

SUSAN K. GROVE | JENNIFER R. GRAY

Understanding Nursing Research

Building an Evidence-Based Practice

8th
EDITION



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EDITION

Understanding Nursing Research

Building an Evidence-Based Practice

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ELSEVIER

Elsevier
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St. Louis, Missouri 63043

UNDERSTANDING NURSING RESEARCH: BUILDING AN
EVIDENCE-BASED PRACTICE, EIGHTH EDITION

ISBN: 978-0-323-82641-9

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Previous editions copyrighted 2019, 2015, 2011, 2007, 2003, 1999, and 1995.

Executive Content Strategist: Lee Henderson
Senior Content Development Manager: Luke Held
Senior Content Development Specialist: Maria Broeker
Publishing Services Manager: Shereen Jameel
Project Manager: Karthikeyan Murthy/Beula Christopher
Design Direction: Renee Duenow

Printed in India.

Last digit is the print number: 9 8 7 6 5 4 3 2 1



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*To all the nursing students and registered nurses
who are using the best research evidence in their practice.*

Susan and Jennifer

*To my grandchildren, Jack, Boone, and Cole Appleton,
who have added so much joy to my life.*

Susan

*To my husband Randy Gray, our children, and our grandchildren,
who make me laugh and remember the importance of memories.*

Jennifer

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The delivery of evidence-based care is a major goal of professional nursing and health care. By making nursing research an integral part of baccalaureate education, we hope to prepare graduates who can read, critically appraise, and synthesize research. In this way, BSN-prepared nurses can make evidence-based changes in practice. Our aim in writing this research text, *Understanding Nursing Research: Building an Evidence-Based Practice*, is to create excitement about research in undergraduate students. We want students like you to be aware of the relevant knowledge that has been generated through nursing research. Only through research can nursing truly be recognized as a profession with documented effective outcomes for the patient, family, nurse provider, and healthcare system.

Developing the eighth edition of *Understanding Nursing Research* has provided us with an opportunity to update, clarify, and refine the essential content of this undergraduate research text. In addition, a new feature, **Research/EBP Tip**, was included throughout each chapter to increase your understanding of providing an evidence-based practice (EBP) in nursing. The revisions in this edition are based on our own experiences with the text and input from dedicated reviewers, inquisitive students, and supportive faculty from across the country who provided us with many helpful suggestions.

Chapter 1, Introduction to Nursing Research and Its Importance in Building an Evidence-Based Practice, introduces you to nursing research, the history of research, and the significance of research evidence for nursing practice. We introduce the types of research synthesis being conducted in nursing—systematic review, meta-analysis, meta-synthesis, and mixed methods research synthesis. The definition of EBP has been updated based on current literature and EBP activities of nurses. The research methodologies of quantitative, qualitative, mixed methods, and outcomes research are explained with the use of examples from published articles. We describe each methodology's contribution to evidence-based practice.

Chapter 2, Introduction to Quantitative Research, presents the steps of the quantitative research process in a clear, concise manner. Extensive, current examples of descriptive, correlational, quasi-experimental, and experimental studies are provided, which reflect the quality of research being conducted in nursing and health care.

For Chapter 3, Introduction to Qualitative Research, we selected four approaches to qualitative research that are frequently reported in the literature. These approaches include phenomenology, grounded theory, ethnography, and exploratory-descriptive qualitative research. Data collection and analysis methods specific to qualitative research are discussed. Guidelines for reading and critically appraising qualitative studies are explained using examples of published studies.

Chapter 4, Examining Ethics in Nursing Research, provides an extensive discussion of the use of ethics in research and the Common Rule, the federal regulations that govern the protection of human subjects. Guidelines are provided to assist students in critically appraising the ethical discussions in published studies and to participate in the ethical review of research in clinical agencies.

In Chapter 5, Examining Research Problems, Purposes, and Hypotheses, we clarify the difference between a study problem and purpose. Examples of problems and purposes are included from current quantitative, qualitative, mixed methods, and outcomes studies. Detailed appraisal guidelines are provided for critically appraising the problems and purposes in studies; the objectives, questions, or hypotheses that may be included; and the variables or concepts that are manipulated or measured.

Chapter 6, Understanding and Critically Appraising the Literature Review, begins by describing different types of publications that might be included in a review, with attention to their quality. The steps for finding relevant sources, reading studies, and synthesizing information into a logical, cohesive review are presented. We provide guidelines for critically appraising literature reviews, distinguishing between the purpose and timing of the literature review in quantitative and qualitative studies.

Chapter 7, Understanding Theory and Research Frameworks, presents the components of theory, different types of theories, and using theories or parts of theories as research frameworks. The purpose of a research framework is discussed, recognizing that researchers may not include the framework in the publication. Guidelines for critically appraising the research framework are presented as well. The guidelines are applied to studies with frameworks derived from research findings and from different types of theories.

Chapter 8, Clarifying Quantitative Research Designs, addresses descriptive, correlational, quasi-experimental, and experimental designs. Because design validity is a key part of a study's quality, we summarize the strengths and threats to design validity in a table and discuss them in relation to current studies. Guidelines are provided for critically appraising the designs of quantitative studies and their validity.

Chapter 9, Examining Populations and Samples in Research, provides a detailed discussion of the concepts of sampling in research. Different types of sampling methods for quantitative, qualitative, mixed methods, and outcomes research are discussed. Guidelines are included for critically appraising the sampling criteria, sampling method, and sample size of nursing studies.

Chapter 10, Clarifying Measurement and Data Collection in Quantitative Research, has been updated to reflect current knowledge about measurement methods used in nursing research. Content has been expanded and uniquely organized to assist students in critically appraising the reliability and validity of scales; precision and accuracy of physiological measures; and the sensitivity, specificity, and likelihood ratios of diagnostic and screening tests.

Chapter 11, Understanding Statistics in Research, focuses on the principles and concepts of the statistical analysis process. We presented the analyses used for describing variables, examining relationships, predicting outcomes, and examining group differences in studies. Excerpts from studies are used as examples of data analyses and results. Guidelines are provided for critically appraising the Results and Discussion sections of nursing studies.

Chapter 12, Critical Appraisal of Quantitative and Qualitative Research for Nursing Practice, was revised to present the three major criteria for critically appraising quantitative and qualitative studies. These criteria are (1) to identify the steps or components of studies; (2) to determine the strengths and weaknesses of studies; and (3) to evaluate the credibility, trustworthiness, and meaning of studies. Within each criterion are specific questions to ask in critically appraising quantitative and qualitative studies. We provide detailed examples of critical appraisals of a current quantitative study and qualitative study using the guidelines provided in the chapter. The studies we use are available in the online Research Article Library for this text.

Chapter 13, Building an Evidence-Based Nursing Practice, has been significantly updated to reflect the current trends in providing evidence-based nursing practice. Detailed guidelines are provided for critically appraising the four common types of research synthesis conducted in nursing (systematic review, meta-analysis, meta-synthesis, and mixed methods research synthesis). These guidelines were used to assist students in examining the quality of published research syntheses and the potential use of research evidence in practice. The chapter includes models to assist nurses and agencies in moving toward EBP. Translational research is introduced as a method for promoting the use of research evidence in practice.

Chapter 14, Introduction to Additional Research Methodologies in Nursing: Mixed Methods and Outcomes Research, includes current information about mixed methods and outcomes studies. Mixed methods studies are making significant contributions to what we know about chronic illness and new infections, such as COVID-19. Outcomes studies are important as they examine patient and financial outcomes using large databases. Because both types of studies are important to healthcare, we wanted you to be able to read and critically appraise these studies to determine their contribution to your EBP.

The eighth edition is written and organized to facilitate ease in reading, understanding, and critically appraising studies. The major strengths of the text are as follows:

- State-of-the art coverage of EBP—a topic of vital importance in nursing.
- **Research/EBP Tips** to increase students' understanding and use of research evidence in practice.
- Balanced coverage of qualitative and quantitative research methodologies.
- Inclusion of mixed methods and outcomes research methodologies throughout the book, with Chapter 14 focused on these two types of research.
- Rich and frequent illustration of major points and concepts from the most current nursing research literature from a variety of clinical practice areas.
- A clear, concise writing style that is consistent among the chapters to facilitate student learning.
- Electronic references and websites that direct the student to an extensive array of information that is important in reading, critically appraising, synthesizing, and using research knowledge in practice.

This text provides a background for understanding quantitative, qualitative, mixed methods, and outcomes research methodologies, making it appropriate for use in research courses for both RN and pre-licensure students. In addition, the text can serve as a valuable resource for practicing nurses in critically appraising studies and implementing research evidence in their clinical settings.

