AN ABSTRACT OF THE DISSERTATION

FOR THE DEGREE DOCTOR OF PHILOSOPHY IN THE

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Title: Revealing the invisible college of evidence-based practice in nursing: Mapping

citations from policy and procedure documents in the intermountain west region of the

United States.

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Dr. Mirah J. Dow (Chair)

Citation analysis identifies the empirical sources of evidence cited by nurses in hospital

policy and procedure documents. This study investigates nursing procedure documents

created or updated during a 12-month period prior to a site visit by the researcher at

hospitals with libraries that are full members of the National Network of Libraries of

Medicine (NN/LM) in the intermountain west region of the United States. All site visits

occurred between September 2012 and November 2013. In addition to gathering study

site demographics, the units of analysis include the policy and procedure documents

explicit linkages to books or book chapters, journal articles, websites, government

documents, dissertations, pamphlets, product manuals, recordings, interviews, or from

subscription evidence-based practice summary databases the nursing document authors

record to support, provide precedent for, illustrate, or elaborate patient care decisions.

Analysis of the citations describes the scholarly interconnections of hospital nurses

related to knowledge building for patient care procedures, and informs evidence-based

practices for medical librarians working in hospitals.

REVEALING THE INVISIBLE COLLEGE OF EVIDENCE-BASED PRACTICE IN NURSING: MAPPING CITATIONS FROM POLICY AND PROCEDURE DOCUMENTS IN THE INTERMOUNTAIN WEST REGION OF THE UNITED STATES

by

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CHAPTER 1

INTRODUCTION

Health care is a topic of interest to all Americans, the public in general, the medical profession, health care industries, and medical librarians. Evidence-based practice (EBP) represents a possible paradigm shift in how the medical profession, professional librarians, and the public consider research-based information and the responsibilities of professionals to include research in their practice. EBP is an approach to making health care decisions that integrates best evidence from research with the provider's clinical expertise from professional education and clinical experience, while incorporating the patient's preferences and values in the process. The movement towards EBP began with physicians but quickly moved to change practice patterns for other health care providers including nursing.

The problem is that by 2020, 90% of patient care in the United States must be evidence-based (IOM, 2012). Nurses are the largest group of healthcare providers in hospitals. Nurses, along with medical librarians, need to know more about current evidence-based practices of healthcare providers. A useful way to learn more is to study EBP practices of nurses who write nursing policy. The purpose of this study is to investigate the use of EBP in making health care decisions through an examination of nurse-authored hospital policy and procedure documents.

Scientific knowledge builds on a foundation of primary research as each author and study contributes to the work of another author. The growth of scientific studies addressing many illnesses and diseases has increased in recent years, resulting in many more resources upon which health care professionals may rely in making patient care

decisions. Health professionals' use of digital resources and computerized devices has influenced how they access this research in the clinical setting and apply the information they retrieve to patient care decisions (Doran et al., 2007; Lang, Wyer, & Haynes, 2007).

The public and the professions demand accountability in medical practice and clinical care decisions. EBP is necessary to inform the decisions healthcare professionals make at the level of patient care. This emphasizes and highlights the importance of revealing the associated citation trends and patterns of resource use in EBP documents. Bibliographic data can identify the presence of an invisible college (Eldredge, 2013; Noma, 1984; Price & Beaver, 1966; Zuccala, 2006) for sharing clinical knowledge. To continue to effect, advance, and improve hospital nurses use of published literature to inform and make treatment decisions, more must be known about the published sources of authority most often cited, or not cited, by nurses in creating or updating hospital policy and procedure documents.

Evidence-Based Practice and American Health Care

The financial cost of health care is important to nearly everyone. When EBP directs decision-making, the quality of patient care improves and health care costs are decreased (Melnyk, Fineout-Overholt, Gallagher-Ford, & Kaplan, 2012). EBP provides policy makers, the public, insurance providers, and clinical care providers with research-based information to make informed healthcare decisions. This research-based information may be in the form of primary research findings, compilations of summaries from critically appraised primary resources, and/or summaries of research translated into clinical practice guidelines by experts.

As medical research expands, practicing physicians struggle to stay current with all the options available for diagnosis and treatment decisions (Alper et al., 2004; Holmboe, Lipner, & Greiner, 2008). EBP provides physicians with a means to update their knowledge by finding answers to their most important practice questions (Guyatt, 2008; Lapaige, 2009; Sackett & Rosenberg, 1995; Sinclair, 2004). The change to EBP is a paradigm shift (Guyatt et al., 1992) in how providers define patient care questions and the resources they use to find answers for clinical questions. This shift that now involves looking to published sources of authority for finding answers is a shift toward increased need for the expertise of medical librarians.

EBP was not practical until hospitals had widespread access to personal computers, the Internet, and electronic databases (Claridge & Fabian, 2005; Lang et al., 2007). Before bedside access to online information, only a few patient care questions from nurses and other healthcare providers were considered important enough to necessitate a visit or telephone call to the medical library. Once hospitals provided wireless access to the Internet, both patients and health care providers had nearly instant access to health information using portable computers and handheld devices. Today, the knowledge and information skills librarians bring to organizing and retrieving relevant information are vital to hospital staff implementation of EBP for patient care. Medical librarians are making library resources available to hospital staff at the point-of-care, which improves the quality of health care decision-making.

Evidence-Based Practice for Nurses

Nurses adopted EBP from physicians because nurses, like doctors, have an ethical responsibility to maintain awareness of current research and base their clinical decisions

on the finding and conclusions from current scientific evidence (Beck & Staffileno, 2012; Silka, Stombaugh, Horton, & Daniels, 2012). To incorporate EBP into daily patient care, hospital nurses utilize current research-based evidence to guide their writing of nursing policy and procedure documents. Nursing policy and procedure documents spell out roles and responsibilities, determine protocols for managing various patient care needs, and describe the performance of particular nursing activities. For example, the nursing policy and procedure manual includes detailed instructions on how to manage a patient's epidural analgesia for control of pain (Ellis & Hartley, 1992). Policy and procedure documents help nurses provide safe and consistent care to patients' around-the-clock, avoiding unexplained variations from nurse-to-nurse (Doran et al., 2007; Marshall, West, & Aiken, 2011; Sciarra, 2012).

Some hospitals officials utilize print or electronic versions of popular nursing textbooks as generic policy and procedure manuals for their institutions (Simons & Abdallah, 2012). Other hospitals establish practice councils for creating and updating EBP patient care policy and procedure documents for their institutions (Ellis & Hartley, 1992; Long, Burkett, & McGee, 2009; Oman, Duran, & Fink, 2008, Squires, Moralejo, & LeFort, 2007). Nursing leaders often direct the nurses who write policy and procedure documents to include "the source of information at the end of the policy" (Pape, 2003, p. 154). Medical librarians provide the support nurses need to locate, evaluate, and cite the sources of evidence that informs practice decisions.

Evidence-Based Practice for Librarians

Medical librarians who work directly with health care providers to develop special literature search filters for locating useful clinical evidence (Isetta, 2008;

McKibbon, 1998). They assist clinicians to identify, appraise, and use research-based evidence to inform their practice, so it is natural that medical librarians would apply these same approaches to library activities (Grant, 2011). As the medical library resources moved from print to electronic formats, medical librarians gathered and used empirical evidence about information behavior and user studies to develop best practices in collection development, reference, information services, and professional development instruction decisions. The medical librarian moved from a primary focus on collections to a focus on serving people who use the medical library resources.

Librarians in other types of libraries such as academic, corporate, and law libraries were also interested in applying empirical research to their practice. Evidence-based library and information practice (EBLIP) emerged in response to the need to apply current research in library practice settings. Eldredge (2013) described early EBLIP as "functioning more like an 'invisible college' that exerts tremendous influence without presenting many physical clues of its existence" (p. 105). The invisible college also describes people informally sharing papers, books, and concepts containing the current essential knowledge in a scientific community (Price, 1971). According to Noma (1984), Price and Beaver (1966), and Zuccala (2006), bibliographic citation research can identify the presence of an invisible college that shares and creates knowledge by revealing connections to highly cited resources.

Need for Research

Society expects that health care professionals base care decisions on appropriate evidence (Gardner, Smyth, Renison, Cann, & Vicary, 2012; Thompson et al., 2001). However, few studies identify the sources of evidence nurses use to support patient care

decisions. Medical librarians select and make available research-based resources in electronic databases along with paper and online information sources but it is unclear which hospital library resources are used in support of the development of nursing EBP policy and procedure documents.

In order to learn more about the use of scientific evidence in current health care procedures performed by hospital nurses, this study undertakes a citation analysis of nursing policy and procedure documents. This study answers these central questions:

1. What information sources do nurses cite when creating or updating nursing policy and procedure documents?

2. What do variations in hospital nurses' citations of information resources in policy and procedure documents imply about the cumulative growth of knowledge in the area of health care research?

3. Does the bibliographic data identify the presence of an invisible college within the practice of nursing policy writing?
Findings inform understanding of the growth of cumulative academic and/or professional knowledge in the area of nursing policy and procedure writing and clarify the roles of medical librarians in providing reference services and resources relevant to the needs of nurses and others who use hospital libraries.

CHAPTER 2

LITERATURE REVIEW

EBP is important to healthcare providers as a way to integrate current research

into practice and improve the quality of patient care. When current research guides

clinical decisions patients receive the best possible care (Melnyk & Fineout-Overholt,

2005). Nurses, as healthcare professionals, demonstrate their use of EBP to guide patient

care by including citations to current research-based evidence in the documents they

create to guide routine nursing practice decisions for hospitalized patients. The use EBP

in health care has a long history. The term "evidence-based" first appeared in the

medical literature in the 1990s at the beginning of the modern EBP movement (Dawes et

al., 2005, p. 2). However, the philosophical origins of EBP are much older.

Early Greek physicians used careful observation of patient outcomes as their

guide for making medical care decisions (Claridge & Fabian, 2005; Sackett, Rosenberg,

Gray, Haynes, & Richardson, 1996). In mid-19th century Paris, a physician, Pierre

Louis, used patient outcome data to determine best medical practices. Louis counted

deaths related to pneumonia; more patients died after aggressive bloodletting than from

any other pneumonia treatment. His empirical evidence led to the abandonment of

bloodletting from medical practice (Bernstein, 2004).

Modern Evidence-Based Medicine

Alper et al. (2004) described medical decision-making before EBP as based on a

foundation of medical science, using a wide range of experience, common sense, and

hunches. When a physician was uncertain about the best options for patient care, a

consultation with a more experienced colleague generally answered their questions. EBP

was a paradigm shift in medical decision-making (Guyatt, 1992, Isetta, 2008, Perry & Kronenfeld, 2005). EBP requires the health care professional to evaluate available current research to find the best possible answer to their clinical question rather than relying on expert advice from formal and informal leaders in the clinical setting.

Cochrane championed the use of empirical evidence for medical decisions in the 20th century. He challenged the public not to pay for care without research that demonstrated it was effective (Claridge & Fabian, 2005; Melnyk & Fineout-Overholt, 2005). He also criticized other physicians for not using outcomes evidence as a guide for practice decisions. After his death, Cochrane's call to maintain and update summaries of evidence useful for clinical decisions helped establish the *Cochrane Library* (Cochrane Library, 2012). The *Cochrane Library* collects research-based evidence using very strict standards that include identifying results from unpublished clinical trials to create a meta-analysis of research-based findings. Access to the full text summary of evidence from the *Cochrane Library* is only available by paid subscription.

Sackett at McMaster University developed the current methods used for teaching EBP in medicine (Claridge & Fabian, 2005; Gersing & Krishnan, 2002; Greenhalgh, 2010; Guyatt et al., 1992). Sackett and his colleagues published a series of articles in the *Journal of the American Medical Association* on their EBP approach to patient care, teaching, and the critical appraisal of research. They defined EBP as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett et al., 1996, p. 71).

EBP is more than simply applying current research to practice decisions. Very few single research studies have a strong enough design to change clinical practice

(Greenhalgh, 2010; Melnyk & Fineout-Overholt, 2005). A summary of evidence from multiple sources of empirical evidence combined with expert knowledge and provider experience, along with consideration for patient preferences guides clinical choices in EBP. This framework for clinical decision-making includes asking a clinical question, locating, evaluating the available research-based evidence in light of clinical experience, and then applying it to practice. This can be time consuming, but it ensures patients receive the best possible care (Guyatt, 1992, Pape, 2003), which is the goal of modern healthcare. Some libraries pay to subscribe to EBP summary databases that provide pre-appraised evidence for application in clinical practice to save staff the considerable time and effort required to evaluate individual research studies.

Growth of Research

Between 1865 and 2006, the National Library of Medicine (NLM) index for the medical literature grew from 1,600 references to nearly 10 million (Bastian, Glasziou, & Chalmers, 2010). Much of this growth in literature was the result of clinical research reports. Scientific research funded by federal agencies, drug companies, and academic medical centers provide needed information on the safety, benefit, risks, and effectiveness of therapeutic, diagnostic, or preventative interventions in healthcare. From 1978 to 2001, the enrollment of patients in clinical trials tripled and as Druss and Marcus (2005) noted, this increase in published research was useful for guiding clinical practice but "the sheer magnitude of the evidence can at times serve as a barrier to its effective use" (p. 501).

With the rapid increase in the volume of medical research, the scholarly journal became the primary vehicle for disseminating research findings (Allen, Jacobs, & Levy,

2006; Oermann et al., 2008c; Perry & Kronenfeld, 2005, Smith & Hazelton, 2008).

However, according to Balas and Boren (2000) health care providers would need to read

19 articles a day, 365 days a year to stay current. EBP provides the framework for

practicing health care providers to utilize research-based information as clinical questions

arise. Rather than scanning and reading a few professional journals, the health care

provider comprehensively examines the available research-based literature related to

specific patient care questions. The need for an answer to a clinical question provides the

impetus for the health care professional to search, read, and evaluate research-based

publications in EBP.

Levels of Evidence

In EBP, the best available evidence guides patient care decisions. The quality of a

source of evidence is measured by critically appraising the soundness of the research and

the validity of the findings (Bastion et al., 2010; Bernstein, 2004; Greenhalgh, 2010).

Greenhalgh (2010) described the pyramid for "level of evidence" (p. 18) as a scale to

determine believability of the information gathered as evidence. Not every source of

research-based evidence ranks equally. Many consider the RCT the best research design

for evaluating health care interventions (Bernstein, 2004; Melnyk & Fineout-Overholt,

2005; Schulz, Altman, & Moher, 2010). Combining RCTs creates an even stronger type

of evidence. The systematic review from the *Cochrane Library* is considered the

strongest form of evidence for health care decision-making on the strength of evidence

scale (Figure 1). Systematic reviews reduce the risk of bias that might influence results

in a single study.

Cochrane reviews and other systematic reviews of multiple RCTs are the highest levels of evidence because of their careful attention in the selection of studies for inclusion in the form of a meta-analysis. Statistical analysis of relevant quantitative research results is used to calculate the overall effectiveness of treatment interventions in a meta-analysis which provides the strongest evidence for clinical practice decisions (Greenhalgh, 2010; Melnyk & Fineout-Overholt, 2005; Rosenbaum, Glenton, & Cracknell, 2008; University of Washington, 2013). However, because of the workload involved in producing these forms of evidence, only a small number of research questions are answered by systematic reviews at the apex of the pyramid. The pyramid has a wide base, representing various forms of evidence in ever-increasing volumes.

Mid-level forms of evidence include practice guidelines informed by research and produced by professional organizations or government agencies as well as cohort studies and clinical research critiques. This level of evidence may be available from websites or special publications. In practice, lower ranked evidence such as information from textbooks frequently direct health care decisions. Textbooks remain a popular source of evidence because they are often immediately available in the clinical setting (Glasziou & Haynes, 2005). Point of care resources such as *UpToDate* are subscription databases that are similar to easy-to-use textbooks with continuously updated current evidence (Greenhalgh, 2010). Oermann et al. (2008c) noted that books and book chapters are important sources of evidence in the nursing journal literature.

Evidence-Based Practice and Theory

Critical realism provides library scientists a lens for examining the use of EBP. Critical realism is a philosophy of science that considers how humans study and learn

about the world in which we live. It is a useful theory for examining EBP because it integrates the study of the natural and social world, which both impact health and health care decision-making. Bhaskar (1998) originally described critical realism, however he termed the approach "transcendental realism" (p. 19), which regards objects of knowledge as both structures and mechanisms. Structures "endure and operate independently of our knowledge, our experience, and the conditions which allow us access to them" (Bhaskar, 1998, p. 19). Angus (2011) noted the human body also possesses "properties that exist independently of what is known or claimed" about it (p. 1). A mechanism is "something, which is capable of producing an observable event" (Nairn, 2011, p. 8). Sometimes a mechanism may be dormant and only active under certain circumstances; other times countervailing mechanisms may prevent an expected event from happening (McEvoy & Richards, 2003; Nairn, 2011; Wikgren, 2005).

In critical realism, the world contains three strata: the empirical, the actual, and the real (Littlejohn, 2003; McEvoy & Richard, 2003; Nairn, 2011). The empirical is what a person perceives from the senses; the actual exists on the level of identifiable physical and social events, while the real is the interplay of underlying mechanisms that cause the event to occur. At the level of the real, the mechanisms that cause events are not directly observable. All of this exists within a context of political, economic, and social structures. Empirical research is a social practice influenced by history and available resources (Budd, Hill, & Shannon, 2010). Critical realism values empirical evidence, but it also recognizes experimental research conducted in a controlled artificial environment does not provide complete knowledge of causal mechanisms (Budd et al., 2010; McEvoy & Richards, 2003, Porter & O'Halloran, 2011). The RCT can provide information about

a specific outcome related to health care interventions, but it cannot provide information about all the interactions between mechanisms. The mechanisms in play for a particular patient may not be the same forces that produced patient outcomes in clinical research (Porter & O'Halloran, 2011).

For example, on the level of the actual, heart muscle is damaged from a heart attack. There is empirical evidence of this event measured by laboratory scientists testing the blood for enzymes released by the destruction of heart muscle fibers. However, this information does nothing to explain why people in different social classes experience different rates of heart attacks. The complex interactions of the underlying mechanisms related to diet, stress, behavior, and genetics that cause the event remain unexplained (Nairn, 2011). In EBP, for the best quality health care decisions for the individual patient, empirical knowledge from scientific research must be combined with clinician judgment and patient preferences. Empirical evidence provides us incomplete knowledge of the real world that needs further consideration along with knowledge gained from clinical experience before application into practice.

Change in Practice

Studies of medical care from the 1980s estimated only 15% of patient care was directed by current research (Gersing & Krishnan, 2002; Greenhalgh, 1996). Research-based evidence has been difficult to integrate into clinical practice, as is evident in the research-to-practice gap. The Institute of Medicine (IOM, 2001) noted it took an average of 17 years for new knowledge from research to change clinical care. The gap between the best available evidence and current medical care produces misuse, underuse, and

overuse of medical therapies adding unnecessary cost to health care and reducing care quality (IOM, 2001).

EBP is widely accepted as the best way to resolve the research-to-practice gap (Glasziou & Haynes, 2005; ICN, 2012; Isetta, 2008; Pretty, 2007). Brice and Hill (2004) state the evidence-based movement challenges practitioners to stay up-to-date with research evidence and to incorporate it into practice. EBP is grounded in patients' need for health care therapies that are determined to be safe and effective by the best available scientific knowledge. Because nurses comprise the largest group of health-care providers in the hospital (Lang, 1999) implementing EBP in nursing is important to achieve IOM (2001) goal for 2020; 90% of patient care is determined by the best available scientific evidence.

Policy and Procedure Documents for Evidence-Based Practice in Nursing

High quality patient care promotes improved patient outcomes. To maintain quality and consistency many routine care practices performed by hospital nurses are determined by policy and procedure documents (Abrahamson, Fox, & Doebbeling, 2012; Burns & Foley, 2005; Doran et al., 2007; Hodge, Kochie, Larsen, & Santiago, 2003; Long et al., 2009; Marshall et al., 2011; Oman et al., 2008). Rycroft-Malone, Fontenla, Seers, and Bick (2009) described EBP policy and procedure documents as "clear statements and standards for the delivery of care" (p. 1490). When policy and procedure documents use the best available research-based information, they support EBP for the clinical nursing staff (Grossman & Bautista, 2002; Pape, 2003; Oman et al., 2008; Squires et al., 2012; Thompson et al., 2004). Thus, nursing care following EBP policy and procedure documents promotes improved patient outcomes.

Invisible Colleges

An invisible college is defined as groups of people who are studying the same problems, cite one another in their work, but may never formally meet (Blashfield & Reynolds, 2012; Casey & McMillan, 2008; Conn et al., 2003; Eldredge, 2013; Price & Beaver, 1966; Zuccala, 2006). The term originated in 17th century Europe when a group of scholars who did not belong to any formal institutions began communicating by letters and met informally to stay current on shared scientific interests. These invisible colleges advance the profession with cooperative work between scientists who share interest in the same problems but are not part of a formal group. They are invisible because their informal associations and casual conversations often at meetings do not identify them as a group within their discipline.

Price and Beaver (1966) were among the first to use bibliometric research of formal communication channels to describe the presence of informal patterns of communication between elite scientists. They used the citations included in memorandums between the scientists to describe the structure of one invisible college. Blashfield and Reynolds (2012) described the structure of another invisible college in professional practice involving personality disorders using bibliographic references cited in a single document. However, as Lenzenweger (2012) stated in his editorial on the study, without additional research to corroborate the presence of an invisible college the structure may be an "illusory college" (p. 841) reflecting an interesting publication artifact. Noma (1984) stated the problem of publication artifacts falsely identifying the structure of an invisible college in citation research is overcome by validating that researchers are writing on a common topic.

Bibliometric research on formal channels of communication, specifically citation patterns, can reveal the structure of an invisible college within a subject specialty (Noma, 1984; Paisley, 1989; Price & Beaver, 1966; Zuccala, 2006). However, only research into social phenomenon can fully describe the informal interpersonal patterns of information sharing (Paisley, 1989; Price & Beaver, 1996; Zuccala, 2006). Crane (1969) validated social ties and confirmed the presence of an invisible college between scientists with publications in a particular area using a questionnaire after identifying the structural links between the scientists.

Bibliometric tools using citations from nursing policy and procedure documents can identify the structures of scholarly communication patterns suggesting the presence of an invisible college of EBP. As Zuccala (2006) explained, "documented evidence may be viewed as the structural component of the invisible college" (p. 155) identified with bibliometric maps. By mapping the authors and the associated hospitals that share citations, shared resources can be identified and patterns of scholarship and knowledge sharing become visible. The scholarly connections between authors of policy documents and the citations they document to support clinical care are useful to identify interactions between geographically distant scholars by subject areas.

Evidence-Based Practice Document Citations

Nurse researchers have studied the sources of evidence cited in nursing policy and procedure documents. Simons and Abdallah (2012) examined the evidence used in the protocol for confirming the placement of feeding tubes at 28 hospitals in Massachusetts and New Hampshire. The most frequently cited sources in this policy and procedure document in the sampled hospitals were popular nursing textbooks.

Morin et al. (1999) examined the process for developing, implementing, or revising research-based policy and procedure documents at 11 Delaware hospitals. The researchers interviewed nurses familiar with EBP at each hospital and obtained copies of the nurses most recent and most favored policy and procedure documents. The majority of these nursing policy and procedure documents contained no references to books, journals, or websites to demonstrate the use of evidence for the nurses practice decisions. The documents with citations frequently cited textbooks as the source of evidence (Morin et al., 1999).

By 2004, the Magnet program of the American Nurses Credentialing Center (ANCC) had recognized 105 hospitals in the U.S. as centers of nursing excellence (Turkel, 2004). The ANCC Magnet program includes EBP as an integral component for identifying high quality nursing care (Strickland & O'Leary-Kelley, 2009). Nurses in magnet-designated hospitals are encouraged to identify the evidence they use for supporting practice decisions in their policy and procedure documents (Turkel, 2004).

Oman, Duran, and Fink (2008) looked at 10 recently updated policy and procedure documents at a magnet-designated hospital in Colorado. The hospital developed an algorithm for staff nurses to follow when they updated EBP policy and procedure documents. The algorithm includes a step for the nurse to document the source and the strength of evidence for practice decisions. The 49 citations listed in these policy and procedure documents were mostly to journal articles or textbooks. The nurse researchers checked 37 of the references for levels of evidence by examining the resource. Problems with over-rating the levels of evidence for textbooks and

manufacturer product guides resulted in a revision of the table for levels of evidence used by nurse authors at the hospital.

There is a need for research on greater numbers of nursing policy and procedure document citations with more detailed information on multiple topics. The number of sites and number of policy types reviewed limits these studies. This study looks at many more topics using several sites in one geographical section of the U.S. It examines citation data in much more detail by identifying common authorities by policy and procedure document topic.

