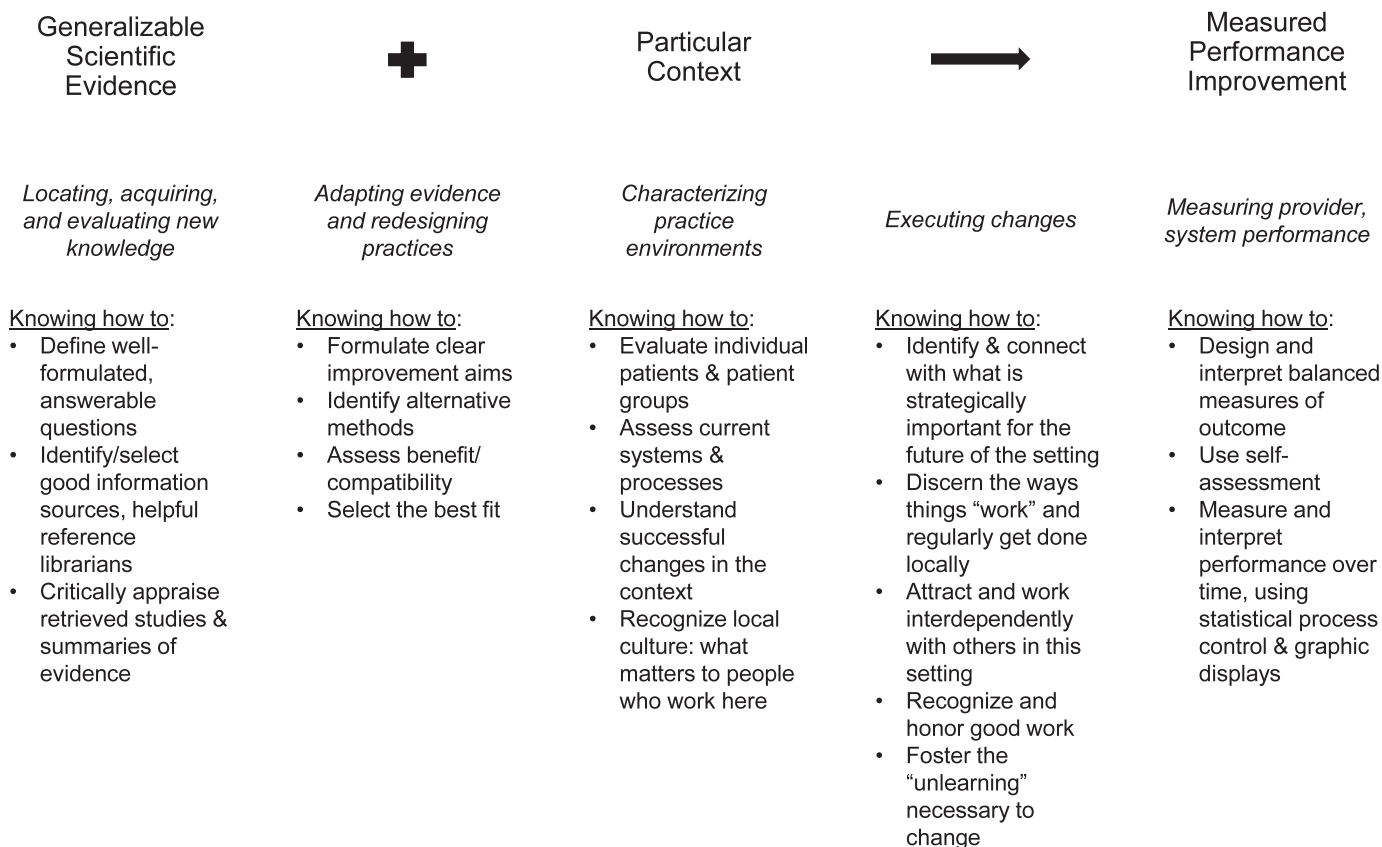
Applying the Model for Improvement

To meet the expectations of delivering high-quality care to patients and ensuring a care model that supports QI, clinicians should be aware of how to use quality measurement tools.³⁹ Improvement involves a substantial shift in our idea of the work of health care, a challenging task that can benefit from the use of a wide variety of tools and methods.²³ The Model for Improvement has been identified as an important tool for driving quality initiatives and achieving quality goals (Figure 3).⁴⁰ It connects the concepts of best-practice evidence with local health care delivery systems. The Model for Improvement has been used to improve documentation,^{24,34} education,^{41,42} and clinical care.^{43,44} Although this model is well known in hospitals and primary care settings,³⁹ it is less familiar to ATs working in various athletic health care systems.

