

Mapping Select Theoretical and Empirical Contributions to Understanding  
the Relationship between Caring in Nursing and Technology

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### Abstract

Although there is a long history of technology used in the healthcare environment, recent advances in healthcare technology, as well as the visibility of the technology at the patient's bedside, have initiated a debate about how technology today impacts the nurse-patient relationship. The opinions range from one group that views technology as important in creating a safe and efficient environment for patients, to another group that believes technology interferes with a nurse's ability to maintain caring therapeutic relationships with her or his patient. The ongoing inability to define who nurses are and what we do is highlighted as I explore the relationship between caring in nursing and technology in the clinical setting. This literature review, using the hermeneutic approach, has given me the opportunity to move through iterative cycles, gaining insight into my topic and clarifying information while raising more questions to be answered. As a result, other explanations emerge as to why technology and caring at present coexist in what at times appears to be an adversarial relationship. It is clear that more research into this topic is needed to help nurses achieve the balance between therapeutic caring relationships with their patients while meeting the challenges that technology creates in this environment.

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between Caring in Nursing and Technology

**Statement of Problem**

In this paper I conduct a hermeneutic literature review on the evolution of technology in nursing, a caring profession. The objective of this inquiry is to explore present knowledge relating to the coexistence of medical technology and caring relationships in the nursing environment. Most healthcare professionals agree that technology provides greater efficiency and knowledge transmission, but technology can also distract nurses from interpersonal relationships, personal contact and sharing the health experience with our patients. Technology used in health care has the potential to dehumanize, depersonalize, objectify or separate the person from the body. From this perspective, clinical environments are dehumanized by machinery and equipment that challenge the expression of caring.

In contrast, Barnard and Sandelowski (2001) suggest that rather than being a barrier to caring in the clinical environment, technology may be a strategic part of that caring. They conceptualize the stethoscope not as an instrument of diagnosis but as an extension of the ear of the caring nurse. Technology in the form of pacemakers and artificial joints becomes part of what is human. Technology is created by humans, and in some cases, such as in-vitro fertilization, technology creates life. From this perspective, technology becomes human.

My interest in technology and nursing was piqued the day I walked into the nurses' lounge and found three nurses texting on their cellular phones, oblivious to the presence of other nurses in the room. If technology has changed interactions between nursing peers, what has it done to the nurse-patient relationship? Through critical analysis of the available literature, and

synthesis of existing knowledge, I will gain an understanding of the relationship of technology and caring in nursing.

### **Definitions**

#### **Caring**

Caring has long been used to define what nurses do. If you ask the general public what nurses do, many would respond they care for patients. Nursing theorists concur, positing that the philosophy of caring is the relational core of nursing (Benner 1989; Parse 1981; Watson 1979). Caruso and Cisar (2008) define caring in nursing as a “science that is a transpersonal process between the nurse and the patient with the capacity to expand human consciousness, transcend the moment and potentiate healing” (p. 58). If you ask a nurse why she entered the profession, the typical response is “because I wanted to be part of a caring profession.” Hills and Watson (2011) believe that caring is one of the fundamental values of nursing.

As appealing and intuitive as the caring perspective on nursing is, there are critiques of this view. Such critiques posit that defining nursing as caring has the potential to obscure the competencies that accrediting bodies require a professional nurse to possess. According to this line of argument, holding to the view that nursing is caring may endanger the survival of nursing as a profession. Gordon and Nelson (2006) express the need for an accurate public understanding of nursing’s role in patient care in addition to the scientific knowledge and clinical skills of nurses. Although caring exists in all professions, concerns arise that the focus on feelings and relational practice in nursing fails to give credit to nurses’ scientific and medical knowledge, including skills that are foundational to patient care. Whatever the outcome of the debate, technology and caring will remain as key components of nursing.

**Technology**

The use of technology in the patient care environment has become common. Nursing practice settings include technology in the form of instruments of assessment, diagnosis, monitoring and documentation. Rogers (2011) states that technological innovations often come with desirable and undesirable consequences that are not initially understood when adopting the new technology. Nursing has been revolutionized by the ability to view a patient's heart rate at a glance, obtain a blood pressure within seconds and check blood sugar within minutes.

Technology offers the nurse tools for quick, accurate and comprehensive assessment strategic for quality patient care. However, in my experience, introduction of technology in the clinical environment has been stressful and time consuming. Is this negative perception of technology supported in the research?

**Background**

Nursing has been transformed over the last three decades, leaving behind the white uniforms, caps and mercury thermometers that traditionally were symbols of the profession. Although nurses' appearance has changed, the common value of caring remains the guiding principle in nursing. Caring has historically been viewed by the public as the foundation of the nursing profession (McDaniel, 2003).

However, within the profession there exists a body of scientific knowledge and technological competencies that is seldom acknowledged as part of nursing. Technology has the potential to advance patient care and safety as well as manage knowledge growth (Buckner & Gregory, 2011). According to Buckner & Gregory's study showed that nurses experience frustration with the use of technology and express concerns about the time that technology required, distracting them from, and limiting interactions with, patients. But how does a practice

based on caring exist in an environment that focuses on safety and quality improvement?

Jackson (2012) also holds the view that technology can be “isolating and depersonalizing.”(p.72). Jackson describes how caring relationships can be tricky with technology in between, using the example of charting at the patient’s bedside while focusing on the monitor. Used without sufficient reflection, technology can create conflict that limits therapeutic interactions and caring.

A historical view of technology in the nursing environment shows an increasing presence of medical technology over the years. Historians believe that technology in the form of clinical thermometers appeared in the practice setting in the 1870s. Although, at first glance, nurses may not consider telephones revolutionary medical technology (introduced in the early 1900s), their contribution to communication in the practice setting was and remains crucial—consider the importance of telephone lines supporting internet service, telephone therapy (assessing patients over the phone), e-Health (universal access to health records) and tele-health (on-line support to health information). The mid-20th century saw the introduction of cardiac monitors, ventilators and renal dialysis as well as Gomco suction, pleur-evacs for chest tubes, and oxygen tents, to name a few. After World War II the use of cardiac monitors evolved, and vital sign monitor machines were introduced in the practice setting. Technology such as chest tubes, needles, IV pumps, pain pumps, and wound care have become so common in our practice setting we forget the science and technology that was instrumental in their development.

Barnard (2002) believes that nurses’ understanding of the “experience, meaning and implications of technology” (p. 15) will be instrumental if we are to gain insight into the healthcare experience for our patients. He also raises the issue that nurses as major consumers of healthcare technology need to be aware of the epistemological, ontological and ethical

challenges of technology. Barnard explores technology from two perspectives: engineering and humanities. The engineering perspective views technology from the mechanical viewpoint, separating the ontology of the machine and the human experience into two entities. For example, an engineering perspective of radiation treatment for a cancer patient would focus on the equipment, monitors and protective equipment, and not the experience of the patient. The humanities perspective would include the technical aspect but also incorporates the relational perspective of the patient receiving the treatment. Does this mean that technology and caring view the human experience from opposite positions?

### **Purpose and Objectives of Proposed Project**

Some administrators believe that technology used by nurses gives nurses more time to interact with their patients, but nurses can find it challenging to balance their duty to check and maintain equipment while simultaneously trying to sustain caring relationships. By undertaking this project, I have the opportunity to advance my knowledge of the relationship between technology and caring in nursing by critiquing and synthesizing research through a literature review. The purpose of the project is to review the research and discuss the current available knowledge. My objectives are to:

- (1) Describe the hermeneutic framework for this literature review.
- (2) Critically appraise the evidence relating to caring and technology in nursing.
- (3) Identify its relevance of for nursing practice.

This literature review will deepen my understanding about the relationship between caring and technology in nursing, and relevant findings will inform my practice.

### **Significance of Project for Nursing**

Technology can increase safety and efficiency in the healthcare environment. Alarms alert nurses to a dropping blood pressure, and a temperature can be taken in seconds. However, as technology's presence in the healthcare environment continues to expand rapidly, nurses must be aware of the challenges that a highly technological environment presents to caring, interpersonal interactions. My literature review will highlight new knowledge and understanding of the relationship between technology and nursing practice, examining technological influences on caring relationships as we strive for patient-centred care. New knowledge and perspective of the topic will emerge as I interact with the text. This project offers the opportunity for professional growth while contributing to our discipline.

### **Theoretical Perspective**

Caring and technology are often viewed as separate ends of the continuum of the humanist approach to nursing. Sandelowski (1999) reflects on the view of nursing as a feminine, caring service while technology is male and powerful, putting one at odds with the other. Barnard and Sandelowski (2001) suggest that the divide between humane care and technology may be the result of social construction rather than an actual difference. We know that caring is a core value of nursing, and we know that technology in the nursing environment has brought safety, efficiency and knowledge of patients (Tunlind et al, 2014), but my understanding of how technology influences caring in practice is limited to my personal practice.

The branch philosophy known as hermeneutics is concerned with the process of creating understanding by interpreting the literature (Boell & Cecez-Kecmanovic, 2014). The purpose of the literature review is to interpret and understand the text relevant to an area of interest. Starting

with a process of examining existing knowledge or prejudice, the literature review offers the opportunity to develop new knowledge and understanding of a topic of interest. Hermeneutics is concerned with the interpretation of texts, which creates a foundation to develop understanding of a topic through a literature review. For the purpose of this paper, I will use the hermeneutic process and method of inquiry to further understand of the relationship between technology and caring (see Appendix E).

I will use the hermeneutic framework to search for, analyze and interpret the literature for my literature review. The hermeneutic process for conducting literature reviews flows from pre-understanding to understanding. The hermeneutic framework supports the inclusion of both empirical and theoretical literature, and engaging with both types of literature contributes to my understanding of the relationship between caring in nursing and technology. The hermeneutic framework for the literature review is an iterative process, moving through the search and acquisition circle and the analysis and interpretation circle. As my previous experience and understanding of technology has been stressful and frustrating, it has left me with a negative view of technology in the clinical environment. Rodgers (2005) believes that biases can be enabling or a barrier to understanding a topic, so during the pre-understanding stage of the literature review, I engaged in reflection to surface my biases. By deepening our awareness of our biases, we can become open to new meaning (Boell & Cecez-Kecmanovic, 2014). The hermeneutic approach will offer the opportunity to view technology and caring from the lived experience of other nurses and expert opinions of other authors. My preliminary search for articles refined my pre-understanding to give me a wider perspective and create a comprehensive understanding of technology and caring in nursing.