Evidence-Based Library and Information Practice

For EBP and evidence-based library and information practice (EBLIP), access to current research-based information is essential; it places the library and the librarian in a central role in problem solving and decision-making. Pochciol and Warren (2009) identified professional librarians as the key resource in providing research-based information in the hospital. The librarian's expert search skills and understanding of the organization of knowledge resources are especially important for nurses who are always pressed for time. Levin (2007) noted that even with access to full-text databases, nurses were unable to gather the information they needed for EBP without the assistance of a librarian. Many nurses report they do not know how to identify, obtain, or critically evaluate information (Duncan & Holtslander, 2012; Klem & Weiss, 2005). Professional librarians greatly enhance access to EBP information with mediated database searching using appropriate information filters (Abels, Cogdill, & Zach, 2002; Holst et al., 2009: Isetta, 2008; Klem & Weiss, 2005; Perry & Kronenfeld, 2005). Rew (2011) noted nurses

need librarian assistance for document delivery and interlibrary loan services to gather the best quality evidence for patient care decisions.

Teaching is an additional role for the librarian in EBLIP. Li and Wu (2011) reported 61% of U.S. medical librarians taught hospital staff about EBP. Librarians provide demonstrations of EBP database searching at staff meetings, create online EBP tutorials, instruct continuing education classes, and assist hospital staff in one-on-one EBP sessions (Grant, Hanson, Johnson, Idell, & Rutledge, 2012; Krainovich-Miller, Haber, Yost, & Jacobs, 2007; Kronenfeld et al., 2007; Perry & Kronenfeld, 2005).

The adoption of EBP by library and information professionals results from a "professional environment characterized by encouragement, inquiry, skepticism, dialogue, an openness to new information, and a willingness of the part of LIS professionals to change their own minds" (Eldredge, 2012, p. 139). Both EBP and EBLIP encourage practitioners to ask questions, find research-based information, and then apply the knowledge acquired in the context of professional expertise and experience (Booth, 2009; Eldredge, 2012; Glasziou & Haynes, 2005; Hjorland, 2011; Isetta, 2008; Oman et al., 2008; Pretty, 2007). The information professionals' role expands in EBLIP, providing opportunities for collaboration with users in creating new knowledge products by the application of research-based information into clinical practice when solving problems and answering clinical questions.

Summary

The term EBP was coined in the 20th century to describe the how physicians and other professionals are expected to make decisions, but the underlying philosophy of determining best practices based on scientific evidence is not new. EBP could not have

developed without access to computers and databases that provide full text to research-based information. Library professionals play an important role EBP by locating, gathering, and the critical appraisal of research for health care decision-making and the policies and procedures that guide those decisions.

Librarians use the bibliographic method of citation analysis to identify patterns in the sources of evidence cited in a particular document or set of documents. The extent to which EBP is used for patient care decisions can be discovered through an examination of bibliographic data, that is citations to published evidence included in nursing policy and procedure documents. Identifying patterns and structure of particular citations in nursing policy and procedure documents may reveal a structure for the presence of an invisible college of EBP in nursing, with certain authors and resources appearing in policy and procedure documents of similar topics at different hospitals. The existence of an invisible college of EBP in nursing is important in order to understand the growth and exchange of knowledge within the practice of writing policy and procedure documents.

CHAPTER 3

RESEARCH METHODS

This is a bibliometric study using citation analysis of a purposive sample of 10 hospital's nursing policy and procedure documents. The sample from full member National Network of Libraries of Medicine (NN/LM) hospitals with medical libraries is in the intermountain west region of the U.S. The study examines policy document citations to identify, count, describe, and analyze the sources the nurse authors of those documents refer to in support of policy decisions during the 12 months prior to this study. I visited the sites between September 2012 and November 2013. Nursing staff wrote the studied policy and procedure documents to describe the hospital-accepted protocols for the treatment and observation of patients. These documents cover a full range of nursing care for patients. Two examples of the types of care described in the documents are how to admit a patient to a nursing unit, and how to perform the complex precautions for the safe administration of chemotherapeutic medications.

Questions and Sub-Questions

I counted, analyzed, and mapped dates, authors, disciplines, and publication types from nursing policy and procedure document citations to answer the following questions:

1. What are the information sources nurses cite when they create or update nursing policy and procedure documents in the hospital?

   1.1 What publication types (e.g., books, journal articles, websites, and other data sources) do nurses cite?

   1.1.1 What academic disciplines and/or subject area inform the author of journal publications?

1.1.2 Does the journal publication cite primary or secondary

sources?

1.1.3 What websites do nurses cite in these documents?

1.2 What are the publication dates?

2. Are there variations between hospitals for information sources cited in nursing

policy and procedure documents?

2.1 Do nurses from different hospitals cite the same titles, authors, and

websites in policy and procedure documents?

2.2 Do the citations vary between large and small hospitals?

2.3 Do the citations vary between urban and rural hospitals?

2.4 Do the citations vary between hospitals located in the two different

NN/LM regions?

3. Does bibliographic data identify the presence of an invisible college within the

practice of nursing policy writing?

Citations

The narrow focus of this study to citations used to document authority for the

selected contents in the nursing policy. Citations are explicit linkages between papers

selected by an individual author (Beck & Manuel, 2008; Garfield, 1979). References of

one work to another are the data sources for bibliometric research (Beck & Manuel,

2008). Bibliometric researchers narrow their research questions to a particular population

to describe how a group shares knowledge. Bibliometricians need a narrow focus for

their study because of the vast numbers of publications and types information resources

available for citing.

In the study, the citation data gathered is broader than in a traditional bibliometrics study. It includes the facility name, policy and procedure document title or topic, and the bibliographic citations to other works. Each citation in the policy and procedure document that lists an author or authors, date of publication, resource title, and source is included as necessary data. Demographic data for the study includes: the study site location (e.g., rural or urban); the number of licensed beds (e.g., large with 100 or more licensed beds or small under 100 licensed beds); policy and procedure document title or topic; policy and procedure creation or revision date; and the linkages to published resources used to support, provide precedent for, illustrate, or elaborate the authors patient care decisions.

Major units of analysis are the document citations. The data points from the cited resources are the publication dates, authors, and types of sources (e.g., books, journals, and websites). When the source is a journal, additional data points include the academic disciplines or subject areas as identified in *Ulrichsweb,* a subscription database for bibliographic and publisher information about periodicals, and the type of article (e.g., primary or secondary sources of research information). When the source cited is a website, the data point collected is the uniform resource locator (URL) category to describe the different types of websites (e.g., academic or government sponsored sites).

Citation Analysis

Citation analysis is a type of bibliometrics (Nicholas & Ritchie, 1978) that involves counting forms of communication to describe the flow of information within a discipline or a geographic region. According to Beck and Manuel (2008), the bibliometric method is one of library science's oldest research methods. By examining

the formal links of citations, it is possible to obtain an understanding of networks created for knowledge exchange by exploring information sources and trends (Nicholas & Ritchie, 1978). After Garfield (1979) created the *Science Citation Index* and the *Social Science Citation Index*, journal citation analysis became a very popular library science bibliometric research method (MacRoberts & MacRoberts, 1989). Nursing journal citation analysis describes the transfer of research knowledge to practice in nursing publications (Estabrooks, Winther, & Derksen, 2004; O'Neill & Duffey, 2000; Scott et al., 2010; Urquhart, 2006). Garfield (1984) was the first to use journal citation analysis to study the literature of nursing. He selected seven core-nursing journals and reported the average nursing article cited 14 references.

The Nursing and Allied Health Resources Section (NAHRS) of the Medical Library Association (MLA) has studied nursing and the allied health literature using citations from samples of professional journal articles (Allen et al., 2006; Delwiche, Schloman, & Allen, 2010; Oermann, Blair, Kowalewski, Wilmes, & Nordstrom, 2007; Oermann et al., 2008b). NAHRS researchers use publication counts to map dates and types of works cited in core journal articles. Allen et al. (2006) and O'Neill and Duffey (2000) noted medical journal articles were the most frequently cited sources in their study samples.

The NAHRS study of general nursing literature calculated citation ages. The majority of citations in their sample were aged 7-years or less (Allen et al., 2006). Vincent and Ross (2000) suggested a minimum of 43% of citations in research-based disciplines should be less than 5-years of age. Because EBP involves using current research information, the date of a citation is an important measure in EBP.

Oermann and colleagues (2007) in a study of maternal-child nursing literature counted the number of research, evidence-based practice, and clinical articles cited in a sample of specialty publications. They found an average of 23 citations per article with nearly half of the citations reports of primary research. Although journals are the most frequently cited documents in the nursing literature, the number of websites in journal citations has been steadily increasing. Oermann, Nordstrom, Ineson, and Wilmes (2008a) counted website citations in nursing articles. They found more citations to websites in clinical nursing journals compared to nursing research journals.

Prior nursing research studies of citations to policy and procedure documents examined limited numbers of policy and procedure documents (Oman et al., 2008; Morin et al., 1999; Simons & Abdallah, 2012). This suggests a need for further exploration of nurses' citations in a greater number of documents that direct EBP for nurses in the hospital setting and with a much detail as possible. To realize the goal of increased number of documents and details, this research study examined nursing policy and procedure document citations and determines the dates and types of resources (e.g., websites and books) nurses used in writing these documents. In this study, I mapped the citations to identify research and other publication details in a combination not accomplished in other single study cited in this dissertation.

Study Sample

Cresswell (2003) describes purposive sampling technique as choosing study locations that will best help the researcher to answer the research questions. Following Cresswell's technique and using a listing of full-member hospital libraries of the National Network of Libraries of Medicine (NN/LM), I identified study sites. Selection criteria

for the sample are full-member NN/LM hospital library sites located within 300 miles of my residence in Idaho Falls, Idaho. Full NN/LM membership is open to any American library that provides health information services and uses DOCLINE, the NN/LM interlibrary loan system. DOCLINE participants have a minimum holding of 25 biomedical journals available for loan to other members (NN/LM, 2012).

Twenty–two NN/LM full member hospital libraries are located in Idaho, Montana, and Utah within 300 miles of Idaho Falls, Idaho. I determined the 300-mile distance limitation to manage available time and travel expenses. The 300-mile range includes two of the eight NN/LM regions: the MidContinental region; and the Pacific Northwest region. MidContinental region member libraries are located in the states of Colorado, Kansas, Missouri, Nebraska, Utah, and Wyoming. The Pacific Northwest region includes member libraries in the states of Alaska, Idaho, Montana, Oregon, and Washington (NN/LM, 2012).

I am a practicing medical librarian in a NN/LM member hospital. I contacted the 22 hospital library managers by U.S. mail to invite participation in the research and followed-up with telephone calls after the mailings (Appendix A). When the library manager responded positively to participating in the study, the researcher asked for an introductory meeting with the hospital nursing administrative team, research councils, or institutional review boards required for approval of research at the facility. Ten hospital sites in Idaho and Utah volunteered to participate in this study. Based on citation counts from previous nursing policy and procedure citation studies (Morin et al., 1999; Oman et al., 2008; Simons & Abdallah, 2012), this provided an adequate sample sized as each of

the participating hospitals provided access to 12 months of updated policy and procedure documents.

While human subjects are not included in the study, I obtained consents from authorized hospital personnel to access to the hospital policy and procedure documents used in this study (Appendix B). These documents are internal operating documents that direct patient care within the institution. I assigned participating hospitals a unique identification code to maintain confidentiality of collected data (Table 1).

Limitations

Selecting the sample frame within a 300 mile radius of my home did not give each NN/LM full member medical library an equal opportunity to participate in the research study. This sample from the intermountain west may not be representative of hospitals with medical libraries in other NN/LM regions. However, because the sample includes both rural locations (with a population of under 50,000 residents) and urban locations (cities with a population of more than 50,000 residents) the sample comparisons between population centers (U.S. Census Bureau, 2010) may be comparable to other parts of the U.S. The study was also limited to NN/LM member hospitals that have a staffed medical library. It does not identify nurses' selections for resources in hospitals without participation of a staff medical library.

Policy and Procedure Documents

After obtaining the necessary consents, I asked the participating hospital library managers for assistance in locating copies of 12 months of new and updated nursing policy and procedure documents. Each hospital has these documents, because the Joint Commission (JC) and other regulators require hospitals to provide policy and procedure

documents to direct patient care and to review them on a regular basis. Some policy and procedure documents have annual reviews, other documents are on two, or three-year cycles for review. I did not examine all nursing policy and procedure documents at the participating sites. The collected sample of 12 months of approved nursing policy and procedure documents at the participating hospitals includes the documents updated during the current scheduled review cycle.

Only policy and procedure documents that apply to nursing practice were included in the sample of policy and procedure documents. Nurses' sources of evidence guide the research questions for this study of citations. Therefore, I excluded documents outside of the nursing department from the sample. Citations were located within the text or at the end of policy and procedure documents; I directly examined each updated nursing policy and procedure document to collect citation data from those documents containing references to published resources in the literature.

Citation Data

The library manager assisted with obtaining temporary logins or other permissions for access to the 12-month sample of nursing policy and procedure documents at each site. I was provided with direct access to electronic copies of the EBP nursing policy and procedure documents at some hospitals, other hospitals allowed limited access to these documents. I made copies of the document pages containing cited resources from the online nursing policy and procedure documents.

Quantifying citations. Not every nursing policy and procedure document had a list of references to published literature. Therefore, as part of the bibliometric data collected, I identified the total number of nursing policy and procedure documents

approved during the 12-month period at each hospital. The percentage of documents with citations was determined from this count. When citations were present, I collected the citation data by printing the pages containing the references from the electronic policy and procedure manuals. I collected these printed pages and entered the citations into a database.

Recording data. Documents with citations to published literature are the primary data source for this research study. The collected data included the nursing policy and procedure document name or topic along with the cited resources listed from the participating hospitals. I entered the data into the Microsoft Access database using researcher-designed forms. The citation data was sorted and downloaded into various Microsoft Excel worksheets for further calculations and evaluations. The collected copies of citations and the associated data files are in a locked office and on a password-protected computer to preserve confidentiality of the citation data for the five-year period standard for research in the social sciences.

Types of Resources

I used pre-determined categories to sort the types of resources cited in the policy and procedure documents. I took the categories and their definitions from prior citation analysis projects. NAHRS researchers (Allen et al., 2006; Delwiche et al., 2010; Oermann et al., 2008c) defined types of resources as websites; books or book chapters; journal articles; dissertations; pamphlets; meeting minutes; government documents; recordings or interviews; and miscellaneous.

Oman, Duran, and Fink (2008) noted product manuals were another type of resource cited in nursing policy and procedure documents. Appendix C includes

definitions for each information resource type used in this study including journal citations, primary research, EBP articles, clinical practice articles, and websites.

Journal citations. When the information resource cited by the policy and procedure document was a journal article, I verified the citation using PubMed or the Cumulated Index to Nursing and Allied Health Literature (CINAHL) bibliographic databases. I corrected incomplete or inaccurate citations and the additions were noted in the Access database. I used *Ulrichsweb* serials database, to determine the academic disciplines and subject areas covered by the cited journals. *Ulrichsweb* is among the most highly respected sources of bibliographic information about serials among libraries and librarians in the U. S. When available, bibliographic databases were used to obtain abstracted for journal articles. Indexing terms and abstract information were used to identify if a journal article was primary research, EBP, or a non-research based clinical practice article.

Primary research. Oermann et al. (2008b) define primary research articles as those from an original work demonstrating "the major steps of the research process including background, purpose, methods, results, and discussion" (p. 152). I used the abstract's description of the journal article content identify primary research sources. If the journal article was from an original work and included steps from the research process in the abstract, I categorized it as primary research.

EBP articles. EBP articles, according to Oermann et al. (2007, 2008c, 2010), include reviews of multiple studies: meta-analysis; meta-synthesis; systematic reviews; clinical practice guidelines; and general articles about EBP.

Clinical practice articles. I followed O'Neill and Duffey's (2000) descriptions of clinical practice articles as those that present clinical updates, descriptions of clinical problems, or describe the use of technology in clinical areas. When no abstract was available or the journal article did not fit within these definitions, the item was described as "miscellaneous" when mapping the journal citations.

Website analysis. I counted the nursing policy and procedure documents that included citations to websites and categorized the citations using the core URL address. Websites were categorized using the definitions developed by Watson (2012) as: advocacy/ organizational; blogs; commercial; dead; educational; government; how-to; marketing or retail; personal; publication; and quote or dictionary sites. The Internet has changed the way we communicate. Therefore, it is important to include the counts for website citations on maps describing the flow of knowledge in EBP.

Pilot Study

In preparation for dissertation research, I conducted a pilot study to test the feasibility of investigating hospital-based nursing policy and procedure documents. I conducted the pilot study at one intermountain west hospital, with permission from the hospital's nursing administration and the doctoral dissertation committee. The pilot study hospital used a password protected online policy and procedure document system. The policy and procedure documents I studied were from 9/25/2011 to 9/25/2012 and reported in an Excel spreadsheet. This report listed hospital department, document title, identification number, and version number for each policy and procedure document in the 12-month period. Policy and procedure documents were sorted by department on the Excel spreadsheet.

The nursing policy and procedure documents in the pilot study (*n*=495) were each examined online to determine the presence of any citations (*n*=72). I printed the pages containing citations to published sources of information from the online manual. Citations (*n*=171) were present in slightly less than 15% (72/495, 14.54%) of the current year nursing policy and procedure documents. I entered the citations from the printed documents into a Microsoft Access database using the drop down menu feature in researcher created form for data entry. During the pilot study, I identified two additional types of resources in the nurse's policy and procedure citations. Citations for subscription databases such as *UpToDate* and the EBP summary database the *Cochrane Library* did not fit into the earlier categories. The categories subscription database and EBP summary database were added to the list of document types cited by nurses and included in Appendix C.

I checked PubMed and CINAHL databases to verify the journal bibliographic information listed in the nursing policy and procedure documents, correcting any incomplete or inaccurate citations and noted this added data in the file. I evaluated journal articles to identify author disciplines and article types. Using Watson's (2012) method to describe websites, the researcher used the universal resource locator (URL) core addresses to categorize the websites (*n*=17) listed in the pilot project policy and procedure documents.

Data Evaluation

Based on the pilot study experience and from practices described in previous citation studies, sources (e.g., books, journals, and websites) cited in the policy and procedure documents (Figure 2) were counted and mapped by frequency of use. Using

the process outlined by Nicholas and Ritchie (1978) in their description of bibliometrics, I mapped by counting and sorting journal citations (*n=*328) into discipline and/or subject areas cited in the nursing policy and procedure documents. I sorted journal articles types using the categories described by Oermann et al. (2007, 2008c, 2010) and O'Neill and Duffey (2000). I produced a map (Figure 3) of the disciples and types of journal articles that inform nursing practice in the intermountain west.

Belter (2012) used open source network software to create bibliometric maps to study the relationships in scientific publications of authors supported by the Office of Ocean Exploration and Research. Using Belter's technique, I downloaded Microsoft Excel data matching the various authors cited in the policy and procedure documents to each hospital (Table 2) into NodeXL open source networking software to create social networking maps connecting the hospitals whose nurses cited the same authors (Figure 4). According to Zuccala (2012), networking maps of cited author maps may model the structure of an invisible college of a "subject specialty" (p.155). Because the structure of the invisible college was so complex in Figure 4, I created additional maps based on shared topics present at five or more hospitals in the intermountain west. Fourteen maps were created to clarify the topics associated with highly cited shared authors that outline the structure of the invisible college of knowledge sharing.

The age of the cited item in the policy and procedure document is an important measure for EBP. I calculated the age of cited sources by subtracting the citation publication year from the policy and procedure document date following the methods described in the NAHRS journal citation studies (Allen et al., 2006). I calculated the mean age for citations from dated books and journals. The combined percentage of

citations less than five-years old was calculated for the various types of hospitals in the study.

Other Variables

I gathered information about hospital size at participating hospital sites using American Hospital Association (AHA) publications. The AHA collects data about U.S. hospitals and monitors trends in health care including the number of licensed beds (AHA, 2013). I designated participating hospitals as large (100 or more licensed beds) or small (fewer than 100 licensed beds) based on AHA listings. According to the AHA (2005), approximately half of the AHA member hospitals have 99 or fewer licensed beds.

Using population data from the latest census, I identified participating hospitals as located in rural (population less than 50,000) or urban (population of 50,000 or more) centers. One participating hospital is a magnet-designated facility according to the American Nurses Credentialing Center (ANCC) website. Magnet status is associated with increased research utilization by nursing staff. However, because this status is only present in one of the participating hospitals I did not use this variable in comparisons between the sites. I compared aggregated citation data between rural and urban locations, large and small hospitals, and between the two NN/LM regions.

Ethical Issues

There are no known risks for participation in the study. However, I exercised principles of information ethics in the careful handling of hospital policy and procedure documents and other related information at each participating hospital site. Hospital participation was voluntary. I stored data on password-protected computers, in a locked office or home, all copies of the policy and procedure documents sections with citations

collected during this research study. To protect the confidentiality of the participants

each site was assigned a code based on the size and hospital location (Table 1). The

coding key is stored in a locked file.

Study Strengths and Weaknesses

As a practicing medical librarian, I have established professional relationships

with other librarians that belong to the NN/LM. I served as the president for the Idaho

Health Information Association and as recording secretary for the regional Pacific

Northwest region of the Medical Library Association. I have met and collaborated with

many of librarians in the region on library projects. I am a registered nurse and in the

past has been responsible for updating unit policies and procedures in the hospital. As a

member of the hospital's nursing research council, I regularly search for EBP resources

for hospital staff using multiple databases and participates in evaluating EBP resources

and summarizing evidence for use in clinical practice at her hospital. This background is

helpful to gain entrée to the research sites and for recognizing patterns of resource use in

policy and procedure documents.

The study includes 10 hospitals of different sizes with a variety of medical library

services at both rural and urban locations in two NN/LM regions and in two states. The

data collected provides a "snapshot" of current published resources nurses used as

evidence in the intermountain west region of the U.S. Mapping the citations provided a

visual representation of the exchange and growth of knowledge in this discipline. By

showing connections between hospitals, the previously invisible network between

hospital sites, and the certain authors listed in the citations, this map reveals the structure

of an EBP invisible college of nurses working in separate locations on similar questions or problems.

A weakness of bibliometric studies using citations is the recorded citations cannot identify all the resources used to develop the policy and procedure document. Tenopir et al. (2010) noted this limitation in references cited for grant applications, most grant writers cited one item for every 18 to 40 items they reviewed. Another problem for researchers looking at citations is that it is impossible to know if an item cited was the best resource, or if it was simply the most accessible resource for the document author. Authors sometimes cite documents they have not directly used to emphasize certain ideas or academic credentials (Nicholas & Ritchie, 1978).

Although I can infer the presence of an invisible college using bibliographic data, identifying the informal communication patterns that characterize information sharing among members of an invisible college requires additional qualitative data. Without directly questioning the nurse authors of the policy and procedure documents, it is impossible to identify which cited information resources are readily available in print or electronic format, which information resources took extra time or effort to locate, and which resources were selected because of ties within the invisible college. Frequently cited journals included many different authors, the social networking maps do not clarify the connections between authors and journal titles. Another weakness of the study is only one magnet hospital participated which made it impossible to compare aggregated data.

A strength of this study is in the identification of the most frequently cited resources in nursing policy and procedure documents from aggregated from different

document authors and locations. This information has value for collection development and planning library services in hospitals. Nursing administrators, researchers, and educators are likely to find the information useful in planning services and programs related to EBP in nursing. Staff nurses who update policy and procedure documents will be interested in seeing what other nurses cite as evidence. The research findings provide new understanding of cumulative growth within the nursing policy research area and identify previously unrecognized patterns of collaboration and information flow among nursing staff writing these documents.

CHAPTER 4

RESULTS

To learn about the scientific evidence used to support current health care

procedures as performed by hospital nurses, I conducted a citation analysis of nursing

policy and procedure documents was conducted at 10 intermountain west hospitals.

These hospitals are located in two National Network of Libraries of Medicine (NN/LM)

regions within a 300-mile radius of Idaho Falls, Idaho. Twenty-two hospitals with

medical libraries were invited to participate in the study. Ten hospitals voluntarily shared

their nursing policy and procedure documents.

Policy and Procedure Documents

A total 1,581 nursing policy and procedure documents were identified and

reviewed, revealing 409 (25.86%) nursing policy and procedure documents with citations

to publications (Figure 2). The number of citations in these 409 documents ranged from

1-12 (M=3.14). The 1,285 citations provide a "snapshot" of the types of resources nurses

use to support their practice choices and their use of research-based evidence in practice

decisions.

Analysis of Data

I accomplished network mapping by entering the author names into NodeXL

software for social networking and matching these names to the citing hospital code

numbers (Table 2). The network map (Figure 4) displays a visual pattern of resource use.

Belter (2012) describes this pattern type as having "nodes and edges" (p. 16). Each node

represents a social actor, either the cited authority or the hospital that cited the author.