The Model for Improvement consists of 3 fundamental questions that guide improvement strategies (Figure 3)⁴⁰:

- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What change can we make that will result in improvement?

These questions have guided the design of the Model for Improvement, which includes setting an aim, establishing measures to determine if change occurred, and selecting tests of change to implement during the improvement process.^{39,40}



The essential forms of knowledge required for successful performance of each step of the Clinical Improvement Formula are shown.

Figure 2. Connecting the elements in the science of improvement using the clinical improvement formula. © Joint Commission Resources: Olds DM, Brennan CW, Misra-Hebert AD, et al. *Understanding clinical improvement: foundations of knowledge for change in health care systems.* In: Splaine ME, Dolansky MA, Estrada CA, Patrician PA, eds. *Practice-Based Learning & Improvement: A Clinical Improvement Action Guide.* 3rd ed. Oakbrook Terrace, IL: Joint Commission on Accreditation of Healthcare Organizations, 2012, page 6. Reprinted with permission.²³

What Are We Trying to Accomplish?

Quality concerns often stem from frustrations with a system or process of care or from data that suggest poorer than expected outcomes. Once a general area of concern is identified, ideas for change can be explored. The improvement team should first meet to become more knowledgeable about the system, including system performance and processes. Many processes are embedded in our complex health care systems, such as the flow from when a patient checks in to a clinic until the visit is completed or the treatment flow for patients with a specific diagnosis. Furthermore, processes are influenced by the culture and context of a system. Understanding the local system and processes is important because this provides a shared picture for all team members (administrative staff, support staff, physicians, and all health care professionals) focused on keeping the patient experience at the center of the improvement effort. If we understand our system or how the health care setting works, we are better prepared to identify areas in need of improvement and possible solutions to problems. Therefore, system knowledge helps generate hypotheses for change: identifying gaps in the system by describing current processes is key for

developing ways to improve a system. Several standard process-analysis graphic tools exist to describe systems and processes.¹⁹ For example, a detailed flowchart can be used to describe the flow of processes at a system level, typically showing multiple steps.^{19,45} A flowchart can also clarify processes for all team members and serve as a basis for designing new processes.⁴⁵ Another example of a process-analysis tool is a cause-and-effect diagram, which describes the causes that influence an effect or quality problem.^{19,46} These diagrams are also known as *Ishikawa* or *fishbone diagrams*, and they graphically display the relationships between the causes that contribute to an effect.⁴⁶

After the team identifies potential or actual barriers to best practices, the second step is to include more detailed information about the project and then create the aim statement. The aim statement should include specific elements, such as the system to be improved, the setting or population of focus, what is expected to happen, the timeframe, and goals.⁴⁰ Furthermore, it should be clear and strong. The Table presents an aim statement based on a study by Ranpura et al³⁴ as an example of the application of the first question of the Model for Improvement.

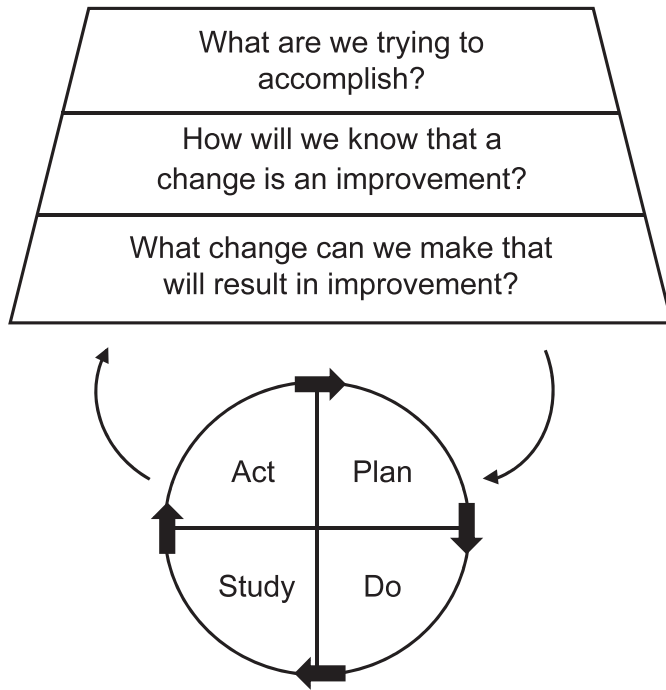


Figure 3. The model for improvement. Reprinted with permission. Langley GJ, Moen RD, Nolan KM, Nolan TW, Norman CL, Provost LP. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance*. 2nd ed. San Francisco, CA: Jossey-Bass. Copyright © 2009; 23–24. All rights reserved.⁴⁰

The problem and aim statement in the Table are clear and reasonable. A key element of creating a reasonable goal for the aim statement is obtaining baseline data from the system. By collecting baseline data before they established their goal for improving care, Ranpura et al³⁴ identified the failure to provide adequate cancer pain management compared with the National Initiative. Baseline data are critical for comparisons with postintervention data to demonstrate if the improvement effort was successful.