LEARNING RESOURCES TO ACCOMPANY *UNDERSTANDING NURSING RESEARCH*, 8th EDITION

The teaching and learning resources to accompany *Understanding Nursing Research* have been revised for both the instructor and student to reflect content updates to the eighth edition and to promote a maximum level of flexibility in course design and student review.

Evolve Instructor Resources

A comprehensive suite of Instructor Resources is available online at <http://evolve.elsevier.com/Grove/understanding/> and consists of a Test Bank, PowerPoint slides, Image Collection, Answer Guidelines for the Appraisal Exercises provided for students, and TEACH for Nurses, which include teaching strategies and other educator resources for research and EBP courses.

Test Bank

The Test Bank consists of approximately 550 NCLEX® Examination–style questions, including approximately 10% of questions in alternate item formats. Each question is coded with the correct answer, a rationale from the textbook, and the cognitive level in the new Bloom's Taxonomy. The Test Bank is provided in ExamView and Evolve LMS formats.

PowerPoint Slides

The PowerPoint slide collection contains approximately 550 slides, including seamlessly integrated Audience Response System Questions, images, and Unfolding Case Studies. The PowerPoints have been simplified, with the Notes area of the slides featuring additional content details. Unfolding Case Studies focus on practical EBP/PICO or PICOS questions, such as a nurse on a unit needing to perform a literature search or to identify a systematic review or meta-analysis to address a practice problem. PowerPoint presentations are fully customizable.

Image Collection

The electronic Image Collection consists of all images from the text. This collection can be used in classroom or online presentations to reinforce student learning.

TEACH for Nurses

TEACH for Nurses is a robust, customizable, ready-to-use collection of chapter-by-chapter teaching strategies and educational resources that provide everything you need to create an engaging and effective course. Each chapter includes the following:

- Chapter Objectives
- Student Resources
- Instructor Resources
- Teaching Strategies
- In-Class/Online Case Study
- Nursing Curriculum Standards

Evolve Student Resources

The Evolve Student Resources include interactive Review Questions, a Research Article Library consisting of 10 full-text research articles, and Appraisal Exercises based on the articles in the Research Article Library.

- The interactive Review Questions (approximately 25 per chapter) aid the student in reviewing and focusing on the chapter material.
- The Research Article Library is an updated collection of 10 research articles taken from leading nursing journals.
- The Appraisal Exercises are a collection of application exercises, based on the articles in the Research Article Library, that help students learn to critically appraise and apply research findings. Answer Guidelines are provided for the instructor.

Study Guide

The companion Study Guide, written by the authors of the main text, provides both time-tested and innovative exercises for each chapter in *Understanding Nursing Research*, 8th Edition. Included for each chapter are a brief Introduction, Terms and Definitions exercises, Linking Ideas exercises, Web-Based Information and Resources exercises, and Conducting Critical Appraisals to Build an Evidence-Based Practice exercises. An integral part of the Study Guide are the appendices, which feature three published research studies that are referenced throughout the critical appraisal exercises. These three recently published nursing studies (a quantitative study, a qualitative study, and a mixed methods study) can be used in classroom or online discussions, as well as to address the Study Guide questions. Key features of the eighth edition Study Guide include the following:

- Increased emphasis on EBP: This edition of the Study Guide continues the EBP emphasis of the revised textbook and reinforces the value of understanding the research process and critical appraisal.

- **Web-Based Activities:** This section promotes the appropriate use of the Internet for scholarly research and EBP learning experiences.
- **Back matter has been updated for quick reference:** An “Answer Key” is provided for the exercises developed for each chapter. Each published study is in a separate appendix (three appendices total), which simplifies cross referencing in the body of the Study Guide. Also included is a Critical Appraisal Guidelines appendix that details critical appraisal guidelines for quantitative and qualitative research.
- **Quick-reference printed tabs:** Quick-reference printed tabs have been added to differentiate the Answer Key and each of the book’s three published studies (four tabs total), for improved navigation and usability.

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ACKNOWLEDGMENTS

Developing the eighth edition of *Understanding Nursing Research* was a 2-year project, and there are many people we would like to thank. We want to extend a very special thank you to Dr. Polly Hulme for her revision of Chapter 2, Introduction to Quantitative Research, and Chapter 6, Understanding and Critically Appraising the Literature Review. We are very fortunate that Polly was willing to share her expertise and time in developing the eighth edition of this text.

We want to express our appreciation to our universities, The University of Texas at Arlington College of Nursing and Health Innovation and Oklahoma Christian University, which continue to support our writing. We would like to thank nursing faculty members across the world who are using our book to teach research, especially those who take time to send us information on errors. Special thanks to the students who have read our book and provided honest feedback on its clarity and usefulness to them. We would also like to recognize the excellent reviews of the colleagues, listed on the previous pages, who helped us make important revisions in the text.

In conclusion, we would like to thank the people at Elsevier who helped produce this book. We thank those who have devoted extensive time to the development of this eighth edition, the instructor's ancillary materials, the student study guide, and all of the web-based components. These individuals include Lee Henderson, Luke Held, Maria Broeker, Beula Christopher, Karthikeyan Murthy, Aparna Venkatachalam, and Ramkumar Bashyam. Maria Broeker and Beula Christopher have been in constant communication with us to promote the quality and consistency of the formatting and content in this text. It has been such a pleasure working with you.



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Introduction to Nursing Research and Its Importance in Building an Evidence-Based Practice

Jennifer R. Gray

CHAPTER OVERVIEW

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LEARNING OUTCOMES

After completing this chapter, you should be able to:

1. Define research, nursing research, and evidence-based practice (EBP).
2. Discuss the past and present activities influencing research in nursing.
3. Examine ways of informally and formally acquiring nursing knowledge.
4. Describe the common types of research—quantitative, qualitative, mixed methods, and outcomes—conducted to generate evidence for nursing practice.
5. Describe the purposes of research in implementing an evidence-based nursing practice.
6. Discuss your role in research as a professional nurse.
7. Describe the following strategies for synthesizing healthcare research: systematic review, meta-analysis, meta-synthesis, and mixed methods research synthesis.
8. Examine the levels of research evidence available to nurses for practice.

Welcome to nursing research! Learning about nursing research is similar to moving to a new country. What would you need to do if you moved to a new country? You might need to learn a new language, understand new laws and social customs, and become integrated into the culture of the country. Your experiences in the new country might change your way of evaluating situations and gathering new information. Throughout the process of becoming part of the new

country, you may become more observant and ask relevant questions. You may refer to a book about the country as a guide. We developed this book to be a trusted resource, a guide to the world of research.

Research has its own language. This chapter will clarify the meaning of nursing research and its significance in developing an evidence-based practice (EBP) for nursing. Key terms and definitions are introduced throughout the book. You also have a glossary at the back of the book in which each term that appears in the main text in bold font is listed with its definition. Knowing the history of a country may provide a new resident insight into the country. For that reason, this chapter also will include a short description of the history of nursing research. The research accomplishments in the profession since the 1850s are discussed. Research has standard scientific processes that are followed to produce credible, reliable evidence. We will describe these processes and provide examples to help you understand research.

We believe understanding research is necessary for you to be an effective nurse in practice. In this chapter, we will compare ways nurses acquire the knowledge they use in practice, including acquiring knowledge through research. The research methodologies that are commonly used to generate evidence for practice are introduced. We also want you to understand how your role in nursing research will change as you increase the level of your nursing education. Nurses with graduate degrees have additional ways by which they can contribute to ensuring EBP. Your knowledge of research will allow you to contribute to EBP by providing quality, safe, cost-effective care for patients and families. The chapter will conclude with the critical elements of evidence-based nursing practice, such as strategies for synthesizing research evidence, levels of research evidence, and evidence-based guidelines.

WHAT IS NURSING RESEARCH?

The word *research* means “to search again” or “to examine carefully.” More specifically, **research** is a diligent systematic inquiry or study that validates and refines existing knowledge and develops new knowledge. Diligent systematic study indicates planning, organization, and persistence. The ultimate goal of research is to develop an empirical body of knowledge for a discipline or profession, such as nursing.



RESEARCH/EBP TIP

Nursing research is validating existing knowledge and developing new knowledge in a systematic way.