The edges represent the relationship between nodes and form lines that connect the

various hospitals and cited authorities. Table 3 lists the count of author connections and isolated edges associated with each hospital. I assigned a weight to each edge based on the citation count connecting the author in the nursing policy and procedure documents to a particular hospital. For example, the thickest line on Figure 4 represents the connection to one author at hospital 5 with an isolated edge. This author *The Foundation for the Accreditation of Cellular Therapy* (FACT, 2012) is cited 50 times in nursing policy and procedure documents. However, none of the other nine hospitals cite this author in their nursing policy and procedure documents.

The network map (Figure 4) makes visible other patterns including circles and clusters associated with the citation authors in nursing policy and procedure documents. Circles represent self-citations from internally authored documents forming loops directly connected to the citing hospital. These self-citations include references to another of the hospital's policy and procedure documents or to a hospital memorandum. Hospital 10 had the most self-citations ($n=37$), hospital 3 cited itself 28 times; these numbers resulted in prominent circles on Figure 4. Fewer internal documents, identified by narrow circular patterns, were cited at hospital 1 ($n=3$), hospital 4 ($n=2$), and hospital 9 ($n=1$).

The network map (Figure 4) reveals clusters of unique authors surrounding hospital nodes. Belter (2012) describes "clusters" (p.16) as semi-autonomous communities in a larger network. The clusters represent authors who lack ties to other hospitals on the network map. Isolated edges not cited by another hospital may still have been cited multiple times, such as the author FACT (2012).

Network Connections

Connections between the participating hospitals in terms of their shared use of the same key authorities in nursing policy and procedure documents are noteworthy in these findings given Nicholas and Ritchie's (1978) description of knowledge sharing networks identified by individuals citing "key authors" (p.114) in publications. The network map (Figure 4) identifies at its center a complex network of evidence-based practice (EBP) knowledge sharing between nurses at different hospitals citing the same authorities. This is an example of the structure of an invisible college (Price & Beaver, 1966; Zuccala, 2006). Thick and thin lines, various shapes, and colors on the map present a representation by the number coded hospitals of their connections to authors as cited by nurses in these policy and procedure documents. Connections between two hospitals to a single author are identifiable by green triangles (*n*=52). Connections between three hospitals to a single author form the black triangles (*n*=10). Connections between four hospitals to a single author are identified on the map as brown squares (*n*=6). Connections between five hospitals to a single author are represented by purple circles (*n*=7).

The most connected authorities are labeled on Figure 4. The American Academy of Pediatrics (AAP), Association of periOperative Registered Nurses (AORN), Infusion Nurses Society (INS), and the State Legislatures of Idaho or Utah are identified with red diamonds (*n*=4) that represent connections between these sources and six hospitals. Connections between seven hospitals to the Centers for Medicare & Medicaid (CMS), Lippincott Nursing Manual, and the Occupational Health & Safety Association (OSHA) are represented by the labeled black spheres (*n*=3). The blue sphere (*n*=1) signifies the

connections between seven hospitals to the most cited authority, the Centers for Disease

Control & Prevention (CDC). The connections between nine of the ten hospitals citing

the Joint Commission (JC) are identified by the black diamond ($n=1$) near the center of

Figure 4. The JC is the accrediting body for most U. S. hospitals.

Mapping by Topic

Each of the policy and procedure document with citations included a name or

title. I designated key word from the document names as policy and procedure document

topics. Table 4 identifies the top-ten nursing policy and procedure topics from the study

sample. I created an author network map using NodeXL software for the following 14

policy and procedure topics addressed at five or more study sites to provide a closer look

at the key authors cited by topic. By examining topical connections between hospitals

citing the same authorities, the structure of the invisible college within a subject specialty

can be determined (Zuccala, 2005).

Drug therapy. Drug therapy requires the nurse to administer prescribed

medications and observe for potential complications. Figure 5 maps the 184 authorities

on the topic of drug therapy by hospital. Drug therapy is associated with policy and

procedure document titles at all 10 hospitals; however, hospital 7 did not specify authors

in their policy and procedure references. Self-citations were frequent (23/184, 12.55%)

at two hospitals on this topic. The author JC (7/184, 3.8%) connects to five hospitals.

Four hospitals connect to Pasero (5/184, 2.71%) and the CDC (4/184, 2.17%). Three

hospitals connect to McCaffery (4/184, 2.17%) and Polovich (3/184, 1.63%). Two

hospitals shared connections to the Agency for Health Care Policy and Research

(AHCPR) (2/184, 1.08%), the American Society of Health-Systems Pharmacists (ASHP)

(3/184, 1.63%), OSHA (3/184, 1.63%), and White (2/184, 1.08%). Hospital 8 cites

isolated authors on the topic of drug therapy.

Intravenous therapy. Intravenous therapy relates to the access of a patient's

circulation by a vein for the administration of fluid and/or medications. Figure 6 maps

the 93 authors cited on this topic by hospital. It is a topic in policy and procedure

documents at all ten hospitals; however, two hospitals did not identify authors in their

intravenous therapy policy and procedure document references. The Infusion Nurses

Society (INS) (11/93, 11.82%) was the most cited author on intravenous therapy with

connections to six hospitals. Two hospitals shared connections to the authors; the CDC

(4/93, 4.3%), Hadaway (2/93, 2.15%), Lynn-McHale (2/93, 2.15%), and Wiegand (2/93,

2.15%). Two hospitals cited isolated authors on the topic of intravenous therapy.

Devices. Medical devices are mechanical objects that are used in patient care;

they range from simple thermometers to complex gastrointestinal tubes and implanted

electronics such as pacemakers. Figure 7 maps the 133 authors on this topic by hospital.

Devices is a topic in policy and procedure documents at nine of the ten hospitals. The

Society of Gastroenterology Nurses and Associates (SGNA) (5/133, 3.75%) was the most

cited author with connections to two hospitals. The American National Standards

Institute (ANSI) (2/133, 1.5%), CDC (3/133, 2.25%), Drew (2/133, 1.5%), and OSHA

(3/133, 2.25%) also connected to two hospitals. Self-citations ($n=1$) were noted at

Hospital 9. Two hospitals cite only isolated authors on the topic of devices.

Emergency. Emergency care involves treatment for conditions requiring

immediate interventions to protect a patient's life or health. Figure 8 maps 102 authors

on the topic of emergency by hospital. Emergency is a topic in policy and procedure

documents at nine of the ten hospitals. The most highly cited authors in these documents are the U.S. Congress (7/102, 6.86%) and Centers for Medicare and Medicaid (CMS) (7/102, 6.86%). Three hospitals shared connections to the U.S. Congress. Heavy lines connect two hospitals CMS. Two hospitals shared connections to the authors, Alderdice (2/102, 1.96%), Baker (2/102, 1.96%), Brewer (2/102, 1.96%), Chamberlain (2/102, 1.96%), Demeritt (2/102, 1.96%), Donley (2/102, 1.96%), the Emergency Nurses Association (ENA) (2/102, 1.96%), Kapila (2/102, 1.96%), Maddison (2/102, 1.96%), Mayhew (2/102, 1.96%), McGaughey (2/102, 1.96%), Tucker (2/102, 1.96%), and Vossmeyer (2/102, 1.96%). Three hospitals cited isolated authors on the topic of emergency.

Services. Services are the various types of care offered to patients at a hospital. Not every hospital offers the services patients might need. For example, there are special burn centers established for the care of patients with extensive burn injuries after they are stabilized in the emergency department in the community hospital. Figure 9 maps the 88 authors on the topic of services by hospital. The Veterans Health Administration (VHA) (10/88, 11.36%) is the most frequently cited authority on this topic; these citations to the VHA connect to one hospital. Three hospitals shared connections to State Legislatures (6/88, 6.81%). Two hospitals shared connections to the American Nurses Association (ANA) (4/88, 4.54%), State Boards of Nursing (4/88, 4.54%), and the U.S. Congress (2/88, 2.27%). Self-citations (4/88, 4.54%) are present at two hospitals. Two hospitals cited isolated authors on the topic of hospital services.

Infant care. Infant care policies describe the nursing care of a newborn. Figure 10 maps the 38 authors on the topic of infant care by hospital. Verklan (6/38, 15.78%)

and Walden (6/38, 15.78%) were the most cited authorities. The American Academy of Pediatrics (AAP) (3/38, 7.89%) connects to three hospitals. Three hospitals cited isolated authors on the topic of infant care.

Laboratory tests. Laboratory tests are important for diagnosing and treating many diseases. Figure 11 maps the 30 authors on the topic of laboratory tests by hospital. Seven hospitals cited references to authors related to the topic laboratory tests in nursing policy and procedure documents. The State Legislature (3/30, 10%) was the most cited authority connected to one hospital. All seven hospitals cited isolated authors on this topic.

Admissions. Patients are admitted to hospitals under the direction of a physician who is a member of the medical staff at that hospital. Figure 12 maps the 27 authors on the topic of admissions by hospital. Admissions is a topic in nursing policy and procedure documents at six hospitals. Figure 12 shows a very thick line connecting The Foundation for the Accreditation of Cellular Therapy (FACT, 2012) the most frequently cited authority (8/27, 29.62%) to hospital 5 on the topic of admissions. Self-citations (7/27, 25.92%) were noted at one hospital. All six hospitals cited isolated authors on this topic.

Surgery. Surgery is a medical specialty that involves operating on the human body. Figure 13 maps the 20 authors on the topic of surgery by hospital. Surgery is a topic in nursing policy and procedure documents at six hospitals. The most cited author (7/20, 35%) was the Association of periOperative Registered Nurses (AORN). The AORN is connected to all six hospitals. The author Petersen (2/20, 10%) connected two hospitals on the topic of surgery.

Critical care. Patients who are extremely ill, unstable, or at risk for their condition worsening require critical care with close monitoring by highly skilled nurses. Figure 14 maps the 15 authors on the topic of critical care by hospital. The topic critical care is present in nursing policy and procedure documents at six hospitals. The American Heart Association (AHA) (5/15, 33.33%) was the most frequently cited authority for critical care connected to two hospitals. Four of the six hospitals cited isolated authors on the topic of critical care.

Facility security. Facility security is the process involved in keeping the hospital patients, staff, buildings, and equipment safe from harm. Some hospitals employ their own security services while others rely on community police. Figure 15 maps the 15 authors on this topic by hospital. Facility security is topic in nursing policy and procedure documents at six hospitals. The Joint Commission (JC) (4/15, 26.66%) was the most frequently cited authority with connections between two hospitals. Self-citations ($n=4$) were present at two hospitals. Four hospitals cited isolated authors on this topic.

Patient safety. Patient safety is a priority in the hospital setting. This involves protecting the patient from harm associated with hospital care including medical errors such as misdiagnosis or administering the wrong medications. Figure 16 maps the 11 authors on this topic by hospital. Patient safety is a topic in policy and procedure documents at six hospitals. The JC (3/11, 27.27%) was the most frequently cited author on the topic of patient safety with connections to three hospitals. The other three hospitals cite isolated authors on this topic.

Infection control. Preventing the spread of infectious diseases from one patient to another is important in the hospital environment. Figure 17 maps the 87 authors on the topic of infection control by hospital. Infection control is a associated with policy and procedure documents at five hospitals. The Centers for Disease Control and Prevention (CDC) (27/87, 31.03%) was the most cited authority with connections to four hospitals. Three hospitals are connected to the Association for Professionals in Infection Control and Epidemiology (APIC) (6/87, 6.89%). Two hospitals shared connections to the AAP (2/87, 2.29%), AORN (3/87, 3.44%), OSHA (3/87, 3.44%), Siegle (2/87, 2.29%), and the State Legislatures (2/87, 2.29%) on the topic of infection control.

Death and dying. Patients do not always regain health in the hospital. Figure 18 maps the 23 authors on this topic by hospital. Death and dying is associated with nursing policy and procedure documents at five hospitals. Self-citations (*n=4*) were present at two hospitals. Two hospitals shared a connection to the CDC (2/23, 8.69%). Three hospitals cite isolated authors on the topic of death and dying.

Document Types

I aggregated, counted, and sorted citations by publication types to describe the flow of information within this geographic region (Figure 2). These 10 hospitals frequently cite books and book chapters, journals, websites, and government documents as resources in policy and procedure documents. The hospitals cite product manuals, subscription databases, meeting minutes, and pamphlets less often as sources of evidence in these nursing documents.

Books and book chapters. Books and book chapters (348/1285, 27.08%) were the most frequently cited resources. Table 5 lists the top-ten books cited by hospitals in

the intermountain west in nursing policy and procedure documents. The American

Association of Critical-Care Nurses (AACN, 2008, 2012) published the most frequently

cited text, the *AACN procedure manual for critical care* (29/348, 8.33%). The JC

accreditation manual (28/348, 8.04%) was also cited frequently. The Foundation for the

Accreditation of Cellular Therapy (FACT, 2012) authored two highly cited books, the

FACT accreditation manual (25/348, 7.18%) and the *FACT International standards for*

cellular therapy product (25/348, 7.18%).

    Journals. Following the Nicholas and Ritchie (1978) method for journal

bibliometrics, I counted, sorted, and mapped journal citations by discipline and/or subject

area (Figure 3). The citation map shows the flow of journal information into nursing

policy and procedure documents. Journals (328/1285, 25.52%) are frequently cited

resources in these nursing policy and procedure documents. Table 6 lists the top-ten

journal titles from these citations. The most frequently cited journal in the nursing policy

and procedure documents is *Obstetrics and Gynecology* (26/328, 7.92%). *Morbidity and*

Mortality Weekly Report (22/328, 6.7%) is also cited frequently.

    Disciplines. I used *Ulrichsweb* (2014) to determine the journal author discipline

or subject area. Medicine (197/328, 60.06%) and nursing (87/328, 26.52%) were the

most cited disciplines. Medicine is the discipline responsible for diagnosing, treating, or

preventing disease in an individual patient (Starr, 1982). The American Nurses

Association (2004) defined nursing as "the protection, promotion, and optimization of

health and abilities, prevention of illness and injury, alleviation of suffering through the

diagnosis and treatment of human response, and advocacy in the care of individuals,

families, communities, and populations" (p. 7).

Other disciplines represented by journal articles cited by nurses in these policy and procedure documents included public health (26/328, 7.92%), the discipline responsible for protecting and improving the health of groups of people (Association of Schools of Public Health, n.d.) and health care administration (6/328, 1.82%). The growth of technology in hospitals created the need for administrators in health care organizations (Starr, 1982). The scientific study of the composition and use of drugs, pharmacology (6/328, 1.82%) was also cited the nursing policy and procedure documents. The profession of law (4/328, 1.21%) was represented in these journal citations as well.

Article types. I sorted journal articles by types as described in the following study protocols. Oermann et al. (2008b) defined primary research articles as those from an original work including "the major steps of the research process" (p. 152). EBP articles included reviews of multiple studies or general articles about EBP (Oermann et al., 2007; Oermann et al., 2008c; Oermann, Shaw-Kokort, Knafl, & Dowell, 2010). O'Neill and Duffey (2000) described clinical practice articles as those that present clinical updates, descriptions of clinical problems, or describe the use of technology in clinical areas.

I categorized journal citations (*n*=328) by discipline and article types; EBP articles (155/328, 47.25%), primary research (94/328, 28.65%), and clinical practice articles (70/328, 21.34%). Journal articles that did not fit within these definitions I categorized as *miscellaneous* (9/328, 2.74%). For example, editorials and news items were included in this category of the Figure 3 map.

Websites. Websites (257/1285, 20%) were frequently cited resources in the nursing policy and procedure documents. Websites were sorted using the core URL to

describe the flow of knowledge into nursing practice from this electronic source. The CDC (27/257, 10.50%) was the most frequently cited website. Table 7 lists the top-ten websites cited in the nursing policy and procedure documents by these hospitals.

      Government documents. Government documents (245/1285, 19.06%) were frequently cited resources in the sample of nursing policy and procedure documents. Nurses might have retrieved some of these government documents from websites as publisher data files but these citations did not include a URL. For example, the OSHA Technical Manual and some CDC infection control guidelines are included in this list.

      Other document types. Less frequently cited resources included product manuals (39/1285, 3.03%) and subscription databases (20/1285, 1.55%). For example, the EBP summary database the *Cochrane Library* (4/20, 20%) and *UpToDate* (3/20, 15%) were the most frequently cited subscription databases. Other resources included meeting minutes (1/1285, 0.07%) and pamphlets (1/1285, 0.07%). I was unable to assign the predetermined categories to 46 of the citations. For example, a nurse cited the name and job title of a supervisor as a reference. These items were categorized as miscellaneous.

      Citation ages. Cited document dates and the date of the policy and procedure document was created or updated were used to calculate the average age of resources cited by nurses. The 1036 dated citations in this study ranged from under one-year to 38-years of age (6415/1036, $M=6.19$ years). Citations less than five-years of age ($n=509$) comprised nearly half (509/1036, 49.13%) of the documents.

Hospital Size and Location

To expand on the findings, I sorted citations by geographic locations and the size of the citing hospital. Categories are small or large, rural or urban and NN/LM region. These categories further determine and describe the use and type of citations in the nursing policy and procedure documents (Table 8).

Small hospitals. Hospitals 2, 3, and 7 are small hospitals with less than 100 licensed beds. Hospital 3 is located in an urban area; the other two are in rural locations. The nurses at these hospitals updated 464 documents in the study sample revealing 115 (24.78%) documents containing 350 citations. Government documents ($n=111$) were the most frequently cited resource at the small hospitals. Books and book chapters ($n =102$), then journal articles ($n=98$), websites ($n=20$), product manuals ($n=5$), and subscription databases ($n=4$) were also used by nurses to support their practice decisions.

Citations ranged in age from less than one to 31-years (M=7.16 years) at the small hospitals. Citations less than five-years of age ($n=147$) comprised less than half (147/350, 42%) of the small hospital documents. Self-citations are the most cited government documents. The most frequently cited text is the (2012) *Lippincott Manual of Nursing Practice*.

The most frequently cited journal in the small hospital nursing policy and procedure documents is the *Morbidity and Mortality Weekly Reports*, classified by *Ulrich's* as a public health title. However, medicine ($n=51$) and nursing ($n=28$) are the most frequently cited disciplines at the small hospitals. Public health ($n=12$), law ($n=4$), health care administration ($n=1$), and pharmacology ($n=1$) were cited less frequently. Small hospitals cited various article types. EBP articles ($n=45$), clinical practice articles

(n=27), and primary research sources (n=22). Small hospitals did not cite any EBP summary databases. Four journal articles did not fit the predetermined categories for article type.

Large hospitals. Hospitals 1, 4, 5, 6, 8, 9, and 10 are licensed for 100 or more inpatient beds. Only hospital 6 is located in a rural area, the other hospitals are in urban population centers. The nurses at these large hospitals updated 1117 documents revealing 255 (22.82%) documents with citations to 935 resources. In order of frequency, the citations were to books and book chapters (n=246), websites (n=237), journal articles (n=230), government documents (n=134), product manuals (n=34), subscription EBP summary databases (n=16), meeting minutes (n=1), and pamphlets (n=1).

Citations ranged in age from one to 38-years (M=5.77 years), citations less than five-years of age (147/725, 20.27%) comprised less than one quarter of the citations at these large hospitals. The most frequently cited texts were from one large hospital with frequent citations to the *FACT International standards for cellular therapy product collection, processing, and administration* (2012) and *FACT accreditation manual* (2012). The researcher sorted websites using the core URL. The most frequently cited website is the CDC, which also is the author of the most cited government documents. The most frequently cited journal in the nursing policy and procedure documents in large hospitals is *Obstetrics and Gynecology.* The *Cochrane Library* is the most cited subscription EBP summary database.

Journal author disciplines as cited by large hospitals were most frequently for medicine (n=146) and nursing (n=59). Other disciplines cited included public health

(n=14), pharmacology (n=7), and health care administration (n=4). Large hospitals

mostly cite EBP articles (n=110), followed by primary research sources (n=72), and

clinical practice articles (n=43). Five journal articles did not fit predetermined categories

for article types.

   Rural hospitals. Hospitals 2, 6, and 7 are located in population centers with less

than 50,000 residents. Rural hospital 6 is licensed for over 100 beds. Therefore, the rural

hospitals and small hospitals are not identical populations. The nurses at rural hospitals

updated 458 policy and procedure documents yielding 109 (23.79%) documents with

citations to 262 resources. These are listed in order of frequency to books and book

chapters (n=91), journal articles (n=75), government documents (n=60), websites

(n=23), product manuals (n=5), and subscription EBP summary databases (n=4).

   Citation ages ranged from less than one to 27-years (M=8.29 years). Citations

less than five-years of age (94/225, 41.77%) comprised less than half of the rural hospital

documents resources. The most frequently cited text is the (2012) *Lippincott Manual of

Nursing Practice.* The most frequently cited journal in the rural hospital's nursing policy

and procedure documents is the *Morbidity and Mortality Weekly Report.* CMS is the

most cited government document resource. Intranet sites were the most frequently cited

websites (n=5) in rural hospitals.

   Medicine (n=47) and public health (n=11) were the most cited journal

disciplines, other disciplines cited included nursing (n=9), law (n=4), health care

administration (n=2), and pharmacology (n=2). Journal citations were sorted as EBP

articles (n=34), clinical practice articles (n=23) and primary research sources (n=14).

Four journal articles did not fit into the three predetermined article types. No rural

hospital cited any EBP subscription databases.

Urban hospitals. Hospitals 1, 3, 4, 5, 8, 9, and 10 are located in urban population

centers with 50,000 or more residents. Urban hospital 5 is licensed for fewer than 100

beds. The nurses at urban hospitals updated 923 documents, 300 (32.5%) documents

included citations to 1023 resources. Urban hospitals cited documents to books and book

chapters ($n=257$), journal articles ($n=253$), websites ($n=234$), government documents

($n=185$), product manuals ($n=34$), subscription databases ($n=16$), meeting minutes

($n=1$), and pamphlets ($n=1$).

Citations ranged in age from less than one to 38-years (M=5.6 years). Citations

less than 5-years of age (415/811, 51.17%) comprised slightly more than half of the urban

hospital documents. The FACT (2012) texts cited by hospital 5, *FACT International*

standards for cellular therapy product collection, processing, and administration and

FACT accreditation manual are the most frequently cited books in urban hospitals. The

most frequently cited journal in the nursing policy and procedure documents is *Obstetrics*

and Gynecology. The most frequently cited website is the CDC. The Veterans Health

Administration (VHA) is the authority most frequently cited in government documents at

these urban hospitals. The EBP summary database the *Cochrane Library* was the most

frequently cited subscription database.

Journal disciplines were cited in this order; medicine ($n=150$) and nursing

($n=78$), public health ($n=15$), pharmacology ($n=6$), and health care administration ($n=4$).

No urban hospital included law journal citations. EBP articles ($n=121$), primary research

sources ($n=80$), and clinical practice articles ($n=47$) were the most frequently cited types of articles in urban hospitals. Five articles did not fit these categories.

NN/LM Region 4. Hospitals 8, 9, and 10 are located in NN/LN Region 4. The nurses at the Region 4 hospitals updated 210 documents 79 (37.61%) of the documents included citations to 176 resources. The citations are to government documents ($n=79$), then books and book chapters ($n=36$), journal articles ($n=24$), websites ($n=20$), product manuals ($n=6$), subscription EBP summary databases ($n=2$), and pamphlets ($n=1$).

Citations ages ranged from less than one to 32-years (M=6.76 years). Citations less than 5-years of age (53/117, 45.29%) comprised fewer than half of the Region 4 hospital references. The VHA is the most cited author of government documents. The most frequently cited book is the JC (2012) text, the *Comprehensive accreditation manual for hospitals*. The most frequently cited journal is *Pediatrics*. Intranet websites available to the internal staff at the participating hospitals were the most frequently cited URLs. The *Cochrane Library* was the only EBP summary database cited in NN/LM Region 4.

Medicine ($n=12$) and nursing ($n=7$) were the most cited disciplines, other disciplines cited in Region 4 included public health ($n=2$), and health care administration ($n=1$). Journal article types included EBP ($n=11$), primary research sources ($n=9$), and clinical practice articles ($n=4$).

NN/LM Region 6. Hospitals 1, 2, 3, 4, 5, 6, and 7 are located in NN/LN Region 6. The nurses at the Region 6 hospitals updated 1371 documents, 331 (24.14%) documents included citations to 1109 resources. The citation were to books and book chapters ($n=312$), journal articles ($n=304$), websites ($n=237$), government documents

(*n*=166), product manuals (*n*=33), subscription databases (*n*=18), and meeting minutes (*n*=1).

Citation ages ranged from less than one to 38-years (M=6.11 years). Citations less than 5-years of age (456/919, 49.61%) comprised nearly half of the Region 6 hospital references. The most cited texts are from hospital 5, FACT's (2012) *International standards for cellular therapy product collection, processing, and administration* and FACT's (2012) *Accreditation manual.* The most frequently cited journal in the nursing policy and procedure documents is *Obstetrics and Gynecology.* The most frequently cited website is the CDC. *UpToDate* is the most cited subscription database in the region.

