CHAPTER

Safety, Quality, & Performance Improvement

58

KEY CONCEPTS

1. In the 1980s, anesthesiologists were recognized for being the first medical specialty to adopt *mandatory* safety-related clinical practice guidelines. Adoption of these guidelines, describing standards for basic monitoring during general anesthesia, was associated with a reduction in the number of patients suffering brain damage or death secondary to ventilation mishaps during general anesthesia.
2. In 1999 the Institute of Medicine of the (U.S.) National Academy of Sciences summarized available safety information in its report, *To Err is Human: Building a Safer Healthcare System*, which highlighted many opportunities for improved quality and safety.
3. It has long been recognized that quality and safety are closely related to consistency and reduction in practice variation.
4. There is a natural tendency to assume that errors can be prevented by better education or better management of individual workers (ie, to look at errors as individual failures made by individual workers rather than as failures of a system or a process). To reduce errors one changes the system or process to reduce unwanted variation so that random errors are less likely.

PATIENT SAFETY ISSUES

As a profession, anesthesiology has spearheaded efforts to improve patient safety. Some of the first studies to evaluate safety of care focused on provision and sequelae of anesthesia. When spinal anesthesia was virtually abandoned in the United Kingdom (after two patients developed paraplegia following administration of spinal anesthetics), Drs Robert Dripps and Leroy Vandam helped prevent this technique from being abandoned in North America by carefully reporting outcomes of 10,098 patients who received spinal anesthesia. They determined that only one patient (who proved to have a previously undiagnosed spinal meningioma) developed severe, long-term neurological sequelae.

After halothane was introduced into clinical practice in 1954, concerns arose about whether it might be associated with an increased risk of hepatic injury. The National Halothane Study, perhaps the first clinical outcomes study to be performed (long before the term *outcomes research* gained widespread use), demonstrated the remarkable safety of the then relatively new agent compared with the alternatives. It failed, however, to settle the question of whether "halothane hepatitis" actually existed.

1 In the 1980s, anesthesiologists were recognized for being the first medical specialists to adopt *mandatory* safety-related clinical practice guidelines. Adoption of these guidelines was not without controversy, given that for the first time

the American Society of Anesthesiologists (ASA) was "dictating" how physicians could practice. The effort resulted in standards for basic monitoring during general anesthesia that included detection of carbon dioxide in exhaled gas. Adoption of these standards was associated with a reduction in the number of patients suffering brain damage or death secondary to ventilation mishaps during general anesthesia. A fortunate associated result was that the cost of medical liability insurance coverage also declined.

In 1984, Ellison Pierce, president of the ASA, created its Patient Safety and Risk Management Committee. The Anesthesia Patient Safety Foundation (APSF), which celebrated its 25th anniversary in 2011, was also Dr Pierce's creation. The APSF continues to spearhead efforts to make anesthesia and perioperative care safer for patients and practitioners. Similarly, through its guidelines, statements, advisories, and practice parameters, the ASA continues to promote safety and provide guidance to clinicians. As Dr Pierce noted, "Patient safety is not a fad. It is not a preoccupation of the past. It is not an objective that has been fulfilled or a reflection of a problem that has been solved. Patient safety is an ongoing necessity. It must be sustained by research, training, and daily application in the workplace."

Meanwhile, other specialties of medicine began to place greater emphasis on quality and safety. 2 In 1999 the Institute of Medicine (IOM) of the (U.S.) National Academy of Sciences summarized available safety information in a report entitled *To Err is Human: Building a Safer Healthcare System*. That document highlighted many opportunities for improved quality and safety in the American health care system. A subsequent IOM report, *Crossing the Quality Chasm: A New Health System for the 21st Century,* explored the way that variation in medical practice reduced quality and safety of health care system. More recently, the Institute for Healthcare Improvement has been "motivating and building the will for change; identifying and testing new models of care in partnership with both patients and health care professionals; and ensuring the broadest possible adoption of best practices and effective innovations," as described on its web site.

QUALITY OF CARE & PERFORMANCE IMPROVEMENT ISSUES

3 It has long been recognized that quality and safety are closely related to consistency and reduction in practice variation. The quality and safety movement(s) in medicine have their origins in the work of Walter Shewhart and his associate W. Edwards Deming, who popularized the use of statistics and control charts in evaluating the reliability of a process. In manufacturing (where these ideas were initially applied), reducing an error rate reduces the frequency of defective products and increases the customer's satisfaction with the product and the manufacturer. In medicine, reducing the error rate (for everything from accurate timing and delivery of prophylactic antibiotics to ensuring "correct side and site" surgery and regional anesthetic blocks) increases quality and reduces preventable injuries to patients, while also eliminating the additional costs resulting from those errors.

