Chapter

1 Evidence-Based Practice in Nursing, or Why Do I Need to Take Statistics?

Learning Objectives

This chapter will introduce you to the rationale for advanced statistical preparation in nursing. This chapter will prepare you to:

- Understand trends in health care and what these mean for evidence-based practice
- Define evidence-based practice as a foundation for nursing practice
- Describe different levels of evidence and how these are connected to statistics
- Understand the relevance of statistics for evidence-based practice in nursing

Key Terms

Efficacy
Evidence-based practice
Quality improvement
Process improvement
Levels of evidence
Statistics

INTRODUCTION

The healthcare environment is fast paced and constantly changing. When the first edition of this text was published in 2013, nurses and other healthcare providers were just beginning to contemplate the impact of the Affordable Care Act (Patient Protection and Affordable Care Act of 2010, 2015). We had embraced recommendations from the Institute of Medicine (IOM, 2010) with regard to the scope of practice for nurses and, among other things, had embarked on sweeping changes in nursing education to advance the doctorate as the expected educational preparation for advance practice nurses. In hindsight, much of what we thought would be a force for change in nursing practice, education, and health care has happened, but we are only now beginning to understand the effect of those events.

Now we are grappling with the implementation of the Affordable Care Act (2015) and its influence on reducing the number of uninsured in the United States. Increasing the number of Americans with health insurance increases access to healthcare services, but along with an aging population, has resulted in a steeply increasing demand for primary care providers such as nurse practitioners (U.S. Department of Health and Human Services, 2013). Colleges and universities are expanding enrollment in graduate programs to prepare advance practice nurses, but the shortage of faculty, clinical sites, qualified preceptors, and other finite or dwindling resources limit the expansion of graduate education for nurses and thousands of qualified students are denied entry to programs each year (American Association of Colleges of Nursing [AACN], 2013).

Moreover, the Affordable Care Act (Patient Protection and Affordable Care Act of 2010, 2015) has adjusted reimbursement rates and policies resulting in major shifts in healthcare institutions. The attention to reducing readmissions, limiting or eliminating payment for hospital-acquired illness and injury, and rewarding institutions that improve patient outcomes are important and necessary inducements to promote quality of patient care. Since Linda Aiken's groundbreaking work in 2003, there has been a substantial body of evidence indicating that baccalaureate preparation for nurses improves patient outcomes (Kutney-Lee, Sloane, & Aikin, 2013; McHugh et al., 2013) and is likely to reduce costs through a reduction in length of stay

(Yakusheva, Lindrooth, & Weiss, 2014) and readmissions (McHugh & Ma, 2013). As a result of improved care, trends in data suggest that there will be fewer patients in hospitals producing a decreased demand for nurses working in those settings and an increase in the demand in outpatient, ambulatory, clinic, community, occupational, and long-term settings (Wadhwani & LeBuhn, 2014). Educational programs are in the midst of adjusting curricula to prepare nurses at the undergraduate and graduate level to manage care and ensure good patient outcomes in these environments.

Nurses presently in the workforce will need to consider how to prepare for the shift in employment demand. The Joint Statement on AACN, 2015 sets forward principles that community colleges, educational accrediting bodies, and universities to promote the further education of a diverse and well prepared nursing workforce to meet the demands of 21st century. The call for 80% of all registered nurses to be prepared at the baccalaureate level by 2020 (IOM, 2010), combined with the strong push for Magnet Certification (American Nurses Credentialing Center, 2015) among many top-tier hospitals, has been a strong motivating force behind the increase in the number of nurses returning to complete their BSN. It remains to be seen if those nurses will go on to complete graduate degrees including the doctorate with advance practice education to meet the healthcare needs of the future.

What does any of this have to do with the acquisition and application of statistics, quantitative reasoning skills, and evidence-based practice? What we know is that nurses across all settings, and with all manner of experience and educational preparation, are being asked to step up and do their part to ensure:

- The care patients, families, and communities receive is of the highest quality
- That care is substantiated in the best quality evidence
- That the delivery of care takes place in an environment that values perspectives from all health-related disciplines.