Medicine (*n*=185) and nursing (*n*=80) were the most cited disciplines in Region 6, other disciplines cited included public health (*n*=24), pharmacology (*n*=6), health care administration (*n*=5), and law (*n*=4). Article types cited in Region 6 include EBP articles (*n*=144), primary research sources (*n*=85), and clinical practice articles (*n*=66/304). Nine journal articles did not fit these predetermined article categories.

Summary

Ten hospitals provided access to their nursing policy and procedure documents created or updated during a 12-month period. Nursing staff use these documents as a guide for patient care. According to Springhouse, 2000, a useful policy and procedure manual based on up-to-date standards of care is a mark of a successful nursing department and ensures that nurses fulfill their responsibilities to patient within the limits of the law. The resources cited by nurses in the examined policy and procedure documents represent the sources of evidence that will guide nurses' decisions about safe

and effective nursing care. Data collected from these citations reveals the types of resources nurses cite. Networking map software makes possible the display of same authors used among study hospitals. Certain authors are frequently cited at multiple hospitals on some common health care topics. Grouping and sorting citations by hospital size and location illustrates the similarities and differences among the types of resources cited at small and large hospitals, rural and urban hospitals, and the two NN/LM regions represented in the study sample.

CHAPTER 5

CONCLUSIONS AND FUTURE RESEARCH

The data collected from the 10 hospitals in this study provide empirical evidence of the scholarly connections between sources cited by hospital nurses in policy and procedure documents related to knowledge building to support decision-making about patient care. This large, systematically analyzed sample identifies current practices for acknowledging sources of scientific authority to support nursing care at hospitals in the intermountain west region of the U.S. Evidence of hospital nurse involvement in EBP is the physical artifact of a citation. This study answers three central questions and additional sub-questions related to the citations in nursing policy and procedure documents used by nurses in guiding routine patient-care decisions.

Research Question 1. What are the information sources nurses cite when they create or update nursing policy and procedure documents in the hospital?

Policy and procedure documents analyzed in this study are written to provide protocol to be followed by nurses directly involved in patent care in hospitals. Patient care is identified in multiple topic areas including drug therapy; intravenous therapy; devices; emergency; services; infant care; laboratory tests; admissions; surgery, critical care, facility security, patient safety, infection control, and death and dying (Figures 5-18). Of the 1,581 nursing policy and procedure documents updated or created during the 12-months prior to the study period, only about one-quarter of the documents (n=409, 25.86%) include in-text or end-of-text citations. Information sources (Figure 2) cited by nurses when creating or updating hospital nursing policy and procedure documents include books and book chapters (348/1285, 27.08%); primary and secondary source

journal articles (328/1285, 25.52%); websites (257/1285, 20%); government documents (245/1285, 19.06%); product manuals (39/1285, 3.03%); EBP summary databases (20/1285, 1.55%); and a few miscellaneous resources (48/1285, 3.73%).

The knowledge base of cited authors of publications (Figure 3) include medicine (197/328, 60.06%); nursing (87/328, 26.52%); public health (26/328, 7.92%); health administration (6/328, 1.82%); pharmacology (8/328, 2.44%); and law (4/328, 1.21%). The resources cited in these policy and procedure documents varied in age from under one-year to 38-years of age. Citations less than 5-years of age (509/1036, 49.13%) are cited in nearly half the nursing policy documents with citations. Cited sources identified in this study provide evidence that only a small portion of hospital nursing policy and procedure is supported with documentation through use of references in the form of citations to scholarly or professional publications.

Sources of information cited by nurses include general information from manuals and textbooks. Nurses cite more books or book chapters than any other type of resource in the policy and procedure documents. Many of the book citations are from the *Joint Commission (JC) Accreditation Manual*. JC manuals contain general and background information and describe standards of care for hospital patients. Some of the citations are for electronic versions of well-known textbooks with current copyright dates such as the *Lippincott Manual* of nursing practice. Many of the cited textbooks were published by professional nursing organizations such as the American Association of Critical-care Nurses (AACN) and the Association of periOperative Registered Nurses (AORN). These specialty texts publish detailed nursing standards for practice and provide recommendations and guidelines for patient care decisions.

On the *Pyramid of Strength of Evidence* (Figure 1), textbooks are considered weak sources of evidence for practice decisions. However, according to Glasziou and Haynes (2005), readily available textbooks are popular resources in clinical practice. Frequently cited texts (Table 5) in this study in the intermountain west provide a common standard for the nurses' patient care decisions in many of the policy and procedure documents. The specialty organizations in nursing provide trusted, mediated sources of evidence for nursing practice at these hospitals. Although they are a lower level of evidence, these respected sources of authority appear to provide answers to the clinical questions nurses are addressing in the policy and procedure documents.

Nurses also cite primary research findings published in current journals including titles from medicine such as *Anesthesia and Analgesia*, *Chest,* and *Pediatrics*, and nursing journals, *American Journal of Critical Care* and *Journal of Infusion Nursing*. Nurses' journal article citations include secondary research for EBP articles as well as non-research-based clinical practice articles, and a few citations to other types of journal information such as editorials. Nurses cite the strongest evidence for practice decisions when they include systematic reviews of multiple research findings as sources of evidence gathered from EBP electronic summary databases. Most of the EBP database systematic reviews cited by nurses are from the *Cochrane Library* subscription database. Some nursing policy and procedure documents in this study include references to specific regulations from state or federal legislation. Other governmental sources of information cited include websites that connect to frequently updated standards such as the Centers for Disease Control and Prevention (CDC) infection control guidelines.

When creating or updating nursing policy and procedure documents for use in hospitals, best practice is for nurses to cite a variety of sources to support standards for patient care they establish in hospital policy and procedures. Pape (2003) and Turkel (2004) noted that nursing leaders expect nurses to include their sources of information in policy documents to demonstrate the use of EBP in nursing. Citing and using sources of information in nursing policy has been a topic of interest to researchers. During the 1980s, only about 15% of medical care was based on current research (Gersing & Krishnan, 2002; Greenhalgh, 1996). In the Morin et al.'s (1999) research sample, three of eight nursing (38.5%) policy and procedure documents included references. The evidence from this study indicating that only one-quarter of policy documents include source citation suggests that there is no particular growth in the selected hospital region in the practice of citing evidence from published literature. This lack of growth indicates that hospital nurses in this study are not yet demonstrating or meeting the expectations of the IOM (2012) of having 90% of health care decisions informed by research-based evidence.

The limited use of EBP summary databases to support nursing practice by nurses in this study is another surprising finding. Nurses cited EBP summary databases only 20 times in the examined nursing policy and procedure documents. Of the EBP summary databases, *The Cochrane Library* is the most respected source of evidence from the *Pyramid of Strength of Evidence* (Figure 1). While access to the full-text of systematic reviews in the *Cochrane Library* is restricted to paid subscribers, the abstracts are available free on *PubMed*. Libraries with a subscription generally provide staff a link to the website. Libraries without subscriptions can obtain copies by interlibrary loan.

When nurses update or write new policy and procedure documents, they include websites as sources of information. Table 7 lists the top-ten websites cited in the nursing policy and procedure documents. The Internet provides hospital nurses access to many free health care-related websites. The website citations were primarily to government or health care organization websites. Only a few of the cited websites are for commercial organizations. One commercial website cited is Atriummed.com. This cited URL is from a policy related to chest drainage systems. Atrium Medical Corporation is the manufacturer for the device that collects fluid via a chest tube drain placed in a patient. The link to this website allows the nurse access to the manufacturer's recommendation for the use of this device. Intranet addresses are also included as websites in nursing policy and procedure documents citations. These resources are only available internally for hospital staff after verified login on hospital-owned computer equipment. Hospital Intranet documents may include forms or links to other electronic nursing policy and procedure documents. Intranet documents were included as self-citations on Figure 4.

The Centers for Disease Control and Prevention (CDC) is the most cited government document author. The CDC publishes many infection control guidelines and other documents that nurses rely on for preventing the spread of infectious disease. The Veterans Health Administration (VHA) is another government agency that publishes information cited frequently in these nursing policy and procedure documents. Other citations to government resources include legislation and regulations that apply to hospitals. Nurses cite some specific federal codes in their policy and procedure documents, for example *42 USC 1395dd,* the Emergency Medical Treatment and Labor Act (EMTALA) is cited by three hospitals. Nurses also cite state codes governing

nursing practice such as Administrative rules 23.01.01 in Idaho and R156.31b in Utah. Many of the cited government resources are available at governmental websites. However, the nursing policy and procedure documents did not include a URL web address for these citations.

Most of the authors of journal publications cited by nurses are informed by disciplines related to the health care professions. The most frequently cited discipline was medicine, accounting for more than half of the journal citations (197/328, 60.06%). Journal authors from the discipline of nursing are cited in these nursing policy and procedure documents less often (87/328, 26.52%). Nurse authors of the policy and procedure documents in this study cite disciplines of public health (26/328, 7.92%), pharmacology (6/328, 1.82%), health care administration (6/328, 1.82%), and on occasion, law (4/328, 1.21%). The journals in the top-ten list of journal titles (Table 6) are primarily specialty medical journals. Two top-ranked medical journals that nurses cite are *Obstetrics and Gynecology* and the *American Journal of Obstetrics and Gynecology.* The nursing specialty obstetrical journal, the *Journal of Obstetrics, Gynecology, and Neonatal Nursing* is cited only once. In fact, only two of the titles in the list of most cited journals represent the discipline of nursing, the *Journal of Infusion Nursing* and the *American Journal of Critical Care*. Nursing specialty journals are not widely cited in these nursing policy and procedure documents. Prior research by medical librarians in the Nursing and Allied Health Resources Section of the Medical Library Association (NAHRS) also noted nurse's journal literature primarily cited the discipline of medicine (Allen et al., 2006). Medical journals provided more of the primary and

secondary research, e.g., EBP summary articles, on the topics nurses write about in their policy and procedure documents.

The *PubMed* and *Cumulative Index for Nursing and Allied Health Litera*ture (CINAHL) electronic bibliographic databases provide the opportunity to examine journal citations in more detail by individual article. The journal publications nurses cite include primary research articles, secondary sources such as EBP articles, and non-research based clinical practice articles. The citations from journals in the nursing policy and procedure documents are mostly from EBP articles, a secondary source that reviews multiple research studies. Garrard (1999) describes these sources as "tertiary source materials" (p. 31) because they summarize the results of multiple primary research articles. These are ranked as stronger sources of evidence on the strength of evidence pyramid (Figure 1).

Primary sources are original research reports written by the scientists who actually conducted the study and include the major steps of the research process (Garrard, 1999; Oermann et al., 2007; Oermann et al., 2008c). Primary research articles (94/328, 28.65%) were the second most frequently cited journal article type in the policy and procedure documents. In EBP, primary research sources do not provide the highest level of evidence on the *Strength of Evidence Pyramid* (Figure 1). However, it may be that primary sources are often cited because EBP articles are not available for every clinical question. Few single primary research study results change clinical practices; nursing practices change after multiple individual research studies consistently report similar results. To apply results from multiple primary research studies into clinical practice, the nurse must evaluate if the patients in the study populations match the patients cared for in

the hospital and determine based on clinical experience and education if the cumulated research results are likely to benefit hospital patients.

EBP articles are considered secondary sources. Garrard (1999) and Oermann et al. (2007, 2008c) describe secondary source materials as summaries of the original work of others including reviews of multiple studies, or articles about EBP. Nurses updating policy and procedure documents cited journal articles that categorized as secondary sources (155/328, 47.25%) more frequently than primary sources. These secondary sources from journals articles are indexed in the bibliographic databases as a meta-analysis when the article includes the analysis of quantitative research using statistical summaries of the evidence, or as a meta-synthesis of multiple qualitative research results. The citations from journals in the nursing policy and procedure documents were mostly from these higher rated levels of evidence. Nurses also cited non-research-based clinical practice articles (70/328, 21.34%). According to Smith (1996), these clinical articles provide sound nursing practice information although they lack the theory or models that support a research-based article.

Nurses in this study cite journals articles almost as often as they cite books as sources of evidence in nursing policy and procedure documents. They select mostly higher ranked, secondary summary articles and primary research articles to support as evidence their practice decisions. The cited journals are mostly health care publications primarily from medicine and less frequently from the discipline of nursing. Nurses appear to be locating and selecting current research-based evidence from journal publications to answer some of their practice questions.

The nursing policy and procedure documents frequently included citations to government websites and website of established health-related organizations. Table 9 lists the top-ten websites cited by nurses in these documents. Respected government websites provide current resources with links to primary research findings and summaries of evidence such as clinical practice guidelines. The Centers for Disease Control and Prevention (CDC), the Centers for Medicare and Medicaid (CMS), and the Occupational Safety and Health Administration (OSHA) are frequently cited by nurses in the policy and procedure documents. Organizational websites cited by nurses include the Joint Commission (JC), the American Association for Critical-care Nurses (AACN), the American Academy of Pediatrics (AAP), and the American College of Obstetricians and Gynecologists (ACOG). These websites reflect specific specialty sources of knowledge that publish current standards of care for providers. Very few citations were from publications by commercial vendor websites. Those found were citations to manufacturers' product manuals. Nurses cite credible websites of high quality that link to current sources of information almost as often as they cite books and journals.

The resources cited in these policy and procedure documents varied from under one-year to 38-years of age. Citations less than 5-years of age (509/1036, 49.13%) are cited in nearly half of the nursing policy documents with citations. According to Vincent and Ross (2000), at least 43% of research-based disciplines citations should be under 5-years of age. Many of the citations for books are to online texts with a current copyright date. Book citation ages range from under one-year to 32-years. The average age for cited books is 4.94 years. Cited by hospital 8, the citation to the oldest book in this sample is the 2nd edition of *The Gastroenterology Assistant* (1981). Journal articles range

in age from the current year to 38 years of age. The oldest journal article citation is for a Durie and Salmon (1975) article from *Cancer* on staging multiple myeloma. The average age for journal article citations is 8.65. It is surprising to note that journal articles have the oldest average citation ages. The median journal age is seven years, the same age as journal article citations in the nursing journal mapping study done by Allen, Jacobs, and Levy (2006). Although nurses cite many current resources in policy and procedure documents, they include older citations on some topics.

This study gathered citation data to provide a "snap shot" of information sources nurses are currently citing as sources of evidence to support EBP in the intermountain west. Many times when updating policy and procedure documents, the nurse did not include any source of evidence. The documents that included citations mostly cited textbooks, many available electronically with current copyright dates or written by nursing specialty groups to share standards of practice. Nurses also cite EBP and primary research articles from medical and nursing journals as well as high quality websites to reliable government agencies or well-recognized professional organizations, interestingly the journal articles have older publication dates. These sources of evidence are well-known and respected by nurses. Nurses rarely cite the subscription EBP summary databases considered the highest level of evidence for practice.

Research Question 2. Are there variations between hospitals for information sources cited in nursing policy and procedure documents?

Analysis of data according to hospital size by large and small hospitals and rural and urban hospital location shows a pattern of differences in the practices of nurses when citing sources in nursing policy and procedure documents. Citation types vary between

large and small hospitals. Small hospitals cited government documents (111/350, 31.71%) more often than large hospitals (134/935, 14.33%). Small hospitals did not cite any subscription EBP summary databases. Large hospitals cited more websites (237/935, 25.34%) compared to small hospitals (20/350, 5.71%).

Urban and rural hospital citations vary. Urban hospitals cited books and book chapters (257/1023, 25.12%), journals (253/1023, 24.73%) and websites (234/1023, 22.87%) nearly equally. Rural hospitals cited more books and book chapters (91/262, 34.73%) and journals (75/262, 28.62%) than websites (23/262, 8.77%). The average age of resources for rural hospitals was older (8.29-years) compared to urban locations (5.6-years). No urban hospitals include the discipline of law in their journal citations, but nurses in policy and procedure documents at rural hospitals cite law journal articles. Rural hospital nurses also cited more clinical practice articles (23/75, 30.66%) than urban hospitals (47/253, 18.57%).

Variations between sources of authority between hospitals are particularly evident when examining the author-networking map in Figure 4. Hospitals cite many isolated authors in policy and procedure documents forming distinct clusters surrounding each hospital. The thick line connecting to The Foundation for the Accreditation of Cellular Therapy (FACT, 2012), the author of two textbooks cited at hospital 5, is an example of an isolated author. Two hospitals cite a number of internally authored documents. These self-citations are prominent in Figure 4. For example, at hospital 10, internal nursing policy and procedure documents related to one nursing protocol are cited nine times. However, even with these variations in types of resources cited by nurses in the small and

large hospitals, nurses at rural and urban hospitals cite similar patterns for research-based

journals articles mostly to the discipline of medicine and for EBP articles.

Figure 4 also shows many hospitals cite the same sources of authority in nursing

policy and procedure documents. Key authors connect the hospitals on similar topics that

signify the presence of shared standards for patient care decisions. Some of the study

participant hospitals are part of a non-profit system, or are associated with a for-profit

corporation, or a government agency. These system-based hospitals may have

unexamined social and financial connections that influence the shared resources

visualized in Figure 4. Topic maps (Figure 5-18) provide a clear view of a structure that

suggests the possibility of an invisible college where multiple hospital nurses make use of

same authors in policy documents.

The author map on Figure 4 connects nine of the ten hospitals to one author, the

Joint Commission (JC). The Centers for Disease Control and Prevention (CDC), the

Centers of Medicare and Medicaid (CMS), the *Lippincott Nursing Manual*, and the

Occupational Health and Safety Administration (OSHA) are cited at seven different

hospitals. Six hospitals cite the American Academy of Pediatrics (AAP), the Association

of periOperative Registered Nurses (AORN), Infusion Nurses Society (INS), and the

State Legislature (either Idaho or Utah). These highly connected resources include both

textbooks and websites.

Nurses who write policy and procedure documents in the intermountain west cite

core resources that appear at multiple hospitals. The topics with highly connected

citation authors at different locations include drug therapy (Figure 5), intravenous therapy

(Figure 6), surgery (Figure 13), patient safety (Figure 16), and infection control (Figure

17). The highly cited authorities based on topic provide a view of the structure of a

potential invisible college for knowledge sharing between nurse-authors of these

documents.

Research Question 3. Does bibliographic data identify the presence of an invisible

college within the practice of nursing policy writing?

Data in this study are viewed through the lens of critical realism (Bhaskar, 1998)

theory that indicates the need for empirical sources of authority to establish knowledge

and suggests that experimental research conducted in controlled artificial environments

does not provide complete knowledge of causal mechanism. Because the mechanisms

that cause events cannot be directly observed, empirical data provides researchers the

tools to infer what is happening under the surface. The event itself can be studied in

detail and causes are constructed based on current understanding of the hidden

mechanisms. As knowledge is accumulated over time, the interpretation of events and

their cause's change. Critical realism provides a useful explanation of why evidence-

based practice used by nurses is important for making informed decisions when providing

health care. An understanding of the interplay between environment, genetics, social

status, and health are incomplete. Current research that identifies how complex systems

in the human body respond to both potential and actual health effects provides needed

information to make decisions on therapy for individuals using data collected from

populations with similar health issues. This theory leads to an opportunity for

investigation of bibliographic data to reveal use of current research-based evidence in

clinical practices of hospital nurses.

This bibliographic data revealed in this study suggests that nursing policy writers are most likely to be working in isolation from one and another and their respective medical librarians. However, they do share some similar sources of authority with policy writers from other hospitals. These policy writes are citing many of the same sources of authority on particular topics and they prefer and use similar publication types. The nurses' use of citations serve to connect informally these hospitals to certain primary authorities that communicate essential practice knowledge. At the center of the bibliographic map (Figure 4) is a dense and concentrated network that makes visible a possible college of authority. This revealed structure of a college of authority based on scientific knowledge is identified by the presence of shared key authors on topics in a range from infection control (Figure 17) to drug theory (Figure 5). However, as stated by Paisley (1989) "the sophisticated bibliometric researcher does not rely on citation data alone but seeks corroboration and clarification from other sources" (p. 713).

The invisible structure revealed by the evidence in this study cannot therefore fully describe the absolute presence of an invisible college. This provides a starting point to explore how social networks based on the shared key authors influence nursing practice and may potentially validate the presence of the invisible college of EBP. Prominent clusters of isolated authors in Figure 4 indicate the potential invisible college is limited to particular topics in nursing practice. The complete disconnect between hospitals on the topic of laboratory services in Figure 12 demonstrates that not every shared topic in the nursing policy and procedure documents is linked to the same key authorities.

Value for Library and Information Science

This study indicates the need for immediate action to further increase the practice by hospital nurses and medical librarians of reading, using, and citing research-based authoritative sources if the profession is to positively contribute to the IOM (2012) 2020 goal for 90% of patient care in the U.S. to be based on current research-based evidence. The field of library science through practices of medical librarians is central to achievement of this goal of improved quality of patient care.

Many of the reviewed nursing policy and procedure documents did not include citations to published literature. An important medical librarian function is to instruct nurse policy writers by providing access to important and current information, helping policy writers evaluate research studies, and sharing knowledge about scientific resources. As Pochciol and Warren (2009) point out, professional librarians are essential resources for nurses when they create or update EBP policies and procedures. As this study points out, the task of creating or updating EBP policies and procedures requires collaboration between librarians and nurses to locate and use scientific resources to support clinical practices. Medical librarians have library science expertise for instructing nurses on best practices in finding the most current evidence and evaluating research, and selecting higher levels of summaries of research findings moving beyond the current frequent practices of nurses in using lower-level text book sources of practice information. Librarians educated in the area of library and information science are focused on information users and user environments and are experts in accessing, retrieving, evaluating, and citing sources for these documents

The findings in this study can inform medical library collection development. The top-ten lists of nursing policy and procedure topics (Table 4); textbooks (Table 5); journal titles (Table 6); and websites (Table 7) provides librarians with new information about important resources used in hospital nursing policy development. Medical librarians can make available these sources of authority through the hospital library collection. Items that are popular nursing policy citations should to be considered for purchase or licensing by hospital librarians. The citations to standards of nursing practice from professional organizations are also essential resources. Popular websites with links to EBP practice guidelines from government and healthcare organizations should be bookmarked and shared by librarians on the hospital's Intranets for easy access by nurses.

Medical librarians make purchasing decisions about subscriptions to EBP summary databases. These summaries of evidence from EBP provide the research-base that is expected by the IOM (2012) and hospital leaders to support practice decisions. In this study, nursing staff grossly underutilize these resources. Librarians have an opportunity to examine the policy topics that currently cite EBP summaries, identify other nursing topics with completed systematic reviews in these databases, and promote these resources to nursing staff.

The clusters of information that are unique to each hospital provide an opportunity for librarians to identify possible locations where nurses can potentially be networking and sharing knowledge. Medical librarians can help to facilitate networking and knowledge sharing. Items that are highly cited but isolated from some hospital locations should be of particular interest to librarians.   For example, when a librarian

arranges interlibrary loans, the librarian is facilitating networking for knowledge sharing that can benefit nurses in multiple hospitals.

Value for Nurses

EBP is foundational for quality nursing care (Glasziou & Haynes, 2005; Melnyk et al., 2012) and policy and procedure documents require current, research-based evidence (Pape, 2003; Turkel, 2004). There is a need for nursing educators and medical librarians to partner and collaborate at the level of curriculum development to integrate instruction about health care content and the use of research-based evidence in undergraduate and graduate nursing courses.

Nursing and medical librarians should jointly advocate for professional librarians in every hospital to make certain nurses responsible for creating and/or updating policy and procedure documents have access to best, current sources of authority. Rural and small hospitals particularly need librarian support for locating resources outside the library collection including links to EBP practice guidelines from government and professional association websites. As it is now, most rural and small hospital do not have a full-time resident medical librarian.

Including librarians as a part of a team to evaluate research-based information for practice decisions can improve the quality of evidence from published resources used in nursing practice. If nurses include librarians as a part of the team charged with creating and/or updating nursing policy and procedure documents, more extensive literature searches that include EBP databases with systematic reviews will be performed. As noted by Becker (2012), nurses need mentoring to read, evaluate, and cite research for

inclusion into policy and procedure documents. Medical librarians can provide immediate support to nurses who are unprepared for EBP.

Future Research

The current study examined resources cited by hospital nurse authors of policy and procedure documents written during a 12-month period to support EBP. It identified the structure of a possible invisible college of knowledge sharing. Qualitative research on the process involved in developing these documents by individual nurses is need to provide more data about the informal and/or formal social communication patterns that influence knowledge sharing within an invisible college. Details such as these can be identified through interviews with nurses and their hospital librarian.

This study examined the citations at NN/LM member hospitals that provide part- or full-time medical library support for nursing staff. There is a need to explore how different hospital systems in other regions of the U. S. provide access to library services and resources and how nurses are using library services and resources to guide nursing policy and practice. Future studies should also examine differences in the citations to EBP used to support nursing practice between magnet-designated hospitals that have active nursing research programs and base clinical care on current research, and the non-magnet hospitals.

Summary

The research questions have been answered through a discussion of the citations that hospital nurses cite when writing policy and procedure documents; differences among the citing practices of nurse policy writers at small and large, rural and urban hospital; and the structure of a possible invisible college for knowledge sharing on topics

relates to patient care. This study reviewed policy documents from 10 hospitals in the intermountain west region of the U. S. It demonstrates the importance of the medical librarian in the EBP process. It opens the door for future research to more clearly reveal the invisible college of EBP in nursing.