Understanding nursing research requires determining the relevant knowledge needed by nurses. Because nursing is a practice profession, research is essential to develop and refine knowledge that nurses can implement to improve clinical practice and promote quality outcomes (McMenamin et al., 2019; Moorhead et al., 2018; Powers, 2020). Expert researchers have studied many interventions, and nurses have synthesized these studies to provide guidelines and protocols for use in practice. Implementation of practice guidelines in clinical settings, however, has been challenging. Several clinical practice guidelines have been developed for confirming placement of feeding tubes (FTs) in adults. The guidelines recommend using gastric acidity and radiographic confirmation as safe and appropriate methods for confirming placement of a FT in adults (Bourgault et al., 2020).

A national agency in the United Kingdom has banned the use of auscultation and observation of gastric aspirate to determine FT placement (National Patient Safety Agency, 2011). Bourgault et al. (2020) conducted a survey of 408 critical care nurses in the United States and found that 80% used auscultation at least sometimes to verify initial placement of a FT. The most frequently used method was observing for signs of respiratory distress (96%). Most nurses used auscultation in conjunction with other methods, although 35% of their institutions had policies against using auscultation to determine FT placement. The study conducted by Bourgault et al. (2020) confirms the challenges of implementing appropriate methods based on evidence and de-implementing methods not supported by evidence (Makic & Granger, 2019).

Nursing research is also needed to generate knowledge about nursing education. Nursing education research is essential to provide quality learning experiences for nursing students using the most up-to-date methods. For example, Bayram and Caliskan (2019) found that a virtual reality phone learning application improved the tracheostomy care provided by nursing students. With a continuing nursing shortage, it is critical that nursing education finds innovative and effective ways to prepare additional nurses to address relevant health issues, such as opioid abuse and chronic illnesses. In a small study, nursing faculty collaborated with a local health department to provide naloxone education for their students (Carter & Caudill, 2020). The students' knowledge and self-efficacy related to naloxone administration increased and their naloxone stigma decreased after the educational intervention.

Nursing administration and health services researchers examine nurse characteristics, staffing levels, work environment, nurses' intent to leave, cost of care, quality concerns, and patient outcomes. Studies on these topics influence national and state health policy and institutional decisions. Persons with burns are an example of a patient population with risk factors for mortality and complex care needs. A payment claims database was used to extract care outcomes of 14,064 patients with thermal burns who received care in 653 hospitals across the United States (Bettencourt et al., 2020). Nurses in these hospitals provided data on staffing levels and work environment. The researchers found that, in low-volume burn units, nursing staffing and work environment did not have a significant effect on patient mortality. However, in high-volume burn units, each patient that was added to a nurse's workload increased the risk for mortality by 30%. They also found that quality work environments in high-volume burn units were associated with lower patient mortality (Bettencourt et al., 2020). Studies such as these have lifesaving implications. In summary, nursing research is a scientific process that validates and refines existing knowledge and generates new knowledge that directly and indirectly influences nursing practice. Nursing research is the key to building an EBP for our profession.

WHAT IS EVIDENCE-BASED PRACTICE?

The ultimate goal of nursing is an EBP that promotes quality, safe, and cost-effective outcomes for patients, families, healthcare providers, and the healthcare system (Melnyk & Fineout-Overholt, 2019; Melnyk et al., 2018). EBP in nursing evolves from the integration of the best research evidence with our clinical expertise and our patients' circumstances and values to produce quality health outcomes (Melnyk & Fineout-Overholt, 2019; Straus et al., 2019). Fig. 1.1 identifies the elements of EBP and demonstrates the major contribution of best research evidence to the delivery of this practice. The best research evidence is the empirical knowledge generated from the synthesis of quality health studies to address a clinical problem.

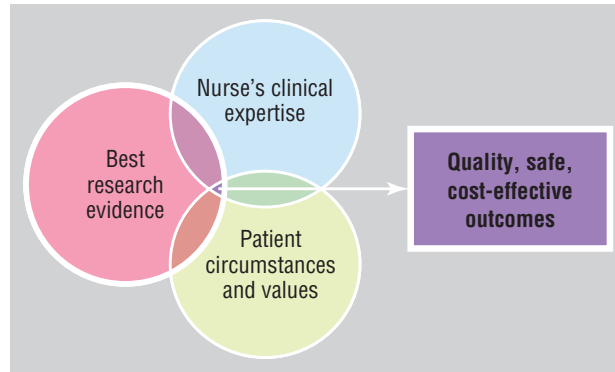


FIG. 1.1 Model of Evidence-Based Practice.

Teams of expert researchers, healthcare professionals, and sometimes policymakers and consumers synthesize the best research evidence in different areas to develop national clinical guidelines or standards of practice for patient and family care (Grinspun & Bajnok, 2018). For example, a professional organization devoted to infusion therapy, the Infusion Nurses Society, published the standards of care for peripheral intravenous (PIV) therapy. The standards of care were developed by a team of clinical nurse experts who identified, critically appraised, and synthesized research to develop EBP standards of care that are discussed later in this section (Gorski et al., 2016; Nickel, 2019).

Clinical expertise is the knowledge and skills of the healthcare professional providing care. The clinical expertise of a nurse depends on his or her years of clinical experience, current knowledge of the research and clinical literature, and educational preparation. The stronger the nurse's clinical expertise, the better is her or his clinical judgment in implementing the best research evidence in practice.

EBP also incorporates the circumstances and values of a patient. **Patient circumstances** include the individual's physical condition, disease trajectory, family structure, economic resources, and educational level. In addition, a patient brings values or unique preferences, expectations, concerns, and cultural beliefs to each clinical encounter that need to be integrated by the nurse into the care delivered. Within the nurse–patient relationship, the nurse learns about the unique characteristics of the patient that affect the care that is needed (Feo et al., 2018). Thus EBP is the unique combination of the best research evidence being implemented by expert nurse clinicians in providing care to patients and families with specific health circumstances and values to promote quality, safe, cost-effective outcomes (Melnyk & Fineout-Overholt, 2019; Straus et al., 2019; see Fig. 1.1).



RESEARCH/EBP TIP

Combining best research evidence, clinical expertise, and patients' preferences and values results in EBP, which promotes quality, safety, and cost-effectiveness.

Evidence-Based Standards of Care for Peripheral Intravenous Access

Research findings from multiple studies are synthesized to develop guidelines, standards, protocols, algorithms (clinical decision trees), and/or policies to direct the implementation of a variety of nursing interventions. Inserting a PIV catheter is the most common invasive procedure in hospitals worldwide (Nickel, 2019). The members of the Infusion Nurses Society used evidence from many studies to develop standards of care for every aspect of PIV therapy. The standards of care for PIV therapy, more than 150 pages long, provides detail about every aspect of PIV therapy (Gorski et al., 2016). As an example of applying evidence in practice, we are going to apply the evidence-based standards of care for initial PIV placement to an older patient (Nickel, 2019). As a nursing student or practicing nurse, you must apply the EBP recommendations for PIV therapy to ensure safety of the patient. Table 1.1 provides guidance for determining the site for PIV, selecting an appropriate catheter, preparing the site, inserting the catheter, and documenting the insertion.

Delivery of Evidence-Based Care to a Selected Patient Needing Peripheral Intravenous Therapy

Fig. 1.2 provides an example of the delivery of evidence-based nursing care to an adult female patient, Evelyn Jackson, who is 79 years old. She is dehydrated and may have a kidney infection. By assessing Mrs. Jackson, the nurse notes that she has fragile skin with skin tears on her nondominant hand from a recent fall. The best research evidence identifies:

1. Selecting a 22-gauge catheter or smaller because of the patient's age
2. Using vascular visualization technology, if needed, to identify an appropriate site for PIV placement
3. Preparing the site aseptically
4. Inserting the catheter at a reduced angle (5–15 degrees) to accommodate less subcutaneous tissue often found in older adults

TABLE 1.1 EVIDENCED-BASED STANDARDS OF CARE FOR PERIPHERAL INTRAVENOUS DEVICE PLACEMENT

ACTION	STANDARDS OF CARE
Selection of device	• For older adults, use the smallest gauge (22–24 gauge) device for the therapy that has been prescribed (p.S51; Std 26.I.B.2^a). • Catheters greater than 20 gauge are associated with an increased incidence of phlebitis (p.S51; Std 26.I. B.1).
Selection of site	• The forearm is the preferred site to increase dwell time, decrease pain, promote self-care, prevent occlusion, and avoid accidental removal (p.S54; Std 27.I.A.1). • Use the nondominant hand or arm when possible (p.S54; Std 27.I.C.1). • Avoid compromised areas and distal to this area, such as site of prior infiltration (p.S54; Std 27.I.C.3). • Promote vascular distention using a tourniquet or blood pressure cuff so that venous flow is impeded but arterial circulation is not (p. S64; Std 33.II.C.1). • If patient has compromised circulation, bruises easily, or fragile veins, use another method, such as warmth or gravity, to promote vascular distention (p. S64; Std 33.II.C.1). • Palpate the veins in the limb at the planned insertion site, maintaining the integrity of the glove (p. S64; Std 33.II.E.1). • Use visible light devices or near infrared light technology to aid in visualization of appropriate veins (p.S44; Std 22.I.B.1–4 and 22.I.C.1–2).

