Critical Thinking Tools for Quality Improvement Projects

Kimberly Whiteman, DNP, RN, CCRN-K
Jason Yaglowski, BSN, RN
Kimberly Stephens, DNP, RN

TOPIC This article explores the use of 4 quality improvement tools and 2 evidence-based practice tools that, when used within the nursing process, encourage critical thinking about quality issues.
CLINICAL RELEVANCE Patients and families expect to receive patient-centered, high-quality, and cost-effective care. Caring for critically ill patients is challenging and requires nurses to engage in quality improvement efforts to ensure that they provide evidence-based care.
PURPOSE OF PAPER To explore the use of critical thinking tools and evidence-based practice tools in assessing and diagnosing quality issues in the clinical setting.
CONTENT COVERED The nursing process serves as the framework for problem solving. Some commonly used critical thinking tools for assessing and diagnosing quality issues are described, including the Spaghetti Diagram, the 5 Whys, the Cause and Effect Diagram, and the Pareto chart. (*Critical Care Nurse*. 2021;41[2]:e1-e9)

Nursing practice has become increasingly driven by data since the late 1990s. In 1998, the American Nurses Association established the National Database of Nursing Quality Indicators to collect data on nursing-sensitive patient care outcomes, which enabled the Association to benchmark quality data.[1] National initiatives such as the core measures from The Joint Commission and Centers for Medicare and Medicaid Services require documentation of patient outcomes that have been improved through the application of evidence-based processes.[2] Many states and specialty organizations participate in registries that permit the quality of

CE 1.0 hour, CERP B

care to be benchmarked.[3] In addition, the use of electronic medical records has made it possible for nurses to gather information from patient records that can be tailored to investigations of specific quality questions or the care that patients with a given diagnosis or treatment receive while in the hospital.[4]

As technology and levels of information advance, nurses must decipher and synthesize numerous reports, charts, and spreadsheets, and then implement that knowledge to improve the quality of patient care. In fact, both the American Nurses Association[5] and the American Association of Critical-Care Nurses[6] identify participation in quality improvement (QI) efforts as part of a nurse's role. Some hospitals, especially those that have received or are seeking Magnet designation, have hired nurses with advanced degrees to guide bedside caregivers in research, evidence-based practice, and QI initiatives.[7] For nurses who work in hospitals but do not have advanced education related to QI, navigating the many critical thinking and evidence-based practice tools to improve patient care can be daunting.

Participation in quality improvement efforts is part of every nurse's role.

This article explains 4 critical thinking tools and 2 evidence-based practice tools that nurses can use as adjuncts to the nursing process (assess, diagnose, plan, implement, and evaluate) to facilitate QI. In clinical practice, registered nurses use observations, communications, and a stethoscope to assess patients and formulate diagnoses. In quality initiatives, nurses replace their stethoscopes with critical thinking, QI, and evidence-based practice tools. Nurses can use these tools in conjunction with the familiar nursing process to identify areas for improvement and, when appropriate, to plan practices changes.

Assessment

As in the nursing process, the first step in any quality initiative is to assess the process or problem that needs to be improved. An early initial step is to form an interprofessional team of caregivers. The team should include stakeholders whose practice could be involved in or changed by the initiative. Consider forming an interprofessional team including bedside nurses; physicians; respiratory, physical, and speech therapists; nursing assistants; and unit-based secretaries as well as patients and their families. Improving clinical practice and sustaining those improvements require leadership support from all levels within the organization.[3]

Once the team has been assembled, it should thoroughly assess the problem or quality issue. When problems occur in the workplace—either as a clinical issue, such as an increase in the number of medication errors, or as a need for improvement, such as a change in workflow—health care workers often want to identify the cause and remedy the situation quickly. Solving complex problems, however, requires in-depth exploration of both the issue and the factors contributing to it. Investing the time necessary to complete a thorough assessment is an essential step in improvement. Include as many means of examining the problem as possible, such as unit or hospital data, observations of current practices, conversations with caregivers and stakeholders, and information specific to the local problem. Clinical nurses who provide direct care to patients are in a unique position to identify quality issues.[8]

In addition to clinical nurses identifying quality issues, hospital data—such as quality or risk reports that reveal, for example, an increase in the number of infections or falls—often alert nursing leaders to clinical triggers for improvement, but triggers can also arise from interactions with patients and families or from new knowledge.[9] Examples of improvement opportunities arising from interactions with patients are a request for a family to be present during resuscitation[10] and frequent requests from patients or family members for educational materials.[11] The release of new or updated practice guidelines, such as the 2016 update to the sepsis guideline[12] and subsequent changes in the 2018 update,[13] are examples

Authors

Kimberly Whiteman is an associate professor of nursing at Waynesburg University, Waynesburg, Pennsylvania.

Jason Yaglowski is a Lean quality coach at Allegheny General Hospital, Pittsburgh, Pennsylvania.

Kimberly Stephens is an associate professor of nursing at Waynesburg University.

