

Chapter 9

Implications for Nursing Research and Generation of Evidence

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ABSTRACT

A sound informatics infrastructure is essential to optimise the application of evidence in nursing practice. A comprehensive review of the infrastructure and associated research methods is supported by an extensive resource of references to point the interested reader to further resources for more in depth study. Information and communication technology (ICT) has been recognized as a fundamental component of applying evidence to practice for several decades. Although the role of ICT in generating knowledge from practice was formally identified as a nursing informatics research priority in the early 1990s (NINR Priority Expert Panel on Nursing Informatics, 1993), it has received heightened interest recently. In this chapter, the authors summarize some important trends in research that motivate increased attention to practice-based generation of evidence. These include an increased emphasis on interdisciplinary, translational, and comparative effectiveness research; novel research designs; frameworks and models that inform generation of evidence from practice; and creation of data sets that include not only variables related to biological and genetic measures, but also social and behavioral variables. The chapter also includes an overview of the ICT infrastructure and informatics processes required to facilitate generation of evidence from practice and across research studies: (1) information structures (e.g., re-usable concept representations, tailored templates for data acquisition), (2) processes (e.g., data mining algorithms,

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natural language processing), and (3) technologies (e.g., data repositories, visualization tools that optimize cognitive support). In addition, the authors identify key knowledge gaps related to informatics support for nursing research and generation of evidence from practice.

RESEARCH TRENDS

The complexity of today's research problems demands that scientists move beyond the confines of a discipline-specific view of the world and explore new research paradigms and methods. Several trends in research indicate increased attention to practice-based generation of evidence. First, the emphasis on interdisciplinary and translational research ("NIH Roadmap for Medical Research," 2003; Zerhouni, 2003) is moving scientists towards study designs that test the effectiveness of clinical discoveries and policy innovations in real-world settings as a complement to efficacy testing through randomized, controlled trials (RCTs) (Lohr, 2007). Second, there is increased interest in research that compares the effectiveness of multiple interventions, which has the potential to increase knowledge about the balance of risks and benefits from all forms of therapies used in routine interdisciplinary clinical care (Smith, 2007). Third, models have been proposed to facilitate sufficient attention to external as well as internal validity in study design and implementation. Fourth, many questions of interest require integration of many data types including genotypic, phenotypic, and environmental data for application in practice settings.

Research designs that address effectiveness or comparative effectiveness emphasize real-world contexts as compared to efficacy testing under controlled conditions as illustrated in the three specific examples that follow. Tunis et al. described the need for clinical trials in which the hypothesis and study design are developed specifically to inform clinical and health policy decision making rather than to understand how or why a particular intervention works (Tunis, Stryer, & Clancy, 2003). Such trials are called pragmatic or

practical clinical trials and are distinguished from explanatory trials such as RCTs by four features: (1) select clinically relevant alternative interventions to compare, (2) include a diverse population of study participants, (3) recruit participants from heterogeneous practice settings, and (4) collect data on a broad range of health outcomes.

There may be comparative effectiveness research opportunities that occur naturally due to health administration or policy decisions that affect both individuals and health care organizations. Designed-delays have been used to study drug policy (Maclure, Carleton, & Schneeweiss, 2007), but are also well-suited to study other changes that occur in the delivery of health care. For example, a designed-delay trial design might be applied to study impact of government-regulated nurse staffing ratios. Administrative data could be used to investigate outcomes of hospitals who implemented the mandated staffing ratios when the legislation was passed compared to hospitals who adjusted their staffing ratios when the law was broadly implemented.

In contrast to clinical trial designs, Horn and colleagues have developed an observational research design for comparative effectiveness studies which they call practice-based evidence for clinical practice improvement (PBE-CPI) (Horn & Gassaway, 2007; Latham et al., 2006). The aim of this practice-based approach is to reduce uncertainty about the comparative effectiveness of treatments by collecting comprehensive patient, treatment, and outcome data. The PBE-CPI study design incorporates qualitative and quantitative research methods and is characterized by seven features: (1) consideration of all interventions to determine the relative contribution of each, (2) general rather than specific hypotheses, (3) maximizing external validity by limiting sample

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