The hermeneutic process, commonly referred to as the hermeneutic circle, moves from examining parts to examining the whole, then re-examining parts in relation to the whole in order to interpret the overall meaning, thus the circle metaphor. For the purpose of this comprehensive review, the articles were chosen based on their relevance to the topic and the quality of the research. Then I examined the articles, scrutinizing the authors' writing to get their impression of technology and caring in nursing and to assimilate understanding of the topic. After my analytic reading of the articles, themes emerged in the articles which I contrasted and compared. Hermeneutics refers to this as texts talking to each other (Boell & Cecez-Kecmanovic, 2014). In the final examination of the text, I viewed elements of the article as a whole, observing language and organization to determine the message and motive of the author (Boell & Cecez-Kecmanovic, 2014). The hermeneutic approach described above provides the framework to interpret the research and refine my pre-understanding, uncovering new meanings of relationships between caring and technology in nursing.

### **Approach to Inquiry**

The hermeneutic framework has two circles: 1) search and acquisition, and 2) analysis and interpretation (Boell & Cecez-Kecmanovic, 2014). The link between the two circles is analytical reading and interpretation of the text. During the literature review I moved back and forth through both circles gaining knowledge and insight into my topic. My initial question is: How does technology in the nursing environment influence caring relationships between nurse and patient?

### **Search and Acquisition Circle**

The search and acquisition circle is the inner circle and consists of seven key steps: searching, sorting, selecting, acquiring, reading, identifying and refining (Boell & Cecez-

Kecmanovic, 2014). CINAHL and PUBMED were used for the initial literature search using the following search terms: caring, nurse-patient relations, nursing care, nursing role, nursing assessment, touch, monitoring-physiologic- equipment and supplies, humanism, empathy and nurse's practice patterns. This preliminary search presented an opportunity to engage with articles, gaining knowledge of the topic, identifying and retrieving articles frequently cited, and identifying future search terms. Articles were selected according to the following inclusion criteria:

- Published within the last 10 years to offer a more recent view of the progression of technology over a decade in nursing
- Written in English
- Focus on nursing and nurses
- Peer-reviewed
- Published in professional nursing journals
- Focus on nursing and technology

My first cycle of the literature search revealed articles specifically related to caring and technology, and although the initial literature search did not add to the focus of my topic (the relationship between technology and caring), it gave me the opportunity to develop deeper knowledge of how caring and technology relating to nursing are defined in the research. My second literature search and journey through the search and acquisition phase of the hermeneutic framework focused on the relationship between technology and caring for nurses in the healthcare setting, and revealed articles that I have included as the bases of this study. I found many of the articles referenced in my critiqued articles that helped give clarity to my topic. These articles were outside my inclusion criteria as they were not current, but they gave an

understanding of how technology has evolved in nursing and an insight into the research that has resulted due to this evolution of technology. From this hermeneutic literature review I increased my insight into technology and technology's influence on nursing practice, while recognizing the need for further research or policy development.

### **Studying the Parts**

#### **Analysis and Interpretation Circle**

Analysis and interpretation is the wider circle, which moves through six activities: reading, mapping and classifying, critical assessment, argument development, research problem/question development and continuous searching (Boell & Cecez-Kecmanovic, 2014). When using the hermeneutic approach for a literature review, it is recommended that one selects small numbers of relevant articles rather than large numbers of documents that may not be as pertinent to your topic. I selected my articles by critically appraising the literature using Johns Hopkins Nursing Evidence-Based Research and Non-Research Evidence Appraisal Tools (Newhouse et al, 2007) (Appendix A, B). Following the critique of the research, I used the assessment summary tool developed by Johns Hopkins University (Newhouse et al., 2007). This tool allows documentation of the evidence of the selected articles, organizing themes pertaining to the research question.

Reading is the first stage of the analysis and interpretation circle. Reading moves from initial understanding to in-depth reading of the selected articles. Boell and Cecez-Kecmanovic (2014) refer to this process of reading as analytic reading, which interprets and understands the selected articles. For the next step, the mapping and classifying stage, I examined the selected articles to identify patterns, themes and/or relationships. I compared these articles looking for

other common subgroups that may be emerging in the summary to be included in the data analysis. The critical assessment stage of the literature review focuses on moving patterns and relationships into generalizations while ensuring that no data or evidence is excluded. I am aware of conflicting opinions in the literature regarding my search topic, so it is imperative I include all themes and subthemes extracted from the selected articles. The goal is to reach a point of saturation, where further research leads to familiar arguments or information, with cited references that are familiar to my review. I found many of my selected articles referenced in other articles. The argument development follows from the critical assessment stage and focuses on finding research gaps or inconsistencies with present knowledge. My initial pre-understanding of the question was challenged and new perspectives became visible. The final stage is the Research Problem and Questions. This is the stage where I questioned whether the problem is not the compatibility of technology and caring in the nursing environment but the barriers that prevent nurses from developing the caring relationships in the technological environment.

The hermeneutic literature review is not a linear process but an iterative process that offers the opportunity to engage and re-engage with new literature. I moved back and forth through both the search and acquisition circle and the analysis and interpretative circle, providing clarity and knowledge of my topic.

Seven qualitative studies and five non-research studies met my inclusion criteria and were rated “good” on the Johns Hopkins Nursing Evidence-Based Practice appraisal tools. Having completed my critical assessment of the selected research articles, I critically engaged with the research to further my understanding of my literature review topic. In this section I present a summary of each of the articles that contributed to my final argument development. Please see Appendix C for additional detail.

## Research Studies

*Caring and technology in an intensive care unit: an ethnographic study*, by A. Price (2013). The objective of this qualitative ethnographic study was to examine the behaviours of nurses in their cultural environment, the intensive care unit (ICU). Separating technology and caring in the context of the intensive care environment proved difficult for the author of this study. The main theme that evolved from my reading of this study was the *crafting process* for nurses, which Price defined as the skills and attention to detail needed to care for their patients using the technology within that environment.

The sub-themes that emerged were *vigilance*, *focus of attention*, *being present and expectations*. *Vigilance* included the nurses' ability to assess patients, prioritizing their needs while creating the plan of care using knowledge and skills within the practice setting. Nurses described several elements that could take their *focus of attention* away from their patients. These included the alarms on machines as well as the needs of other colleagues, families and patients. The theme of *being present* emphasized the communication, both verbal and non-verbal, and the skill needed to build empathy and relationships with the patient. The final sub-theme, *expectations*, was evident in the cultural pressures to adhere to timelines and to appear busy at all times.

The author of this study was unable to separate the concepts of caring and technology and found the concepts entwined in practice. The study included not only nurses but also a physician and two physiotherapists. One conclusion which is an ongoing debate is that caring is not isolated to nursing and that other healthcare professional's care in their practice. Further findings emphasized the fact that, in addition to technology, individuals and organizations impact the ability to care within the nurse-patient relationship.

*The challenges of caring in a technological environment: critical care nurses' experience*, by M. McGrath (2008). This phenomenological research study focused on nurses' practice in a technological environment. The researcher considered how nurse's previous experiences influenced present behaviours.

In my analysis of this study, three themes were apparent: alien environment, pulling together and sharing the journey. *Alien environment* described how the technology that was present in the environment was unfamiliar to the patients. *Pulling together* emphasized the importance of sharing technological knowledge and expertise. *Sharing the journey* illustrated the interconnectivity of nurse, family and patient. Each of the three themes also had sub-themes, described below.

The alien environment had three sub-themes, existing in an alien environment, embracing technology and creating a home. Existing in an alien environment focused on the unnaturalness of caring for patients who are "depersonalized and controlled" (McGrath, 2008, p. 1100) by technology. *Embracing technology* acknowledged that technology can be part of the practice of caring for the patient, especially for the more experienced nurse who has developed technological competencies. *Creating a home* described how nurses in this study felt job satisfaction by creating an environment in which patients and families felt comfortable and safe, similar to being at home.

*Pulling together* had two sub-themes: *giving support* and *sharing experience*. *Giving support* referred to occasions when more experienced nurses sharing technological knowledge and skills with less experienced nurses with a view of ensuring that the patient was kept at the centre of care. *Sharing experience* is a hallmark of nursing in a highly technological and highly charged care environment as nurses rely on each other when giving complex care in uncertain

situations in which technology is central to medical care. Participants emphasized that while it is important to support less experienced nurses, more experienced nurses also rely on the expertise of their peers in complex situations.

*Sharing the journey* had three sub-themes: *uncertainty, suffering and acceptance*. The *uncertainty* of the outcome of patient care brings the nurse closer to her patient, sharing in the satisfaction of a positive recovery or the disappointment, frustration and/ or sadness when an outcome is less successful. Caring for patients who are surrounded by technology but *suffering* is difficult for the nurse. Nurses often have to *accept* that the outcome is not going to be one of recovery, and they derive well-being from the ability to provide comfort through their nursing care. Nurses in this study talked about rituals of letting go that the nurses and families share together.

The interpretations of this study emphasized the positive /negative debate continues with the relationship between technology and caring for nurses. Nurses were the key to bringing caring and comfort to the patient and family in what is described as an alien technological environment. This study emphasized how nurses who have become experts with technology are able to create a home for their patients as well as a support system for their peers and less experienced nurses. Technology is also described as dehumanizing and invasive for the patient, and nurses struggle to maintain a balance between caring and the invasive and unnaturalness of technology. Experienced nurses were able to look beyond the technology and care for the patient and family.

*Caught in an artificial split: a phenomenological study of being a caregiver in the technologically intense environment*, by S. Almerud, R.J. Alapack, B. Fridlund and M. Ekeburgh (2008). This phenomenological study took place in an ICU setting. Three themes emerged:

*mastery or servitude under technology, being secure in insecurity and insecure in security, and making the human technological and the technology human.*

The first theme, *mastery or servitude under technology*, reflected on the need for ICU nurses to master the technology by becoming competent or having expert knowledge of the technology available in their healthcare environment. Nurses said that often the training was inadequate and the nurse was left to develop new knowledge and skills for the technology while carrying heavy clinical workloads. Nurses recognized that technology does not always provide a complete or accurate clinical picture of the patient, and they have to trust their intuition and knowledge when this is opposite to what the technology is revealing. Patients' feelings are overshadowed by data that indicates that vital signs are good, the laboratory results are normal and the diagnostic tests show improvement. Nurses often struggle to ensure that patient's feelings are considered relative to technologically generated data.