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Appendix A

Letter

[Date]
[To]

Dear [**Recipient Name**]:
This is an invitation to participate in a research study titled "Revealing the Invisible College of Evidence-Based Practice in Nursing: Mapping Citations from Policy and Procedure Documents in the Intermountain west Region of the United States."   I am a Doctor of Philosophy, Library and Information Management, degree candidate at Emporia State University, School of Library and Information Management. This is my dissertation research wherein I will identify and describe sources of evidence used by nurses in policy and procedure documents. I will map citations by date, author, source, and type of evidence.

This research project is funded in-part with funds from the Department of Health and Human Services, National Institutes of Health, National Library of Medicine, under Contract No. HHS-N-276-2011-00009-C with the University of Washington.

Your library and hospital can assist with this research by providing me, the sole researcher, with access to the most recent years (current 12 months) of nursing policy and procedure documents. With permission of the nursing director or other hospital administrator, I will review and record citations from the policy documents. The name of the hospital will be NOT be included in the study.

An informed consent document is attached. If you agree to have your hospital nursing policy documents included in this study, please sign and send the signed document to me at the address below.   I will be telephoning within the week to answer any questions you may have.

Thank you in advance for your support.

Kathy J. Fatkin, RN, MLS, AHIP
PhD Student, SLIM, Emporia State University, Emporia, KS
2224 Henryanna Ave
Idaho Falls, ID 83404

Appendix B

Informed Consent Information

The School of Library and Information Management at Emporia State University supports the practice of protection for human subjects participating in research and related activities. While this study does NOT involve human subjects, the following information is provided so you may decide whether you give permission for the _____ hospital nursing policy documents to be used in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time during the data collection. If you do withdraw from the study, you will not be subjected to any reproach. Likewise, if you choose not to participate, you will not be subjected to reprimand or any other form of reproach.

The purpose of this doctoral dissertation study "is to describe the resources registered nurses cite to support evidence-based practice in hospitals". The resources listed on 12 months of nursing policy and procedure documents will be examined at selected hospitals with medical libraries. Specific information resources listed as references in the context of evidence-based practice policy and procedure documents that determine nursing practice will be recorded by the researcher. Basic demographic information about the hospital such as bed size will be collected. The name of the hospital will be kept confidential.

Project codes will be stored in a spreadsheet on files protected with a password or in a locked office at the home of the researcher. The collected information will not identify any specific individuals. Data other than citation authors will be aggregated during analysis and not associated with any particular hospital.

Benefits expected from the research are improved planning for library services and improved availability and selection of resources for medical librarians who serve health care professionals. Nurses involved in evidence-based practice will also benefit from learning more about the sources of evidence nurses use.

For further information about this study, please contact Kathy J. Fatkin, RN, MLS, AHIP, Doctoral Student from Idaho Falls, Idaho by phone (208) 390-9893 or kfatkin@g.emporia.edu. You may also contact Dr. Mirah J. Dow, Associate Professor, Dissertation Chair, School of Library and Information Management, Emporia State University, Campus Box 4025, 1200 Commercial Street, Emporia, KS 66801-5087, 1-800-552-4770 or mdow@emporia.edu

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

Appendix C

Definitions

Advocacy/organizational websites: Websites with URL ending in .org, maintained by non-profits dedicated toward a specific cause, i.e., the American Cancer Society.

Bibliometrics: Study of the information about published items, not about the content, but the data used for indexing information of a publication.

Blogs: A series of web postings using blogging software, i.e., the URL is wordpress.com.

Chi square analysis: A test for statistical significance for differences in bibliometric studies of citations.

CINAHL: The Cumulative Index for Nursing and Allied Health Literature is a subscription bibliographic database for nursing journal articles.

Citations: A reference or link recorded in one source to other sources.

Citation analysis: A form of bibliometrics, which identifies and describes the links between published document.

Citation indexes: Bibliographic databases of citations between publications, identifies which documents cite earlier documents, Eugene Garfield created the first citation indexes for academic journal articles. Google Scholar provides a free online citation index service.

Clinical practice articles: Journal articles containing clinical updates, descriptions of clinical problems, the use of technology in practice, quality improvement projects, or opinion pieces from respected authorities.

Clusters: Clusters represent semi-autonomous communities surrounding nodes (actors) in a social networking map.

Commercial websites: For-profit website, URL ends in ".com", but it does not overtly sell any particular product.

Dead websites: URLs that do not link to an active website, the URL may be incorrect or the site has moved somewhere else on the Web.

Edges: The lines formed by connections in a social network. The edges are weighted based on the number of connections between actors in a social network.

Education websites: Websites with URL ending in .edu linked to universities and other similar institutions.

EBLIP: Evidence-based library and information practice, a problem solving approach for information science, using evidence to either improve or validate existing library practices.

EBP: Evidence-based practice, a problem solving approach to clinical decision making that incorporates the search for the best research-based evidence, the professional's clinical knowledge, and experience, and the patient values.

Evidence-based practice articles: Journal articles indexed as meta-analysis, systematic reviews, integrative reviews, clinical practice guidelines, or articles about EBP.

EBP summary databases: Subscription databases, which require payment for access at a hospital library to obtain full text of summaries of evidence from multiple sources of research an example of a EBP summary database is the *Cochrane Library*.

Government websites: Websites maintained by a government agency, these sites end with *gov.*

Healthcare administration: Professional disciple which directs the services, programs, staff, budgets, and other management functions of a hospital, health system, or other health related organization.

How-to websites: A website focused on instructions for projects and activities such as *YouTube*.

Invisible college: An informal social network between scientists who share the same problems, cite the same authorities, but who are located in different places and may never formally meet.

Large hospital: An acute care hospital, with 100 or more licensed beds regularly maintained for inpatients, that provides diagnostic and therapeutic services for particular or general medical conditions.

Magnet hospital: A hospital designated by the American Nurses Credentialing Center as a magnet facility.

Marketing/retailer websites: Websites that overtly sell a product or service to a customer.

Medicine: The discipline responsible for diagnosing, treating, or preventing disease or damage to the body or mind of an individual.

Medline: The world's largest bibliographic database of health care journals.

Miscellaneous articles: Journal articles indexed as brief news items, obituaries, or articles without abstracts.

Network connections: Links between actors, the individuals, groups, and organizations.

Nursing: The discipline licensed for providing care for the sick or injured generally under the supervision of a physician.

Nodes: One node is assigned to each actor in a social network; the node may represent an individual, group, or institution.

NodeXL: A computer program for social network mapping that works inside of Excel software.

Personal websites: Websites with most of the content about an individual or from a single author.

Pre-appraised evidence: Summaries of research-based evidence obtained from databases such as *Cochrane Library* or *UpToDate*.

Primary research articles: Journal articles which include the major steps of the research process; background, purpose or research questions, methodology, results, and discussion for an original study.

Publication websites: Websites associated printed publications.

Public health: Public health is a health science responsible for protecting and improving the health of entire populations.

PubMed: The *National Library of Medicine* website for free access to the bibliographic database of biomedical journal articles, *Medline*.

RCT: Randomized controlled trial, a method of research where each participant has an equal chance to enter either the intervention or the control group for research studies.

Research-based information: Information derived from systematic and rigorous study. It may be a product of qualitative or quantitative research depending on the type of question.

Rural: A city or town with fewer than 50,000 residents listed in current census.

Small hospital: Acute care hospital of fewer than 100 licensed inpatient beds providing diagnostic and therapeutic services for particular or general medical conditions.

Subscription database: Any database, which requires payment for access at a hospital library.

Quotes/dictionary websites: Websites focused on identifying short quotes or providing word definitions.

Ulrichsweb: A subscription database for bibliographic and publisher information about periodicals.

Urban: A city of 50,000 or more residents listed in current census.

URL: Universal Resource Locator, a web address on the Internet, containing three parts: (a) the Internet protocol such as http; (b) the domain name; and, (c) specific address category.

Table 1

Participant Codes and Hospital Demographic Information

Hospital Code	Size	Location	NN/LM Region
Hospital 1	Large	Urban	6
Hospital 2	Small	Rural	6
Hospital 3	Small	Urban	6
Hospital 4	Large	Urban	6
Hospital 5	Large	Urban	6
Hospital 6	Large	Rural	6
Hospital 7	Small	Rural	6
Hospital 8	Large	Urban	4
Hospital 9	Large	Urban	4
Hospital 10	Large	Urban	4

Note. NN/LM = National Network of Libraries of Medicine. Region 4 hospitals are located in Utah, Region 6 hospitals are located in Idaho. Urban locations are communities of 50,000 residents or more. Rural locations are communities of fewer than 50,000 residents. Large size hospitals are licensed for 100 or more inpatient beds. Small size hospitals are licensed for fewer than 100 inpatient beds.

Table 2

List of Cited Authors by Hospital Codes with Citation Counts

Hospital Code	Author	No Citations
Hospital 4	3M	1
Hospital 4	Abbott Diabetes Care	1
Hospital 9	Abbott Laboratories	1
Hospital 5	Academy of Medical-Surgical Nurses	1
Hospital 5	Academy of Nutrition & Dietetics (AND)	1
Hospital 8	Accreditation Association for Ambulatory Health Care	1
Hospital 6	Accreditation Association for Ambulatory Health Care	1
Hospital 1	Adams H et al.	2
Hospital 4	Adams HP Jr et al.	1
Hospital 3	Advisory Committee for Immunization Practices (ACIP)	2
Hospital 5	Advisory Committee for Immunization Practices (ACIP)	5
Hospital 1	Agency for Health Care Policy & Research	1
Hospital 6	Agency for Health Care Policy & Research	1
Hospital 8	Agency for Health Research and Quality (AHRQ)	1
Hospital 4	Ahrens T	1
Hospital 4	Albright BB	2
Hospital 4	Alfirevic Z	2
Hospital 2	Allen G	2
Hospital 5	Alyea A et al.	1
Hospital 7	American Academy of Obstetricians & Gynecologists	1
Hospital 8	American Academy of Pediatrics	1
Hospital 1	American Academy of Pediatrics (AAP)	4
Hospital 2	American Academy of Pediatrics (AAP)	3
Hospital 4	American Academy of Pediatrics (AAP)	3
Hospital 5	American Academy of Pediatrics (AAP)	6
Hospital 7	American Academy of Pediatrics (AAP)	8
Hospital 5	American Association for Respiratory Care (AARC)	2
Hospital 1	American Association of Cardiovascular and Pulmonary Rehabilitation	11
Hospital 6	American Association of Clinical Endocrinologists	1
Hospital 1	American Association of Critical-Care Nurses (AACN)	8
Hospital 4	American Association of Critical-Care Nurses (AACN)	2
Hospital 5	American Association of Critical-Care Nurses (AACN)	3
Hospital 7	American Association of Critical-Care Nurses (AACN)	3
Hospital 2	American Association of Tissue Banks	1

Hospital 5	American Association of Tissue Banks	1
Hospital 10	American College of Cardiology (ACC)	1
Hospital 5	American College of Chest Physicians	1
Hospital 4	American College of Obstetricians & Gynecologists (ACOG)	16
Hospital 8	American College of Obstetricians & Gynecologists (ACOG)	2
Hospital 2	American College of Obstetricians & Gynecologists (ACOG)	5
Hospital 7	American College of Obstetricians & Gynecologists (ACOG)	5
Hospital 5	American College of Obstetricians & Gynecologists (ACOG)	5
Hospital 1	American College of Sports Medicine (ACSM)	2
Hospital 1	American College of Surgeons	1
Hospital 7	American College of Surgeons	2
Hospital 4	American Diabetes Association	1
Hospital 10	American Federation of Government Employees	2
Hospital 3	American Federation of Government Employees	1
Hospital 2	American Foundation for Suicide Prevention	1
Hospital 7	American Heart Association	3
Hospital 1	American Heart Association (AHA)	3
Hospital 2	American Heart Association (AHA)	6
Hospital 3	American Heart Association (AHA)	1
Hospital 5	American Heart Association (AHA)	8
Hospital 2	American Institute for Architects	1
Hospital 5	American Institute of Ultrasound in Medicine (AIUM)	1
Hospital 5	American Medical Association (AMA)	2
Hospital 2	American Medical Directors Association	1
Hospital 1	American National Standards Institute	1
Hospital 2	American National Standards Institute	1
Hospital 2	American Nurses Association (ANA)	1
Hospital 10	American Nurses Association (ANA)	1
Hospital 3	American Nurses Association (ANA)	1
Hospital 3	American Nurses Association (ANA)	1
Hospital 4	American Nurses Association (ANA)	1
Hospital 5	American Nurses Association (ANA)	3
Hospital 9	American Pain Society	1
Hospital 3	American Red Cross (ARC)	1
Hospital 5	American Society for Gastrointestinal Endoscopy et al.	1
Hospital 1	American Society of Anesthesiologists (ASA)	2
Hospital 6	American Society of Health-System Pharmacists (ASHP)	1

Hospital 9	American Society of Health-System Pharmacists (ASHP)	2
Hospital 9	American Society of Pain Management Nurses	1
Hospital 1	American Society of PeriAnesthesia Nurses (ASPAN)	2
Hospital 5	American Society of PeriAnesthesia Nurses (ASPAN)	3
Hospital 6	American Society of Regional Anesthesia and Pain Medicine (ASRAPM)	1
Hospital 5	American Stroke Association (ASA)	1
Hospital 4	Amnisure	1
Hospital 4	Andreozzi L	2
Hospital 4	Appiah L	2
Hospital 1	Armstrong LL	1
Hospital 1	Arnold MS et al.	1
Hospital 3	Arrants J et al	1
Hospital 5	Association for Nursing Professional Development (ANPD)	1
Hospital 1	Association for Professionals in Infection Control & Epidemiology (APIC)	2
Hospital 2	Association for Professionals in Infection Control & Epidemiology (APIC)	5
Hospital 5	Association for Professionals in Infection Control & Epidemiology (APIC)	4
Hospital 5	Association for the Advancement of Medical Instrumentation (AAMI)	4
Hospital 5	Association of Women's Health Obstetric & Neonatal Nurses (AWHONN)	5
Hospital 1	Association of periOperative Registered Nurses (AORN)	6
Hospital 2	Association of periOperative Registered Nurses (AORN)	1
Hospital 9	Association of periOperative Registered Nurses (AORN)	1
Hospital 4	Association of periOperative Registered Nurses (AORN)	4
Hospital 5	Association of periOperative Registered Nurses (AORN)	6
Hospital 7	Association of periOperative Registered Nurses (AORN)	4
Hospital 1	Association of Women's Health Obstetric & Neonatal Nurses (AWHONN)	1
Hospital 2	Association of Women's Health Obstetric & Neonatal Nurses (AWHONN)	1
Hospital 4	Association of Women's Health Obstetric & Neonatal Nurses (AWHONN)	1
Hospital 7	Association of Women's Health Obstetric & Neonatal Nurses (AWHONN)	5
Hospital 3	Astellas	1
Hospital 4	Atrium Medical Corporation	4

Hospital 8	Avery G	2
Hospital 1	Bader M	3
Hospital 5	Baldwin S	1
Hospital 2	Bare BG	1
Hospital 7	Baren JM	1
Hospital 4	Barfield WD et al.	1
Hospital 4	Barrilleaux PS et al.	1
Hospital 7	Bartholome WG	2
Hospital 3	Basaranthrappa BT	1
Hospital 2	Bassett IV	1
Hospital 4	BD Medical Systems	1
Hospital 4	Beard RM	1
Hospital 4	Becker DE	1
Hospital 1	Behring	1
Hospital 5	Bensinger W	1
Hospital 4	Berkeimer DA	1
Hospital 7	Bernet, W	1
Hospital 6	Bildner J	1
Hospital 3	Bisch A	1
Hospital 7	Bissett-Johnson A	1
Hospital 7	Bitterman, RA	1
Hospital 4	Blaha M et al.	1
Hospital 4	Bowden VR	1
Hospital 2	Boyce JM et al.	1
Hospital 5	Brar SS et al.	1
Hospital 4	Bridges E	1
Hospital 1	Brill RJ et al.	1
Hospital 8	Brill RJ et al.	1
Hospital 5	Bristol-Myers Squibb Company	1
Hospital 1	Broderick J et al	1
Hospital 1	Brosnahan J	1
Hospital 5	Brubaker S	1
Hospital 4	Burlingame B	1
Hospital 1	Burns S	1
Hospital 4	Burt C	1
Hospital 5	Calvert AH et al.	1
Hospital 5	Cancer Therapy Evaluation Program (CTEP)	2
Hospital 1	Carefusion	1
Hospital 4	Carlson KK	1
Hospital 4	Caroll P	1
Hospital 2	Carrico R	1

Hospital 4	Castellucci D	1
Hospital 5	Center for International Blood & Marrow Transplant Research	1
Hospital 1	Centers for Disease Control & Prevention (CDC)	17
Hospital 2	Centers for Disease Control & Prevention (CDC)	11
Hospital 9	Centers for Disease Control & Prevention (CDC)	2
Hospital 3	Centers for Disease Control & Prevention (CDC)	1
Hospital 4	Centers for Disease Control & Prevention (CDC)	1
Hospital 5	Centers for Disease Control & Prevention (CDC)	2
Hospital 5	Centers for Disease Control & Prevention (CDC)	20
Hospital 7	Centers for Disease Control & Prevention (CDC)	4
Hospital 1	Centers for Medicare & Medicaid Services (CMS)	2
Hospital 8	Centers for Medicare & Medicaid Services (CMS)	4
Hospital 2	Centers for Medicare & Medicaid Services (CMS)	5
Hospital 3	Centers for Medicare & Medicaid Services (CMS)	1
Hospital 5	Centers for Medicare & Medicaid Services (CMS)	15
Hospital 6	Centers for Medicare & Medicaid Services (CMS)	9
Hospital 7	Centers for Medicare & Medicaid Services (CMS)	6
Hospital 1	Chamberlain B	1
Hospital 8	Chamberlain B	1
Hospital 5	Chambers ST et al.	1
Hospital 5	Champlin R	6
Hospital 5	Chen JW	1
Hospital 7	Chinn J	1
Hospital 1	Chou YH	1
Hospital 1	Chulay M	1
Hospital 4	Clark W	1
Hospital 5	Claus B	1
Hospital 4	Clement S et al.	1
Hospital 1	Clinical Pharmacology	2
Hospital 9	College of American Pathologists	2
Hospital 4	Colon I et al.	1
Hospital 9	Commission of Laboratory Accreditation (CLA)	1
Hospital 7	Committee on Bioethics	1
Hospital 4	Conner R et al.	5
Hospital 8	Cook CB et al.	1
Hospital 4	Cook Medical	1
Hospital 1	Courtney B et al.	1
Hospital 4	Cousins LM et al.	1
Hospital 3	Craven RF	1
Hospital 2	Creehan PA	4

Hospital 4	Creehan PA	1
Hospital 5	Creehan PA	1
Hospital 7	Creehan PA	1
Hospital 7	Cross AW	1
Hospital 6	Cross Cultural Health Care Program	1
Hospital 5	Crum BS	1
Hospital 5	Cumbler E et al.	1
Hospital 3	Cummings-Winfield C	1
Hospital 10	Cummins RO	1
Hospital 4	Cunningham FG et al.	1
Hospital 3	Cutright J	1
Hospital 4	Dallenbach P et al.	1
Hospital 3	D'Arcy Y	1
Hospital 4	Darovic GO	2
Hospital 4	Datascope Corporation	1
Hospital 4	Davies GAL	1
Hospital 4	Davis MS	2
Hospital 7	Davis D	1
Hospital 1	Deane B	1
Hospital 8	Deane B	1
Hospital 1	DeFazio	1
Hospital 1	Deglin JH	1
Hospital 4	Del Zoppo et al.	1
Hospital 6	Dellit TH et al.	1
Hospital 5	Department of Health & Human Services	1
Hospital 7	Department of Health & Human Services	1
Hospital 10	Department of Veterans Affairs	2
Hospital 3	Department of Veterans Affairs	1
Hospital 5	Devine S	1
Hospital 7	Dickenson D	1
Hospital 5	DiPersio JF	1
Hospital 2	Do AN et al	1
hospital 1	Donley K	1
Hospital 8	Donley K	1
Hospital 10	Drew BJ et al.	1
Hospital 4	Drew BJ et al.	1
Hospital 1	Drouiche R	1
Hospital 6	Drug Enforcement Administration (DEA)	1
Hospital 8	Drug Enforcement Administration (DEA)	1
Hospital 4	Duarte-Gardea M	1
Hospital 1	Duke University	1

Hospital 1	Dumont CP	1
Hospital 5	Duncan JL	1
Hospital 4	Duncan RJ	1
Hospital 4	Dungan K et al.	1
Hospital 5	Dunlevy CL	1
Hospital 5	Durie BG	1
Hospital 5	Eagye KJ et al.	1
Hospital 2	eFacts	1
Hospital 1	Eledjam JJ	1
Hospital 10	Emergency Nurses Association (ENA)	1
Hospital 5	Emergency Nurses Association (ENA)	2
Hospital 7	Emergency Nurses Association (ENA)	1
Hospital 4	End of Life Nursing Education Consortium	1
Hospital 7	English A et al.	2
Hospital 6	Environmental Protection Agency (EPA)	1
Hospital 1	Erstad BL	1
Hospital 7	Esiddel	1
Hospital 10	Estrada CA et al	1
Hospital 1	Etches RC	1
Hospital 2	Facility Safety Management	1
Hospital 3	Farjo L	1
Hospital 7	Federal Emergency Management Agency (FEMA)	1
Hospital 5	Fenske T et al.	1
Hospital 7	Ferguson P	1
Hospital 7	Fernandez	1
Hospital 3	Field JM et al.	1
Hospital 4	Fisher SA	1
Hospital 4	Fleck DA	1
Hospital 8	Fletcher	1
Hospital 8	Fletcher MA	1
Hospital 5	Food & Drug Administration (FDA)	1
Hospital 9	Food & Drug Administration (FDA)	1
Hospital 3	Food & Drug Administration (FDA)	1
Hospital 4	Food & Drug Administration (FDA)	2
Hospital 9	Fortescue EB et al.	1
Hospital 5	Foundation for the Accreditation of Cellular Therapy (FACT)	50
Hospital 5	Frank BJ	1
Hospital 2	Freedberg KA	1
Hospital 3	Frey AM	1
Hospital 2	Frye C	2

Hospital 1	Fu ES et al.	1
Hospital 6	Furdon SA	1
Hospital 2	Gahart BL	1
Hospital 1	Gan TJ et al.	1
Hospital 5	Garcia D et al.	1
Hospital 8	Gardner SL	1
Hospital 2	Garner JS et al.	2
Hospital 9	Gawande A et al.	1
Hospital 4	Geiter H	1
Hospital 3	Genetech Inc.	1
Hospital 1	Gentilello LM et al.	1
Hospital 5	Genzyme	1
Hospital 1	George Washington University Medical Center	1
Hospital 2	Gerberding JL	1
Hospital 1	Gerdik C et al.	1
Hospital 8	Gerdik C et al.	1
Hospital 1	Giannetta ET	1
Hospital 5	Gilbert DN et al.	1
Hospital 5	Giralt S	1
Hospital 4	Giuliano KK	1
Hospital 3	Gleaves M	1
Hospital 1	Gleeson M	1
Hospital 8	Gleeson M	1
Hospital 1	Glover J	1
Hospital 1	Gluckman PD	1
Hospital 1	Goldman MP	1
Hospital 1	Goodman G et al.	1
Hospital 4	Goodman MH	1
Hospital 4	Goodwin TM	2
Hospital 3	Gould C	1
Hospital 4	Graber R et al	1
Hospital 4	Graham P	1
Hospital 5	Grant EM et al.	1
Hospital 5	Grass Technologies	1
Hospital 4	Green SM et al.	1
Hospital 4	Greenberg CS	1
Hospital 4	Greene CM	1
Hospital 7	Gunderson Lutheran Medical Foundation	2
Hospital 2	Gupta A et al.	1
Hospital 1	Hadaway L	1
Hospital 4	Hadaway L	1