Corresponding author: Kimberly Whiteman, DNP, RN, CCRN-K, Waynesburg University, 300 Penn Center Blvd, Building 3, Ste 120, Pittsburgh, PA 15235 (email: kwhitema@waynesburg.edu).

To purchase electronic or print reprints, contact the American Association of Critical-Care Nurses, 27071 Aliso Creek Rd, Aliso Viejo, CA 92656. Phone, (800) 899-1712 or (949) 362-2050 (ext 532); fax, (949) 362-2049; email, reprints@aacn.org.

of new knowledge that might prompt the need for practice changes.

Despite the type of trigger for a quality initiative, once the team has identified a problem, the next nursing actions are the same: Complete an inquiry to determine whether the event was a 1-time occurrence or a continuing problem. Explore current practices to determine the scope of the problem. Also, determine whether this issue is a priority for the organization. In general, selecting continual problems that are a high priority for the organization will result in increased administrator and staff buy-in.[14]

After the scope of the problem has been evaluated and the problem determined to be a priority, clinicians should review the current literature related to the problem. This step is still early in the QI process. During the literature review, look for background information to determine the characteristics of the problem, its prevalence at other centers, and factors that contribute to it.[15] After completing the review of the literature, the team can use a variety of critical thinking tools to assess the problem. Many hospitals have adopted formal programs such as Lean methodology or Six Sigma to assess and manage improvement efforts. For nurses working in hospitals without a formal QI model, the Institute for Healthcare Improvement (IHI) has extensive free resources such as critical thinking templates, videos, and toolkits[16]; these assets are available to educate nurses about the IHI's improvement model, the Model for Improvement. The items in the toolkits can be combined to best suit the improvement need. Scoville and Little[17] suggest that no 1 method is superior to another and that a combination of tools that are specific to the problem, rather than to the QI method, might best serve patients.

Observations and Conversations

A foundation for any assessment is built from targeted, direct observations that qualified clinicians make at the point of care. Clinicians can gather important information by going into clinical units, watching care being delivered, and asking questions of the direct caregivers. The purpose of these observations and questions to staff is not to assign blame but to understand fully the factors that have led to the clinical problem. Observation of units that do not have the same problem can often yield important information that helps determine what factors contribute to those units' relative success.

When observing a unit, team members may find that more than 1 factor contributes to the quality issue. For example, a nurse manager in a medical intensive care unit noted a high rate of central catheter–associated bloodstream infection. The nurse manager convened a team that included a nurse leader, a critical care medicine physician, staff nurses, an infection control nurse, and nursing assistants. After being assembled, the team decided to observe the process of a nurse caring for central venous catheters on the unit. One team member observed the nurse searching for equipment both in the patient's room and on the supply cart while changing a dressing. The team decided to investigate the workflow further to determine whether the multiple interruptions to care resulting from the nurse obtaining supplies was routine on the unit or an anomaly. Conversations with staff confirmed that supply carts were inconsistently stocked, and the bedside carts did not always have the supplies necessary for dressing changes. The process in place for replenishing supplies seemed to be broken. In this case, improving workflow to increase efficiency was not the only intervention necessary to solve the unit's multidimensional problem with central catheter–associated bloodstream infections, but it was the first step in improving it.

Improving the workflow to increase efficiency may be a first step in solving your unit's problem.

Spaghetti Diagram

The team decided to complete a Spaghetti Diagram, a visual tool that allowed them to examine the flow of people within the unit to determine whether the layout or organization of supplies could be improved. The team's goal was to use the Spaghetti Diagram to redesign the work and processes—in this case, the supply and bedside carts—on the basis of how staff completed the work.[18] To create a Spaghetti Diagram, the team started with a blank schematic of the area. They selected a nurse and recorded on the unit schematic that nurse's movement from 1 area to another (Figure 1). In addition, they recorded the nurse's step count.