The quality bar for nursing practice is being raised. One way that nurses can be certain that their leadership to improve healthcare practice and patient outcomes is effective is to learn the fundamental concepts of statistical reasoning and apply those skills to evidence-based practice. As a nurse, you are accountable every day to your patients,

your employer, and your profession to make certain that the quality of care you deliver is the best available. Your professional experience and previous training, while important, are not enough to safeguard the public's confidence in the quality of nursing care. Over time, new knowledge and information become available, and your ability to engage in **evidence-based practice**, **quality improvement**, and **process improvement** are based on scientific review and hold the key to providing high-quality nursing care.

Statistics is an important tool of evidence-based practice, and we commend you for deciding to improve your skill set by taking a statistics course or reading this text. As a nurse with advanced education in statistics and evidence-based practice, you will be better qualified to make important contributions to health care, nursing practice, and the well-being of patients across a variety of settings.

By now you are undoubtedly aware that the quality of health care in the United States is dependent upon the quality of nursing care (IOM, 2010). Logically, the better prepared nurse is more likely to promote safety and quality of patient care through evidence-based practice. Recognizing the important role that advanced practice nurses have in the healthcare system, the AACN (2006) has recommended that the Doctor of Nursing Practice (DNP) degree be the educational entry level for advanced practice nurses and there is general consensus that the DNP is well suited for those nurses in leadership roles as well. To meet this expectation, we contend that nurses pursuing graduate education need a strong understanding of statistics to implement evidence-based practice and all its permutations. This text is designed to help nurses develop the skills necessary to carry out evidence-based practice.

Evidence-based practice is clinical decision making using the best evidence available in the context of individual patient preferences by well-informed expert clinicians (Melnyk & Fineout-Overholt, 2005). There are many kinds of evidence that nurses can integrate into their practice (see **FIGURE 1-1**). We strive to use the best quality evidence available. Types of evidence range from our professional experience and expert opinion to substantiated theoretical propositions and findings from research. The volume and quality of evidence available depends on the nature of the clinical problem. From the earlier example, we know quite a bit about restraint use, but less about the best way to encourage adherence to complex

Case Study

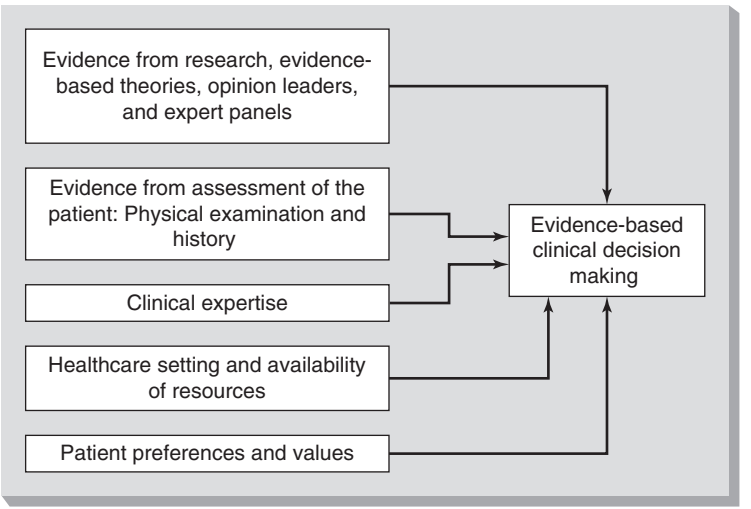
EVIDENCE-BASED PRACTICE

Have you been a patient lately? What did you expect of the nurses, physicians, and allied healthcare providers who were delivering your care? We are practicing in an era where patients expect that the interventions provided by the nurse will be supported by evidence. Dr. Mallory tells the following story.

> Nurses have always been concerned about the safety of patients, but we did not always have good evidence for our interventions. At the beginning of my career, in the mid 1980s, the use of physical restraints for residents living in nursing homes was common practice. We were concerned that our unsteady and often confused patients would fall if not restrained in their beds and wheelchairs. At that time, there was no research to investigate the **efficacy** of fall prevention using physical restraints or to determine if restraints had any negative consequences. Thankfully, falls and restraints are just the sort of problems that nurses care about, and through the accumulation of research evidence we learned that physical restraints were causing more harm than good, and they have been virtually eliminated throughout healthcare systems except under strict protocols. Now, we are facing new questions about the use of chemical restraints and taking a much more methodical approach to investigating the efficacy of pharmacotherapy for patient wellbeing. The conduct of research and the application of evidence to practice ensure that we are practicing in the best interest of our patients. Furthermore, we can educate our patients with the evidence, so they can be confident in the approach we have recommended. Our ability to combine evidence to meet a patient's individual needs and apply this information with a good dose of clinical judgment is what evidence-based practice is all about.