Hospital 1	Haig K	1
Hospital 1	Haire WD et al.	1
Hospital 3	Hale K	1
Hospital 2	Haley CC et al.	1
Hospital 5	Haley NR	2
Hospital 4	Hall R	1
Hospital 3	Halm M	1
Hospital 5	Hamadani M et al.	1
Hospital 4	Harlass F	1
Hospital 3	Harrison SC et al.	1
Hospital 1	Hawkins K	1
Hospital 8	Hazinski MF	3
Hospital 4	Headley JM	1
Hospital 4	Headley JM	1
Hospital 2	Health Canada	1
Hospital 1	Heart & Stroke Foundation of Ontario	1
Hospital 7	Henry GL	1
Hospital 7	Henry PF	1
Hospital 5	Hermsen E	1
Hospital 1	Herout PM	1
Hospital 5	Hinson D	1
Hospital 3	Hirnle CJ	1
Hospital 6	Hirsh J et al.	1
Hospital 4	Ho KM	1
Hospital 1	Hodding JH	1
Hospital 4	Hodding JH	1
Hospital 5	Hoffman JI	1
Hospital 5	Hokanson H	1
Hospital 7	Holder AR	1
Hospital 5	Hommes DW et al.	1
Hospital 2	Horan TC et al.	1
Hospital 1	Hospital 1	3
Hospital 9	Hospital 9	1
Hospital 10	Hospital 10	37
Hospital 3	Hospital 3	28
Hospital 4	Hospital 4	2
Hospital 1	Hospital Corporation of America (HCA)	1
Hospital 8	Hospital Corporation of America (HCA)	5
Hospital 6	Hospital Corporation of America (HCA)	5
Hospital 4	How HY et al.	1

Hospital 5	Howes MC	1
Hospital 1	Huang YC	1
Hospital 4	Human milk banking association of North America	1
Hospital 3	Hutchinson R et al.	1
Hospital 4	Ifeld BM et al.	1
Hospital 8	Im R	1
Hospital 5	Immunization Action Coalition (IAC)	3
Hospital 1	Infusion Nurses Society (INS)	3
Hospital 2	Infusion Nurses Society (INS)	1
Hospital 9	Infusion Nurses Society (INS)	1
Hospital 3	Infusion Nurses Society (INS)	2
Hospital 4	Infusion Nurses Society (INS)	4
Hospital 5	Infusion Nurses Society (INS)	2
Hospital 5	Institute for Clinical Systems Improvement (ICSI)	1
Hospital 5	Institute for Family Centered Care	1
Hospital 2	Institute for Healthcare Improvement (IHI)	2
Hospital 1	Institute for Safe Medication Practices (ISMP)	1
Hospital 2	Institute for Safe Medication Practices (ISMP)	1
Hospital 9	Institute for Safe Medication Practices (ISMP)	1
Hospital 1	Integra Neurosciences	1
Hospital 4	International Association of Forensic Nurses	1
Hospital 5	International Childbirth Education Association (ICEA)	3
Hospital 5	Ippolit C	6
Hospital 5	Jaccard A et al.	1
Hospital 7	Jacobstein CR	1
Hospital 1	Jensen D	1
Hospital 2	Jensen PA et al.	1
Hospital 4	Johnson L	2
Hospital 1	Joint Commission (JC)	3
Hospital 8	Joint Commission (JC)	2
Hospital 2	Joint Commission (JC)	2
Hospital 9	Joint Commission (JC)	3
Hospital 10	Joint Commission (JC)	5
Hospital 3	Joint Commission (JC)	11
Hospital 4	Joint Commission (JC)	2
Hospital 5	Joint Commission (JC)	21
Hospital 6	Joint Commission (JC)	4
Hospital 1	Jones F	1
Hospital 3	Jones S et al.	1
Hospital 1	Jull A	1

Hospital 4	Kahan M	1
Hospital 4	Kaneka Pharma America	1
Hospital 6	Kaplow R	1
Hospital 1	Karchmer T	1
Hospital 1	KCI	1
Hospital 5	Kearon C et al.	2
Hospital 3	Kelleher LO	1
Hospital 4	Kelleher LO	1
Hospital 1	Kellett J	1
Hospital 8	Kellett J	1
Hospital 1	Kelsey P	1
Hospital 5	Kemper AR et al.	1
Hospital 5	Kim A et al.	1
Hospital 2	Kim DH et al.	1
Hospital 7	King NM	1
Hospital 4	Kirkwood P	1
Hospital 7	Klein BL	1
Hospital 4	Klein DG	1
Hospital 4	Klein SM et al.	1
Hospital 5	Klyne K	1
Hospital 3	Konopad E et al	1
Hospital 8	Krames	1
Hospital 1	Krapes J	1
Hospital 8	Krapes J	1
Hospital 1	Kraus DM	1
Hospital 4	Kraus MD	1
Hospital 6	Krechel SW	1
Hospital 1	Krell K	1
Hospital 4	Kundodyiwa TW	1
Hospital 8	Kuritsky	1
Hospital 2	Kypaios T et al.	1
Hospital 1	Lacy CF	1
Hospital 3	Lamm DL	1
Hospital 5	Lamphere T	2
Hospital 5	Lane C	1
Hospital 9	Lannon CM et al.	1
Hospital 2	Larkin SA	1
Hospital 3	Larson EL et al.	1
Hospital 8	LaTorre Travis E	1
Hospital 6	Lawrence et al.	1
Hospital 1	Lazear S	1

Hospital 2	Lee JT	1
Hospital 8	Lee LL et al.	1
Hospital 1	Lee LL	1
Hospital 8	Lee SW	1
Hospital 4	Lester BM	2
Hospital 2	Lexi-Comp	1
Hospital 5	Lexi-Comp	1
Hospital 6	Liko	1
Hospital 7	Linakis JG	1
Hospital 3	Lindley P	1
Hospital 5	Liou J	1
Hospital 2	Lippincott	2
Hospital 1	Lippincott	6
Hospital 8	Lippincott	2
Hospital 9	Lippincott	2
Hospital 3	Lippincott	4
Hospital 6	Lippincott	1
Hospital 7	Lippincott	5
Hospital 1	Littlejohns L	2
Hospital 4	Litton E	1
Hospital 5	Lodise TP et al.	1
Hospital 4	Lorenz K et al.	1
Hospital 7	LSU Health Sciences Center	1
Hospital 5	Lucile Packard Children's Hospital	1
Hospital 4	Lusardi PA	1
Hospital 4	Lynn-McHale DJ	1
Hospital 1	Lynn-McHale Wiegand DJ	1
Hospital 4	Lynn-McHale Wiegand DJ	5
Hospital 8	MacDonald	1
Hospital 4	Mackenzie VP	1
Hospital 4	Macones GA et al.	2
Hospital 1	Maddison J	1
Hospital 8	Maddison J	1
Hospital 5	Maddox HC	1
Hospital 8	Magbual R	1
Hospital 5	Mahle WT et al.	1
Hospital 5	Maioli M et al.	1
Hospital 5	Majhail N et al.	1
Hospital 4	Maki DG	1
Hospital 2	Malesker MA et al.	1
Hospital 2	Mandeville LK	1

Hospital 7	Mandeville LK	1
Hospital 1	Mann C	1
Hospital 1	Manufacturer	9
Hospital 2	Manufacturer	2
Hospital 4	Manufacturer	1
Hospital 5	Manufacturer	1
Hospital 7	Manufacturer	1
Hospital 1	March K	1
Hospital 4	Marschall J et al.	4
Hospital 3	Martin S	1
Hospital 1	Mather LE	1
Hospital 5	Matt L et al.	1
Hospital 7	Mattson S	1
Hospital 1	Maupin JM	1
Hospital 8	Maupin JM	1
Hospital 6	McAuley DF	1
Hospital 5	McCabe MS	1
Hospital 1	McCaffery M	2
Hospital 9	McCaffery M	1
Hospital 6	McCaffery M	1
Hospital 4	McCamant KL	1
Hospital 3	McCarter T et al.	1
Hospital 5	McCarty JM	1
Hospital 4	McCraig L	1
Hospital 6	McEuan JA et al.	1
Hospital 2	McEvoy G	1
Hospital 7	McEvoy G	1
Hospital 1	McGaughey J et al.	1
Hospital 8	McGaughey J et al.	1
Hospital 3	McGee WR	1
Hospital 2	McGeer A et al.	1
Hospital 4	McKenna R et al.	1
Hospital 7	McNew	2
Hospital 4	MedConsult	1
Hospital 7	MedEx	1
Hospital 3	Medical University of South Carolina	1
Hospital 10	Mehler PS	1
Hospital 4	Meldon S et al.	1
Hospital 5	Mendez SJ	1
Hospital 1	Mensing C	1
Hospital 8	Merenstein GB	1

Hospital 3	Merriam-Webster	1
Hospital 5	Merten GJ et al.	1
Hospital 4	Meyer M et al.	1
Hospital 5	Micromedex	2
Hospital 7	Miller MA et al.	1
Hospital 10	Mininni NC	1
Hospital 3	Mody L et al.	1
Hospital 3	Mohler M et al.	1
Hospital 5	Mohty M	1
Hospital 10	Moldenhauer K	1
Hospital 1	Monaghan A	1
Hospital 8	Monaghan A	1
Hospital 2	Moore DT	1
Hospital 4	Moriarty P	1
Hospital 4	Mosby	1
Hospital 7	Mosby	1
Hospital 5	Moseley AL	1
Hospital 4	Muller AC	1
Hospital 2	Murphy BS	1
Hospital 3	Murphy E	1
Hospital 4	Murphy-Oikonen J et al.	2
Hospital 5	Murray SM	1
Hospital 3	Mushani-Kanji T	1
Hospital 1	Muto CA	1
Hospital 3	Nash M	1
Hospital 4	Nasraway SA et al.	1
Hospital 5	National Association of Neonatal Nurses (NANN)	1
Hospital 7	National Association of Neonatal Nurses (NANN)	1
Hospital 5	National Association of Orthopaedic Nurses (NAON)	1
Hospital 6	National Center for Missing and Exploited Children (NCMEC)	1
Hospital 7	National Center for Missing and Exploited Children (NCMEC)	2
Hospital 5	National Children's Alliance	1
Hospital 9	National Committee for Clinical Laboratory Standards	1
Hospital 5	National Comprehensive Cancer Network (NCCN)	7
Hospital 4	National Consensus Project for Quality Palliative Care	1
Hospital 9	National Coordinating Council for medication error reporting and prevention	1
Hospital 3	National Council of State Boards of Nursing	2
Hospital 4	National Database of Nursing Quality Indicators	2

	(NDNQI)	
Hospital 3	National Institute on Aging	1
Hospital 5	National Institutes of Health (NIH)	2
Hospital 7	National Integrated Accreditation for Healthcare Organizations (NIAHO)	3
Hospital 3	National Pharmacy Benefits Management Services	1
Hospital 4	National Sexual Violence Resource Center	1
Hospital 5	National Stroke Association	1
Hospital 5	Navaneethan SD et al.	1
Hospital 2	Nazareno AR	1
Hospital 7	Neistein LS	1
Hospital 1	Nelson KL et al.	1
Hospital 2	Nettina SM	1
Hospital 3	Newman DK	1
Hospital 5	Njoku J	1
Hospital 4	Northern New England Perinatal Quality Improvement Networks	1
Hospital 7	Nypaver MM	1
Hospital 3	Occupational Safety & Health Administration (OSHA)	4
Hospital 4	Occupational Safety & Health Administration (OSHA)	2
Hospital 9	Occupational Safety & Health Administration (OSHA)	2
Hospital 10	Occupational Safety & Health Administration (OSHA)	2
Hospital 5	Occupational Safety & Health Administration (OSHA)	12
Hospital 7	Occupational Safety & Health Administration (OSHA)	1
Hospital 2	Occupational Safety & Health Administration (OSHA)	3
Hospital 7	O'Connor C	1
Hospital 3	Office of the Inspector General	1
Hospital 2	O'Grady NP et al.	1
Hospital 4	O'Grady NP et al.	2
Hospital 5	O'Grady NP et al.	1
Hospital 10	Olsen M	1
Hospital 5	Olympus	1
Hospital 9	Oncology Nursing Society (ONS)	1
Hospital 4	Oncology Nursing Society (ONS)	1
Hospital 1	Opus Communications	1
Hospital 4	Ordean A	1
Hospital 3	Overdyk F et al.	1
Hospital 5	Panlilo AL et al.	1
Hospital 5	Pannu N et al.	1
Hospital 5	Park HJ et al.	1
Hospital 9	Pasero C	1

Hospital 3	Pasero C	1
Hospital 5	Pasero C	1
Hospital 1	Pasero C	2
Hospital 5	Patel GW et al.	1
Hospital 5	Patel N et al.	1
Hospital 3	Patterson JD	1
Hospital 5	Pennsylvania Patient Safety Reporting System	1
Hospital 6	Perry AG	1
Hospital 3	Pestano CR	1
Hospital 1	Peter DA	1
Hospital 5	Peter DA	1
Hospital 1	Petersen C	1
Hospital 4	Petersen C	1
Hospital 1	Pettit J	2
Hospital 4	Pettker CM	1
Hospital 6	Pfeil VC	1
Hospital 5	Pharmacist's Letter	1
Hospital 1	Phillips NF	1
Hospital 4	Phillips NF	1
Hospital 4	Phippen ML	1
Hospital 4	Pickett JD	1
Hospital 5	Pindoria S	1
Hospital 5	Poe SS et al.	2
Hospital 9	Point of Care.net	1
Hospital 3	Polovich M	1
Hospital 4	Polovich M	1
Hospital 10	Polovich M	1
Hospital 1	Ponec D et al.	1
Hospital 6	Potter	1
Hospital 1	Pouseratte Y	1
Hospital 4	Pranulis M	1
Hospital 4	Preuss T	5
Hospital 4	Product Manufacturer	1
Hospital 7	Proehl JA	2
Hospital 2	Pronovost PJ	1
Hospital 4	Pulmonary Artery Catheter Education Project (PACEP)	1
Hospital 2	Puro V et al.	1
Hospital 8	Pyxis	1
Hospital 4	Qaseem A et al.	1
Hospital 1	Quinn DM	1
Hospital 5	Rau JL	2

Hospital 4	Rayburn WF	1
Hospital 7	Reinhardt	1
Hospital 4	Reno D	1
Hospital 7	Rice MM	1
Hospital 3	Rigby D	1
Hospital 1	Riordan J et al.	1
Hospital 5	Rizzo JD et al.	1
Hospital 4	Robertson J	1
Hospital 3	Robinson J	1
Hospital 9	Roche Diagnostics	3
Hospital 5	Roman SB	1
Hospital 3	Rosenthal	1
Hospital 1	Roth DJ	1
Hospital 8	Roth DJ	1
Hospital 1	Rothrock JC	2
Hospital 9	Rothrock JC	1
Hospital 5	Royal Children's Hospital Melbourne Australia	1
Hospital 4	Ruffolo DC	1
Hospital 10	Sabel A	1
Hospital 3	Saint S et al.	1
Hospital 7	Salluzzo, RF	1
Hospital 5	Salmon SE	1
Hospital 5	Same Day Surgery	1
Hospital 7	San Diego Patient Safety Task Force	1
Hospital 1	Saxman C	1
Hospital 5	Saxman C	1
Hospital 4	Schaffer RB	2
Hospital 3	Schallom L	1
Hospital 1	Schick L	1
Hospital 10	Scholle CC	1
Hospital 4	Sciscione AC et al.	1
Hospital 4	Scott F	1
Hospital 4	Scott SS	1
Hospital 5	Sehulster L et al.	2
Hospital 4	Shannon C	1
Hospital 8	Shapiro M	1
Hospital 4	Shapiro R	1
Hospital 1	Shears GJ	1
Hospital 7	Sheehy S	2
Hospital 5	Sheils SG	1
Hospital 5	Sheppard D et al.	1

Hospital 7	Siegel DM	1
Hospital 7	Siegel GS	1
Hospital 5	Siegel JD et al.	2
Hospital 4	Sielski LA	2
Hospital 4	Sigrest TD et al.	1
Hospital 7	Simmons PS	1
Hospital 4	Simpson KR	5
Hospital 5	Simpson KR	1
Hospital 7	Simpson KR	3
Hospital 2	Simpson KR	4
Hospital 1	Sittner BJ et al.	1
Hospital 8	Sittner BJ et al.	1
Hospital 4	Slater-Maclean L et al.	1
Hospital 2	Smeltzer S	1
Hospital 5	Smith CD	1
Hospital 7	Smith J	1
Hospital 1	Smith Medical	1
Hospital 9	Smith SF	1
Hospital 6	Snow K	1
Hospital 5	Snyder E	2
Hospital 5	Snyder J	1
Hospital 5	Society for Maternal Fetal Medicine (SMFM)	1
Hospital 5	Society of Cardiovascular Patient Care	1
Hospital 1	Society of Gastroenterology Nurses and Associates (SGNA)	1
Hospital 5	Society of Gastroenterology Nurses and Associates (SGNA)	6
Hospital 7	Solloway M	1
Hospital 4	Sona C	1
Hospital 5	Southwest Oncology Group	1
Hospital 1	Springhouse	1
Hospital 4	St. John RE	1
Hospital 7	Stark AR	1
Hospital 4	Staropoli A	1
Hospital 3	State Board of Nursing	4
Hospital 10	State Board of Nursing	2
Hospital 5	State Board of Nursing	10
Hospital 5	State Department of Health	2
Hospital 9	State Department of Health	1
Hospital 4	State Department of Health	2
Hospital 1	State Department of Health	1

Hospital 7	State Department of Health	6
Hospital 5	State Hospital Association	1
Hospital 8	State Legislature	6
Hospital 9	State Legislature	1
Hospital 3	State Legislature	1
Hospital 4	State Legislature	1
Hospital 5	State Legislature	7
Hospital 7	State Legislature	7
Hospital 5	State Nurses Association	1
Hospital 4	State perinatal quality care collaborative	1
Hospital 9	State Safe Haven	1
Hospital 3	Stedman	1
Hospital 5	Steinbrook R	1
Hospital 5	Storm C	1
Hospital 4	Stryker	1
Hospital 1	Stryker Instruments	1
Hospital 9	Stucky ER	1
Hospital 1	Su LH	1
Hospital 5	Subramaniam B	1
Hospital 5	Subramaniam K	1
Hospital 7	Sullivan DJ	1
Hospital 1	Sutton S	1
Hospital 2	Tacconelli E et al.	1
Hospital 4	Taketomo CK	1
Hospital 1	Taketomo CK	1
Hospital 2	Talbot TR et al.	1
Hospital 4	Tambyah PA	1
Hospital 5	The University of California San Francisco	1
Hospital 2	Thomas K et al.	1
Hospital 9	Time Wise Solutions	1
Hospital 5	Tomblyn M et al.	3
Hospital 1	Tracy C	1
Hospital 1	Trautner BW	1
Hospital 7	Treloar DJ et al.	1
Hospital 5	Trissel LA	1
Hospital 2	Troiana NH	1
Hospital 7	Troiana NH	1
Hospital 7	Tsai AK et al.	1
Hospital 1	Tucker KM et al.	1
Hospital 8	Tucker KM et al.	1
Hospital 4	Ulmer BC	1

Hospital 5	University of Iowa Hospitals & Clinics	2
Hospital 5	University of Washington Pharmacy Services	1
Hospital 4	US Conference of Catholic Bishops	1
Hospital 3	US Congress	2
Hospital 5	US Congress	2
Hospital 6	US Congress	4
Hospital 7	US Congress	2
Hospital 8	US Congress	3
Hospital 2	US Department of Health & Human Services	2
Hospital 7	US Department of Labor	1
Hospital 4	US Drug Testing Laboratories	2
Hospital 3	US National Library of Medicine MEDLINEPLUS	1
Hospital 1	US Nuclear Regulatory Commission	1
Hospital 9	US Pharmacopeia	1
Hospital 8	US Pharmacopeia	1
Hospital 5	US Preventative Services Task Force	1
hospital 1	Vallerand AM	1
Hospital 7	Veilleus DR	1
Hospital 7	Verklan MT	1
Hospital 8	Verklan MT	6
Hospital 9	Veterans Health Administration	1
Hospital 3	Veterans Health Administration	22
Hospital 10	Veterans Health Administration	13
Hospital 7	Vida Care	1
Hospital 2	Wachter RM	1
Hospital 8	Walden M	6
Hospital 7	Walden M	1
Hospital 2	Walensky RP	1
Hospital 1	Wallace S	1
Hospital 5	Walter JL	1
Hospital 4	Wang M	1
Hospital 2	Wang SA et al.	1
Hospital 5	Wasterlain CG	1
Hospital 5	Watson DS	1
Hospital 4	Weeks A	2
Hospital 4	Wells MP	1
Hospital 6	Whaley	1
Hospital 3	White JM	1
Hospital 4	White JM	1
Hospital 10	Whitford JM	1
Hospital 1	Whittington J	1

Hospital 4	Wiegand DL	1
Hospital 4	Williams BA et al.	1
Hospital 3	Willson M	2
Hospital 5	Wilson W et al.	1
Hospital 4	Wing DA et al.	1
Hospital 5	Wingard JR et al.	4
Hospital 4	Winikoff B	1
Hospital 5	Wojciechchowski WV	2
Hospital 4	Wong S	1
Hospital 6	Wong S	1
Hospital 1	Woodhouse A	1
Hospital 4	Woomer JL	1
Hospital 1	Wooten MK	1
Hospital 1	World Health Organization (WHO)	1
Hospital 3	World Health Organization (WHO)	1
Hospital 5	World Health Organization (WHO)	4
Hospital 8	Wound Ostomy & Continence Nurses Society (WOCNS)	1
Hospital 1	Wyckoff MM	1
Hospital 5	Xamplas RC et al.	1
Hospital 4	Yokoe D et al.	4
Hospital 5	Youssef-Ahmed MZ et al.	1
Hospital 2	Zenner D et al.	1

Note. Hospitals that cite the same author have their own citation count.

Table 3.

Count of Hospital Connections and Isolated Edges.

Hospital Code	Connections	Isolated Edges
Hospital 1	128	51
Hospital 2	67	24
Hospital 3	73	21
Hospital 4	163	36
Hospital 5	163	37
Hospital 6	31	12
Hospital 7	78	27
Hospital 8	47	29
Hospital 9	34	18
Hospital 10	21	10
Total	805	265

Note. Connections are between hospitals citing the same authors. Isolated edges are the unique author citations that do not connect to other hospitals.

Table 4

Top-ten nursing policy topics.

Topic	Counts
Admissions	27
Critical care *	15
Device	133
Drug therapy	184
Emergency	102
Facility security*	15
Infant care	38
Intravenous therapy	93
Laboratory tests	30
Services	88
Surgery	20

Note. Policy topics critical care* and facility security* tied for 10th place.

Table 5.

Top-ten List of Books Cited by Nurses to Support EBP.

Book Title	Counts
AACN procedure manual for critical care	29
AORN perioperative standards and recommended practice	25
APIC text of infection control and epidemiology	12
AWHONN perinatal nursing	8
FACT accreditation manual	25
FACT international standards for cellular therapy product collection, processing, and administration	25
JC Comprehensive accreditation manual for hospitals	28
AACVPR Guidelines for cardiac rehabilitation and secondary prevention programs	11
ACOG/AAP Guidelines for perinatal care	10
Lippincott manual of nursing practice	24

Note. AACN= American Association of Critical-care Nurses. AORN= Association of periOperative Registered Nurses. APIC= Association for Professionals in Infection Control. AWHONN=Association of Women's Health, Obstetric, and Neonatal Nurses. FACT= Foundation for the Accreditation of Cellular Therapy. JC= Joint Commission. AACVPR= American Association of Cardiovascular and Pulmonary Rehabilitation. ACOG/AAP= American College of Obstetricians and Gynecologists and American Academy of Pediatrics.

Table 6.

Top-ten List of Journal Titles Cited by Nurses to Support EBP.

Journal Title	Counts
American Journal of Critical Care*	6
American Journal of Obstetrics and Gynecology	6
Anesthesia and Analgesia	6
Biology of Blood and Bone Marrow Transplantation	8
Chest	6
Infection Control and Hospital Epidemiology	14
Journal of Infusion Nursing*	17
Morbidity and Mortality Weekly Reports	22
Obstetrics and Gynecology	26
Pediatrics	15

Note. American Journal of Critical Care* and Journal of Infusion Nursing* are titles published by nursing specialty organizations.

Table 7.

Top-ten List of Websites Cited by Nurses to Support EBP.

Core URL	Type	Counts
aacn.org	Organization	7
aap.org*	Organization	6
acog.org*	Organization	6
cdc.gov	Government	27
cms.gov	Government	14
heart.org	Organization	7
jointcommission.org	Organization	21
nccn.org	Organization	8
osha.gov	Government	12
sgna.org	Organization	7
who.int*	Organization	6

Note. Three websites aap.org*, acog.org*, and who.int* tied for 9th and 10th places.

Table 8.