After counting the lines on the diagram and the steps the nurse took to gather supplies, the team noted an excessive number of trips to the supply area; this finding indicated that the restocking process needed to
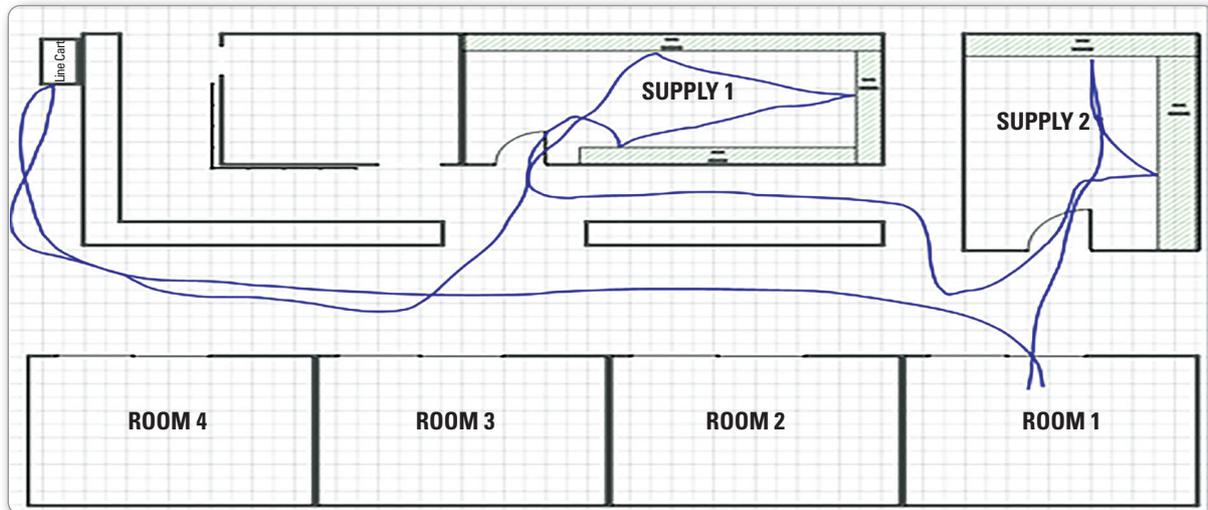
Figure 1 Spaghetti Diagram for obtaining supplies used in changing the dressing for a central venous catheter. The observer captured the route the nurse took to gather supplies before the supplies had been reorganized. The diagram includes 8 lines. The nurse took 71 steps to gather the necessary items.
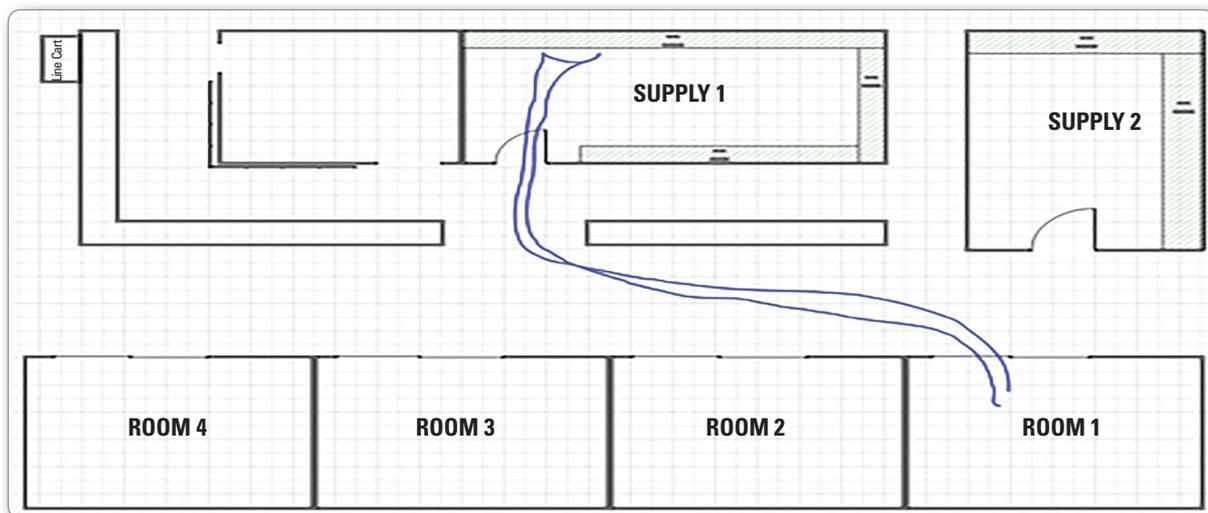

Figure 2 Spaghetti Diagram based on repeated observations after the supplies for changing central catheter dressings were reorganized so they were all available in supply room 1. This diagram includes 2 lines, and the nurse had to take just 33 steps to gather the necessary items.

be improved. The observations also illuminated other workflow problems, such as the need to call frequently for more supplies on busy days or to leave the unit to obtain equipment. The team collaborated with the hospital's central supply department to change the par stock and the location of items. A second Spaghetti Diagram created after the reorganization depicts improvements in workflow (Figure 2).