How Will We Know That a Change Is an Improvement?

After we answer the first question of the Model for Improvement by establishing the aim statement, the next step is to identify measures that will determine if a change results from the improvement effort. Measures are necessary to differentiate between a change and an improvement in a system.⁴⁰

Three 3 measures of improvement should be considered: process measures, outcome measures, and balancing measures.⁴⁰ *Process measures* evaluate actions that influence the end result.¹⁹ One example is measuring the percentage of patients referred for a radiograph after an ankle sprain. Radiographic findings are not an outcome for ankle sprain, but they are an important measure to rule out a potential ankle fracture. *Outcome measures* are the end result of a process.¹⁹ Using the same example, an outcome measure might be the number of patients referred for radiographs with a positive finding of an ankle fracture.

However, identified measures should not produce unintended consequences in other parts of the system. Thus, balancing measures are necessary, and any related measures should be maintained or improved.⁴⁰ Returning to the example of the Ranpura et al³⁴ QI project, their process measure was the pain documentation rate in patients with a pain score of ≥ 4 . Monitoring this measure during a 3-month period indicated that a change had been made in their system.

By measuring improvement, we can understand variations in our system. Variations in clinician adherence to clinical practice guidelines and in the organization and delivery of patient care services can negatively affect patient outcomes and increase costs.⁴⁷ Therefore, many QI efforts are designed to reduce system variations to make them work better and more efficiently. For example, the implementation of clinical care pathways has improved care quality and reduced waste.⁴⁸ Great potential exists for the development of appropriate clinical pathways to reduce variations and improve quality in athletic health care. Clinicians and researchers should collaborate to develop clinical pathways for common conditions for which athletic training services are thought to be beneficial.

What Changes Can We Make That Will Result in Improvement?

To answer this question, the QI team must identify possible interventions and develop changes to test. With a proper understanding of the system, we can generate hypotheses for an improvement plan. Rather than roll out a complex program of changes, we should begin with simple and reasonable interventions. To improve the pain documentation rate, Ranpura et al³⁴ developed easily implemented interventions that included provider education and an electronic health record trigger to prompt clinicians to obtain pain scores. Furthermore, we should identify a unit (for example, a single sport team or specific patient

Table. Example of Aim Statement^a for a Quality Improvement Project to Increase Documentation at a Hematology-Oncology Clinic in a Hospital Setting

Problem	Aim Statement
Quality problem	The documentation for moderate to severe pain was inferior (69%) compared with the American Society of Clinical Oncology Quality Oncology Practice Initiative (79%)
Aim statement	“Achieve $\geq 90\%$ documentation of plan of care in patients with a pain score of ≥ 4 in the hematology-oncology clinic at [MedStar Washington Cancer Institute] by the conclusion of the first quarter of 2014” ³⁴
System to be improved	Hematology-oncology clinic at MedStar Washington Cancer Institute
Setting/population of focus	Oncology patients with a pain score ≥ 4
What is expected to happen	To increase documentation of the plan of care
Timeframe	By the conclusion of the first quarter of 2014
Goals	Achieve $\geq 90\%$ documentation

^a Based on Ranpura et al.³⁴

population) best suited to allow us to work on the problem of our system. Identifying such a unit to start the QI project is the key to success. Choosing the correct starting place for change depends on the characteristics of the people and the system.⁴⁹

The Plan-Do-Study-Act Cycle

The Plan-Do-Study-Act cycle completes the Model for Improvement (Figure 3). This cycle turns ideas (possible interventions) into action and connects action to learning.⁴⁰ It consists of 4 repetitive steps that are applied to small changes before those changes are made to the whole system. First, plan the change. Then conduct the change intervention and assess the results. Finally, act so that lessons learned from the current cycle can be incorporated into the next cycles. For the next cycle, the sequence starts again (Figure 3).⁴⁰ Quality improvement is a continuous process that starts with the first cycle and continues through subsequent cycles by adding what was learned from the previous cycle and applying the change to other units in the system. For example, after a month of implementing their interventions, Ranpura et al³⁴ collected postintervention data to measure if their changes resulted in improvement. Their rate of pain documentation improved to 90% after their first Plan-Do-Study-Act cycle.³⁴ Even though they achieved their goal in the first cycle, they planned to continue tracking their outcomes by measuring the pain documentation rate quarterly and by continuing to educate new staff and providers to improve the quality of documentation.³⁴ This example highlights the need for improvement efforts in health care to be ongoing and continuous.