Comparisons between Hospital Types

Citations	Small (*n*=350)	Large (*n*=935)	Rural (*n*=262)	Urban (*n*=1023)	Region 4 (*n*=176)	Region 6 (*n*=1109)
Average age of dated citations	(2228/311) 7.16 yr	(4187/725) 5.77 yr	(1866/225) 8.29 yr	(4549/811) 5.60 yr	(792/117) 6.76 yr	(5623/919) 6.11 yr
Books	(102/350) 29.14%	(246/935) 26.31%	(91/262) 33.73%	(257/1023) 25.12%	(36/176) 20.57%	(312/1109) 28.13%
Government documents	(111/350) 31.71%	(134/935) 14.33%	(60/262) 22.9%	(185/1023) 18.08%	(79/176) 44.88%	(166/1109) 14.96%
Product manuals	(5/350) 1.42%	(34/935) 3.63%	(5/262) 1.9%	(34/1023) 3.23%	(6/176) 3.40%	(33/1109) 2.97%
Subscription databases	(4/350) 1.14%	(16/935) 1.71%	(4/262) 1.52%	(16/1023) 1.56%	(2/176) 1.13%	(18/1109) 1.62%
EBP subscription databases		(4/16) 25%		(4/16) 25%	(1/2) 50%	(3/18) 16.66%
Websites	(20/350) 5.71%	(237/935) 25.34%	(23/262) 8.77%	(234/1023) 22.87%	(20/176) 11.36%	(237/1109) 21.37%
Journals	(98/350) 28%	(230/(35) 24.59%	(75/262) 28.62%	(253/1023) 24.73%	(24/176) 13.63%	(304/1109) 27.41%
Disciplines						
Administration	(1/98) 1.02%	(4/230) 1.73%	(2/75) 2.66%	(4/253) 1.58%	(1/24) 4.16%	(5/304) 1.64%
Law	(4/98) 4.08%		(4/75) 5.33%			(4/304) 1.31%
Medicine	(51/98) 52.04%	(146/230) 63.47%	(47/75) 62.66%	(150/253) 59.28%	(12/24) 50%	(185/304) 60.85%
Nursing	(28/98) 28.57%	(59/230) 25.65%	(9/75) 12%	(78/253) 30.83%	(7/24) 29.16%	(80/304) 26.31%
Pharmacology	(1/98) 1.02%	(7/230) 3.04%	(2/75) 2.66%	(6/253) 2.37%		(6/304) 1.97%
Public health	(12/98) 12.44%	(14/230) 6.08%	(11/75) 14.66%	(15/253) 5.92%	(2/24) 8.33%	(24/304) 7.89%
Article Type						
Clinical practice	(27/98) 27.55%	(43/230) 18.69%	(23/75) 30.66%	(47/253) 18.57%	(4/24) 16.66%	(66/304) 21.71%
EBP	(45/98) 45.91%	(110/230) 47.82%	(34/75) 45.33%	(121/253) 47.82%	(11/24) 45.83%	(144/304) 47.36%
Primary research	(22/98) 22.44%	(72/230) 31.3%	(14/75) 18.66%	(80/253) 31.62%	(9/24) 37.5%	(85/304) 27.96%
Miscellaneous	(10/350) 2.85%	(42/935) 4.49%	(4/262) 1.52%	(42/1023) 4.1%	(8/176) 4.54%	(38/1109) 3.42%

Note. EBP= Evidence-based practice. Miscellaneous items do not fit the listed

categories for citation types. Small hospitals < 100 beds. Large hospitals $\geq$ 100 beds.

Urban hospitals are in communities of $\geq$ 50,000 residents. Rural hospitals are located in

communities with < 50,000 residents. Region 4 hospitals are in Utah, Region 6 in Idaho.

Figure 1. Pyramid of Strength of Evidence
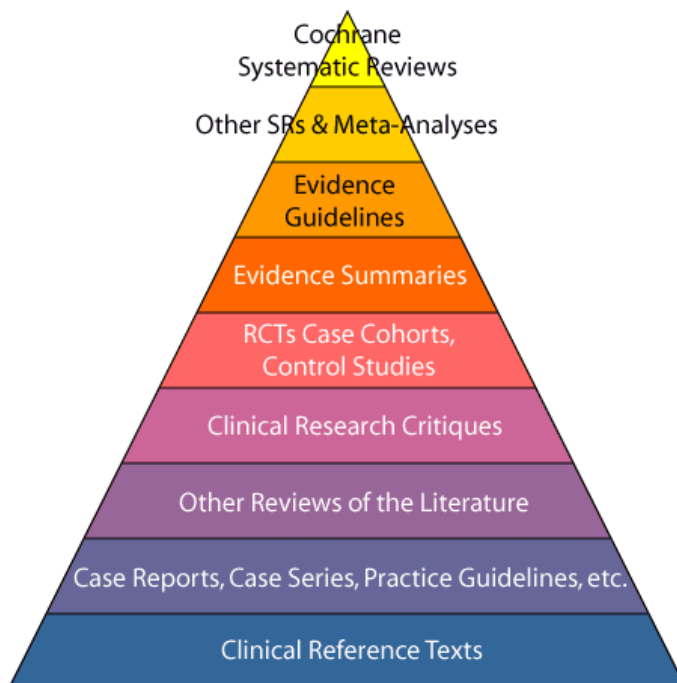
Figure 1. SR= systematic reviews. RCTs = randomized controlled trials.
Strongest evidence is at the top of the pyramid. Copyright 2013 by the University
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Figure 2. Map of Document Citations by Type of Resource
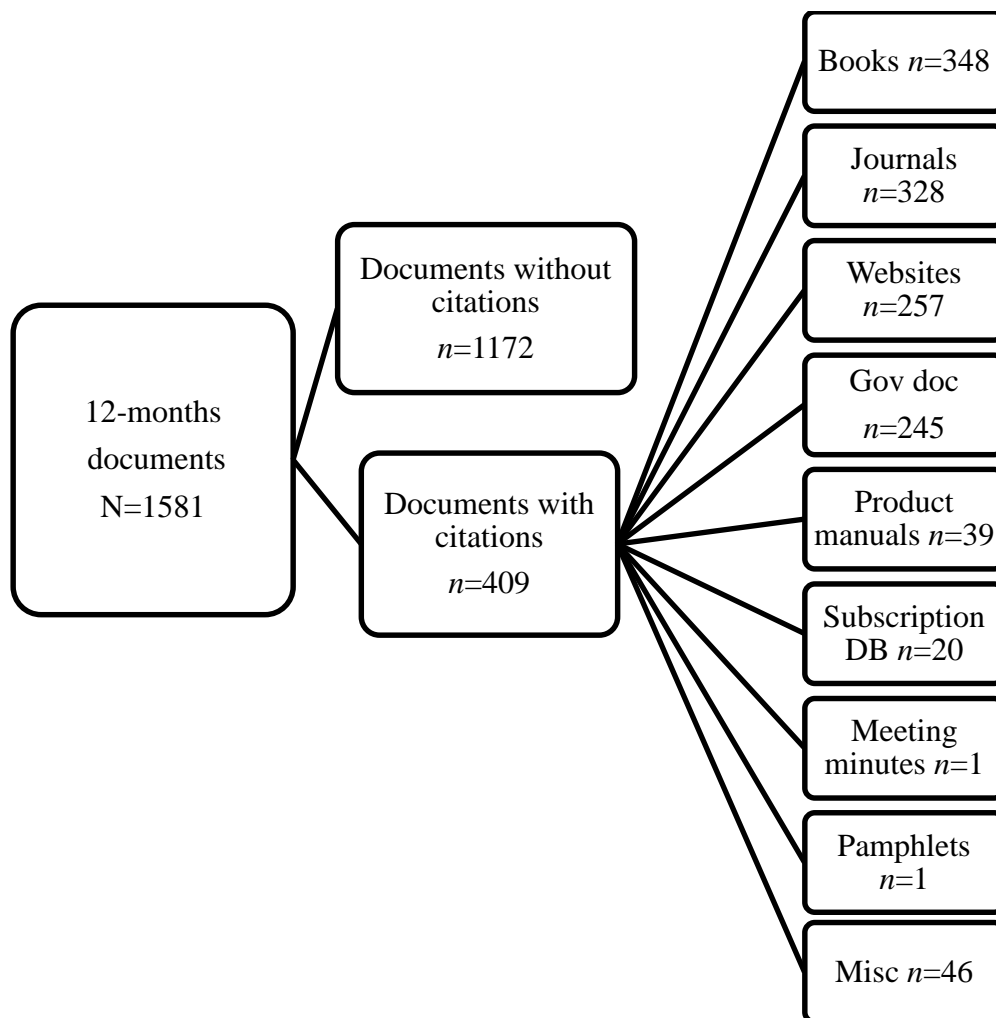
Figure 2. Citation resource types are listed in order of frequency in the pre-determined categories for the 409 documents that included citations. Gov doc= government documents. DB= database. Misc= miscellaneous types of citations that did not fit the categories above.

Figure 3. Map of 328 Journal Citations by Subject areas and Article Types
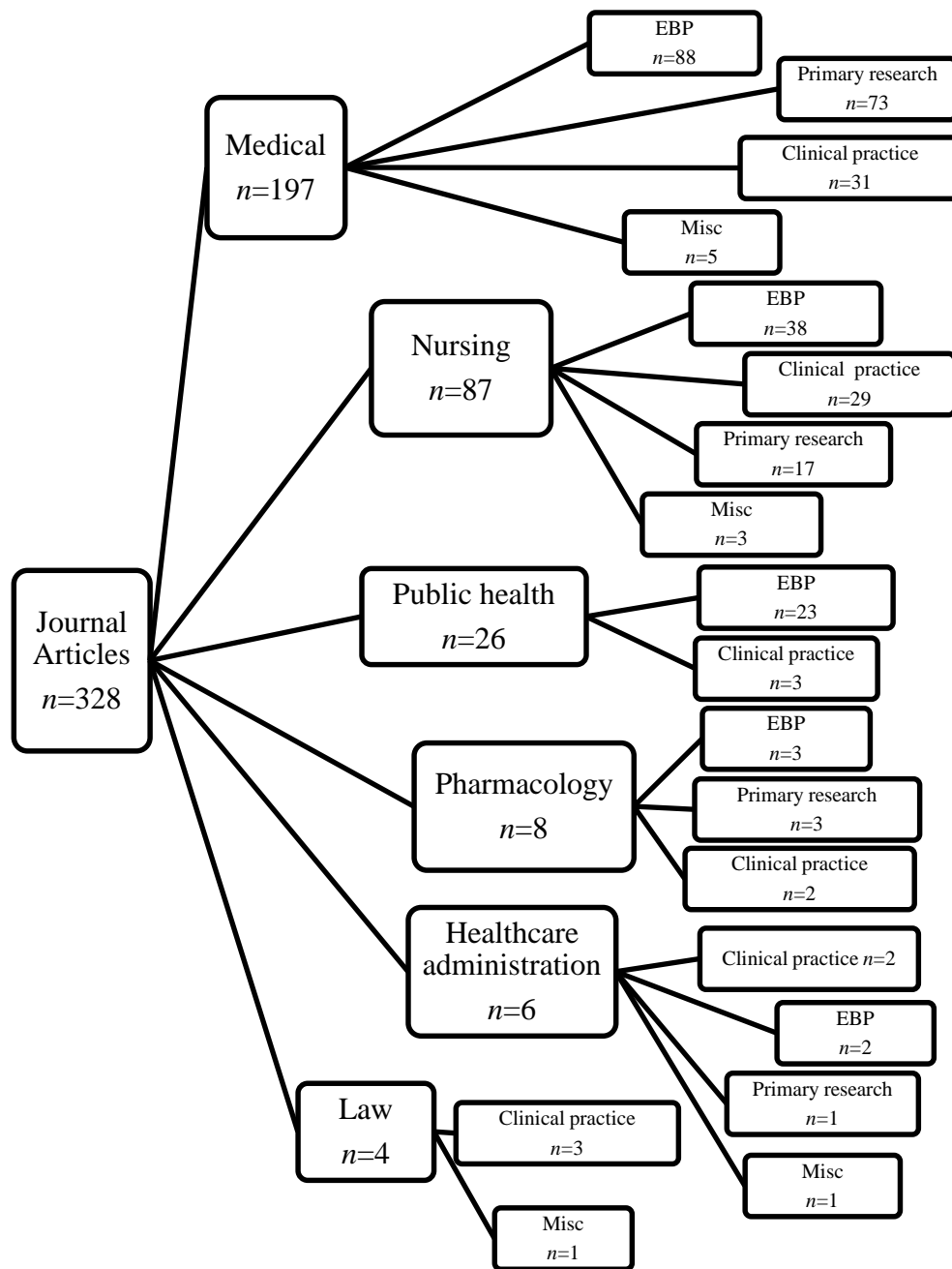
Figure 3. EBP= evidence based practice. Misc=miscellaneous articles that do not fit the listed categories.

Figure 4. Map of 1285 Citation Authors by Hospital

Created with NodeXL (http://nodexl.codeplex.com)
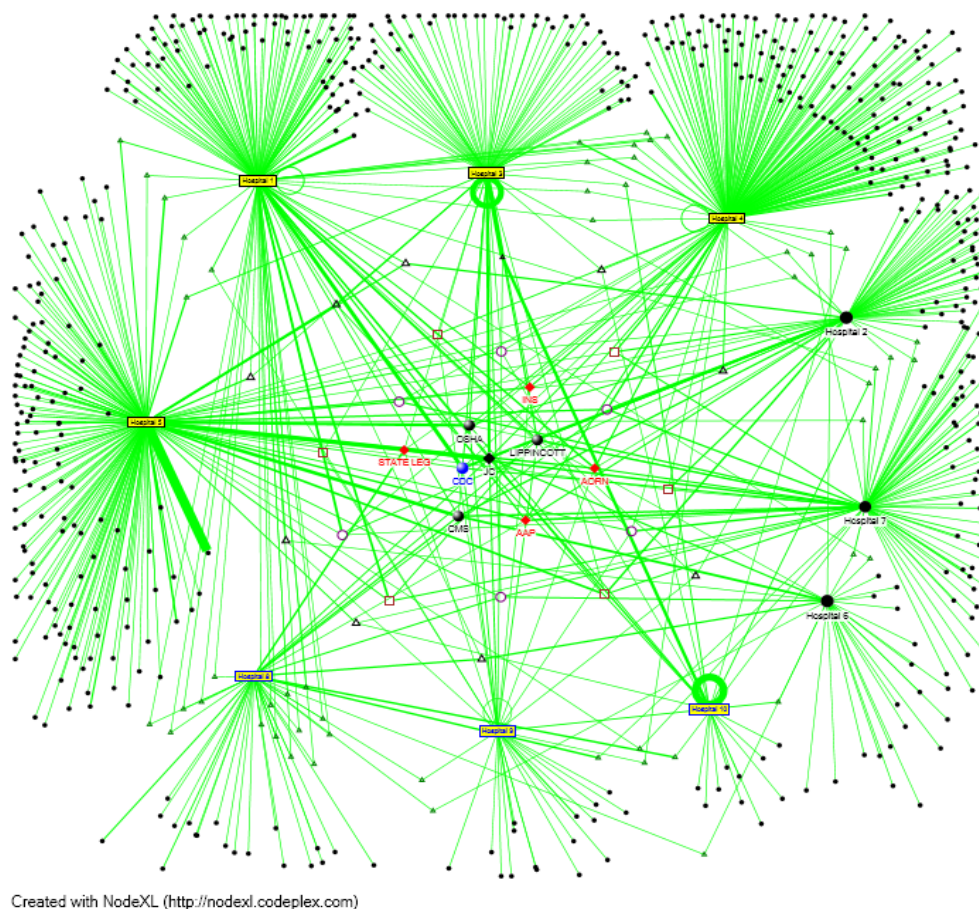
Figure 4. AAP= American Academy of Pediatrics. AORN = Association of

periOperative Registered Nurses. CDC= Centers for Disease Control and Prevention.

CMS= Centers for Medicare and Medicaid. INS= Infusion Nurses Society. JC = Joint

Commission. LIPPINCOTT= Lippincott nursing manual. OSHA= Occupational Safety

and Health Administration. State Leg= state legislature. Small dots represent unique

authors; thicker lines represent multiple citations to same author. Circular lines are self-

citations for internally authored documents at that hospital.

Figure 5. Map of Drug Therapy Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)
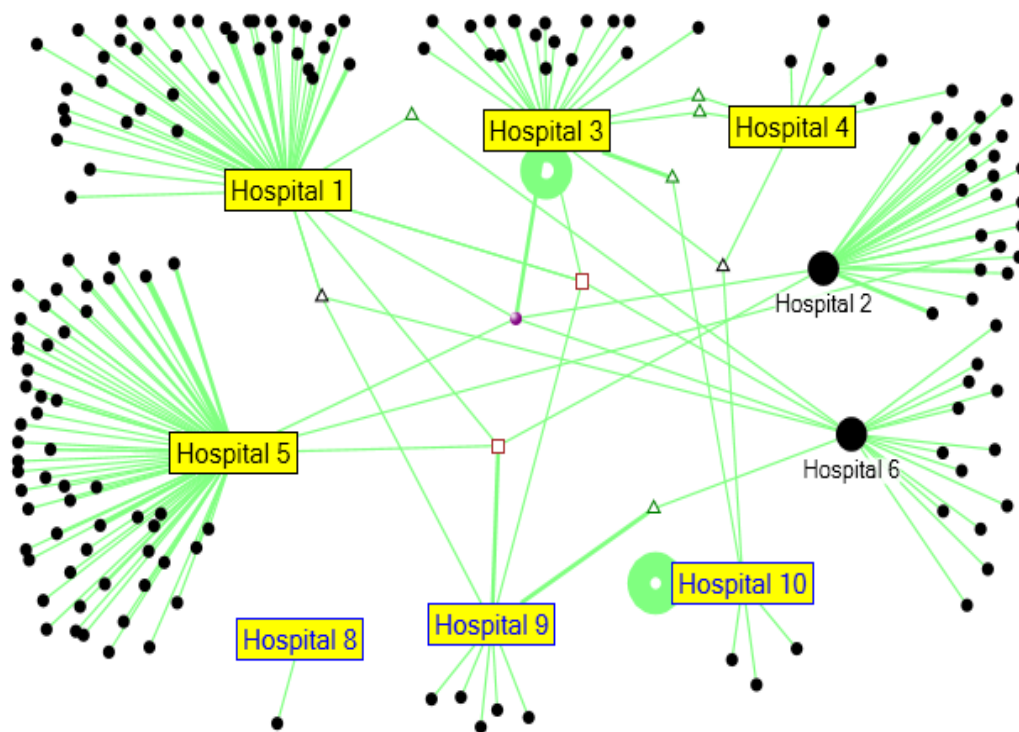
Figure 5. Small dots represent unique authors; thicker lines indicate author cited multiple times. Circular lines are self-citations for a hospital's internal documents. Triangles represent connections between two or three hospitals to the authors Agency for Health Care Policy and Research (AHCPR), American Society of Health-Systems Pharmacists (ASHSP), Kelleher, Occupational Safety and Health Administration (OSHA), McCaffery, Polovich, and White. Squares connect four hospitals to the authors Pasero and the Centers for Medicare and Medicaid (CMS). The sphere connects five hospitals to the author Joint Commission (JC). Large dot represent rural hospitals, square labels are for urban hospitals.

Figure 6. Map of Intravenous Therapy Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)
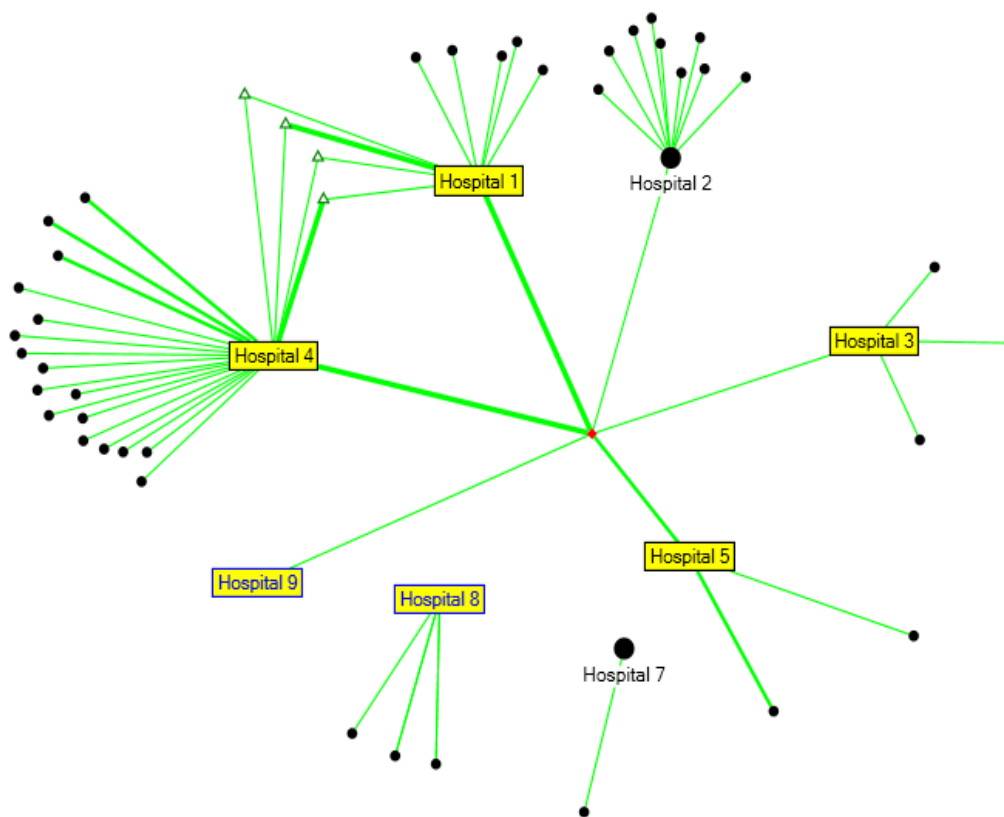
Figure 6. Small dots represent unique authors; thicker lines indicate author cited multiple times. Four triangles represent connections between two hospitals to authors CDC, Hadaway, Lynn-McHale, and Wiegand. The diamond connects six hospitals to the author Infusion Nursing Society. Rectangular hospital label indicates urban locations; black disc next to hospital indicates rural location.

Figure 7. Map of Devices Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)
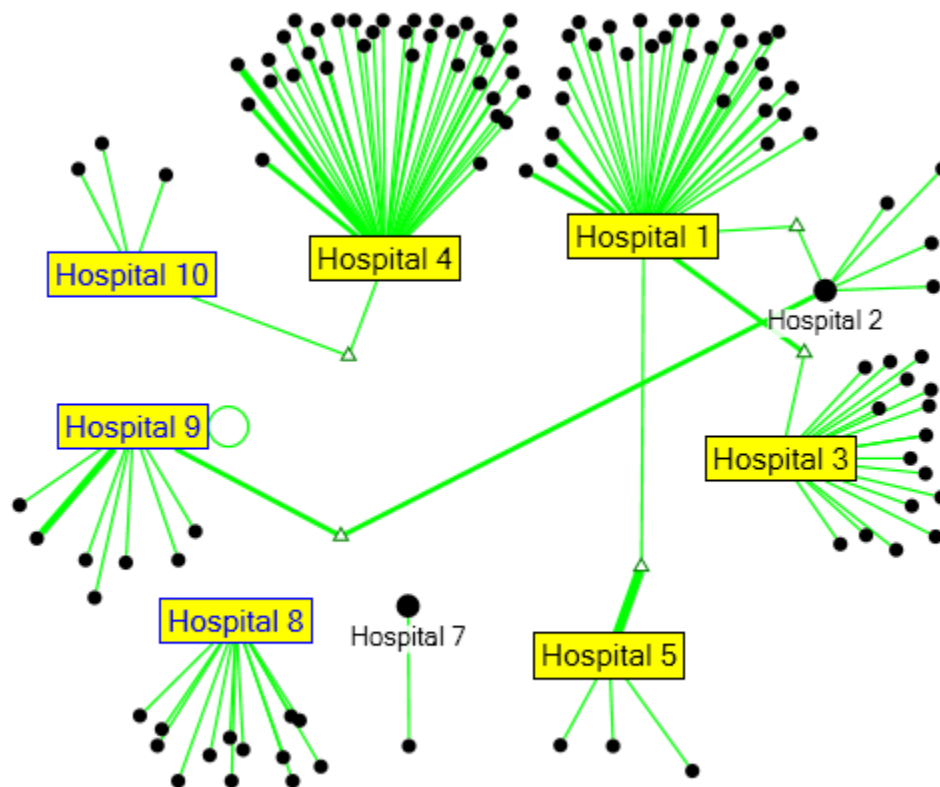
Figure 7. Small black dots represent unique authors; thicker lines indicate author was cited multiple times. Circular lines are self-citations for a hospital's internal documents. Five triangles represent connections between two hospitals to the authors, American National Standards Institute (ANSI), Centers for Disease Control and Prevention (CDC), Drew, Occupational Safety and Health Administration (OSHA), and the Society of Gastroenterology Nurses and Associates (SGNA). Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.