Strategies to Reduce Performance Errors

4 Both in manufacturing and in medicine, there is a natural tendency to assume that errors can be prevented by better education, better performance, or better management of *individual workers*. In other words, there is a tendency to look at errors as individual failures made by individual workers, rather than as failures of a system or a process. Using the latter point of view (as advocated by Deming), to reduce errors one changes the system or process to reduce unwanted variation so that random errors will be less likely. An outstanding example of this is the universal protocol followed by health care institutions prior to invasive procedures. Adherence to this protocol ensures that the correct procedure is performed on the correct part of the correct patient by the correct physician, that the patient has given informed consent, that all needed equipment and images are available, and that (if needed) the correct prophylactic antibiotic was given at the correct time.

A related example of a simple approach to improve safety and quality of a procedure is the use

of a standardized checklist, as described in the popular press by Dr. Atul Gawande. The importance of checklist use is addressed elsewhere in this text, for example, in Chapter 2 in the context of developing a culture of safety in the operating room. Such checklists provide the "script" for the preprocedure universal protocol (**Figure 58–1**). Studies have shown that the incidence of catheter-related bloodstream infections can be reduced when central venous catheters are inserted after adequate cleansing and disinfection of the operator's hands by an operator wearing a surgical hat and mask, sterile gown, and gloves; using chorhexidine (rather than povidone iodide) skin preparation of the insertion site; and with sterile drapes of adequate size to maintain a sterile field. Studies have also shown that use of all elements in this central line "bundle" is much more likely when a checklist is required prior to every central line insertion; a sample checklist is shown in **Figure 58–2**.

Benefits of Standardized Checklists

Checklists emphasize two important principles about improving quality and safety in the surgical environment. First, using a checklist requires that a physician *communicate* with other members of the team. Good communication among team members improves quality and prevents errors. It is easy to find examples of good communication strategies. By clearly and forcefully announcing that protamine infusion has been started (after extracorporeal perfusion has been discontinued during a cardiac operation), the anesthesiologist helps prevent the surgeon and perfusionist from making a critical error, such as resuming extracorporeal perfusion without administering additional heparin. By accurately describing the intended surgical procedure (at the time the patient is "posted" on the surgical schedule), the surgeon helps prevent the operating room nurses from making the critical error of not having the necessary instrumentation for the procedure, and helps prevent the anesthesiologist from performing the wrong regional anesthetic procedure. We have selected these examples of good communication because we are aware of adverse patient outcomes that resulted from failure to transfer these specific points of information.

Second, using a checklist underscores the importance of ensuring that every member of the surgical team has a stake in patient safety and good surgical outcomes. The team member who records the checklist "results" is usually not a physician but has the implicit authority to enforce adherence to the checklist. On poorly functioning teams in which there is excessive deference to authority figures, team members may feel that their opinions are not wanted or valued, or may be afraid to bring up safety concerns for fear of retaliation. On well-functioning teams, there is a "flattening" of the hierarchy such that every team member has the authority and every team member feels an obligation to halt the proceedings to prevent potential patient harm.

Quality Assurance Measures

In surgery there are well-recognized indicators of quality, such as having a very low incidence of surgical site infections and of perioperative mortality. However, at present there is no consensus as to the important measurements that can be used to assess quality of anesthesia care. Nevertheless, surrogate anesthesia indicators have been monitored by a variety of well-meaning agencies. Examples include selection and timing of preoperative antibiotics and temperature of patients in the postanesthesia care unit after colorectal surgery. Mindful of the importance of having accurate and relevant outcome measures, the ASA established the Anesthesia Quality Institute in 2009 and charged it with developing and collecting valid quality indicators for anesthetic care that can be used for quality improvement programs. Aggregation of the large amounts of data required for statistical validity is dependent on widespread adoption of electronic medical records (EMR) and anesthesia information management systems (AIMS) (discussed in Chapter 18). Currently these systems are present in a minority of hospitals in the United States. It is our hope that as their use becomes more widespread, the data and indicators that are collected and aggregated will provide greater insight into how quality of anesthesia care may influence clinical outcomes that are important to patients.

Name **MRN** **Patient Identification**	**Pre-Procedure and Time Out** Documentation

Procedure 1: _____

Pre-Procedure Verification	**Circle One**		
➢ Patient's identity confirmed using two identifiers	Yes	No	
➢ Procedure confirmed and consistent with documents, e.g. H&P, progress notes	Yes	No	
➢ Procedure site & side verified	Yes	No	NA
➢ Relevant images reviewed/available	Yes	No	NA
➢ Procedure site marked (required for procedures involving laterality, lesions, levels, digits)	Yes	No	NA
➢ Risk/benefits discussed and/or consent form completed	Yes	No	NA

Time Out Verification (Performed immediately prior to the procedure)	**Circle One**		
➢ Patient's identity confirmed using two identifiers	Yes	No	
➢ Procedure site and side verified	Yes	No	NA
➢ Correct procedure confirmed	Yes	No	
➢ Correct patient position confirmed	Yes	No	NA
➢ Availability of Implants/special equipment confirmed	Yes	No	NA