Figure 1-1

Elements of evidence-based practice.



Adapted from Melnyk, B. M., & Fineout-Overholt, E. (2005). *Evidence-based practice in nursing and healthcare*. Philadelphia, PA: Lippincott Williams & Wilkins.

treatment of chronic illness. **Levels of evidence** are one useful way to think about what kinds of evidence are available, how these are connected to statistical tests, and what kinds of clinical questions each type of evidence can answer.

Let's examine the levels of evidence table (see **TABLE 1-1**). Keep in mind that the evidence table is similar to a healthy diet—that is, you need a bit of everything to have a good understanding of any given clinical situation or problem. Let us consider the problem of pressure ulcers, we could ask a question like, "What is the patient experience of pain associated with a pressure ulcer?" Such a question would be best answered with evidence from descriptive studies in which researchers asked patients with a pressure ulcer about associated pain. On the other hand, if we wanted to know whether a wet-to-dry dressing or a hydrophilic dressing was best for healing a pressure ulcer, evidence from randomized clinical trials comparing these two approaches would be the most useful. The nurse needs to skillfully interpret reports of investigations, including the statistical results, in order to determine the quality of the evidence and the applicability

Table **1-1** Levels of Evidence

Type of Research Evidence	Uses	Strength of the Evidence
Descriptive or exploratory research (single studies that report frequencies, averages, and variation)	Helps to answer questions about the nature of a problem (population or phenomenon being studied), such as "How many people are affected?" or "What is the subjective patient experience?"	Best evidence for describing problems or concerns in health care
Correlational research (single studies that report correlation coefficients such as Pearson's *r*)	Provides information about the relationship between factors, such as, "Is body weight related to the formation of pressure ulcers?"	Useful evidence for beginning to understand complex health problems.
Comparative research (single studies that report on differences between groups using *t*-tests or ANOVA)	Helps to answer questions about how two or more groups are different on some factor, for example, "Does blood pressure vary between men and women?"	Evidence from these studies may be combined with correlational research to better describe the factors influencing health
Case controlled and cohort studies (single "natural experiments" that help us predict outcomes)	Provides information on what factors might influence or predict health outcomes, such as "Does smoking predict lung cancer?"	Strong preliminary evidence for examining cause and effect
Experimental or randomized controlled trials (single studies that test cause and effect)	Studies examine the effect of an intervention on patient outcomes. For example, "Does turning a patient every 2 hours prevent pressure ulcers?"	Very good evidence for examining cause and effect, especially the effect of interventions on patient outcomes

(*continued*)

Table 1-1 Levels of Evidence (*continued*)

Type of Research Evidence	Uses	Strength of the Evidence
Meta-analyses (analyses of existing randomized controlled trials to determine the effectiveness of interventions)	These studies combine many previous experiments on one or more interventions and their effects on a patient outcome to answer a question such as, "What do all of the studies on patient turning tell us about the effect on pressure ulcers?"	Strongest evidence for cause and effect and the effectiveness of an intervention.

to any given clinical situation. Each type of research approach, exploratory to experimental, has its own statistical analysis that corresponds to the kind of research question that is being asked and the type of data that have been collected. There are many valid forms of evidence such as expert opinion and findings from qualitative studies; however, since this text is focused on statistics and evidence-based practice, we will limit our discussion to approaches that use statistical methods for analyzing data.

STATISTICS AND EVIDENCE-BASED PRACTICE

Statistics are a useful tool for expressing data or characteristics in a scientific way. Going back to the example of pressure ulcers, let us assume that both wet-to-dry dressing and hydrophilic dressings were effective for healing a pressure ulcer with only a subtle difference in the healing rate. Such small differences may be difficult to observe in a single patient. We need to use the power of statistical analysis in

combination with the right kind of study to determine if this subtle difference is an actual difference and not just luck or chance. The power of statistics to help us decide the effectiveness of a treatment is one aspect of how statistics are important in implementing evidence-based practice.