Continued

TABLE 1.1 EVIDENCED-BASED STANDARDS OF CARE FOR PERIPHERAL INTRAVENOUS DEVICE PLACEMENT—cont'd

ACTION	STANDARDS OF CARE
Preparation of the site	• Use a new pair of disposable, nonsterile gloves (p. S64; Std 33.II.E.1). • Clean the skin at the intended site with 5% or more chlorhexidine in alcohol solution. Use an approved alternate solution if chlorhexidine is contraindicated (p. S64; Std 33.II.D). • Allow adequate time after cleaning of the site for the skin to dry (p. S64; Std 33.II.D). • Do not palpate the vein after the skin is cleaned to avoid contamination (p. S64; Std 33.II.E.1).
Insertion of catheter	• Use a new sterile device (catheter) for each attempt (p. S64; Std 33.1). • Insert the catheter. Adjust the catheter insertion angle based on the thickness of the skin and subcutaneous tissue (Coulter, 2016). With blood return or perceived entrance into the vein, reduce the angle further to almost parallel to the skin (Coulter, 2016).
Securing the PIV catheter	• Use an adhesive “engineered stabilization device (ESD)” or “bordered polyurethane securement dressing” to maintain the PIV and visualize the insertion site (p. S72–S73; Std 37.D.1–3). • Do not use rolled bandages of any type to secure a PIV catheter because they may impair visualization of the site and infusion of solution (p. S72–S73; Std 37.H).
Documentation of insertion	• Document in the electronic healthcare record the patient or family member’s understanding of the need for the PIV and subsequent therapy; site preparation; type, length, and gauge of PIV device; date and time; number of insertions; patient teaching of signs and symptoms to report; and other elements based on facility policies (p. S29; Std 10.A.1–7).
Ongoing assessment of PIV insertion site	• Assess signs of infiltration such as pain, edema, changes in color, and fluid leakage at the insertion site (p. S99; Std 46.F.1–4). • Immediately stop the infusion if any signs of infiltration exist (p. S99; Std 46.G). • Recognize that subsequent PIVs are at higher risk for infiltration (p. S98; Std 46.C.4). • In case of infiltration, outline the area of infiltration with a skin marker to allow assessment of subsequent changes (p. S99; Std 46.G.7). • Assess insertion site for signs of infection, such as erythema, edema, pain, and changes in body temperature (p. S106; Std 49.A). • Remove PIV if patient develops any signs of infection (p. S106; Std 49.C).

*All page numbers in the table are from Gorski et al. (2016). The page numbers are in a supplemental issue; therefore pages are preceded with capital S. The numbers after the page number refer to the Standard number and subpart, such as 33.3. For some standards, the subsequent numbers refer to the Practice Criteria sections, subsections, and numbered Statements. Page numbers are included, although not direct quotations, to facilitate finding specific standard in the 160-page standard document.

PIV, Peripheral intravenous.

Adapted from Coulter, K. (2016). Successful infusion in older adults. *Journal of Infusion Nursing*, 39(6), 352–358.

<https://doi.org/10.1097/NAN.000000000000196>; Gorski et al. (2016). Infusion therapy standards of practice. *Journal of Infusion Nursing*, 39(1S), S1–S159; Nickel, B. (2019). Peripheral intravenous access: Applying infusion therapy standards of practice to improve patient safety. *Critical Care Nurse*, 39(1), 61–71. <https://doi.org/10.4037/ccn2019790>.

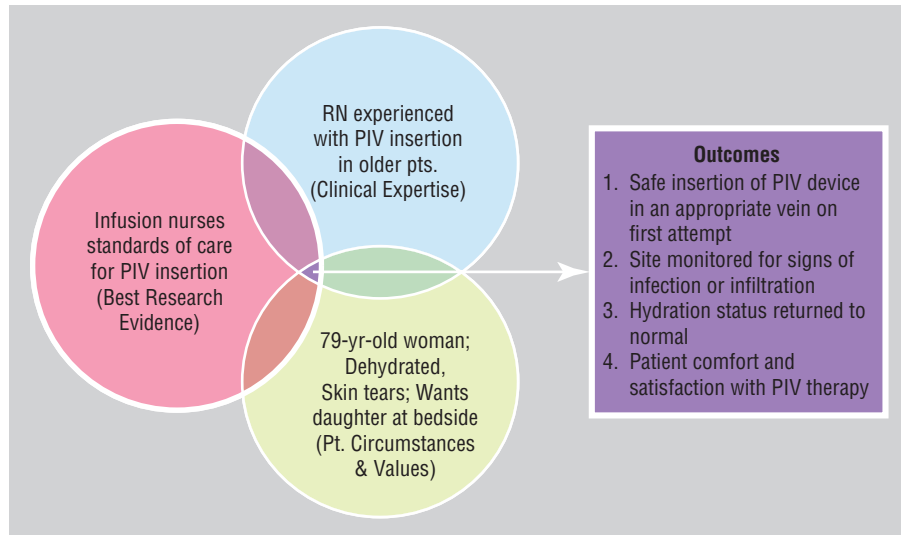


FIG. 1.2 Evidence-Based Practice for Peripheral Intravenous (PIV) Device Insertion in an Older Adult Woman. *Pt.*, Patient; *pts.*, patients; *RN*, registered nurse.

5. Securing the PIV catheter in a way that allows visualization and assessment of the site
6. Monitoring the infusion and the PIV site routinely (see [Table 1.1](#); [Gorski et al., 2016](#); [Nickel, 2019](#)).

EBP goes beyond knowing and applying standards of care or clinical guidelines, however. As shown in [Fig. 1.2](#), the evidence must be integrated with the nurse's clinical expertise and the patient's preferences. The nurse asks Mrs. Jackson about previous PIV insertions and learns that she has not had one recently. Although the standards of care indicate using the nondominant forearm for PIV devices, the nondominant side is ruled out because of the skin injury. The assessment of Mrs. Jackson's skin and experiences with PIV therapy in older adults are indicators of the nurse's clinical expertise. Mrs. Jackson does not like needles and asks that her daughter be able to hold her other hand during the procedure. These standards of care, developed from the best research evidence, are translated by registered nurses (RNs) and nursing students to address the characteristics, circumstances, and values of adult patients being hospitalized for dehydration and possible infection.

HISTORICAL DEVELOPMENT OF RESEARCH IN NURSING

Initially, nursing research evolved slowly following the investigations of Florence Nightingale in the 19th century. During the 1930s and 1940s, nurse researchers studied nursing education. Their focus moved to exploring and describing nurses and nursing roles in the 1950s and 1960s. From the 1970s to the present, nurse researchers have focused their research on clinical problems, nursing interventions, and the outcomes of the interventions. These topics were important because of their growing commitment to providing EBP for patients. Reviewing the history of nursing research enables us to identify the accomplishments of nurses earlier in our profession. It also helps us understand the need for further research to determine the best research evidence for use in practice. [Table 1.2](#) outlines the key historical events that have influenced the development of research in nursing.