Figure 8. Map of Emergency Citation Authors
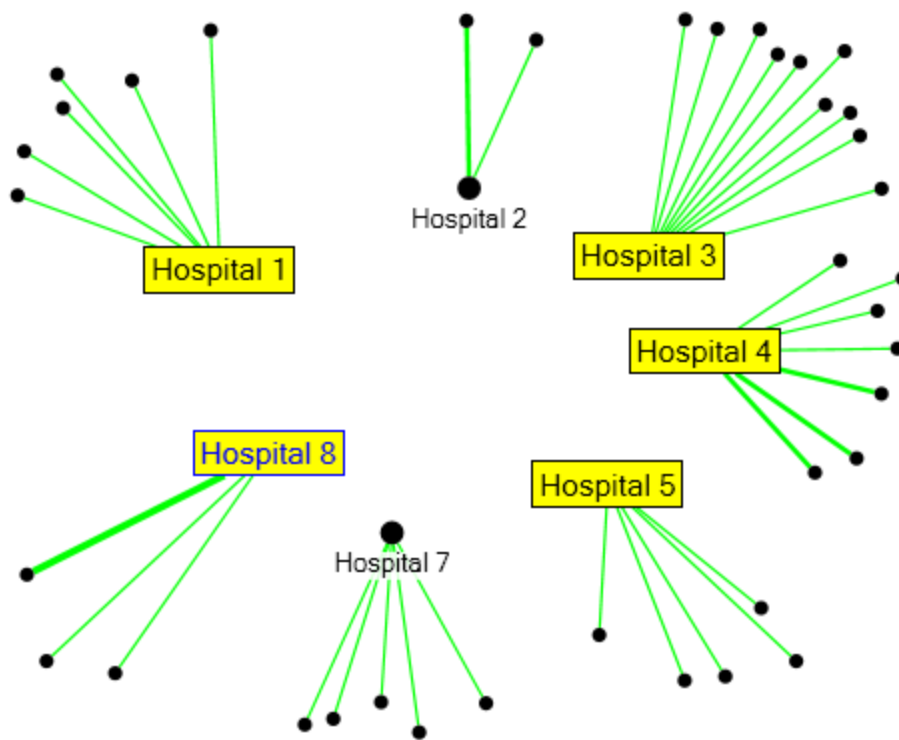

Created with NodeXL (http://nodexl.codeplex.com)
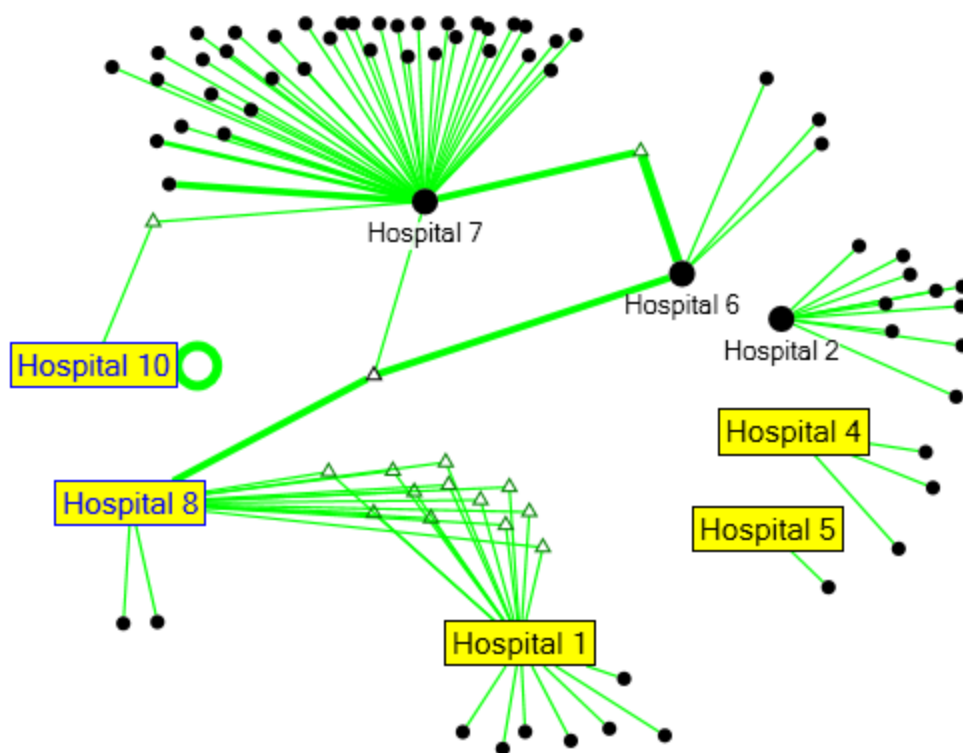
Figure 8. Small dots represent unique authors; thicker lines indicate author was cited multiple times. Circular lines are self-citations for a hospital's internal documents. Triangles represent connections between two hospitals to authors, Alderdice, Baker, Brewer, Centers for Medicare and Medicaid (CMS), Chamberlain, Demeritt, Donley, Emergency Nurses Association (ENA), Kapila, Maddison, Mayhew, McGaughney, Tucker, and Vossmeyer. One triangle connects three hospitals to the U. S. Congress as author. Rectangular hospital label indicates urban location, black disc next to hospital indicates rural location.

Figure 9. Map of Services Citation Authors
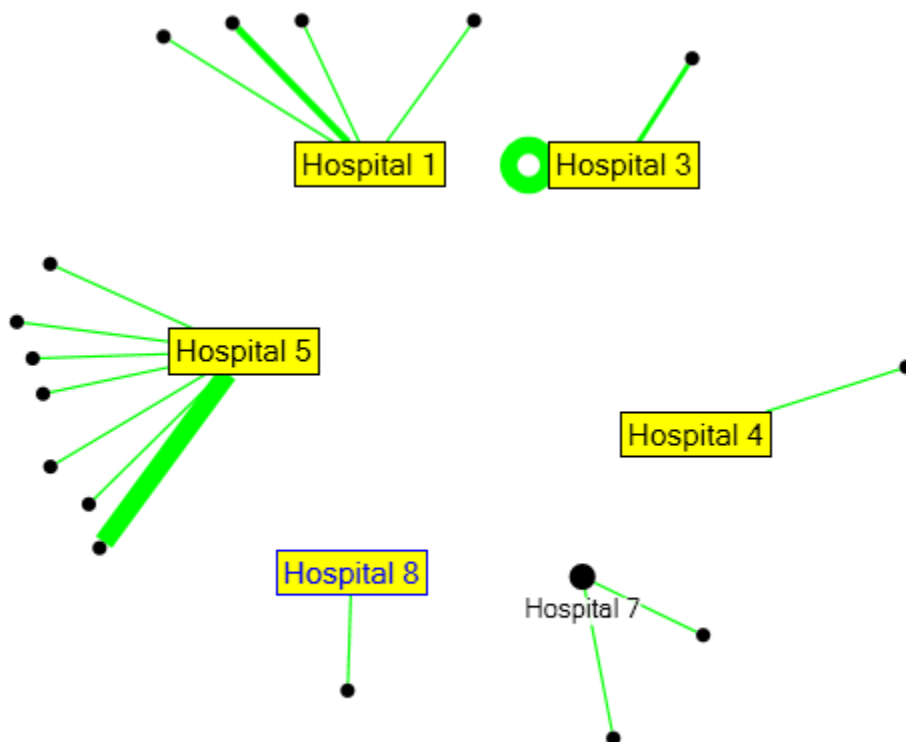

Created with NodeXL (http://nodexl.codeplex.com)
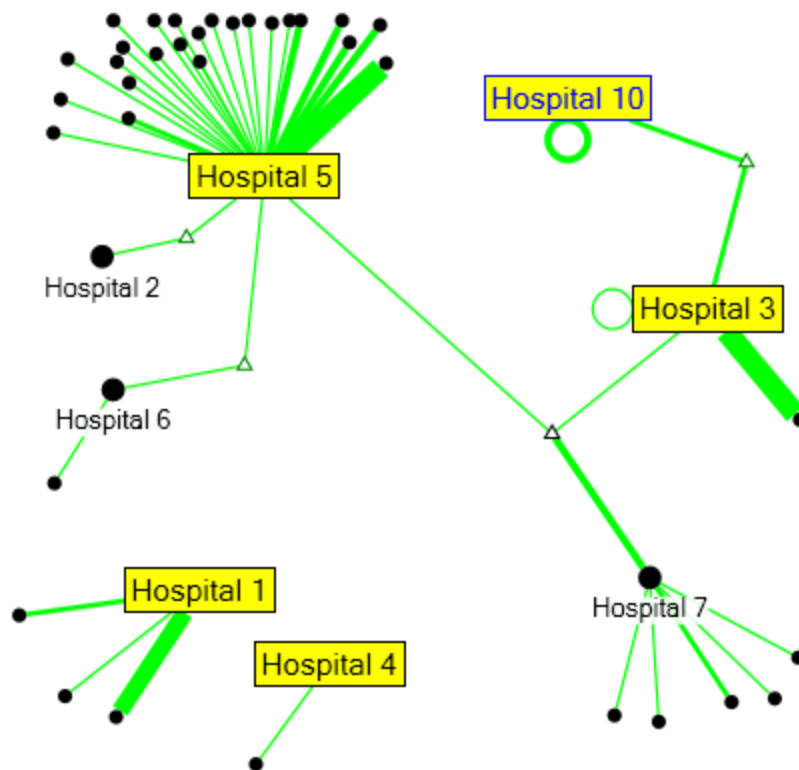
Figure 9. Small dots represent unique authors; thicker lines indicate author cited multiple times. Circular lines are self-citations for a hospital's internal documents. Triangles represent connections between two hospitals to authors American Nurses Association (ANA), state board of nursing, and the U.S. Congress. One triangle connects three hospitals to the state legislature as author. Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.
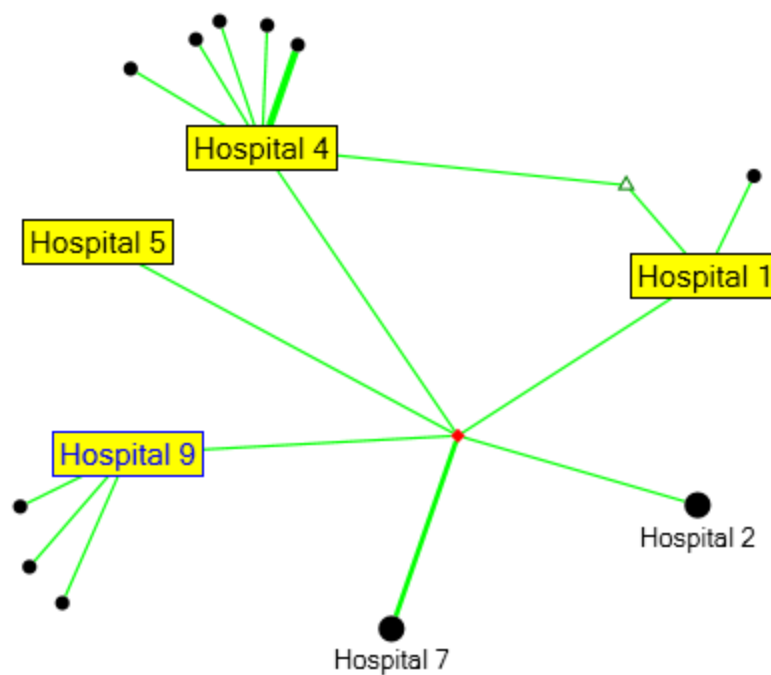
Figure 10. Map of Infant Care Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)
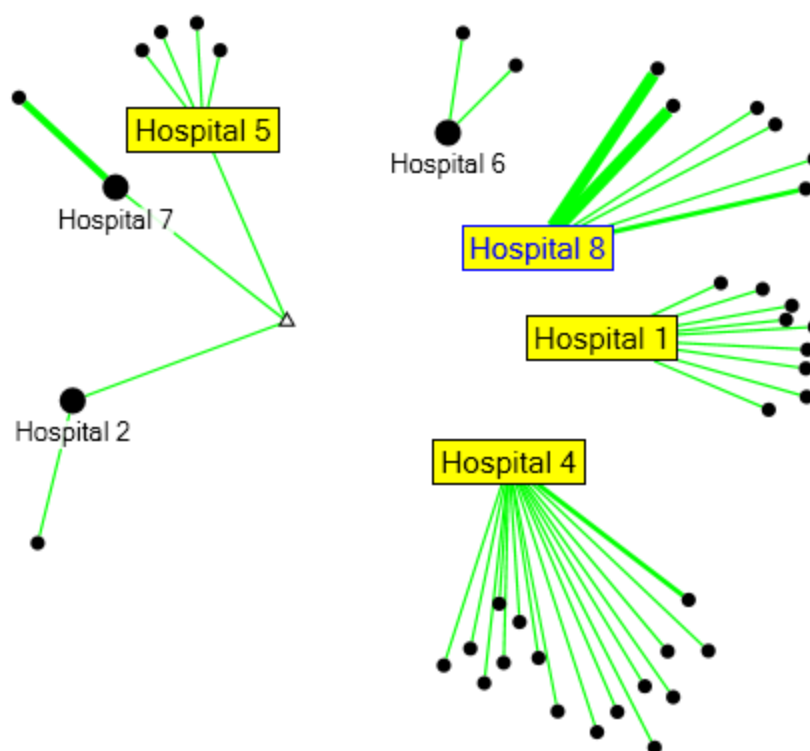
Figure 10. Small dots represent unique authors; thicker lines indicate author was cited multiple times. The triangle connects three hospitals to the America Academy of Pediatrics (AAP) as author. Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.
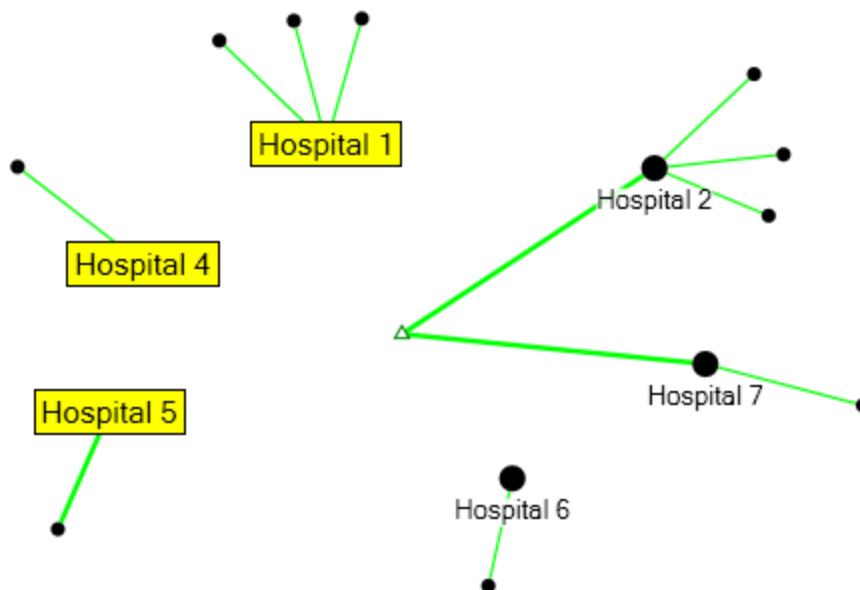
Figure 11. Map of Laboratory Tests Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)

Figure 11. Small dots represent unique authors; thicker lines indicate author was cited multiple times. Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.

Figure 12. Map of Admissions Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)

Figure 12. Small dots represent unique authors; thicker lines indicate author was cited multiple times. Circular lines are self-citations for a hospital's internal documents. Rectangular fill in hospital label indicates urban location; black disc next to hospital indicates rural location.

Figure 13. Map of Surgery Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)

Figure 13. Small dots represent unique authors; thicker lines indicate author cited multiple times. The triangles represent connections between two hospitals to the author Petersen. The diamond connects six hospitals to the author the Association of periOperative Registered Nurses (AORN). Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.

Figure 14. Map of Critical Care Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)

Figure 14. Small dots represent unique authors; thicker lines indicate author was cited multiple times. The triangle represents connections between two hospitals to the American Heart Association (AHA) author. Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.
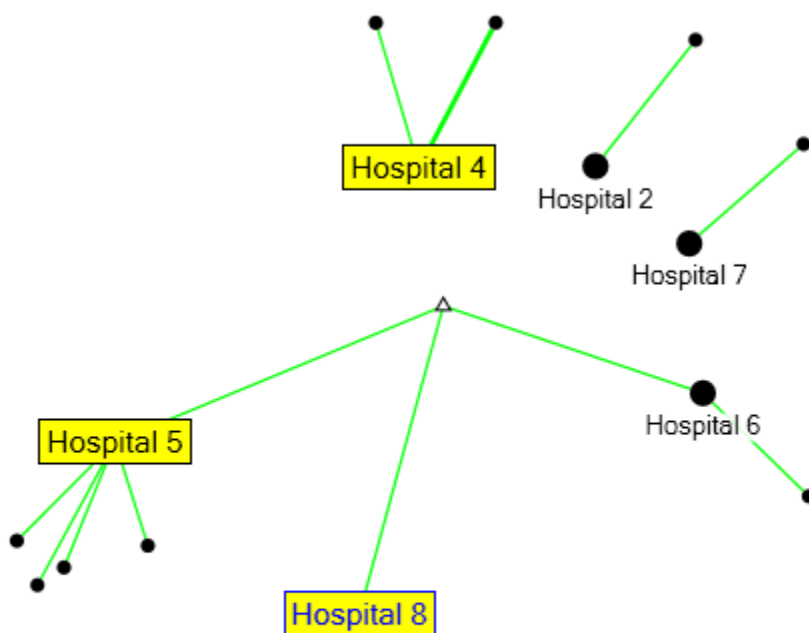
Figure 15. Map of Facility Security Citation authors

Created with NodeXL (http://nodexl.codeplex.com)
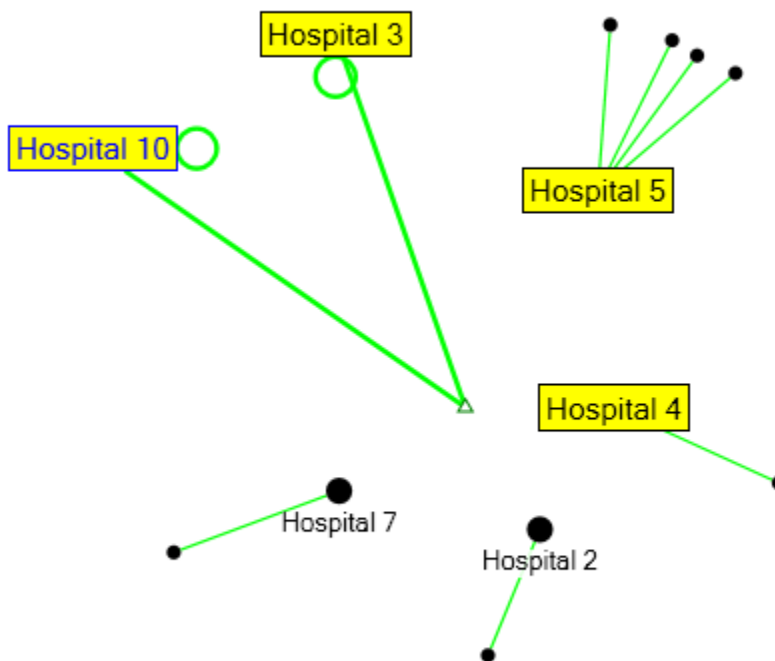
Figure 15. Small dots represent unique authors; thicker lines indicate author was cited multiple times. Circular lines are self-citations for a hospital's internal documents. The triangles represent connections between two hospitals to the author the Joint Commission (JC). Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.
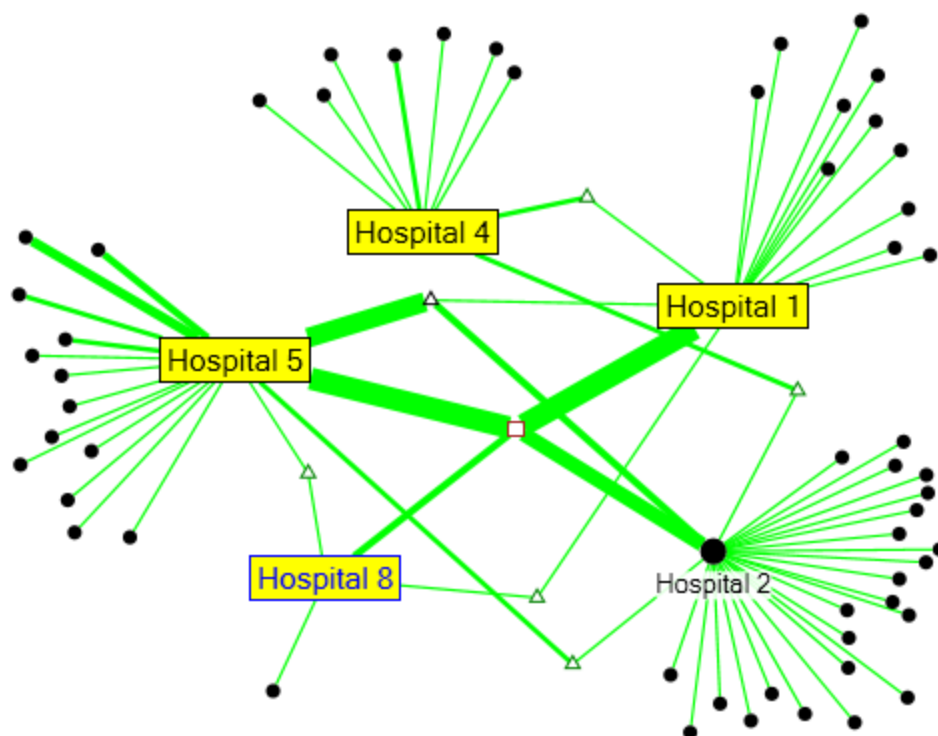
Figure 16. Map of Patient Safety Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)

Figure 16. Small dots represent unique authors; thicker lines indicate author was cited multiple times. The triangle connects three hospitals to the author Joint Commission (JC). Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.

Figure 17. Map of Infection Control Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)

Figure 17. Small dots represent unique authors; thicker lines indicate author was cited multiple times. Five triangles represent connections between two hospitals to the authors America Academy of Pediatrics (AAP), Association of periOperative Registered Nurse (AORN), Occupational Safety and Health Administration (OSHA), Siegle, and state legislatures. One triangle connects three hospitals to the Association for Professionals in Infection Control (APIC). The brown square connects four hospitals to the Centers for Disease Control and Prevention (CDC). Rectangular hospital labels indicate urban location; black disc next to hospital indicates rural location.

Figure 18. Map of Death and Dying Citation Authors

Created with NodeXL (http://nodexl.codeplex.com)
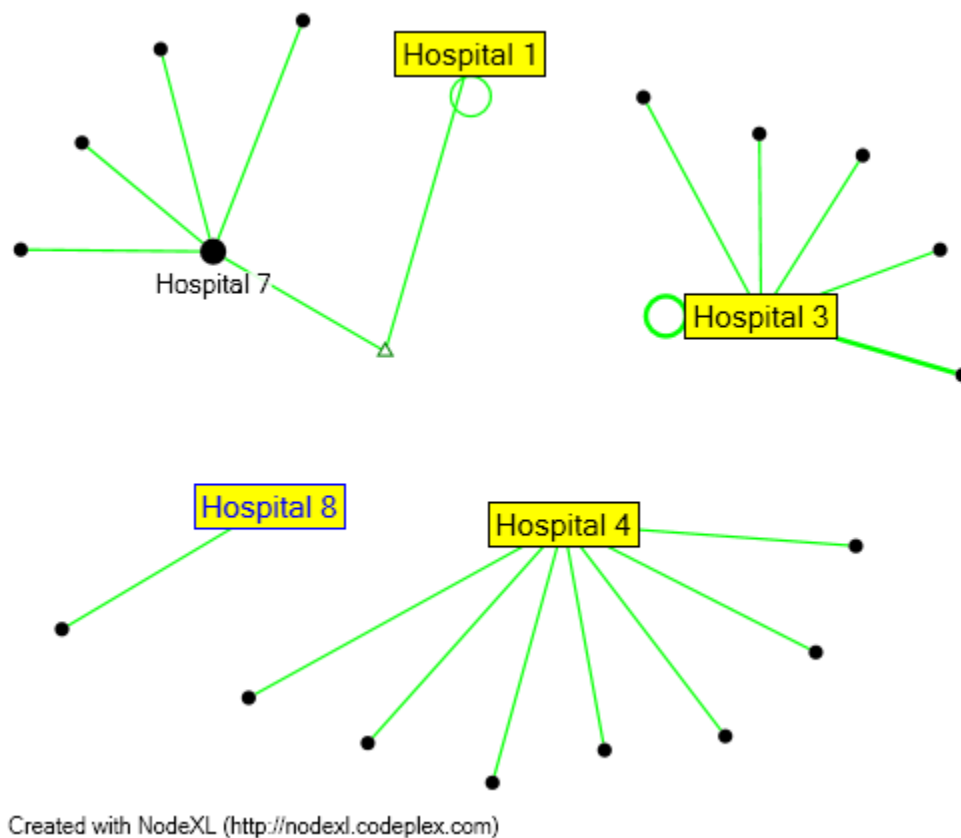
Figure 18. Small dots represent unique authors. Circular lines are self-citations for a hospital's internal documents. The triangle represents connections between two hospitals to the author the Centers for Disease Control and Prevention (CDC). Rectangular hospital label indicates urban location; black disc next to hospital indicates rural location.

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from policy and procedure documents in the

intermountain west region of the United

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