The second theme, *being secure in insecurity and insecure in security*, relates to the notion a nurse's mastery of technology gives the nurse a sense of control but real security for a nurse is a combination of experience founded in theoretical competence. A nurse relies on clinical judgement when observations differ from the information technology is relaying regarding the patient. For example the monitor maybe alarming indicating the patient does not have a heart rate but on observation the patient is sitting in his chair conversing with his family. Nurses often feel insecure in changing a treatment regime if it contradicted what the previous nurse had done. The nurses in this study relayed feeling insecure if they did not document technological procedures to prove to their colleagues that they had completed all their duties on that shift. Prestige for nurses often came from conquering technological competencies rather than comforting a patient or family. Nurses expressed concerns of feeling inadequate and insecure

dealing with patients' families often finding security dealing with the more familiar technological aspects of patient care. Nurses also felt that they gave a lot of themselves to the patient but felt insecure and powerless as they rarely received validation for their care. One nurse summarized this feeling as giving a lot of yourself to the patient and then you never know how your care contributed to the patient's comfort or recovery.

The third theme, *making the human technological and the technology human*, relates to the concern nurses expressed about the amount of time and space in their daily routines dedicated to the technology. The time spent focused on technology limits nurses availability to be emotionally close with their patients. One nurse talked about having to fix the alarms, which delayed the opportunity to comfort their patient. The nurses also reflected on how, as their experience increases, they are able to move away from focusing on the technology and to view and be with the patient.

This article portrayed technology as inhuman and a barrier to being with the patient. Nurses were seen as balancing their time between caring for the technology and caring for the patient. Patients are attached to technology which displays objective measurements strategic to determining patient care. As nurses gain experience and master the technology, they gain control of the patient environment, creating a secure environment while also crafting the ability to focus on the patient. Nurses in the technologically intense environment recognizes when to focus on the information provided by technology and when to focus on the patient.

*Being in front of the patient: Nurse-patient interaction and use of technology in emergency services*, by Y. Granados-Pemberty and M. Arias-Valencia (2013). Four themes emerged from this qualitative research study: *interaction, care and mediations; difficulties in interaction; dual mediations*; and the *indispensable nature of technology*.

For this first theme, *interaction, care and mediations*, the authors analyzed data relative to three levels of interaction: direct care, fairly direct care and indirect care. These three levels of care were on a continuum from a physical presence with the patient to administrative tasks, such as checking on diagnostic results or dealing with process issues. The authors' conclusion was that as interaction with the patient diminishes, reliance on technology increases.

The second theme, *difficulties in interaction*, revealed that in emergency situations the opportunity for feedback and interactions decreased between the nurse and patient. The need to respond to technology during an emergency situation drew the nurse to the patient, interaction between the nurse and the patient decreased as the patient became unstable. Nurses found competing duties such as answering phones, scheduling and other non-nursing duties to be in direct conflict with the time needed to interact with the patient.

The third theme, *dual mediations*, spoke to the value of the nurses and the importance of the technology. Dualities against technology describe technology as positive or negative depends on who uses it and for what purpose. For example one nurse uses technology to get close to her patient while another nurses uses technology to quickly complete her tasks. Technology cannot replace nursing care but helps the nurse by providing information to assist with patient care decisions. The mediation of technology assists nurses in caring for and interacting with their patients.

The fourth theme, *the indispensable nature of technology*, described how nurses cannot imagine work without today's technology. They talked about not knowing how to care for their patients if the technological resources were not available. Participants in the study felt that interaction between them and the patient and family members occurs concurrent with the use of

technology. From this perspective, technology was seen as creating the opportunity for nurses to interact with the patient while checking and maintaining the technology.

This study recognized the duality of the inhuman/human perspectives of technology in the patient care area. The authors acknowledged that nurse-patient interactions can be affected by technology but did not view technology as an obstacle to the interaction. They saw technology as an opportunity to bring the nurse and patient closer together—for example, if the machine alarms—or can decrease interaction as the nurse tries to determine why the alarm is sounding. Nurses can view technology as an excuse to approach the patient or as a means to stay away from the patient. The authors suggested that if nurses embrace their technological skills as part of their nursing care, the patient remains as the centre of the caring. This moves technology from a dehumanizing element to an extension of the caring.

*Managing technology in the intensive care unit: the nurses' experience, by J. Alasad* (2002). In this study researchers applied a phenomenological hermeneutic methodology. Data was gathered using interviews with the nurses within an ICU and participant observation. The purpose of this study was to explore the lived experience of critical care nurses in an ICU with dominating technological presence. Three themes emerged in this study: *safe and in control*, *being technologically competent*, and *demanding and time-consuming*.

The first theme, *safe and in control*, referred to the nurses' feelings of safety because the machines in the unit are capable of showing the nurse what is happening with the patient's bodily functions at all times. In some circumstances—for example, a patient on a respirator—the machine is maintaining the patient's bodily functions. This flow of information allows the nurse to provide care specific to that patient's needs based on that information. This constant

awareness of the patient's bodily functions creates a feeling of safety and being in control for the critical care nurse.

In order to feel comfortable while managing and interpreting the technology, it was necessary for the nurse to be *technically competent*. This sense of competence was acquired as knowledge in the critical care environment accrued, specifically experience with technology. As the nurse felt more competent with technology, the nurse's focus on the patient increased. The nurses in this study felt that, with experience, the technology started to be secondary to nursing care, and their appreciation grew for the role technology plays in keeping the patients alive and contributing to their recovery.

The consensus of the critical care nurses in this study was that although they had become competent with managing the technology, it was *demanding and time-consuming*, forcing them to let go of aspects of care important to them as nurses, specifically time to develop therapeutic relationships. They posited that nursing care, including interpersonal relationships between nurse and patient and nurse and families were viewed by administration as less important than the technological role. Nurses in this study spoke to the importance of the critical care nurses ability to manage the technological demands of an ICU while meeting the needs of the patient and family.

This study revealed the tension that exists between technological competencies and therapeutic relationships with the patient and family. This raised the question is nursing an art or a science? Critical care nurses experience ambivalence in their practice as they struggle with what is more important, the technological competencies or the caring relationships they bring to their practice setting. The author of this study posits that the two roles can exist simultaneously

in the right environment and if nurses are adequately prepared to manage the technological demands of the setting.

*Making a difference in critical care nursing practice*, by M. Hawley and L. Jensen (2008). This qualitative research study presented a view of the lived experience of critical care nurses and an understanding of the difference they make to the critically ill patient. Four themes emerged; *making the inhumane humane*, *making the unbearable bearable*, *making the life-threatening life-sustaining* and *making the unliveable liveable*.

*Making the inhumane humane* spoke to the dehumanization of the patient during diagnosis and treatment, where patients become victims of invasive tubes and painful diagnostic procedures while they are restrained and objectified in an attempt to restore them to health. Nurses found themselves in an ethical dilemma where the physician dominates the direction of the care, not the patient and family. In this environment, nurses found themselves searching for opportunities, through their nursing care, to restore trust and humanity for the patient. They advocated for the judicious use of technology to prevent needless pain and suffering.

*Making the unbearable bearable* addresses the suffering and uncertainty associated with critical illness. Nurses had the opportunity to bring familiarity to the patient by encouraging inclusion of everyday interests, inviting participation of those who were supportive of and connected with the patient, and preserving meaningful rituals and beliefs that brought comfort to the patient. This inclusion of significant people, ritual and events for the patient created a sense of normalcy in the patient's environment.

*Making the life-threatening life-sustaining* referred to nurses' vigilance in monitoring the patient and responding appropriately to maintain physiological stability for the patient. The ability to recognize subtle changes in the patient's condition was beneficial to prevent

complications or avoid crisis. The critical care nurse's knowledge and ability to apply skilful action to a situation allowed the nurse to focus on stabilizing and maintaining physiological function for the patient.

*Making the unliveable liveable* described how nurses foster normalcy for patients whose bodies no longer function as they did before the disease or injury. Nurses encouraged patients to maintain daily routines, ritual and practices; they also engendered hope by creating opportunities for the patient to experience success and by pointing out evidence of progress. For one patient this might mean pointing out the future possibilities; for another, the courage to face death.

This article defined technology as inhumane, describing the critical care unit as the high-tech battleground where technology contributed to pain and suffering. Nurses were the caring practitioners who made the difference for the patient, creating an environment that was humane, bearable, life-sustaining and liveable. The author's hope was that by finding meaning in, and understanding, their practice, nurses might gain insight into new actions for practice.

*Nursing care in a high-technological environment: experiences of the critical care nurses*, by A. Tunlind, J. Granstrom and A. Engstrum (2014). The authors used a descriptive qualitative design resonant with a naturalistic paradigm. Data collection involved interviewing critical care nurses employed in a high-tech healthcare environment. The researchers were seeking to develop a deeper understanding of how technology in intensive care affects the practice of the nurse, and how nurses envision and use technology. Using thematic inductive content analysis three themes emerged from the qualitative research study: *technology as a security and utility, technology and the physical environment as an obstacle and ability to use the clinical gaze.*

There were two subgroups for the theme of *technology as a security and utility: technology that facilitates bedside nursing, and technology that creates safety for patients and families*. The discussion of technology that facilitates bedside nursing described how the new technology saved time and decreased the physical work that was needed for patient care. For example, beds with pressure-free mattresses limited the need to turn the patient, and the ability to get the results of a blood test in seconds contributed to timely treatment. The nurses felt the technology also provided safe monitoring of the patient, giving them more time to focus on patient care, and the ability to continuously monitor the patient was reassuring for the nurse, the patient and the patient's family.

There were two sub-themes for the idea that *technology and the physical environment are an obstacle: technology inhibits nursing work and limits the physical environment, and medical equipment produces frustration and stress*. Nurses in this study talked about their inability to perform nursing tasks, or limits on these tasks in the physical environment, due to the risk of setting off alarms or compromising tubing. They further described the stress and frustration they felt working with equipment they had not mastered, and their discomfort when they felt they were not doing a good job because they did not have the knowledge and skills to work with the technology.