TABLE 1.2 CHRONOLOGY OF KEY EVENTS IN THE DEVELOPMENT OF NURSING RESEARCH

YEAR	EVENT
1850	Florence Nightingale was recognized as first nurse researcher.
1900	<i>American Journal of Nursing</i> was published for the first time.
1923–1929	First graduate educational program for nurses began at Columbia University and Yale University.
1932	Association of Collegiate Schools of Nursing was formed to develop standards for education and practice.
1950	ANA commissioned study of nursing functions and activities.
1952	First research journal in nursing, <i>Nursing Research</i> , was published.
1955	American Nurses Foundation was established to fund nursing research.
1957	Regional nursing societies were developed to support and disseminate nursing research.
1965	ANA sponsored first nursing research conferences.
1970	ANA Commission on Nursing Research was established.
1972	Cochrane published <i>Effectiveness and Efficiency</i> , introducing concepts relevant to EBP.
1973	First Nursing Diagnosis Conference held and became the NANDA.
1976	<i>Stetler-Marram Model for Application of Research Findings to Practice</i> was published.
1980s–1990s	Methodologies were developed to determine <i>best evidence</i> for practice by Sackett and colleagues.
1982–1983	The report of the <i>Conduct and Utilization of Research in Nursing Project</i> was published.
1983	<i>Annual Review of Nursing Research</i> was published for the first time.
1985	NCNR was established at the National Institutes of Health.
1989	AHCPR was established.
1990	American Nurses Credentialing Center implemented the Magnet Hospital Designation Program for Excellence in Nursing Services.
1992	<i>Healthy People</i> was initiated by the federal government; the Cochrane Center was established.
1993	NCNR renamed the National Institute of Nursing Research (NINR); The Cochrane Collaboration initiated providing systematic reviews and EBP guidelines.
1999	AHCPR renamed Agency for Healthcare Research and Quality (AHRQ).
2001	Stetler revised the model, <i>Steps of Research Utilization to Facilitate EBP</i> ; Institute of Medicine published report <i>Crossing the Quality Chasm: A New Health System for the 21st Century</i> .
2002	The Joint Commission revised accreditation policies for hospitals supporting EBP; NANDA became international—NANDA-I.
2005	Quality and Safety Education for Nurses program was initiated with one competency being EBP.
2006	AACN published statement on nursing research.

TABLE 1.2 CHRONOLOGY OF KEY EVENTS IN THE DEVELOPMENT OF NURSING RESEARCH—cont'd

YEAR	EVENT
2016	NINR mission statement and strategic plan updated.
2017	AACN leading initiatives of research and data management; AHRQ current mission and funding priorities; <i>Healthy People 2020</i> topics and objectives; NINR current research funding and other activities to promote research in nursing.
2020	<i>Healthy People 2030</i> was published. Nursing professional organizations responded to the coronavirus disease 2019 (COVID-19) pandemic by providing continuing education about the disease and stress management.

AACN, American Association of Colleges of Nursing; AHCPR, Agency for Health Care Policy and Research; ANA, American Nurses Association; EBP, evidence-based practice; NANDA, North American Nursing Diagnosis Association; NCNR, National Center for Nursing Research; NINR, National Institute of Nursing Research.

Florence Nightingale

Florence Nightingale (1840–1910) was a British nurse who is viewed as the Mother of Modern Nursing because of her work during the Crimean War, research activities, and involvement in the education of nurses. Nightingale (1859) is also recognized as the first nurse researcher for her studies focused on the influence of a healthy environment, such as ventilation, cleanliness, and purity of water, on patients' health (Herbert, 1981). She investigated maternal mortality related to puerperal fever and found that the deaths of many mothers were preventable (McDonald, 2001). She also became involved in training nurses and began moving nursing from an uneducated, poorly respected group to a profession that is among the most respected (Pickler, 2020).

Nightingale became well-known because of her work during the Crimean War and the reports of her work in the *London Times*. In addition to leading trained nurses who provided care, she collected data and conducted statistical analyses. She studied soldiers' mortality rates and the conditions related to mortality. By presenting her results in tables, bar graphs, and pie charts, she was able to present a clear argument for clean conditions and trained nursing care (McDonald, 2001). She advocated for systematic collection of data in hospitals. Nightingale was the first woman elected to the Royal Statistical Society based on her research and statistical expertise (Oakley, 2010).



RESEARCH/EBP TIP

Nightingale, often called the Lady of the Lamp, was a researcher and statistician.

Nightingale's research enabled her to instigate attitudinal, organizational, and social changes. She changed the attitudes of the military and society about the care of the sick. The military began to view the sick as individuals who require adequate food, suitable quarters, and appropriate medical treatment. This realization greatly reduced the mortality rate (Cook, 1913). Because of Nightingale's research evidence and influence, society began to slowly accept responsibility for testing public water, improving sanitation, preventing starvation, and decreasing morbidity and mortality rates (Palmer, 1977).

Nursing Research in the 1900s Through the 1970s

The *American Journal of Nursing* was first published in 1900, with the first research, case studies, appearing in this journal in the late 1920s. A **case study** involves an in-depth analysis and systematic description of one patient or group of similar patients to promote the understanding of healthcare interventions, problems, and/or situations (Yin, 2018). Case studies are one example of the practice-related research that has been conducted in nursing over the last century. Research capacity grew among nurses as graduate education programs were developed for nurses. The first doctoral program for nurses was offered at Columbia University, and the first master's degree in nursing was offered by Yale University.

The American Nurses Association (ANA) initiated a 5-year study on nursing functions and activities, which was published in 1959. The findings from this study were used to develop statements on functions, standards, and qualifications for professional nurses. Some new nursing specialty organizations included in their missions to develop standards of care for their specialties. The research conducted by the ANA and specialty groups provided the basis for the first nursing practice standards that have been revised over time and continue to guide professional practice (Fitzpatrick, 1978; McMenamin et al., 2019).



RESEARCH/EBP TIP

As more nurses completed graduate degrees, nurses developed more studies on clinical topics. Graduate nursing education increased nurses' ability to provide evidence-based care and conduct research.

Research became part of the curricula of baccalaureate and master's in nursing programs in the 1950s and 1960s. The increase in research activities prompted the publication of the first research journal, *Nursing Research*, in 1952 (Fitzpatrick, 1978). *Nursing Research* is still one of the most respected nursing research journals today. The American Nurses Foundation was established in 1955 to fund nursing research projects. The Southern Regional Educational Board, Western Interstate Commission on Higher Education, Midwestern Nursing Research Society, and New England Board of Higher Education were formed in 1957 and have important roles today in supporting and disseminating nursing research across the United States.

In the 1960s, an increasing number of clinical studies focused on quality care and the development of criteria to measure patient outcomes. Intensive care units were developed, which promoted the investigation of nursing interventions, staffing patterns, and cost-effectiveness of care for a new setting (Gortner & Nahm, 1977). Nurses also began developing models, conceptual frameworks, and theories to guide nursing practice. These nursing theorists generated propositions that required testing, which provided direction for nursing research. In 1970 the ANA Commission on Nursing Research was formed to expand the conduct of research. The commission influenced the development of federal guidelines for research with human subjects (See, 1977).

Despite these accomplishments, nurses were not recognized for their intelligence and expertise. However, in a nursing school in Indiana, six nursing students decided to start an honor society for nurses. They would be surprised to see that the honor society they started, Sigma Theta Tau International, has grown to include chapters around the world. Sigma, the current name of the society, advocates for the dissemination of research findings. Sigma leaders recognize that clinical nurses cannot use research findings in practice when they do not know about the findings. Over time, Sigma has sponsored national and international research conferences, and chapters of this organization sponsor many local conferences to communicate research findings.

Moving from knowing research findings to using them in practice is not an easy process. Archie Cochrane, a medical professor, recognized that fact. To facilitate the use of research evidence in practice, the Cochrane Center was established in 1992 and the Cochrane Collaboration in 1993. The Cochrane Collaboration and Library house numerous resources to promote EBP, such as systematic reviews of research, evidence-based guidelines, and other quality evidence to use in practice (see the Cochrane website, <http://www.cochrane.org>).

Researchers who wanted to study nursing care and its influence on patient outcomes found that work very difficult. Nurses in different hospitals and different parts of the country used a variety of terms for aspects of the nursing process. To work toward consistency, the first Nursing Diagnosis Conference was held in 1973. From the conference, the North American Nursing Diagnosis Association (NANDA) was formed and expanded internationally to be known as NANDA International (NANDA-I). The organization started a journal to publish research related to nursing diagnoses and interventions (see [Table 1.2](#)). Details on NANDA-I can be found on their website (<http://www.nanda.org>). The standardization of nursing diagnoses and interventions allowed researchers to extract data from electronic health records and laid the groundwork for outcomes research.

Nursing Research in the 1980s and 1990s

The conduct of clinical research received increased focus in the 1980s, and clinical journals began publishing more research reports. New nursing journals were also published specifically to report studies and the application of theory to practice. Although the body of empirical knowledge generated through clinical research increased rapidly in the 1980s, little of this knowledge was used in practice. During 1982 and 1983, a project called the Conduct and Utilization of Research in Nursing was funded by the federal government. The project published a guide on how to use research to improve clinical practice ([Horsley et al., 1983](#)).

Qualitative research was introduced in nursing in the late 1970s; the first studies appeared in nursing journals in the 1980s. Qualitative research used text, instead of numbers, to explore the holistic nature of people and phenomena, discovering meaning and gaining new insights into issues relevant to nursing. The number of qualitative researchers and studies expanded greatly in the 1990s, with qualitative studies appearing in most of the nursing research and clinical journals.