A statistician is a person who specializes in the application and/or development of statistical approaches for understanding data. Most nurses in advanced practice or leadership roles are experts in their chosen field, but are not statisticians. However, nurses in advanced practice are still expected to be competent in the use of statistics for conducting evidence-based practice projects. AACN (2006) has specified that nurses at the DNP level should be able to do the following:

- Use analytic methods to critically appraise existing literature and other evidence to determine and implement the best evidence for practice.
- Design and implement processes to evaluate outcomes of practice, practice patterns, and systems of care within a practice setting, healthcare organization, or community against national benchmarks to determine variances in practice outcomes and population trends.
- Design, direct, and evaluate quality improvement methodologies to promote safe, timely, effective, efficient, equitable, and patient-centered care.
- Use research methods appropriately to:
  - collect relevant and accurate data to generate evidence for nursing practice
  - inform and guide the design of databases that generate meaningful evidence for nursing practice
  - analyze data from practice
  - design evidence-based interventions
  - predict and analyze outcomes
  - examine patterns of behavior and outcomes
  - identify gaps in evidence for practice

Each of the criteria listed above require quantitative and statistical reasoning skills. The AACN expectations for the DNP are well aligned with the rising expectations for graduate nurses in all settings as set forward by the *Future of Nursing* report from the IOM (2010).

Caroline's Story

I remember my first statistics course. I was so worried about my ability to learn the material that I set my goal at earning a "C" in the course. I kept telling myself "If I can just pass this class, then I won't have to worry about statistics again." Much to my surprise, I earned an "A" and found out that I was not stupid when it came to math or logical thinking—I just had not practiced enough. Most of us can remember a time when we were just learning a new skill, perhaps physical assessment or aseptic technique. Initially, we might have been quite clumsy or not understood completely the nuances of the skill. Statistics is just like that; a new skill that with practice becomes familiar and promotes in-depth understanding.

In our experience, nurses entering graduate programs are often unsure of their quantitative reasoning skills and have not practiced using statistics since their undergraduate or basic nursing program. As a nurse embarking on a more in-depth study of statistics and evidence-based practice, you may feel anxious about the current state of your skills. You may even question whether you *really* need additional training in statistics. Our objective in this text is to make statistics accessible and help you understand the importance of statistics to your practice. We hope that you are motivated to persevere in statistics to promote the quality and safety of patient care.

MyoungJin's Story

I began my journey in statistics with a master's program. Being a business major previously, switching to statistics was not an easy transition. Over the years of statistical consulting, I have seen students who did not know where to go for help with statistical analysis for their data, and some who tried to be self-learners but struggled with where to begin. They need a better and new way to resolve their problems. Through the use of evidence and my personal experience helping others, I hope that everyone will see the role of statistics in evidence-based nursing practice, understand statistics better, and become a competent clinician delivering the best quality of care.

SUMMARY

In this chapter, we have discussed some of the reasons that nurses need to develop skills for evidence-based practice, especially a strong understanding and use of statistics. The Affordable Care Act and shifts in workforce are resulting in a re-visioning of graduate nursing education to include an improved skill set in evidence-based practice. We learned that there are levels of research evidence that correspond to different types of research questions and that the strength of the evidence also varies accordingly. Nurses must be able to judge the quality of research evidence for use in practice, and understanding statistics helps us to do that. We also learned that the advanced practice nurse is more than just a consumer of research and statistics, but must also be competent in the use of statistics for evidence-based practice projects.

Critical Thinking Questions

1. Read the summary of the Institute of Medicine's report *To Err Is Human: Building a Safer Health System* (1999). What is the nurse's role in ensuring quality and safety?
2. Go to the AACN website and read the essentials for the DNP (www.aacn.nche.edu/DNP/pdf/Essentials.pdf). What are your thoughts on the expectations for evidence-based practice for advanced practice nurses?
3. What do you think the role of statistics is in making evidence-based decisions?
4. On a scale of 0–10, with 10 being the most anxious, how would you rate your anxiety about statistics? What measures are you prepared to take to reduce your anxiety?

Self-Quiz

1. True or false: The Affordable Care Act provides for the expansion of insurance to cover more Americans.
2. True or false: The Institute of Medicine's report *To Err is Human* makes recommendations for nursing education and practice.

3. True or false: Evidence-based practice is best described as the use of only research for making clinical decisions.
4. True or false: Evidence from experimental research is best for describing the number of people affected by chronic disease.
5. True or false: Statistics is a scientific approach to express data or characteristics being studied.
6. True or false: Evidence-based practice is always founded on research evidence.
7. True or false: Nurses with master's and doctorate of nursing practice degrees are expected to carry out original research.

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