There were also two sub-themes to the theme of *being able to use the clinical gaze: ability to see the patient in the technological environment, and ability to prioritize nursing care*. Nurses believed that it was important to see the patient, especially when the technology was giving them a different picture. This ability to assess a patient who is sitting up comfortably in a chair is necessary when the machine says his oxygen level is 78 percent and the nurse has to be able to respond correctly to the situation. Nurses also found that incorrect alarms pulled the nurse away

from the patient to correct the machine. They agreed that experience allowed them to focus less on the alarms and the machines and to see the patient.

The technology in this study was recognized for its ability to create security for the patient and nurse in the clinical environment. However, the nurses recognized that technology not only created physical barriers to caring for the patient, but also the alarms and the need to fix the machines distracted the nurse from the patient. This authors concluded that technology provides safety in the clinical environment but can be a barrier to nursing care.

### **Non-research studies**

*Capacity for care: meta-ethnography of acute care nurses' experiences of the nurse-patient relationship, by Bridges et al (2012).* The first non-research study was a synthesis of qualitative studies of nurses' experiences of the nursed-patient relationships this meta-ethnography revealed how nurses strive to develop therapeutic relationships with their patients that are valuable for the patient and gratifying for the nurse. However, what was also revealed that there are organizational barriers that limit the nurse's ability to value and maintain therapeutic relationships. Some of these barriers place value on the technological skills and physical care for the patient. This article contributed to my study by highlighting how organizations that value technical and physical care create barriers to the therapeutic relationships nurses believe are valuable for themselves and their patients.

I discovered *Troubling distinctions: a semiotics of the nursing/technology relationship, by M. Sandelowski*, while moving through my second hermeneutic circle. This article was published in 1999 and was quoted in many of the articles I retrieved. It brought to light nurses' continuing struggles to define who nurses are and what they do, and how technology shapes nursing care. Nursing as a caring practice was depicted in opposition to the inhuman technology

found in the nursing-patient environment by Sandelowski. A nurse's discomfort was evident when aligning with science and technology versus the feminine caring therapeutic relationships that has traditionally been the image of nursing. This article added to my study by bringing a different perspective, which showed that the inability of nursing/nurses to define what nursing is and what is valuable to nursing creates a barrier to how we view technology in our patient-care environment.

*Technology and humane nursing care: (ir) reconcilable or invented differences?* by A. Barnard and M. Sandelowski 2001. This second article that I chose as I moved through the hermeneutic circle is frequently cited in the research and helped me develop a deeper understanding of the tensions between technology and nursing. The article stated that technology is made inhumane by the meanings the user attributes to technology, as well as by how "human" is defined culturally. The authors suggested that technology could be viewed, not in opposition to touch, but as an object of touch. This article left me asking what is the significance of technology and nursing being depicted as opposing positions in caring for the patient. It gave me the opportunity to delve deeper into the question of why we continue to view technology as inhumane. It also raised the question, what influence do individuals, cultural groups, organizations, politics and economics have on the division of caring and technology?

*Implications of 21st century science for nursing care: interpretations and issues*, by M. Yeo 2014. In offering his expert opinion on the relationship of technology and nursing, Dr. Yeo revealed that how nurses view technology, whether as a science or a tool, determines how nurses understand technology in the patient-care environment. He also posited that how nurses define nursing care affects our relationship with technology. Do we see nursing care as the acts that we perform, or is it a combination of what the nurse does and the component of caring? Two

opposing opinions arise. From a positive perspective, science and technology make better evidence-based care possible. From the negative perspective, the nurse is pulled from the patient to tend to the technology. Yeo concluded that elevating nursing care to a science and preserving space in the technology-laden environment for caring is a promising solution. How we who define technology, science and nursing can affect our view of the impact of technology in the nursing care environment.

*Technology and its effect on knowing the patient, by M. MacDonald 2008.* The author believed that nurses felt that decreased length of stays and increased use of technology in the clinical setting was a barrier to getting to know their patients. MacDonald concluded that knowing the patient is important to the nurse and patient and central to providing quality patient care. Her study identified technology as facilitating the nurse-patient relationship: when nurses become familiar with the technology, they will have more time to get to know their patient. This study puts technology in a positive light as being one way of knowing the patient in the clinical environment.

### **Technology and Caring in Nursing: Summary of the Literature**

In this literature review I was looking for answers to questions about the impact of technology in the nurse-patient environment, and about whether technology hinders the nurse's ability to maintain caring therapeutic relationships. Two themes emerged: technology or caring in the nursing environment, where the two are in opposition; and technology and caring in the nursing environment, where technology and caring are simultaneously supportive in the nursing environment. In the literature that supports the opposition of technology and caring in the nursing environment, authors talked about nurses being frustrated by the demands of learning new equipment and by the sound of alarms pulling their attention away from their patients. These

nurses felt that technology creates unnatural environments, in which patients were controlled by machines, and that technology produces physical barriers, where basic care, such as turning a patient, is limited. Experienced nurses related feeling overwhelmed by technology, often focusing on the technology and not seeing their patients.

Other authors presented a different opinion of technology, not as a barrier to caring but supportive of caring. Technology in the form of monitoring equipment allows the nurse to observe the patient from a physiological perspective in a matter of seconds, freeing up time for nurses to spend with their patients. Technology from the viewpoint of better science and technology offered evidence-based practices that ultimately improve patient outcomes.

Are technology and caring in a symbiotic relationship or a conflictual relationship? In this section, I will attempt to answer this question by synthesizing what I have gleaned from reading and reflecting on the literature.

### **Technology in Opposition to Caring**

As I reflect on the theme of “technology or caring,” I see that technology is portrayed as dehumanizing and depersonalizing. Nurses expressed feelings of frustration and stress while giving care to patients who are supported by technology. Critical care nurses described feeling overwhelmed when working with new equipment, and thus losing sight of their patients while they tried to manage the new equipment (Tunlind et al., 2014). Nurses also said the technology took their attention away from the patient as they focused on alarms and beeps emitted by the equipment. The actual physical environment of the patient care area often has poor definition, allowing technology to take centre stage from the patient. This was especially true for new, inexperienced nurses. Feelings of ambiguity arose when nurses felt their relationship with technology and science was more fulfilling than their therapeutic relationships with the patient.

In the following subsections I explore in greater depth the nurse's perspective on dealing with frustrating equipment, finding space in a technological environment for patients and, for inexperienced nurses, facing the challenges of technology.

### **Frustration and stress with equipment.**

Nurses interviewed in the research studies expressed concerns about technology being frustrating and demanding (Alasad, 2002). Some stress occurred when nurses tried to master new equipment while another source of stress arose from the need to focus on the technology rather than the patient. Further frustration and stress emerged with technology that tracked nurses while they were giving patient care.

The inability to master the technology often left nurses feeling they were not doing a good job, which is an additional source of stress. As well, nurses remarked that they were expected to upgrade their skills while being responsible for heavy clinical workloads (Almerud, et al., 2008, p. 132).

Nurses further remarked that the sound of the alarms drew them away from the patient to troubleshoot equipment, even when the patient was okay. At the opposite extreme, frequent false alarms are eventually ignored, and then the risk that malfunctioning equipment will go unnoticed compromises patient care. For example, if an alarm is ignored while the tubing is clamped, medication will not be infused at the appropriate time. Jackson (2012) summarizes the effects of technology on caring, noting that technology can be distracting, anxiety producing, and overwhelming for nurses.

Nurses spoke of technology used to track them during their day, such as tracking badges, cellphones and pagers, that resulted in their being pulled away from patient care to answer questions of colleagues, other patients or their families (Jackson, 2012). Jackson (2012) also

reflected on how nurses felt pressured to meet institutional timelines—for example, new medication systems that track when medications are given and charted—which force nurses to focus on meeting these timelines rather than meeting the care needs of the patient.

In summary, nurses voiced concerns about feeling frustrated and experiencing stress as they learned new equipment, as well as when they dealt with the constant alarms of the technology. Further stress came as a result of nurses being tracked and monitored while in the patient care environment. This stress and frustration with technology left nurses with negative feelings towards technology.

### **Technology Takes Centre Stage.**

Many writers commented on how technology created unnatural environments, where patients are depersonalized and controlled by machines. Several authors noted that many ICUs lack adequate space to accommodate technology while simultaneously providing adequate patient care. Almerud et al. (2008), for example, described ICUs as patient care areas where technology had a dominant presence that created obstacles to patient care. Tunlind et al. (2014) further elaborated on this, noting that technology such as “short tubes, inaccessible entrances, and position-dependent dialysis catheters” (p.4) made it difficult for nurses to provide personal care, such as positioning or turning. Nurses believed that it took longer to provide basic nursing care when they were working around the technology in the patient care environment (Tunlind et al, 2014). As well, concern about moving or dislodging tubes took priority for nurses over positioning their patients. Nurses remarked that they felt guilty that they limited mobilizing and bathing patients who were attached to technological devices. They also described feeling dissatisfaction that they spent more time caring for technology than the patient. Nurses voiced concerns that their ability to provide basic nursing and comfort care for the patients was limited

at the same time as they felt overwhelmed by the presence of technology in the patient care environment.

### **Challenges for inexperienced nurses.**

The difficulty nurses experience delivering nursing care in the advanced technological environment, described in the previous section, was particularly an issue for new nurses. This was especially apparent in many of the studies that reflected on the inexperienced nurse, but the concern was also expressed by experienced nurses.

McGrath (2008) acknowledged the support and assistance required by novice nurses inexperienced with technology. These nurses reported feeling emotional distress as they developed competency in technological environments. Experienced nurses found inexperienced nurses initially lost site of the patient while gaining experience with technology, as they relied on the machines for information on the patient (Alasad, 2002). Only after meeting the physical and practical demands of technology, and overcoming the fear and stress of working with the machines, were they able to gain sight of the patient. This was substantiated by Ray (1987), who believed that once a nurse is confident with the technology, she will be able to focus on the patient and family.

Tunlind et al. (2014) in their study of experienced nurses, emphasized that nurses needed to have the knowledge to understand technology in order to look beyond the technology and see the patient. Inexperienced nurses were especially vulnerable to the impact of technology in the patient care environment. The need for the support of experienced nurses within the clinical teams is evident while inexperienced nurses gain the competency to move beyond the technological presence of the equipment to caring for the patient. Nursing teams spoke of the need for high levels of experienced nurses to support the inexperienced nurse.

**Summary.**

In summary, nurses expressed that they felt frustration, experienced stress and were overwhelmed when working with technology in the patient care environment. Nurses talked about losing focus on the patient in the midst of alarms, and tending to equipment rather than the patient. They were also often limited by the physical presence of technology in the patient environment. This was especially true for inexperienced nurses.