Another priority of the 1980s was to obtain increased funding for nursing research. Most of the federal funds in the 1980s were designated for medical studies involving the diagnosis and treatment of diseases. However, the ANA achieved a major political victory for nursing research with the creation of the National Center for Nursing Research in 1985. The purpose of this center was to support the conduct and dissemination of knowledge developed through basic and clinical nursing research, training, and other programs in patient care research ([Bauknecht, 1985](#)). The National Center for Nursing Research became the National Institute of Nursing Research (NINR) in 1993 to increase the status of nursing research and to obtain more funding for studies (NINR, n.d.).

Outcomes research emerged in the late 1980s and 1990s as an important methodology for documenting the effectiveness of healthcare services. Outcomes research, sometimes called effectiveness research, evolved when the federal government raised concerns about the quality and appropriateness of care that patients received. The government was especially concerned about the outcomes of patients for whom government programs, such as Medicare, were the insurers. Dr. Linda Aiken led a group of nurse researchers, statisticians, and other scientists to study the outcomes of nursing care in hospitals. [Aiken et al. \(2002\)](#) reported that for every additional patient assigned to nurses, the likelihood that a patient would die within 30 days of discharge increased by 7%. Dr. Aiken has continued this program of research and expanded it to work with researchers in

other countries. Dr. Aiken has continued to affect health policy by reporting that patient mortality decreased when the percentage of nurses in the hospital with a BSN or higher degree increased (Cheung & Aiken, 2006) and demonstrating the effect of nurses on patient outcomes in numerous countries (Aiken et al., 2011).



RESEARCH/EBP TIP

Research has shown that nurses' workload and education influence patient outcomes.

Other agencies and centers were established within the US Department of Health and Human Services to promote positive health outcomes, such as the Agency for Health Care Policy and Research (AHCPR) (Rettig, 1991). AHCPR was responsible for publishing the first clinical practice guidelines, which were syntheses of the best research evidence. In 1999 AHCPR's name was changed to the Agency for Healthcare Research and Quality (AHRQ), which signaled an increased focus on improving the quality and safety of patient care. Also within the US Department of Health and Human Services, the Centers for Disease Control and Prevention (CDC) was established with its name being a statement of its mission. The CDC was viewed as an authority on public health when the pandemic caused by coronavirus 19 (COVID-19) affected the United States in 2020. The Centers for Medicare and Medicaid Services oversee Medicare for older adults and some aspects of state-administered care for the uninsured, children, and families in poverty. Although the primary functions of the CDC and the Centers for Medicare and Medicaid Services do not include research, they employ many scientists who analyze data and conduct research to improve health. Some of these scientists are nurses who study the effects of Medicare decisions, and others are deployed around the world to work with communities in low-income countries and to provide surveillance of emerging infections.

EBP became more refined in the 1990s. A research group led by Dr. David Sackett developed explicit research methodologies to determine the *best evidence* for practice. EBP grew in importance for nursing in 1990 when the American Nurses Credentialing Center implemented the Magnet Hospital Designation Program for Excellence in Nursing Services. The criteria for Magnet designation have evolved but continue to include demonstrating that (1) nurses are delivering evidence-based care to patients and (2) nurses at the bedside are leading studies to improve the outcomes of their patients.

Nursing Research in the 21st Century

The vision for nursing research in the 21st century includes conducting quality studies using a variety of methodologies, synthesizing the study findings into the best research evidence, and using this research evidence to guide practice (Melnik & Fineout-Overholt, 2019; Melnik et al., 2018). To expand EBP in clinical agencies, Stetler (2010) revised the Research Utilization to Facilitate EBP Model, and it continues to be used as a model to integrate research into practice in some healthcare systems (Karl & Mion, 2020; see Chapter 13 for a description of this model). In 2004 Sigma began publishing a journal related to EBP titled *Worldviews on Evidence-Based Nursing* that contains research syntheses and systematic reviews of research for clinical practice.

The focus of healthcare research and funding has expanded from the treatment of illness to include health promotion and illness prevention. The *Healthy People 2000*, *2010*, and *2020* plans increased the visibility of health promotion goals and the motivation to study interventions to

improve health (see [Table 1.1](#)). *Healthy People 2030* (USDHHS, n.d.) topics and objectives can be reviewed on the *Healthy People* website (<https://health.gov/healthypeople>). The topics cover all ages and a wide range of topics related to living healthy and using available technologies that facilitate health-promoting behaviors. In the coming decade, nurse researchers will have a major role in the development of interventions to promote health and prevent illness in individuals and families.

Nurse researchers also have a critical role in promoting safe and quality health care. *To Err Is Human: Building a Safer Health System* (Kohn et al., 2000) was published by the Institute of Medicine (IOM) to report the high incidence of errors in health care. The IOM followed the next year with *Crossing the Quality Chasm: A New Health System for the 21st Century* (IOM, 2001). The second report identified the characteristics of a high-quality health system and the competencies needed by healthcare professionals to create that environment. Based on this report, six competency areas were identified as essential for nursing education to ensure that students were able to deliver quality, safe care. Specific competencies were identified in six areas ([Box 1.1](#)). The [Quality and Safety Education for Nurses \(QSEN\)](#) initiative (2017) identified the requisite knowledge, skills, and attitude statements for each of the competencies for nurses and recommended strategies for incorporating the competencies into nursing education (<http://qsen.org>). The competency most relevant for this book is the EBP competency, which is defined as “integrating the best current evidence with clinical expertise and patient/family preferences and values for delivery of optimal health care” (QSEN, 2020). You, as an undergraduate nursing student, need to be skilled in the critical appraisal of studies. A [critical appraisal of research](#) involves the careful examination of all aspects of a study to judge its strengths, limitations, meaning, and significance. Undergraduate nursing students also need to be skilled in the use of appropriate research evidence in practice, adherence to institutional review board guidelines, and appropriate data collection. Your expanded knowledge of research is necessary to attain EBP and the QSEN competencies.

The AHRQ (2018) continues to be the lead agency for studies designed to improve health and safety while reducing cost and medical errors within healthcare facilities. AHRQ conducts and sponsors research that provides evidence-based information on healthcare outcomes, quality, cost, use, and access. This research information is needed to promote effective healthcare decision making by patients, clinicians, health system executives, and policymakers.

In the past few years, the NINR has focused its research awards in the areas of symptom science and palliative care. For example, one nurse researcher, Dr. A. M. McCarthy, has developed a website for pediatric nurses and parents to assess a hospitalized child’s risk for distress from medical procedures. The website also includes ways to minimize the child’s distress. Other stories of discovery can be found at NINR (n.d.). The NINR continues to advocate for increased funding to support nursing research and encourage innovative technologies and methodologies to generate essential knowledge for nursing practice. The NINR website (<http://ninr.nih.gov>) provides current information on the Institute’s research funding opportunities and supported studies. In this chapter, we

BOX 1.1 COMPETENCIES REQUIRED FOR HEALTHCARE PROFESSIONALS TO PROVIDE HIGH-QUALITY CARE

- Patient-centered care
- Teamwork and collaboration
- Evidence-based practice
- Quality improvement
- Safety
- Informatics

have focused on research as a way to build knowledge. The next section of this chapter is about other ways that nurses acquire knowledge and make decisions, in addition to research.

ACQUIRING KNOWLEDGE IN NURSING

Knowledge is essential information that is acquired in a variety of ways, is expected to be an accurate reflection of reality, and can potentially be used to direct a person's actions (Kaplan, 1964). Because you are in a nursing education program, you are in a time of rapid acquisition of an extensive amount of knowledge. You are learning to synthesize, incorporate, and apply this knowledge so that you can practice as a nurse. Nursing has historically acquired knowledge informally and formally. The informal ways we acquire knowledge is through traditions, authority, borrowing, trial and error, personal experience, intuition, and professional practice. More formally, we learn through role modeling and mentoring, logical reasoning, education, and research. This section introduces these different ways of acquiring knowledge and how you will use knowledge at different stages of professional development.

Informal Acquisition of Knowledge

"We have always done it that way." The statement exemplifies how traditions shape our knowledge. **Traditions** include "truths" or beliefs based on customs and habits. Traditions influence the nursing practice today, sometimes in positive ways, because they maintain structures that are effective in guiding care. However, traditions can narrow and limit our knowledge. Nurses may cling to traditions when the context or situation has changed significantly, making their actions ineffective.