ATHLETIC TRAINING QUALITY IMPROVEMENT CASE

Quality improvement initiatives are essential to the growth of large, connected health systems, such as PBRNs⁵⁰ and the AT-PBRN.¹⁴ Practice-based research networks enable the collection of extensive data from geographically diverse locations and different clinical practice settings.^{13,14} According to the Agency for Healthcare Research and Quality,⁵¹ PBRNs engage clinicians in QI activities and create an evidence-based culture in primary care practice to improve health care. The AT-PBRN is actively involved in gathering practice-pattern data for characterizing athletic training services and patient outcomes.¹⁴ Here, we use the AT-PBRN to demonstrate the application of QI in a real-world athletic training example.

The AT-PBRN includes multiple microsystems, such as participating clinicians, an electronic medical record (EMR), and educational and training practices. Improving and optimizing the AT-PBRN requires an understanding of all these systems. Every health care system has quality challenges and can benefit from QI activities, and the AT-PBRN is no different. One of the problems of the AT-PBRN is obtaining complete documentation from its Clinical Outcomes Research Education for Athletic Trainers (CORE-AT) EMR. Between July 2014 and May 2015, 63.9% of the new injuries documented in the CORE-AT EMR did not have a discharge form completed, resulting in a lack of closed-out cases in the system. Insufficient data entry by clinicians inhibits health information exchange and

hinders clinical research, performance improvement, and quality measurement initiatives.¹¹ However, complete documentation can be challenging for large databases that include input from multiple clinicians in different settings. Thus, the AT-PBRN team is developing a QI initiative to improve documentation by increasing the rate of complete patient injury datasets in the CORE-AT EMR. Specifically, the aim is to achieve a completion rate of greater than 90% for documented discharge forms for new patient cases at 23 AT-PBRN secondary school sites. The QI team will analyze the existing de-identified data to determine the frequency of completed cases after an improvement intervention. A new reminder to close cases and an online clinician education and training module about this feature will be added to the system. After these interventions are implemented, postintervention data will be analyzed. Pre-intervention and postintervention comparisons will be made to ensure that a change in the system was achieved. If a change was achieved, the intervention will be added to collegiate sites in the AT-PBRN. Improving the extent of clinical documentation in the AT-PBRN will allow us to measure the performance of care and demonstrate the value of care that ATs provide within this large system.

CONCLUSIONS

The principles necessary to ensure high-quality (safe, timely, effective, efficient, equitable, patient-centered) and affordable care are embedded in the fundamentals of evidence-based practice and patient outcomes.¹⁶⁻¹⁸ To correct quality problems in health care, reducing variations in services can decrease the gap between what is known and what is done. To reduce these variations, it is essential to understand local systems and their processes and to measure their performance continuously and routinely. Thus, using data available within the system and identifying QI opportunities are essential to measuring and describing the value of care that is provided.

Value in health care is defined using the simple equation of quality divided by cost.^{2,21} In the absence of direct measures of health care quality and costs, an informed statement about the value of athletic training services cannot be made. As health care providers, ATs have an obligation, defined by the "Board of Certification Standards of Professional Practice,"²² to assess quality in the delivery of athletic training services and participate in continuous QI activities.

A key aspect of QI is that making changes becomes an intrinsic part of everyone's job, every day, in all parts of the system.²³ Improvement involves a substantial shift in the idea of the work of health care, which can benefit from the use of a variety of measurement tools,²³ such as the Model for Improvement.⁴⁰

Quality improvement initiatives can help ATs provide high-quality, low-cost care to patients by engaging clinicians and scholars in implementation strategies that measure the care provided and continuously improve health care services. One example of an ongoing QI initiative in the AT-PBRN profession is improving documentation in the AT-PBRN by increasing the rate of complete patient-injury datasets in the CORE-AT EMR. The development of clinical pathways to reduce variations in care and processes represents another significant opportunity for improving the

quality of athletic training services. As health care providers, ATs are ultimately responsible for continually measuring and improving the quality of care that we provide to our patients.

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