_____ _____ _____

Signature & Printed Name or ID of Provider **Performing Procedure** Date Time

_____ _____ _____

Signature, Title & Printed Name of Person **Completing Form** Date Time

Procedure 2: _____

(to be used for second block or any time patient position is changed (i.e., supine to prone)

Pre-Procedure Verification	**Circle One**		
➢ Patient's identity confirmed using two identifiers	Yes	No	
➢ Procedure confirmed and consistent with documents, e.g. H&P, progress notes	Yes	No	
➢ Procedure site & side verified	Yes	No	NA
➢ Relevant images reviewed/available	Yes	No	NA
➢ Procedure site marked (required for procedures involving laterality, lesions, levels, digits)	Yes	No	NA
➢ Risk/benefits discussed and/or consent form completed	Yes	No	NA

Time Out Verification (Performed immediately prior to the procedure)	**Circle One**		
➢ Patient's identity confirmed using two identifiers	Yes	No	
➢ Procedure site and side verified	Yes	No	NA
➢ Correct procedure confirmed	Yes	No	
➢ Correct patient position confirmed	Yes	No	NA
➢ Availability of Implants/special equipment confirmed	Yes	No	NA

_____ _____ _____

Signature & Printed Name or ID of Provider **Performing Procedure** Date Time

_____ _____ _____

Signature, Title & Printed Name of Person **Completing Form** Date Time

Comments: _____

_____

FIGURE 58–1 The "time out" checklist used at the Virginia Commonwealth University Health System before all regional anesthesia procedures. There is space for two separate time outs. An additional time out is performed whenever a patient's position is changed for a second regional block (most commonly for lower extremity surgery). For convenience, the regional anesthesia time out checklist is printed on the reverse of the Consent for Anesthesia acknowledgment form. (Reproduced with permission from Virginia Commonwealth University Health System Authority.)

PATIENT NAME

MRN
(or PATIENT LABEL)

QUALITY DOCUMENT. NOT PART OF THE PERMANENT MEDICAL RECORD.
Return to designated area on your unit.

Intravascular Access Catheter Insertion Checklist

Purpose: To work as a team to decrease patient harm from catheter-related blood stream infections
When: During all central venous catheter insertion or re-wirings
Who: Assistant to complete this form during catheter insertion

1. Date: _____ Time: _____ a.m. p.m.

2. Procedure Site: _____ ☐ New ☐ Re-wiring

3. Procedure is: ☐ Elective ☐ Emergent

4. Before procedure, did person(s) performing procedure:
   - ➢ Wash hands immediately prior? ☐ Yes ☐ No
   - ➢ Sterilize procedure site (chlorhexidine)? ☐ Yes ☐ No
   - ➢ Drape entire patient in sterile fashion? ☐ Yes ☐ No

5. During procedure, did personnel performing procedure:
   - ➢ Wear sterile gloves? ☐ Yes ☐ No
   - ➢ Wear hat and mask? ☐ Yes ☐ No
   - ➢ Wear sterile gown? ☐ Yes ☐ No
   - ➢ Maintain a sterile field? ☐ Yes ☐ No

6. Did **all** personnel assisting with procedure follow the policy? ☐ Yes ☐ No

7. Procedure stopped at any time due to break in sterile field? ☐ Yes ☐ No

If yes, Corrective Actions Taken:
☐ Person performing procedure applied appropriate barrier, re-prepped and draped the pateint ☐ New checklist initiated
☐ Complete new set up: staff barriers, prep, drape new line ☐ New checklist initiated

   - ☐ Attending/designee paged; problem corrected
   - ☐ Attending/designee paged; problem not corrected

8. After procedure, were:
   - ➢ Sterile dressings applied to the site? ☐ Yes ☐ No
   - ➢ New IV bag & tubing set up? ☐ Yes ☐ No
   - ➢ New stopcocks and access devices used? ☐ Yes ☐ No
   - ➢ All ports closed with sterile dead enders? ☐ Yes ☐ No

9. Comments– Please note any additional corrective actions taken: _____
_____
_____

The assistant should **STOP** any procedure that does not meet this standard of care. The procedure should not continue until everyone is in compliance. The assistant will contact unit or division leadership immediately for anyone refusing to comply with this policy.

_____
Name of Person Performing Procedure (& ID #)
PRINT NAME

_____
Assistant Completing Checklist
PRINT NAME

FIGURE 58–2 Mandatory checklist for insertion of central venous catheters in patients who are not currently undergoing anesthesia and surgery at the Virginia Commonwealth University Health System.

A similar electronic document is contained within the Anesthesia Information Management electronic record for central venous lines. (Reproduced with permission from Virginia Commonwealth University Health System Authority.)

SUGGESTED READING

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WEB SITES

American Society of Anesthesiologists Standards, Guidelines, Statements and other Documents. Available at: https://www.asahq.org/For-Healthcare-Professionals/Standards-Guidelines-and-Statements.aspx (accessed August 4, 2012).

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