Tradition is often linked to authority. An **authority** is a person with expertise and power who is able to influence opinion and behavior. A person is given authority because it is thought that she or he is more knowledgeable in a given area. Knowledge acquired from an authority is illustrated when one person credits another as the source of information. You may view your instructors as authorities. During clinical experiences, experienced nurses may be seen as authorities. Nurses with authority must be careful to teach and practice based on evidence and standards of care because they are influencing the actions of others.

As nurses, we use information from other disciplines to guide some areas of practice. **Borrowing** in nursing involves appropriating and using knowledge from other fields or disciplines to guide nursing practice. At times that knowledge has not been integrated with a nursing focus. For example, the medical model and its focus on diagnosis and treatment of illness is often used to guide nursing practice. A more useful way of borrowing is to identify information from other disciplines that can be used within nursing's focus on the whole person. For example, knowledge from other disciplines such as psychology and sociology can guide nurses as they therapeutically communicate with patients and families.

Trial and error is an approach to acquiring knowledge that has unknown outcomes. Patients respond uniquely to nursing interventions, so nursing practice includes many situations of uncertainty. In these situations, nurses frequently scan their minds for applicable information and use that knowledge to inform their actions. They collect information about the outcomes of an initial action to guide subsequent actions. Even when using interventions supported by research, you will encounter some degree of uncertainty because you do not know how the patient will respond. Unfortunately, trial and error frequently involves no formal documentation of which actions worked and which did not. The individual nurse gains knowledge through these personal experiences but may not share it with others.

Personal experience involves gaining knowledge by being involved in an event, situation, or circumstance. Personal experience enables you to gain skills and expertise through life experience. For example, a nurse who has had surgery may be able to empathize more easily with the anxiety experienced by patients scheduled for a surgery. As a student, you may have had a job that provided experience in setting priorities and working as part of a team. Such experiences may have given you additional skills related to flexibility and teamwork. Learning through personal experience enables you to cluster ideas into a meaningful whole. As you practice as a nurse, you may be able to apply the knowledge you previously acquired through your personal experiences.

Intuition is an insight into or understanding of a situation or event as a whole that a person usually cannot explain logically (Benner & Tanner, 1987). Because intuition is a type of knowing that seems to come unbidden, you may describe it as a gut feeling or a hunch. Experienced nurses may take initial actions based on intuition but continue to assess and integrate details in the situation to refine their initial impression. Some describe intuition as deep knowledge that is incorporated so completely into the subconscious that intuitive people cannot explain how they knew what to do. Using intuitive knowledge, nurses can assess the patient's condition, intervene, and contact the provider as needed for medical intervention.

Acquiring knowledge informally occurs in professional practice and overlaps with the other informal ways of learning. **Professional practice** is providing knowledgeable, skillful, and holistic care to patients, families, and communities as part of a healthcare team. During professional practice, nurses develop relationships with recipients of their interventions and select interventions consistent with available research evidence and ethical standards. Benner (1984) was curious about the process by which nurses became experts in their professional practice. She conducted a phenomenological qualitative study to identify the development of expertise in nursing practice. She identified the following levels of expertise: (1) novice, (2) advanced beginner, (3) competent, (4) proficient, and (5) expert. Novice nurses have no personal experience in the work they are to perform. They may have some preconceptions and expectations from their educational experiences but will often rely on tradition and authority in the development of their clinical knowledge. A preceptor or clinical mentor may guide new nurses as they develop knowledge. Advanced beginner nurses have limited experience but can recognize and intervene in recurrent situations. For example, the advanced beginner recognizes a patient's pain and will select from familiar interventions to manage the pain. As they develop professionally, they may begin integrating interventions that are evidence based (Benner, 1984).

Competent nurses are able to generate plans of care based on additional years of clinical experience (Benner, 1984). Competent nurses have developed personal knowledge that they will use to take conscious and deliberate actions that are efficient and organized. Proficient nurses will incorporate interventions from experience, evidence-based guidelines, and standards of care. Proficient nurses recognize that patients and families respond differently to illness and health and can make adjustments based on those responses. The expert nurse has extensive experience and can supplement the facts in a situation with intuition. Their clinical expertise increases their ability to seamlessly incorporate EBP with accuracy and speed. In other words, expert nurses can skillfully and seamlessly integrate personal experience and research evidence in their responses to patients' changing circumstances (Benner, 1984).

Formal Acquisition of Knowledge

Role modeling is acquiring knowledge by imitating the behaviors of an expert. In nursing, role modeling enables the novice nurse to learn through observing and interacting with highly competent, expert nurses. Role models include admired teachers, expert clinicians, researchers, and those

who inspire others through their example. An intense form of role modeling is mentorship, in which the expert nurse serves as a teacher, sponsor, guide, and counselor for a less experienced nurse. The knowledge gained through personal experience is greatly enhanced by a quality relationship with a role model or mentor. Mentoring relationships may be formalized through internships and residencies that help new nurses transition into practice. In addition, mentoring relationships are essential for cultivating EBP (Schuler et al., 2020).

Reasoning is the processing and organizing of ideas to reach conclusions. There are many types of reasoning; we are focusing on logical reasoning and making inferences (Hayes et al., 2018). **Logical reasoning** is using a defined process of thinking to draw conclusions. The science of logic includes inductive and deductive reasoning. **Inductive reasoning** moves from the specific to the general; particular instances are observed and then combined into a larger whole or a general statement (Gravetter & Forzano, 2018). An example of inductive reasoning is provided in Table 1.3. Inductive reasoning is involved in synthesizing the findings of multiple studies to draw conclusions about best practices. Later in this chapter, you will find formal ways that inductive reasoning is applied in the development of EBP.

Deductive reasoning moves from the general to the specific or from a general premise to a particular situation or conclusion (Gravetter & Forzano, 2018). A general premise is an abstract statement that may be based on a theory, beliefs, or facts. An example of deductive reasoning is provided in Table 1.3. Conclusions are reached as abstract statements are applied to specific situations. However, the conclusions generated from deductive reasoning are valid only if they are based on valid statements. Research is a means to test and confirm or refute a statement. Once shown to be valid, the statement can be used as a basis for reasoning in nursing practice (Gray & Grove, 2021).

The learning that is the goal of education is another formal means of acquiring knowledge. **Education** is a structured presentation of information, usually by a person identified to be the expert (teacher). Education includes nursing programs that prepare students to deliver quality nursing care and for the licensing examination to become an RN. Education may also include a program for RNs with a diploma or an associate’s degree in nursing to move to a baccalaureate degree. In the future, you may enter a graduate-level education program to prepare yourself for an advanced practice or leadership role. As a nurse in practice, you will have the opportunity to participate in continuing professional education to keep up to date with clinical advances and technology improvements.

TABLE 1.3 LOGICAL REASONING: INDUCTIVE AND DEDUCTIVE

Example of Inductive Reasoning

Particular instances	• A headache is an altered level of health that is stressful. • An acute viral infection is an altered level of health that is stressful. • A terminal illness is an altered level of health that is stressful.
General statement	• Therefore it can be induced that all altered levels of health are stressful.

Example of Deductive Reasoning

Propositions	• All humans experience loss. • All adolescents are humans.
Conclusion	• Therefore it can be deduced that all adolescents experience loss.

Research is a means of acquiring information through systematic investigation, as defined earlier in the chapter. The purpose of research is to develop new knowledge or validate existing knowledge. Research knowledge needed for practice should be specific and holistic, as well as process oriented and outcomes focused. Because of the breadth of knowledge needed, a variety of research methods are implemented to generate this knowledge. One of the important skills you will learn through this book is to critically appraise research findings to determine whether the findings are reliable and valid. The following sections will describe the types of evidence needed for developing an EBP.

TYPES OF NEEDED EVIDENCE

Nurses need a solid research base as a foundation for implementing selected nursing interventions and documenting their effectiveness in treating patient health problems. Effective interventions promote positive patient and family outcomes. The research evidence needed in clinical practice includes studies focused on the description, explanation, prediction, and control of phenomena (Gray & Grove, 2021).

Description

Description involves identifying and understanding the nature of nursing phenomena and, sometimes, the relationships among them (Chinn & Kramer, 2018). Through research, nurses describe what exists in nursing practice and discover new information. Descriptive research is also used to promote understanding of situations and classify information for use in the discipline. Studies conducted for the broad purpose of description might include:

- Describing the resilience of nurses who are caring for patients with COVID-19 infection
- Determining the incidence of burnout among health professionals
- Exploring the experience of being hopeful after being diagnosed with cancer
- Identification and classification of nursing interventions
- Description of the responses of individuals to a variety of health conditions and aging
- Determination of the incidence of a disease in a geographical area, such as Ebola infection in West Africa or diagnosed hypertension in the United States.