**Technology Supporting Caring**

Not all the research presented technology as cold, sterile or inhumane, or as a barrier to caring relationships. Instead, some nurses viewed technology in the patient care environment as a time saver that boosted safety while giving nurses more time to care for their patients. Electronic care plans and monitoring devices give instant physiological updates of the patient's status, allowing nurses to spend more time interacting with their patient. Similarly, technology can facilitate nursing care by improving nurses' knowledge of their patients (Granados-Pemberty & Arias-Valencia, 2013) or by bringing them closer to their patients. Some technological devices—a stethoscope, for example—extend a nurse's touch and caring (Barnard & Sandelowski, 2001). Nurses often expressed feelings of safety and control when patients were monitored by technology in the patient care environment (Alasad, 2002), and these feelings allowed nurses to engage with the patient more confidently. Traditionally, definitions of nursing have emphasized its caring relationships in stark contrast to the science and technology of the medical model. A redefinition of nursing that includes science and technology as integral to caring could help nurses embrace the beneficial technological developments while ensuring the

space for caring remains. In the following subsections I explore in greater depth the nurse's perspective on dealing with time-saving technology or technology that facilitates nursing care and extends the nurse's touch. I also examine a possible redefinition of nursing care that includes technology.

### **Technology as a Time Saver.**

Tunlind et al. (2014) found that new technology decreased the time nurses needed to do patient care. Electronic monitoring of vital signs and heart rates saves time, allowing nurses to assess the patient's physiological status at a glance. Intravenous infusion technology removes the need to constantly monitor medications being infused, leaving more time for patient interaction. Other technology, such as glucose monitors and individual medication-dispensing systems, decrease the time needed to check glucose levels and distribute medications.

New technology also alleviates some of the physical work of patient care. For example, mattresses have been developed that turn patients by automatically exchanging internal pressure in the mattress. Electronic records and point of care technology offer quick access to patient information without the nurse having to leave the patient's room. Nurses who are competent and skilled with technology are able to find more time to focus on caring relationships with patients.

### **Technology Facilitating Nursing Care.**

In response to the opinions and evidence that technology interferes with nursing care, Yeo (2014) suggests that nursing care has improved as technology and science have improved. Barnard and Sandelowski (2001) suggest that technology may not be in opposition to caring but a facilitator of that caring. They further suggest that what determines whether technology is non-human or dehumanizing is how the technology is used or operated in the clinical environment.

From this perspective, technology is not just the equipment but also the knowledge and the ability to translate it into nursing care (Tunlind et al., 2014). Sandelowski (1999), for example, believes that technology can be an agent of touch—for example, a stethoscope can be an extension of the human ear. Some nurses believed that once they had mastered the technology, they were better able to focus on the patient (Alasad, 2002), and nurses in the critical care unit felt safe and in control with the presence of technology (Alasad, 2002).

Nurses have the opportunity to create a balance between caring and practice assisted by technology. This balance is often achieved over time, as their ability to view the patient as human, separate from the technological connections, is often linked to experience. McGrath (2008) concluded in her study that lifesaving technology can enhance the nurse's opportunity to be closer to their patients and families, and nurses who are able to achieve therapeutic nurse-patient relationships in their work environments report high levels of satisfaction with their practice (Bridges et al., 2012).

### **Redefinition of Nursing Care.**

Historically, nursing has been viewed as the caring relationship and caring practice that make a difference for the patient. Nursing has been seen in direct contrast to medicine, which is considered more technical and scientific. As a result, the explosion of technology in the nursing environment has created confusion for a profession that continues to struggle with a definition of what it is that nurses do. Nurses have trouble reconciling the traditional human caring values that we recognize as nursing with the technological, fast paced, task-orientated practice that we now face (Watson, 2009). However, as Yeo wrote (2014), nursing care is what nurses do, and

whatever nurses do in the future will also be nursing care. Yeo (2014) challenges nurses who feel that caring in nursing is devalued to preserve a space for caring in their practice.

Taking a different track, Sandelowski (1999) refers to nursing as the soft technology that ties caring to science, injects the caring that exists between the nurse and patient, and between the patient and technology. In this view, nursing care can be defined as the way nurses use their skill and knowledge, including their skill with and knowledge of technology, to care for their patients. Including science and technology in this definition of nursing practice gives nurses permission to embrace technology as part of a caring practice, removing the ambivalence some feel about being a caring nurse in a technological environment.

### **Summary.**

In summary, many nurses regarded technology as a time saver, giving them time to interact with the patient, offering safety and giving them a feeling of being in control with the knowledge that alarms would sound if there were any changes in the patient's physiological status. Technology can facilitate nursing care, not as cold and non-human intrusion but as an extension of the nurse's caring touch. Redefining nursing care as a practice that includes technology as well as caring will give nurses the permission to embrace nursing science and technology and integrate them into caring practice.

### **Looking at the Whole**

### **Recommendations for Practice**

In conclusion, nursing has historically valued its caring aspect. Jean Watson (1988), with her Human Caring Theory, emphasized the value of the nurse-patient caring relationship. Dr. Watson believed the future of medicine and nursing belonged to caring over curing. She acknowledged human-to-human caring as the role, responsibility and moral foundation of the

nursing profession. Typically, science and technology were considered part of the medical model of care. However, as science and technology have become a major component of nursing, some nurses are troubled by the value system in their workplace—specifically, they are concerned that hospitals no longer value caring relationships; instead, they value nurses for their ability to manage technology in the patient care environment. Bridges et al. (2012) reported finding that healthcare organizations value caring less than activities that are technical, physical or codifiable. As a result, nurses find themselves struggling to create a space between technology and the patient for caring. They fear that by embracing technology and science, they will lose caring in nursing.

In the articles I read, nurses expressed concern that technology made it difficult to perform routine practices, such as bathing and repositioning the patient. The presence of alarms and technologies often drew their attention away from the patients, forcing them to focus on the machines (Jackson, 2012). Nurses felt that even after they became competent with the technology, the machinery consumed most of their time (Alasad, 2002). One nurse expressed concern that she was spending her time “nursing the machines rather than nursing the patient” (Alasad, 2002, p. 411). Watson (2009) noted that the time technology demands inhibits nurses’ ability to practise their own profession based on human caring values.

As these examples suggest, several barriers affect nurses’ ability to function in a highly technological environment while maintaining patient-focused care. Nurses agreed that organizations need to recognize these obstacles, which include physical, value, educational, experiential and time barriers, and create the appropriate environment for nursing if technology and caring relationships are to exist in a symbiotic relationship.

In terms of physical and value barriers, healthcare institutions need to make space for and value caring relationships and healing environments (Watson, 2009). Engstrum et al. (2014) suggested that more needs to be done to design healthcare environments that reduce technological barriers to nursing care. For example, room design that allows more space for patient and technology will help the nurse to physically turn the patient and provide direct care while maintaining technological functioning. Machines designed to be more compact or to disappear behind a cabinet door will help reduce the overwhelming presence of technology in the room. Technology that has the same monitoring capabilities but is less invasive gives the nurse and patient more ability to move freely around in the room, allowing normalcy in the environment. In the future, technology and room design should support nurses, patients and families, letting them interact and maintain caring relationships in a highly technological environment.

In terms of experiential barriers, nurses expressed concern about how new technology is implemented in the work place, and the plight of the inexperienced nurse trying to gain competency with technology. Experienced nurses recognized how difficult it can be for the inexperienced nurse to see beyond the technology and care for the patient. Engstrum et al. (2014) found nurses frustrated with new equipment that they were expected to master and operate, with minimal education or training. Nurses said they were anxious about, and avoided, using equipment they were expected to develop competency with during a regular clinical day. The anxiety caused by unfamiliarity with the equipment escalated when alarms sounded and the equipment malfunctioned.

In terms of educational barriers, nursing educators and clinical educators have a key role to play in helping nursing students gain competency with the technology in the healthcare

environment. Mentor relationships need to be formalized, giving experienced nurses time to coach less experienced nurses. Formal educational plans need to be implemented with the addition of each new technology, allowing nurses to gain knowledge and understanding of the equipment outside their regular clinical day. The research supported the conclusion that lack of experience with, and knowledge of, equipment created a stressful relationship between nursing care and technology.

On the other hand, technology brings safety and efficiency, with its ability to monitor the patient and perform treatments that previously required time and hands-on care. Intravenous pumps and monitors that constantly show the patient's status save time and ensure safety in our environments. Technology can also extend the nurse's touch, as illustrated by the examples of stethoscopes and monitors.

Reviewing the literature has enabled me to identify opportunities for change that could reconcile the divide between technology and caring for nursing, and create a new definition for nurses. To achieve this, nurses who find themselves torn between technology, high paced, task-orientated, institutional demands, and heavy patient loads, on one hand, and the human caring values that are the foundation of nursing, on the other (Watson, 2009) must find a way to address the physical, value, educational and time obstacles in the patient care environment so that technology and caring might co-exist.

### **Conclusions and Suggestions for Further Research**

In conclusion, the literature shows that caring relationships can exist when barriers are overcome in the technological environment. However, it also showed that there are many areas ripe for research.

- I found that most of the research I examined is focused on technologically intense environments and experienced nurses in critical care units. More inquiry into other healthcare environments, levels of experience and workers may bring different information to light.
- Further exploration of how training and education facilitate the implementation of new technology will enhance the introduction of new technology in the future with less effect on the nurse-patient relationship.
- Studies are needed that examine how organizational values and priorities impact nurses' struggles to maintain a caring therapeutic relationship with the patient.
- The design of the patient room creates barriers that can be circumvented if more attention is put into design efficiencies that allow for ease of patient care for the nurse and normalcy for the patient in the hospital environment.
- Technological researchers need to look at ways to safely and accurately monitor the patient with less invasive requirements.

Research and knowledge translation is the key to understanding the relationship between caring in nursing and technology. One crucial question for study is whether technology and caring are actually bipolar or whether they are on a continuum, where more technology in the environment results in increasing distractions from the patient.