Diagnosis

After assessment, the next step in the nursing process, diagnosis, requires nurses to synthesize what they found during the assessment into information that is meaningful for patient care. For quality issues, after gathering the initial information, nurses attempt to determine all possible causes of the issue. Many nurses are familiar with root cause analysis (RCA), which The
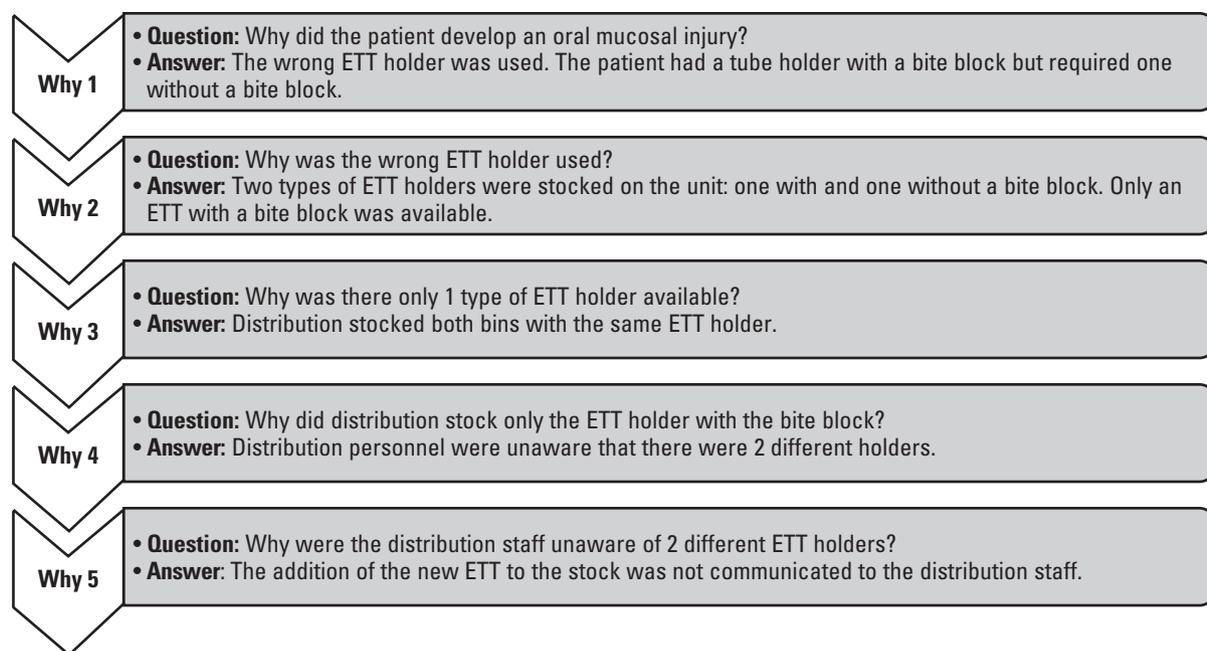
Figure 3 The 5 Whys for an oral mucosal injury related to an endotracheal tube (ETT) holder.
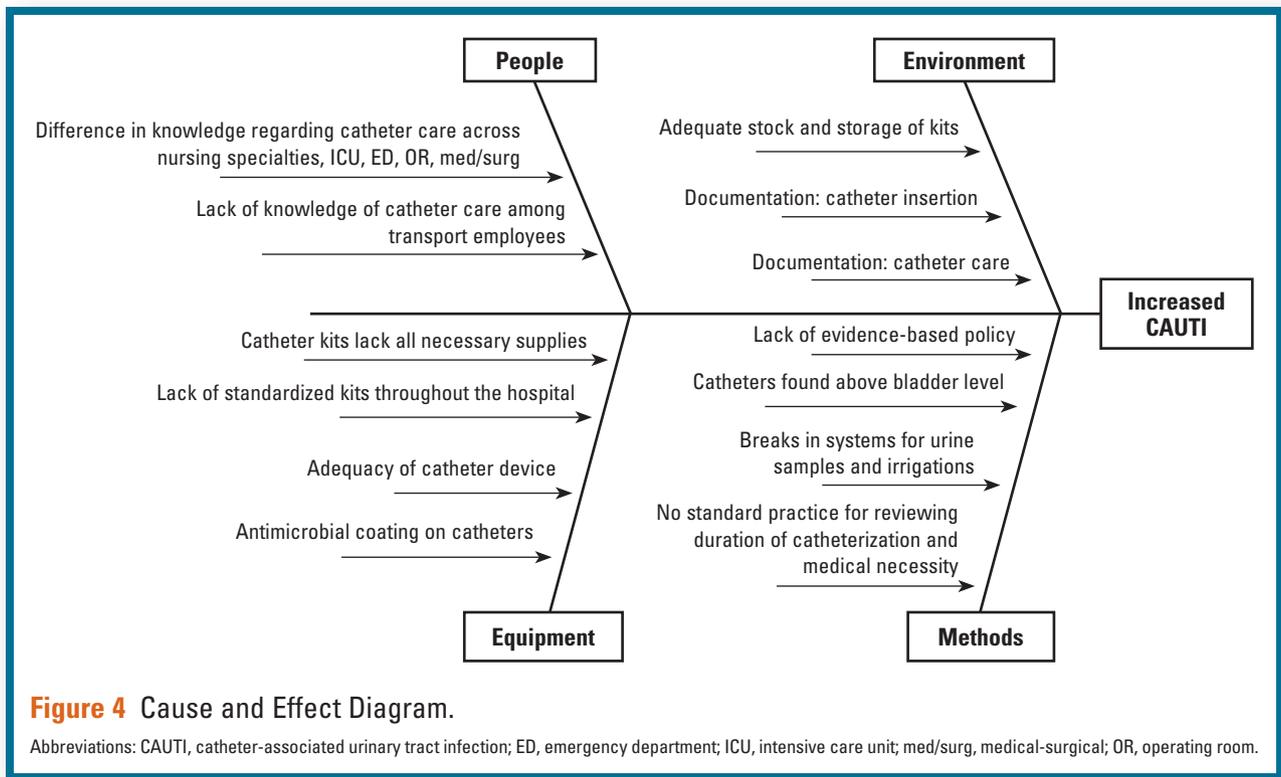
Joint Commission requires in response to a sentinel event.[19] The purpose of an RCA is to identify any system-related problems that may have contributed to the adverse event in question and to allow changes to be made that will prevent a similar event in the future. An RCA involves identifying what happened, what should have happened, and the causes of the adverse event. Through efforts of the National Patient Safety Foundation, standard RCA has been modified to include an additional A for "action plan," changing the acronym to "RCA2."[20] This change emphasizes the need to both identify the root cause and create sustainable improvements in care delivery to prevent future harm.