An example of research conducted for the purpose of description was a qualitative study of fatigue management among acute care nurses in the United States (Groves et al., 2020). “The purpose of this study phase was to describe how hospital nurses manage fatigue in order to inform future regulation and organizational fatigue risk management programs” (Groves et al., 2020, p. 36). This study involved data collected from interviews with 120 nurses from eight hospitals. Barriers to fatigue management at work were “workload,” “schedules and shifts,” and “slowing down,” and at home were “not enough sleep” and “competing time demands” (Groves et al., p. 39). The participants also provided insight into how they managed their fatigue. Studies that identify concerns and describe important characteristics provide essential knowledge. Studies that provide explanations, predictions, and control of nursing phenomena in practice are built on the essential knowledge provided by descriptive studies.

Explanation

An **explanation** clarifies the relationships among phenomena and identifies possible reasons why certain events occur. Research focused on explanation provides the following types of evidence essential for practice:

- Understanding which factors are related to caring for an older relative at home
- Examining the relationships among the patient’s preadmission functional status, hospital complications, and length of stay in the hospital

- Determining the relationships among the physical environment, community socioeconomic characteristics, and health status
- Exploring relationships among nursing students' hours worked per week, family responsibilities, coping strategies, and academic performance.

Studying the relationships among characteristics of research participants allows researchers to explain situations and factors that may interact in these situations. For example, when faculty better understand factors that may explain nursing students' academic performance, the faculty may be able to identify possible strategies to improve students' outcomes.

Deetz et al. (2020) conducted a study with nurse managers to be able to better explain the managers' perceptions of their work and the work engagement of their employees after a union-led strike. The researchers had employment engagement data that had been collected routinely as part of the Press Ganey survey of patient satisfaction and the hospital's work environment. Deetz et al. (2020) collected data from 32 managers using a validated, but relatively new, instrument that was designed to measure meaning and joy in their work. No significant correlations were found among managers' meaning and joy in their work and their employees' work engagement. However, Deetz et al. (2020) did find a strong, significant correlation between work engagement and the employees' perception of the manager. This significant finding was found anecdotally and was not a hypothesis proposed by the researchers. The researchers recommended that the study be repeated with larger samples of nurse managers.

Studies designed to explain characteristics of events, situations, and people typically report correlations as an indicator of relationships among a study's variables. Although the study conducted by Deetz et al. (2020) was a quantitative study using numerical data, some studies may use qualitative methods to collect and analyze data. When the explanatory aspects are well understood of a specific phenomenon, researchers may design a study with the aim of predicting one or more variables based on the characteristics of other variables.

Prediction

Through **prediction**, one can estimate the probability of a specific outcome in a given situation (Chinn & Kramer, 2018). However, predicting an outcome does not necessarily enable one to modify or control the outcome. It is through prediction that the risk for illness or injury is identified and linked to possible screening methods to identify and prevent health problems. Knowledge generated from research focused on prediction is essential for EBP and includes:

- Prediction of the risk for a disease or injury in different populations
- Prediction of behaviors that promote health and prevent illness
- Prediction of nursing student outcomes in programs using innovative teaching strategies
- Prediction of the nursing care required based on a patient's circumstances and values.

Kähkönen et al. (2020) collected data from a large sample of patients ($n = 416$) who had had a percutaneous coronary intervention (PCI) in 2013. The researchers wanted to identify the predictive factors, such as emotional and family support, that facilitated their adherence to medications and to lifestyle modifications. Six years later, Kähkönen et al. (2020) collected data again from 169 of the original participants. They "investigated and identified the level of adherence and the predictive factors of adherence to treatment six years after PCI" (Kähkönen et al., 2020, p. 340). The follow-up participants were more adherent than they were 4 months after PCI. Long-term adherence to treatment was predicted by several factors: close family support, relationships with nurses and physicians, sense of responsibility, fears about complications, continuity of care, and outcomes of care (Kähkönen et al., 2020). Based on these findings, nurses working with patients with a history of PCI could assess the presence and strength of the predictive factors and respond by supplementing absent or weak factors that promote adherence.

Control

If one can predict the outcome of a situation, the next step is to control or manipulate the situation to produce the desired outcome. In health care, **control** is the ability to write a prescription to produce the desired results. Using the best research evidence, nurses could prescribe specific interventions to meet the needs of patients and their families (Melnyk & Fineout-Overholt, 2019). The results of multiple studies in the following areas have enabled nurses to deliver care that increases control over the outcomes desired for practice:

- Testing the effectiveness of interventions to improve the health status of individuals and families
- Synthesis of research for development into EBP guidelines
- Determining the effectiveness of EBP guidelines in your clinical agency.

As discussed earlier, extensive studies have been conducted related to techniques of inserting a PIV device into older patients and the findings integrated into standards for practice (Gorski et al., 2016). In later chapters, you will also learn about randomized control trials (RCTs) conducted by nurse researchers to test the effects of specific interventions on the outcomes of care. Evidence-based guidelines and standards of care have been developed based on the findings of many studies.

Broadly, the nursing profession is accountable to society for providing quality, safe, and cost-effective care for patients and families (Powers, 2020; Sherwood & Barnsteiner, 2017). The extensive number of clinical studies conducted since 1970 has greatly expanded the scientific knowledge available to you for describing, explaining, predicting, and controlling phenomena within your nursing practice.



RESEARCH/EBP TIP

Nurses need research evidence on which to base their practice because they are accountable for providing quality, safe, and cost-effective care.

DIFFERENT TYPES OF RESEARCH

This section introduces studies that are conducted using quantitative, qualitative, mixed methods, and outcomes research methods. These types of research are distinct approaches to generating empirical knowledge for nursing practice (Box 1.2).

Quantitative Research

Many of the studies conducted in nursing included quantitative research methods, which are considered the traditional scientific method. **Quantitative research** is a formal, objective, systematic process in which numerical data are used to obtain information about the world. The quantitative approach toward scientific inquiry emerged from a branch of philosophy called logical positivism. **Logical positivism** is the philosophy that knowledge is developed based on strict rules of logic, objective truth, and laws (Table 1.4). Quantitative researchers hold the position that “truth” is absolute, and that a single reality can be defined by careful measurement. To find truth, the researcher must be objective, which means that values, feelings, and personal perceptions should not enter into the measurement of reality. Quantitative research is conducted to test theory by describing variables (descriptive research), examining relationships among variables (correlational research), and determining cause-and-effect interactions between variables (quasi-experimental and experimental research). The methods of measurement commonly used in quantitative research include scales, questionnaires, and physiological measures (see Table 1.4).

BOX 1.2 RESEARCH METHODS FOR THIS TEXT

Types of Quantitative Research

- Descriptive research
- Correlational research
- Quasi-experimental research
- Experimental research

Types of Qualitative Research

- Phenomenological research
- Grounded theory research
- Ethnographic research
- Exploratory-descriptive qualitative research

Mixed Methods Research

Outcomes Research

TABLE 1.4 CHARACTERISTICS OF QUANTITATIVE AND QUALITATIVE RESEARCH METHODS

CHARACTERISTICS	QUANTITATIVE RESEARCH	QUALITATIVE RESEARCH
Philosophical origin	Logical positivism	Naturalistic, interpretive, humanistic
Basis of knowing	Cause-and-effect relationships	Meaning, discovery, understanding
Theoretical focus	Tests theory	Develops theory and frameworks
Researcher involvement	Objective	Shared interpretation
Common methods of measurement	Scales, questionnaires, and physiological measures	Unstructured interviews, observations, focus groups
Data	Numbers	Words
Analysis	Statistical analysis	Text-based analysis
Findings	Description of variables, relationships among variables, and effectiveness of interventions; generalization	Unique, dynamic, focused on understanding of phenomena and facilitating theory development

The data collected are numbers that are analyzed with statistical techniques to determine results (Grove & CIPHER, 2020). Quantitative researchers strive to extend their findings beyond the situation studied. When extensive evidence is available on a topic, the findings may be generalized to different populations and settings. Chapter 2 describes the types of quantitative research and the quantitative research process.

Types of Quantitative Research

Several types of quantitative and qualitative research have been conducted to generate nursing knowledge for practice. These types of research can be classified in a variety of ways. The classification system for this text is presented in Box 1.2 and includes the most common types of quantitative and qualitative research conducted in nursing. The quantitative research methods are classified into