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**Appendix A**

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: Caring and Technology in an intensive care unit					NUMBER: 1	
AUTHOR(S): Ann Price					DATE: 2013	
JOURNAL: British Association of Critical Care Nurses						
SETTING: Critical Care				SAMPLE (COMPOSITION/SIZE)19 health care professionals		
Experimental	Meta-analysis	Quasi-experimental	Non-experimental	Qualitative	Metasynthesis	
<b>Does this study apply to my patient population?</b>				Yes	No	
If the answer is No, STOP here (unless there are similar characteristics).						
<b>Strength of Study Design</b>						
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
<b>Study Results</b>						
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No	
				Yes	No	
<b>Study Conclusions</b>						
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No	
				Yes	No	

<p><b>PERTINENT STUDY FINDINGS AND RECOMMENDATIONS</b></p> <ol style="list-style-type: none"> <li>1. Caring not limited to nurses but included other professionals</li> <li>2. Culture of unit and organizational pressures impacted caring</li> <li>3. Caring can take many forms</li> <li>4. Personal and professional attributes form expression of caring</li> <li>5. Crafting process enables a view of the complexities of practice</li> </ol>		
<p><b>Will the results help me in caring for my patients?</b></p>	<p>Yes</p>	<p>No</p>

Evidence Level:   3  

Quality Rating GOOD (B)

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: The challenges of caring in a technological environment: critical care nursing experience				NUMBER: 2	
AUTHOR(S): Mary McGrath				DATE: 2008	
JOURNAL: Journal of Nursing					
SETTING: ICU				SAMPLE (COMPOSITION/SIZE) 10 nurses	
Experimental	Meta-analysis	Quasi-experimental	Non-experimental	Qualitative	Metasynthesis
Does this study apply to my patient population?				Yes	No
If the answer is No, STOP here (unless there are similar characteristics).					
<b>Strength of Study Design</b>					
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
<b>Study Results</b>					
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No
				Yes	No
<b>Study Conclusions</b>					
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No
				Yes	No

<p><b>PERTINENT STUDY FINDINGS AND RECOMMENDATIONS</b></p> <ol style="list-style-type: none"> <li>1. Novice nurses find it difficult to work with technology while caring for their patients</li> <li>2. Critical care nurses recognized that technology can be dehumanizing</li> <li>3. Critical care nurses work in harmony with technology</li> <li>4. Experience critical care nurses where able to balance the technology and caring for their patients.</li> </ol>		
<p><b>Will the results help me in caring for my patients?</b></p>	<p>Yes</p>	<p>No</p>

Evidence Level: \_\_\_ III \_\_\_

Quality Rating (B)

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: Caught in an artificial split: a phenomenological study of being a care giver in the technologically intense environment				NUMBER: 3	
AUTHOR(S): S. Almerud, R.J. Alapack, B. Fridlund, M. Ekebergh				DATE: 2008	
JOURNAL: Intensive and Critical Care Nursing					
SETTING: ICU				SAMPLE (COMPOSITION/SIZE) 20 nurses	
Experimental	Meta-analysis	Quasi-experimental	Non-experimental	Qualitative	Metasynthesis
<b>Does this study apply to my patient population?</b>				Yes	No
If the answer is No, STOP here (unless there are similar characteristics).					
<b>Strength of Study Design</b>					
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
<b>Study Results</b>					
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No
				Yes	No
<b>Study Conclusions</b>					
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No
				Yes	No

<p><b>PERTINENT STUDY FINDINGS AND RECOMMENDATIONS</b></p> <ol style="list-style-type: none"> <li>1. Significance to my study and to nursing is that he believes that the two roles of caring and technology can exist simultaneously.</li> <li>2. Raises question whether nursing is about technical competency or therapeutic relationships.</li> <li>3. No reference to limitations of findings or applicability to other areas.</li> <li>4. No recommendation for further research but does identify the inability to define nursing (art vs science or caring is the essence of nursing).</li> </ol>		
<b>Will the results help me in caring for my patients?</b>	Yes	No

Evidence Level: \_\_\_ III \_\_\_

Quality rating: B

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: Being in front of the patient. Nurse-patient interaction and use of technology in emergency services					NUMBER: 4	
AUTHOR(S): Y. Granados-Pemberty and M. Arias-Valencia					DATE: 2013	
JOURNAL: Invest Educ Enferm						
SETTING: Emergency Services				SAMPLE (COMPOSITION/SIZE) 20 nurses Emergency		
Experimental	Meta-analysis	Quasi- experimental	Non-experimental	Qualitative	Metasynthesis	
<b>Does this study apply to my patient population?</b>				Yes	No	
If the answer is No, STOP here (unless there are similar characteristics).						
<b>Strength of Study Design</b>						
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
<b>Study Results</b>						
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No	
				Yes	No	
<b>Study Conclusions</b>						
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No	
				Yes	No	

<p><b>PERTINENT STUDY FINDINGS AND RECOMMENDATIONS</b></p> <ol style="list-style-type: none"> <li>1. Grounded theory based on study of social process that guides human responses and interactions.</li> <li>2. The authors identified that the context of the use of technology and the social environment impacts the interactions between nurse and pt.</li> <li>3. Concludes that technology to be viewed as an aid to nursing work.</li> <li>4. Nurses need to view technological skills in the context of nursing care</li> <li>5. Concerns arise when focus on technology inhibits nurse pt interactions,</li> </ol>		
<b>Will the results help me in caring for my patients?</b>	Yes	No

Evidence Level:   III  

Quality Level B

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: Managing technology in the intensive care unit: the nurses' experience					NUMBER: 5	
AUTHOR(S): J. Alasad					DATE: 2002	
JOURNAL: International Journal of Nursing Studies						
SETTING: Intensive Care Unit				SAMPLE (COMPOSITION/SIZE) 22		
Experimental	Meta-analysis	Quasi- experimental	Non-experimental	Qualitative	Metasynthesis	
<b>Does this study apply to my patient population?</b>				Yes	No	
If the answer is No, STOP here (unless there are similar characteristics).						
<b>Strength of Study Design</b>						
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
<b>Study Results</b>						
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No	
				Yes	No	
<b>Study Conclusions</b>						
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No	
				Yes	No	

PERTINENT STUDY FINDINGS AND RECOMMENDATIONS		
<ol style="list-style-type: none"> <li>1. Significance to my study and to nursing is that he believes that the two roles of caring and technology can exist simultaneously.</li> <li>2. Raises question whether nursing is about technical competency or therapeutic relationships.</li> <li>3. No reference to limitations of findings or applicability to other areas.</li> <li>4. No recommendation for further research but does identify the inability to define nursing (art vs science or caring is the essence of nursing).</li> </ol>		
Will the results help me in caring for my patients?	Yes	No

Evidence Level: \_\_\_ III \_\_\_

Quality rating B

**Critiquing the Literature**

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: Making a difference in critical care nursing practice				NUMBER: 6	
AUTHOR(S): M. P. Hawley				DATE: 2007	
JOURNAL: Qualitative Health Research					
SETTING: Critical Care Unit				SAMPLE (COMPOSITION/SIZE) 16 nurses	
Experimental	Meta-analysis	Quasi-experimental	Non-experimental	Qualitative	Metasynthesis
<b>Does this study apply to my patient population?</b>				Yes	No
If the answer is No, STOP here (unless there are similar characteristics).					
<b>Strength of Study Design</b>					
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
<b>Study Results</b>					
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No
				Yes	No
<b>Study Conclusions</b>					
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No
				Yes	No

PERTINENT STUDY FINDINGS AND RECOMMENDATIONS

This phenomenological inquiry offered the opportunity to look at the lived experiences of nurses in the critical care environment. Although my project is looking at the relationship between technology and caring it is an opportunity to gain understanding of what gives nurses meaning in their everyday work as well as what they feel that they can do to make a positive difference for their patients.

<b>Will the results help me in caring for my patients?</b>	Yes	No
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Evidence Level: \_\_\_III\_\_\_

Quality rating B

**JHNEBP Research Evidence Appraisal**

ARTICLE TITLE: Nursing care in a high-technological environment: experiences of critical care nurses				NUMBER: 7	
AUTHOR(S): A. Tunlind, J. Granstrom, A. Engstrom				DATE: 2014	
JOURNAL: Intensive Critical Care Nurse					
SETTING: Intensive Care Unit				SAMPLE (COMPOSITION/SIZE) 8 nurses	
Experimental	Meta-analysis	Quasi- experimental	Non-experimental	Qualitative	Metasynthesis
<b>Does this study apply to my patient population?</b>				Yes	No
If the answer is No, STOP here (unless there are similar characteristics).					
<b>Strength of Study Design</b>					
<ul style="list-style-type: none"> <li>Was sample size adequate and appropriate?</li> <li>Were study participants randomized?</li> <li>Was there an intervention?</li> <li>Was there a control group?</li> <li>If there was more than one group, were groups equally treated, except for the intervention?</li> <li>Was there adequate description of the data collection methods</li> </ul>				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
				Yes	No
<b>Study Results</b>					
<ul style="list-style-type: none"> <li>Were results clearly presented?</li> <li>Was an interpretation/analysis provided?</li> </ul>				Yes	No
				Yes	No
<b>Study Conclusions</b>					
<ul style="list-style-type: none"> <li>Were conclusions based on clearly presented results?</li> <li>Were study limitations identified and discussed?</li> </ul>				Yes	No
				Yes	No

<p>PERTINENT STUDY FINDINGS AND RECOMMENDATIONS</p> <ol style="list-style-type: none"> <li>1. Technology that supports bedside nursing</li> <li>2. Technology creating safety</li> <li>3. Technology as a barrier to nursing care</li> <li>4. Technology that creates stress and frustration and inhibits job satisfaction for the nurses.</li> <li>5. The ability to see the patient first despite the large presence of technology.</li> <li>6. The ability to recognize the needs of the patient versus the need of the technology and to give care accordingly.</li> </ol>		
<p><b>Will the results help me in caring for my patients?</b></p>	<p>Yes</p>	<p>No</p>

Evidence Level: \_\_\_III\_\_\_

Quality rating B

**Appendix B  
JHMEBP Non-Research Evidence Appraisal**

Evidence Level: IV

ARTICLE TITLE: Capacity for Care: meta-ethnography of acute care nurses' experiences of the nurse patient relationship  
AUTHOR(S): J. Bridges et al

Number: 1  
Date: 2012

JOURNAL: Journal of Advanced Nursing

**Systematic Review**      ⑥ Clinical Practice Guidelines      \_Organizational (QI, Financial data)      \_Expert opinion, case study, literature