The components of the RCA2 include factors related to communication, the environment, equipment, processes, staff performance, the team, management, and the organization. The RCA2 leads teams to think critically about the event, to uncover the contributing factor(s) that precipitated it, and ultimately to make plans to mitigate the current problem and prevent similar events in the future.[21] Teams planning improvements related to sentinel events should collaborate with risk management to identify root causes and implement plans for mitigation. Fortunately, not all quality issues result in sentinel events, but in a learning culture, it is helpful for teams to consider less serious events and near-miss or "good catch" events as opportunities for improvement.[22] In addition to the RCA2, QI teams can use other tools to enhance critical thinking in relation to nonsentinel events, near misses, and good catches. Three critical thinking tools commonly used to diagnose quality issues are the 5 Whys, cause and effect diagrams, and Pareto charts.

5 Whys

The 5 Whys tool requires the team to examine the cause of a clinical problem in an attempt to discover the underlying cause; to do so, the team asks the question "Why?" 5 times.[23] Users must thoughtfully consider all aspects of the problem before deciding on a root cause. Often, what might initially seem to be the cause of a problem is actually only a symptom. Figure 3 shows an example of a 5 Whys process that was completed for a mucosal injury caused by an endotracheal tube holder. As seen in the figure, the initial cause of the injury was determined to be use of the wrong tube holder. The 5 Whys tool forced the team to search further for the root cause. At first, the use of the wrong tube holder seemed to be simply an error in nursing judgment; after completing the 5 Whys, however, the team determined the root cause of this problem to be poor communication about a newly stocked item.

Figure 4 Cause and Effect Diagram.

Abbreviations: CAUTI, catheter-associated urinary tract infection; ED, emergency department; ICU, intensive care unit; med/surg, medical-surgical; OR, operating room.

The 5 Whys tool is useful for relatively simple problems. Not all problems require 5 steps, but users should attempt to fully explore causes in depth before ending the process. Alternatively, the exercise might require more than 5 steps. The strength of the 5 Whys tool is its ease of use; however, it may lead teams to oversimplify complex issues by suggesting that a problem arises from a single cause or that a search for a root cause will end after 5 steps.[24,25]

Cause and Effect Diagram

For complex problems, the 5 Whys tool might be inadequate or cumbersome. A Cause and Effect Diagram, also called a fishbone or Ishikawa diagram, helps clinicians examine complex clinical problems by considering that multiple causes may exist. This diagram has its roots in the manufacturing sector, and so the typical categories are materials, methods, equipment, environment, and people.[26] The categories, however, can be tailored to the specific problem. When completing a cause and effect diagram, enter the problem or adverse event in the "mouth" of the fish and work backward to identify causes within each main category. The 5 Whys method can then be used to determine a root cause within individual branches. The example in Figure 4 details the work of a team exploring the reasons for an increased number of catheter-associated urinary tract infections in the intensive care unit at their hospital.

Pareto Chart

A Pareto chart is based on the Pareto principle, which suggests that 80% of a problem stems from 20% of the causes, called the "vital few." Identifying these vital few causes is intended to begin the improvement process by mitigating the causes of most of the events. The remaining causes—the "useful many"—can be fixed later.[27]