Does review/expert opinion address my practice question?      Yes      \_No

**If the answer is No, STOP here (unless there are similar characteristics).**

**Systematic Review**

<input type="checkbox"/> Is the question clear?	<u>Yes</u>	_No
<input type="checkbox"/> Are search strategies specified, and reproducible?	<u>Yes</u>	_No
<input type="checkbox"/> Are search strategies appropriate to include all pertinent studies?	<u>Yes</u>	_No
<input type="checkbox"/> Are criteria for inclusion and exclusion of studies specified?	<u>Yes</u>	_No
<input type="checkbox"/> Are details of included studies (design, methods, analysis) presented?	<u>Yes</u>	_No
<input type="checkbox"/> Are methodological limitations disclosed?	<u>Yes</u>	_No
<input type="checkbox"/> Are the variables in the studies reviews similar, so that studies can be combined?	<u>Yes</u>	_No

**Clinical Practice Guidelines**

<input type="checkbox"/> Were appropriate stakeholders involved in the development of this guideline?	_Yes	_No
<input type="checkbox"/> Are groups to which guidelines apply and do not apply clearly stated?	_Yes	_No
<input type="checkbox"/> Have potential biases been eliminated	_Yes	_No
<input type="checkbox"/> Were guidelines valid (reproducible search, expert consensus, independent review, current and level of supporting evidence identified for each recommendation)?	_Yes	_No
<input type="checkbox"/> Are recommendations clear?	_Yes	_No

**Organizational Experience**

<input type="checkbox"/> Was the aim of the project clearly stated?	_Yes	_No
<input type="checkbox"/> Is the setting similar to setting of interest?	_Yes	_No
<input type="checkbox"/> Was the method adequately described?	_Yes	_No
<input type="checkbox"/> Were measures identified?	_Yes	_No
<input type="checkbox"/> Were results adequately described?	_Yes	_No
<input type="checkbox"/> Was interpretation clear and appropriate?	_Yes	_No

**Individual expert opinion, case study, literature review**

<input type="checkbox"/> Was evidence based on the opinion of an individual?	_Yes	_No
<input type="checkbox"/> Is the individual and expert on the topic?	_Yes	_No
<input type="checkbox"/> Is the author's opinion based on scientific evidence?	_Yes	_No
<input type="checkbox"/> Is the author's opinion clearly stated?	_Yes	_No
<input type="checkbox"/> Are potential biases acknowledged?	_Yes	_No

**Pertinent Conclusions and Recommendations**  
The organizational environment impacts the clinical setting

Organizations may not value therapeutic relations which can conflict with nurses values Nurses value and find satisfaction with caring relationships		
<b>Were Conclusions based on the evidence presented?</b>	<u>Yes</u>	<u>No</u>
<b>Will the results help me in caring for my patients?</b>	<u>Yes</u>	<u>No</u>

**Quality Rating (Scale on back):**

Basic quality rating of the study under review (check one)	<u>High (A)</u>	<u>Good (B)</u>	<u>Low/Major flaws (C)</u>
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**JHMEBP Non-Research Evidence Appraisal**

Evidence Level: V

ARTICLE TITLE: Troubling distinctions: a semiotics of the nursing/technology relationship  
 AUTHOR(S): M. Sandelowski

Number: 2  
 Date: 1999

JOURNAL: Nursing Inquiry

Systematic Review  Clinical Practice Guidelines  Organizational (QI, Financial data)  Expert opinion, case study, literature

Does review/expert opinion address my practice question?  Yes  No

If the answer is No, STOP here (unless there are similar characteristics).

**Systematic Review**

<input type="checkbox"/> Is the question clear?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are search strategies specified, and reproducible?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are search strategies appropriate to include all pertinent studies?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are criteria for inclusion and exclusion of studies specified?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are details of included studies (design, methods, analysis) presented?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are methodological limitations disclosed?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are the variables in the studies reviews similar, so that studies can be combined?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**Clinical Practice Guidelines**

<input type="checkbox"/> Were appropriate stakeholders involved in the development of this guideline?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are groups to which guidelines apply and do not apply clearly stated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Have potential biases been eliminated	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Were guidelines valid (reproducible search, expert consensus, independent review, current and level of supporting evidence identified for each recommendation)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are recommendations clear?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**Organizational Experience**

<input type="checkbox"/> Was the aim of the project clearly stated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Is the setting similar to setting of interest?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Was the method adequately described?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Were measures identified?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Were results adequately described?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Was interpretation clear and appropriate?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**Individual expert opinion, case study, literature review**

<input type="checkbox"/> Was evidence based on the opinion of an individual?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Is the individual and expert on the topic?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Is the author's opinion based on scientific evidence?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Is the author's opinion clearly stated?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are potential biases acknowledged?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Pertinent Conclusions and Recommendations

Nurses as technology: manual labour and mindless application of knowledge		
Nursing opposed to technology: nurses as in the service of caring undermines nursing knowledge		
Inability to define nursing adds to the inability to determine where/how technology fits into nurse's practice		
<b>Were Conclusions based on the evidence presented?</b>	<u>Yes</u>	<u>No</u>
<b>Will the results help me in caring for my patients?</b>	<u>Yes</u>	<u>No</u>

**Quality Rating (Scale on back):**

Basic quality rating of the study under review (check one)	<u>High (A)</u>	<u>Good (B)</u>	<u>Low/Major flaws (C)</u>
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**JHMEBP Non-Research Evidence Appraisal**

Evidence Level: V

ARTICLE TITLE: Technology and humane nursing care: (ir) reconcilable or invented difference?

Number: 3

AUTHOR(S): A. Bernard, M. Sandelowski

Date: 2001

JOURNAL: Journal of Advanced Nursing

Systematic Review  Clinical Practice Guidelines  Organizational (QI, Financial data)  Expert opinion, case study, literature

Does review/expert opinion address my practice question?  Yes  No

If the answer is No, STOP here (unless there are similar characteristics).

**Systematic Review**

<input type="checkbox"/> Is the question clear?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are search strategies specified, and reproducible?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are search strategies appropriate to include all pertinent studies?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are criteria for inclusion and exclusion of studies specified?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are details of included studies (design, methods, analysis) presented?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are methodological limitations disclosed?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are the variables in the studies reviews similar, so that studies can be combined?	<input type="radio"/> Yes	<input type="radio"/> No

**Clinical Practice Guidelines**

<input type="checkbox"/> Were appropriate stakeholders involved in the development of this guideline?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are groups to which guidelines apply and do not apply clearly stated?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Have potential biases been eliminated	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Were guidelines valid (reproducible search, expert consensus, independent review, current and level of supporting evidence identified for each recommendation)?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are recommendations clear?	<input type="radio"/> Yes	<input type="radio"/> No

**Organizational Experience**

<input type="checkbox"/> Was the aim of the project clearly stated?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the setting similar to setting of interest?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Was the method adequately described?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Were measures identified?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Were results adequately described?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Was interpretation clear and appropriate?	<input type="radio"/> Yes	<input type="radio"/> No

**Individual expert opinion, case study, literature review**

<input type="checkbox"/> Was evidence based on the opinion of an individual?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the individual and expert on the topic?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the author's opinion based on scientific evidence?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the author's opinion clearly stated?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are potential biases acknowledged?	<input type="radio"/> Yes	<input checked="" type="radio"/> No

Pertinent Conclusions and Recommendations

1. Questions what does nursing have to gain or lose by maintaining a distinction between nursing and technology 2. Technology could be viewed as foster personhood and furthers humane care 3. Objectifying view of the human body is not a dehumanizing thing 4. Human beings create technology to enhance nature or make it possible (invitro fertilization)		
<b>Were Conclusions based on the evidence presented?</b>	<u>Yes</u>	<u>No</u>
<b>Will the results help me in caring for my patients?</b>	<u>Yes</u>	<u>No</u>

**Quality Rating (Scale on back):**

Basic quality rating of the study under review (check one)	<u>High (A)</u>	<u>Good (B)</u>	<u>Low/Major flaws (C)</u>
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**JHMEBP Non-Research Evidence Appraisal**

Evidence Level: V

ARTICLE TITLE: Implications of 21<sup>st</sup> century science for nursing care: interpretations and issues  
 AUTHOR(S): M. Yeo

Number: 4  
 Date: 2014

JOURNAL: Nursing Philosophy

Systematic Review      ⑥ Clinical Practice Guidelines      \_Organizational (QI, Financial data)      **\_Expert opinion, case study, literature**

Does review/expert opinion address my practice question?      **\_Yes**      \_No

If the answer is No, STOP here (unless there are similar characteristics).

**Systematic Review**

<input type="checkbox"/> Is the question clear?	_Yes	_No
<input type="checkbox"/> Are search strategies specified, and reproducible?	_Yes	_No
<input type="checkbox"/> Are search strategies appropriate to include all pertinent studies?	_Yes	_No
<input type="checkbox"/> Are criteria for inclusion and exclusion of studies specified?	_Yes	_No
<input type="checkbox"/> Are details of included studies (design, methods, analysis) presented?	_Yes	_No
<input type="checkbox"/> Are methodological limitations disclosed?	_Yes	_No
<input type="checkbox"/> Are the variables in the studies reviews similar, so that studies can be combined?	_Yes	_No

**Clinical Practice Guidelines**

<input type="checkbox"/> Were appropriate stakeholders involved in the development of this guideline?	_Yes	_No
<input type="checkbox"/> Are groups to which guidelines apply and do not apply clearly stated?	_Yes	_No
<input type="checkbox"/> Have potential biases been eliminated	_Yes	_No
<input type="checkbox"/> Were guidelines valid (reproducible search, expert consensus, independent review, current and level of supporting evidence identified for each recommendation)?	_Yes	_No
<input type="checkbox"/> Are recommendations clear?	_Yes	_No

**Organizational Experience**

<input type="checkbox"/> Was the aim of the project clearly stated?	_Yes	_No
<input type="checkbox"/> Is the setting similar to setting of interest?	_Yes	_No
<input type="checkbox"/> Was the method adequately described?	_Yes	_No
<input type="checkbox"/> Were measures identified?	_Yes	_No
<input type="checkbox"/> Were results adequately described?	_Yes	_No
<input type="checkbox"/> Was interpretation clear and appropriate?	_Yes	_No

**Individual expert opinion, case study, literature review**

<input type="checkbox"/> Was evidence based on the opinion of an individual?	<b>_Yes</b>	_No
<input type="checkbox"/> Is the individual and expert on the topic?	<b>_Yes</b>	_No
<input type="checkbox"/> Is the author's opinion based on scientific evidence?	_Yes	<b>_No</b>
<input type="checkbox"/> Is the author's opinion clearly stated?	<b>_Yes</b>	_No
<input type="checkbox"/> Are potential biases acknowledged?	_Yes	<b>_No</b>

Pertinent Conclusions and Recommendations

1. Need to define nurses for what we do versus who we are 2. Big “T” science based on the knowledge embedded 3. Technology as a little “t” as the tool view 4. Caring as acts of nursing		
Were Conclusions based on the evidence presented?	<u>  </u> Yes	<u>  </u> No
Will the results help me in caring for my patients?	<u>  </u> Yes	<u>  </u> No

**Quality Rating (Scale on back):**

Basic quality rating of the study under review (check one)	<u>  </u> High (A)	Good B	<u>  </u> Low/Major flaws (C)
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**JHMEBP Non-Research Evidence Appraisal**

Evidence Level: \_\_\_\_\_

ARTICLE TITLE: Technology and its effect on knowing the patient

Number: 5

AUTHOR(S): M. MacDonald

Date: 2008

JOURNAL: Clinical Nurse Specialist

Systematic Review       Clinical Practice Guidelines       Organizational (QI, Financial data)       Expert opinion, case study, literature

Does review/expert opinion address my practice question?       Yes       No

If the answer is No, STOP here (unless there are similar characteristics).

**Systematic Review**

<input type="checkbox"/> Is the question clear?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are search strategies specified, and reproducible?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are search strategies appropriate to include all pertinent studies?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are criteria for inclusion and exclusion of studies specified?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are details of included studies (design, methods, analysis) presented?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are methodological limitations disclosed?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are the variables in the studies reviews similar, so that studies can be combined?	<input type="radio"/> Yes	<input type="radio"/> No

**Clinical Practice Guidelines**

<input type="checkbox"/> Were appropriate stakeholders involved in the development of this guideline?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are groups to which guidelines apply and do not apply clearly stated?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Have potential biases been eliminated	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Were guidelines valid (reproducible search, expert consensus, independent review, current and level of supporting evidence identified for each recommendation)?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are recommendations clear?	<input type="radio"/> Yes	<input type="radio"/> No

**Organizational Experience**

<input type="checkbox"/> Was the aim of the project clearly stated?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the setting similar to setting of interest?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Was the method adequately described?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Were measures identified?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Were results adequately described?	<input type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Was interpretation clear and appropriate?	<input type="radio"/> Yes	<input type="radio"/> No

**Individual expert opinion, case study, literature review**

<input type="checkbox"/> Was evidence based on the opinion of an individual?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the individual and expert on the topic?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the author's opinion based on scientific evidence?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Is the author's opinion clearly stated?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="checkbox"/> Are potential biases acknowledged?	<input type="radio"/> Yes	<input checked="" type="radio"/> No

**Pertinent Conclusions and Recommendations**

1. Technology can contribute to the quality of time with the patient by providing needed knowledge

2. Maintaining level of expert nurses to improve collaboration and maintaining nurse/patient/family relationships 3. Environments need to foster balance between technology and patient care work 4. Education needs to meet the needs of present day nursing 5. Nurses need to take a lead in identifying what technology improves patient care		
<b>Were Conclusions based on the evidence presented?</b>	<u>Yes</u>	<u>No</u>
<b>Will the results help me in caring for my patients?</b>	<u>Yes</u>	<u>No</u>

**Quality Rating (Scale on back):**

Basic quality rating of the study under review (check one)	<u>High (A)</u>	<u>Good (B)</u>	<u>Low/Major flaws (C)</u>
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## Individual Appendix C

## Evidence Summary Tool

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Article #	Author & Date	Evidence Type	Sample, Sample Size & Setting	Study findings that help answer the research question	Limitations	Evidence Level & Quality
1	Price 2013	Qualitative Research	Health Care Professionals /19/Critical Care	Caring can take many forms. Some barriers to caring can be the work environment	Study limited to one hospital and one unit	E-3 Q-B
2	McGrath 2008	Qualitative Research	critical care nurses/10/ ICU	Experienced nurses able to balance between technology and caring with and for patients	The study was limited to the experienced nurses	E-3 Q-B
3	Almerud et al 2007	Qualitative Research	critical care nurses and physicians /10/ICU	Impact of technology on caring lies in how we define technology. Mgt. values technology.	One hospital one unit	E-3 Q-B
4	Granados-Pemberty et al 2013	Qualitative Research	Nurses/20/ Emergency services	Technology is part of nursing care. How we define technology determines if it is dehumanizing	One hospital one unit	E-3 Q-B
5	Alasad 2002	Qualitative Research	Nurses/22/ ICU	Nurses struggle with which is more important technology or caring relationships	Researcher has preliminary understanding of the topic	E-3 Q-B
6	Hawley 2007	Qualitative Research	Nurses/16/ Critical Care	Technology viewed as dehumanizing and nurses define relationships with patients as making the difference in their practice.	Further inquiry into the voice of the patient identified	E-3 Q-B
7	Tunlind et al 2014	Qualitative Research	Nurses/8/ Critical Care	View of nursing in a high intensity technological environment and the struggle to focus on the patients.	Need for more research on environmental design	E-3 Q-B
8	Bridges et al 2012	Systematic Review	N/A	Organizational values often in conflict with caring which is what nurses value	Not included	E-3 Q-B
9	Sandelowski 1999	Expert Opinion	N/A	How we define nursing and technology determines if	Not included	E-IV Q-B

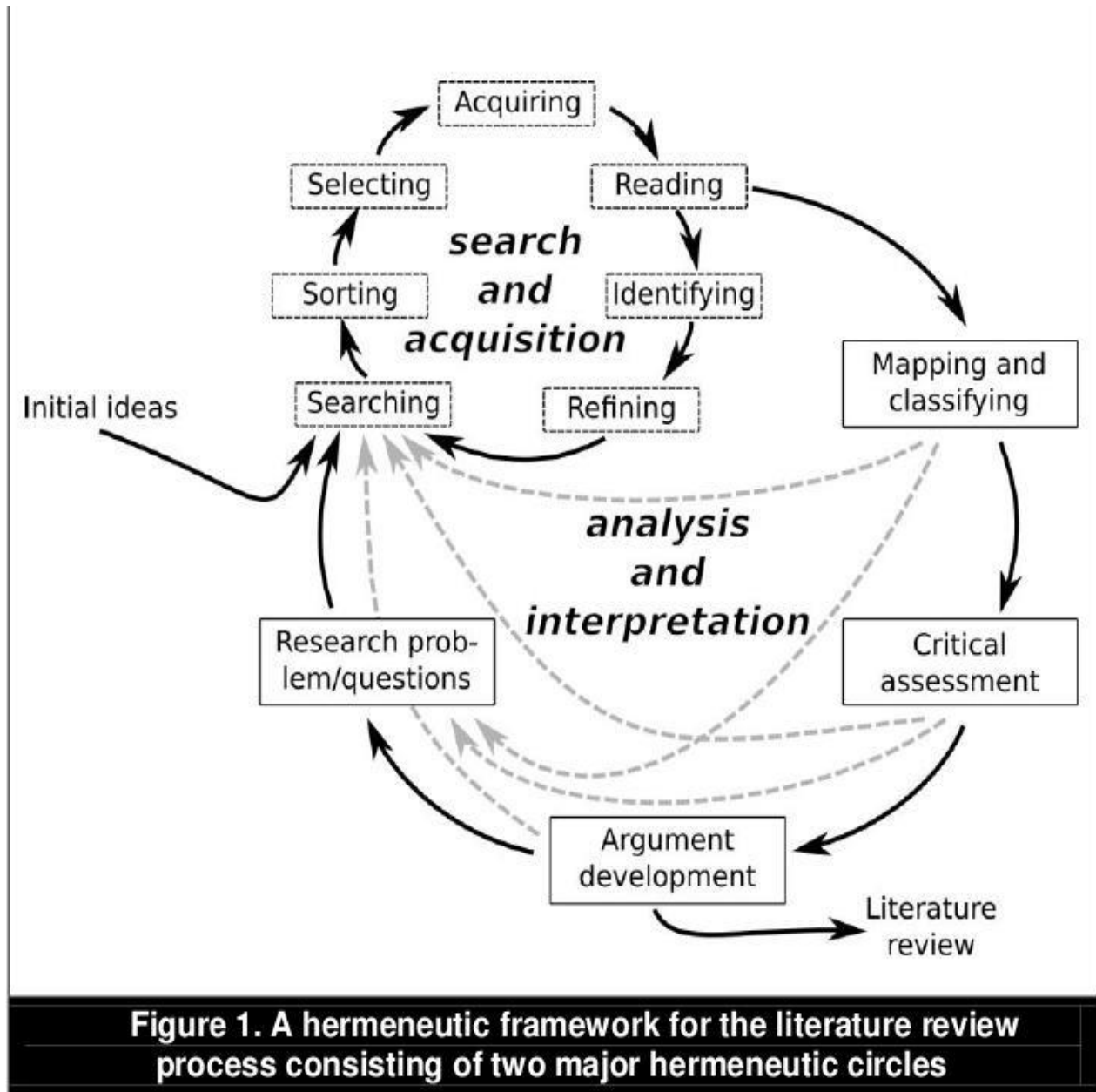
				caring and technology can co-exist		
10	Barnard & Sandelowski 2001	Expert Opinion	N/A	Humans create technology. Need for re-examination of relationships technology and caring practice	Not included	E-IV Q-B
11	Yeo 2014	Expert Opinion	N/A	How we define technology determines how it impacts caring. View technology as machines and dehumanizing. Technology as science and knowledge then strategic in caring practice.	Not included	E-IV Q-B
12	MacDonald 2008	Expert Opinion	N/A	Technology improves ability to know the patient allowing opportunity to develop improve patient and nurse satisfaction	Not included	E-IV Q-B

**Appendix D**

**Timeline**

1. Proposal approved by January 26, 2015
2. First draft of final project available February 22, 2015
3. Weekly revisions
4. March 10,2015 project approved
5. March 11, 2015 application for oral defense
6. April 15, 2015 oral defense completed
7. April 30, 2015 revisions completed and project finalized

Appendix E



**Figure 1. A hermeneutic framework for the literature review process consisting of two major hermeneutic circles**

Boells and Cecez-Kemanovic (2014)