After examining the multiple causes of a quality issue, the team may need to determine which to tackle first. For example, the nurse manager in a surgical intensive care unit noted an increased number of pressure injuries and formed a team to investigate. While reviewing the types of pressure injury that occurred throughout the previous year, the team discovered numerous sites of injury, including heels, coccyx, hips, elbows, back of the head, ankles, face, and ears. The team created a Pareto chart to display visually the frequency and cumulative percentage of pressure injuries at each location. Figure 5 shows the Pareto chart the team created; 80% of the pressure ulcers were located on the heels and coccyx. On the basis of this information, the team decided to explore the literature about how to prevent pressure injuries on the heel and coccyx.
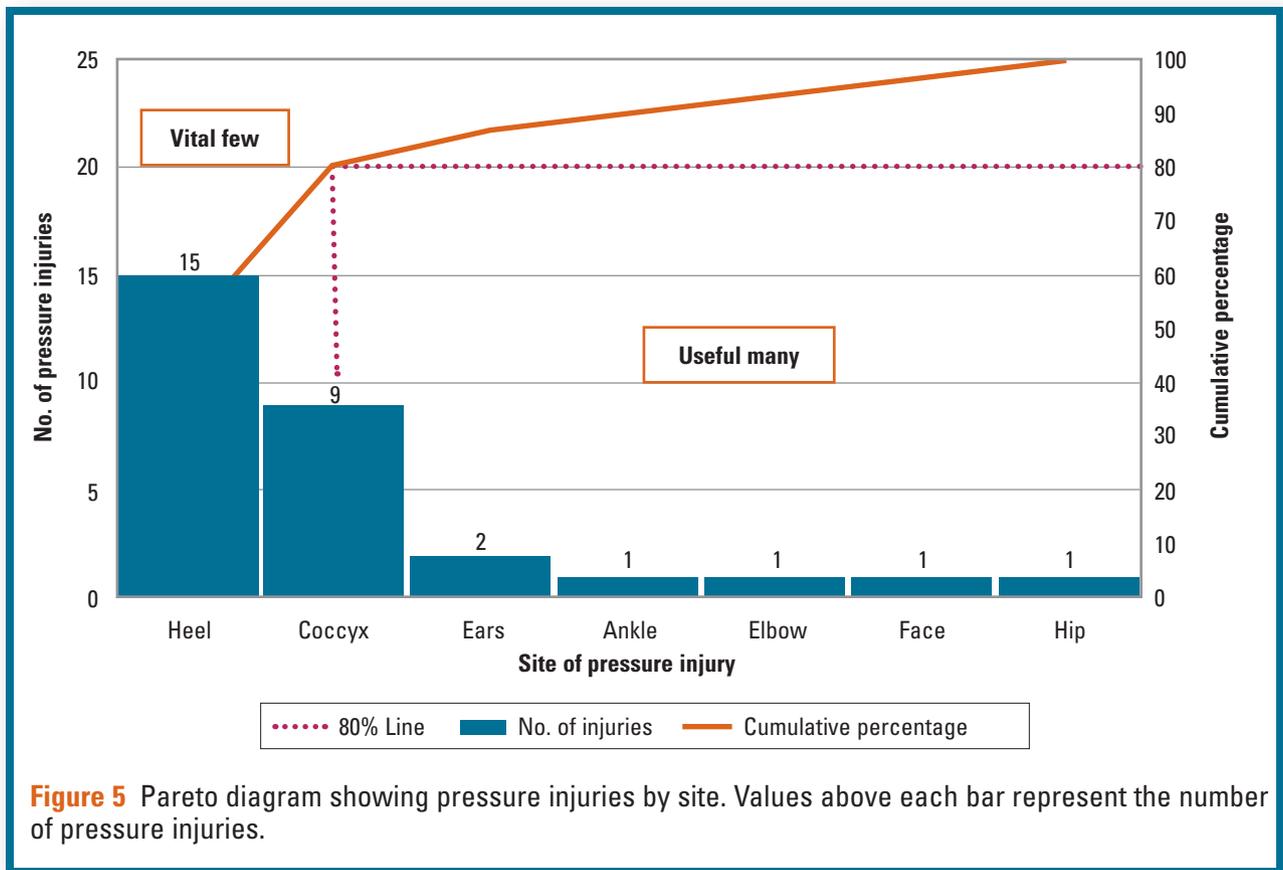
Figure 5 Pareto diagram showing pressure injuries by site. Values above each bar represent the number of pressure injuries.

When planning what causes to mitigate first, a team should consider other elements of the Pareto chart, such as events in the "useful many" category that can be easily fixed. An early win for the team not only encourages them to continue but can help gain buy-in from leadership and staff.[3,14] In our pressure injury example, the team noted that all stage 3 pressure injuries were injuries to the ears and had been caused by respiratory equipment.[28] Although ear injuries were not represented in the "vital few," their severity was a concern. The team decided to include prevention of pressure injuries from respiratory equipment as a priority, along with prevention of those on the heel and coccyx.

As with the use of any tool for patient care, nurses bring their own unique insights to solving problems. Although a Pareto chart can aid nurses in critically thinking about an issue, their knowledge of patient care should still inform practice decisions.

Plan

After the quality issue has been assessed and diagnosed, return to the nursing literature to find evidence-based best practices and potential solutions. Organizations such as The Joint Commission, Centers for Disease Control and Prevention, the Agency for Healthcare Research and Quality, and many professional specialty organizations have published evidence-based practice guidelines and toolkits that are ready to be implemented in clinical practice. Such high-quality assets provide 1 way to ensure that interventions are based on evidence and are useful in practice, without requiring the team to reinvent the wheel and resynthesize the literature.[3]

To determine the quality of a clinical practice guideline, use the Appraisal of Guidelines for Research and Evaluation (AGREE) II tool.[29] This 23-item instrument is reliable and valid, and it is available online at no cost. It leads users through the evaluation of 6 quality domains: Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity of Presentation, Applicability, and Editorial Independence. If the team determines that the guideline is of sufficient quality to use, a literature review should focus on identifying strategies to implement the guideline into practice. If no guideline exists, complete a standard review of the literature to find potential solutions.

Evidence Table

Teams should use evidence-based practice skills to critically appraise and synthesize the literature. An evidence table is an evidence-based practice tool that summarizes the relevant literature in just a few pages.[30] Common column headings in the table include the citation, purpose of the study, sample and setting, methods, results, and a rating of the level and quality of evidence. Create a separate entry for each study within the rows of the table. Once the table has been completed, use the information it provides to identify recommendations for practice that are based on the literature. Use the level of evidence and quality ratings of individual studies to determine the overall strength of the evidence. For example, practice recommendations from numerous experimental studies are considered stronger than recommendations from an equal number of nonexperimental studies, on the basis of the rigor of the study design. Similarly, if most of the articles are of high quality, the overall quality of the evidence can be rated as high.[31] When trying to obtain necessary support for a quality initiative from staff and leadership, the creator of the evidence table can easily share it with other team members, stakeholders, and administrators to provide a summary of the current evidence.[30]

Gap Analysis

Once the team has determined evidence-based practice recommendations, they should use a gap analysis, another evidence-based practice tool, to compare best practices with their organization's current practice. A template with instructions is available online from the Agency for Healthcare Research and Quality[32]; this template can help teams summarize the practice gap. Column headings in the gap analysis table include best practice, best practice strategies, how your practice differs from the best practice, barriers to implementing the best practice, and whether the best practice will be implemented. For problems that are guided by hospital policy, a 2-step gap analysis may be required: the team first compares the evidence-based best practices with the policy and then compares the policy with care delivered on the unit. If the policy is not congruent with best practices, it should be revised to reflect current evidence as an initial step in the quality initiative.

Completing a gap analysis requires that users not only assess how a practice differs from evidence-based best practice, but also identify organizational characteristics that might affect the implementation of change. Factors such as readiness for change within the environment or the ability to engage staff can be either drivers of or barriers to change, and they should be considered in a gap analysis. When deciding whether to implement best practices, consider how the organization's strengths and weaknesses influence the team's ability to embark on a QI initiative. Alternatively, consider possible threats to the organization if the initiative is not begun. When the gap analysis has been completed and the team has determined what actions will be part of the QI initiative, it is helpful to clarify the vision for the initiative by formalizing its purpose and goals.

Project Purpose and Goals

A project's purpose is directly related to the outcome that the team wants to achieve. For example, the purpose may be to improve patient safety by decreasing alarm fatigue among nurses. The project goals should flow directly from the gap analysis and target the best practices that are described in the literature but are missing from practice. For example, if the gap analysis for alarm fatigue noted that the unit lacked a standardized process for determining alarm limits, writing and implementing a policy for setting alarm limits would be a goal for the initiative.

Unfortunately, it is not always possible to implement immediately all the best practices noted in a gap analysis. In the alarm fatigue example, the team may have identified supply issues related to the quality of electrocardiogram electrodes, but implementation of the solution may need to be delayed as the team collaborates with members of the supply chain to evaluate options and select a new product. Other reasons for delaying full implementation might include financial limitations, inadequate staffing, or accessibility of equipment; however, making some progress toward improvement is usually better than waiting for perfect conditions before starting.[3]

Conclusion

Quality improvement requires an interprofessional team effort. Many models exist to guide the process of quality initiatives, including Lean methodology, Six Sigma, and the IHI's Model for Improvement; however, QI remains the work of every nurse, and nurses can use the familiar nursing process in such initiatives. In this article

we have provided an overview of 4 frequently used QI tools and 2 evidence-based practice tools teams can use in quality initiatives. When nurses use these tools in conjunction with their knowledge and expertise, they can help improve care delivery and patient outcomes. CCN

Financial Disclosures
None reported.

See also

To learn more about quality improvement reports, read "Blending Quality Improvement and Research Methods for Implementation Science, Part I: Design and Data Collection" by Granger and Shah in *AACN Advanced Critical Care*, 2015;26(3):268-274. Available at **www. aacnacconline.org**.

References

1. Montalvo I. The National Database of Nursing Quality Indicators (NDNQI). *Online J Issues Nurs.* 2007;12(3):Manuscript 2. doi:10.3912/OJIN.Vol12No03Man02
2. The Joint Commission. Measures. Published 2018. Accessed November 24, 2018. https://www.jointcommission.org/core_measure_sets.aspx
3. Stausmire JM, Ulrich C. Making it meaningful: finding quality improvement projects worthy of your time, effort, and expertise. *Crit Care Nurse.* 2015;35(6):57-61.
4. Stimson CE, Botruff AL. Daily electronic health record reports meet meaningful use requirements, improve care efficiency, and provide a layer of safety for trauma patients. *J Trauma Nurs.* 2017;24(1):53-56.
5. American Nurses Association. *Nursing: Scope and Standards of Practice.* 3rd ed. American Nurses Association; 2015.
6. Bell L, ed. *AACN Scope and Standards for Acute and Critical Care Nursing Practice.* American Association of Critical-Care Nurses; 2015. Accessed November 24, 2108. https://www.aacn.org/~/media/aacn-website/nursing-excellence/standards/scopeandstandardsacutecriticalcare2015.pdf
7. Stausmire JM. Quality improvement or research–deciding which road to take. *Crit Care Nurse.* 2014;34(6):58-63.
8. Mackinson LG, Corey J, Kelly V, et al. Nurse project consultant: critical care moves beyond the bedside to affect quality and safety. *Crit Care Nurse.* 2018;38(3):54-66.
9. Iowa Model Collaborative; Buckwalter KC, Cullen L, Hanrahan K, et al. Iowa model of evidence-based practice: revisions and validation. *Worldviews Evid Based Nurs.* 2017;14(3):175-182.
10. Mureau-Haines RM, Boes-Rossi M, Casperson SC, et al. Family support during resuscitation: a quality improvement initiative. *Crit Care Nurse.* 2017;37(5):14-23.
11. Schnock KO, Ravindran SS, Fladger A. Identifying information resources for patients in the intensive care unit and their families. *Crit Care Nurse.* 2017;37(6):e10-e16. doi:10.4037/ccn2017961
12. Rhodes A, Evans LE, Alhazzani W, et al. Surviving Sepsis Campaign: international guidelines for management of sepsis and septic shock: 2016. *Intensive Care Med.* 2017;43(3):304-377.
13. Levy MM, Evans LE, Rhodes A. The Surviving Sepsis Campaign bundle: 2018 update. *Intensive Care Med.* 2018;44(6):925-928.
14. Kotter J. *Leading Change.* Harvard Business Review Press; 2012.
15. Stillwell SB, Fineout-Overholt E, Melnyk BM, Williamson KM. Evidence-based practice: step-by-step: asking the clinical question: a key step in evidence-based practice. *Am J Nurs.* 2010;110(3):58-61.
16. Institute of Healthcare Improvement. How to improve. Published 2018. Accessed November 24, 2018. http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx
17. Scoville R, Little K. Comparing lean and quality improvement. IHI White Paper. Institute for Healthcare Improvement; 2014. Accessed November 24, 2018. http://www.ihi.org/resources/Pages/IHIWhitePapers/ComparingLeanandQualityImprovement.aspx
18. Graban, M. *Lean Hospitals: Improving Quality, Patient Safety, and Employee Engagement.* 3rd ed. CRC Press; 2016.
19. The Joint Commission. Framework for root cause analysis and corrective actions. Published October 11, 2017. Accessed November 24, 2018. https://www.jointcommission.org/framework_for_conducting_a_root_cause_analysis_and_action_plan/
20. National Patient Safety Foundation (NPSF). RCA2: improving root cause analyses and actions to prevent harm. Published June 2015. Accessed November 24, 2018. http://c.ymcdn.com/sites/www.npsf.org/resource/resmgr/PDF/RCA2_first-online-pub_061615.pdf
21. Stausmire JM, Ulrich C. Using SQUIRE 2.0 as a guide for planning your quality improvement project. *Crit Care Nurse.* 2017;37(6):72-80.
22. Lozito M, Whiteman K, Swanson-Biearman B, Barkhymer M, Stephens K. Good Catch Campaign: improving the perioperative culture of safety. *J Emerg Nurs.* 2018;107(6):705-714.
23. Institute for Healthcare Improvement. 5 Whys: finding the root cause. Published 2018. Accessed November 24. 2018. http://www.ihi.org/resources/Pages/Tools/5-Whys-Finding-the-Root-Cause.aspx
24. Card AJ. The problem with "5 whys." *BMJ Qual Saf.* 2017;26(8):671-677.
25. Peerally MF, Carr S, Waring J, Dixon-Woods M. The problem with root cause analysis. *BMJ Qual Saf.* 2017;26(5):417-422.
26. Institute for Healthcare Improvement. Cause and effect diagram. Published 2018. Accessed November 24, 2018. http://www.ihi.org/resources/Pages/Tools/CauseandEffectDiagram.aspx
27. Institute for Healthcare Improvement. Pareto chart. Published 2018. Accessed November 24, 2018. http://www.ihi.org/resources/Pages/Tools/ParetoDiagram.aspx
28. Edsberg LE, Black JM, Goldberg M, McNichol L, Moore L, Sieggreen M. Revised National Pressure Ulcer Advisory Panel pressure injury staging system: revised pressure injury staging system. *J Wound Ostomy Continence Nurs.* 2016;43(6):585-597.
29. AGREE Trust. AGREE Advancing the science of practice guidelines. Published 2010. Updated 2014. Accessed November 24, 2018. https://www.agreetrust.org/
30. Fineout-Overholt E, Melnyk BM, Stillwell SB, et al. Evidence-based practice step by step: critical appraisal of the evidence: part I. *Am J Nurs.* 2010;110(7):47-52.
31. Peterson M, Barnanson S, Donnelly B, et al. Choosing the best evidence to guide clinical practice: application of AACN levels of evidence. *Crit Care Nurse.* 2014;34(2):58-68.
32. Agency for Healthcare Quality and Research. Instructions: gap analysis. Accessed November 24, 2018. https://archive.ahrq.gov/professionals/systems/hospital/qitoolkit/d5-gapanalysis.pdf