Designing Nursing Care Practices Complemented by Robots: Ethical Implications and Application of Caring Frameworks

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Abstract: The nurse of today must be able to master a variety of technologies. This article will discuss the current state of robots, explore the ethical framework of the Care-Centered Value Sensitive Design (CCVSD) and the caring theory of Nursing As Caring theory as it relates to the sacred nurse-patient relationship. Integrating both an ethical and caring framework will serve the nursing profession as it wrestles with the role and function robots can and will be used in clinical practice in order to protect the nurse–patient relationship. As technology advances, we must remember some human experiences are not programmable.

Keywords: caring; robots; Nursing as Caring; Care-Centered Value Sensitive Design (CVSD)

Introduction

Nursing is a blend of art and science with caring at the center of every patient interaction with the provision of safety, quality, and excellence in patient care being nonnegotiable (Boykin & Schoenhofer, 2013). The American Nurse Association's (ANA) Scope and Standards of Practice, along with the Code of Ethics governs nursing practice with a focus on the nurse–patient therapeutic relationship (ANA, 2015a, 2015b). Though the nurse–patient relationship is complex, it is above all sacred. A typical nurse's day in 2018 (at the time of writing this article) is a blend of person–person interactions alongside person–technology interactions; technology is an integral part of the provision of nursing care whether it be machines to monitor heart or blood pressure, mechanical beds, or mechanical lifts. The nurse of today is able to master a variety of technologies. From this vantage

point, one school of thought is technology holds the potential to take nurses away from their sacred role, to distract nurses from their attentiveness to patients or to replace nurses altogether (Sharkey & Sharkey, 2012; Sparrow & Sparrow, 2006; Van Wynsberghe, 2013a, 2016a; Wilson, 2002). On the other hand, another school of thought holds that technology is perceived as an extension of the nurse; technology enhances the nurses' capacity to care at a higher level or quality (Locsin, 2017). In either case, technology and its impact on nurses, patients, and caring practices must be assessed. The latest technology deserving such scrutiny is that of robotics in healthcare.

Robots in healthcare come in many shapes and sizes, with a variety of capabilities and applications. They provide a range of supportive functions in healthcare delivery such as lifting patients, delivering supplies and medications, tele-communication between patient and staff, or assisting surgeons in surgery. Robots are praised for their positive aspects, for example, increased efficiency and accuracy in care; however, ethicists raise concerns about the role that these robots play in threatening the essence of care and/or the provision of basic human rights (Sharkey & Sharkey, 2010, 2012; Sparrow & Sparrow, 2006). Ethical practice is a core value of the nursing profession and as such, the use of robots in nursing care must be ethically evaluated for the impact on nurses, patients, and outcomes. (Vallor, 2011; Van Wynsberghe, 2013a, 2013b). One ethical evaluative approach is, the Care-Centered Value Sensitive Design (CCVSD), which aims to put the nurse and/or nursing practice as a starting point for understanding the impact of the robot on care as opposed to an isolated activity or task focus (Van Wynsberghe, 2016a, 2016b). Although, a focus on the care practice is a necessary criterion for an ethical evaluation of a care robot, it may not be sufficient since within the caring practices is the human experience. The CCSVD approach requires an exploration of nurses' experiences in their roles as well as a translation of these experiences into useful material for the robot developer (e.g., University or company) and/or the robot implementer (e.g., hospital purchasing the robot).

This article includes a brief discussion of the current state of healthcare robotics and an explorative application of the CCVSD approach to a nursing situation using the Nurse As Caring theory as the foundation of the nurse–patient relationship (Boykin & Schoenhofer, 2013; Van Wynsberghe, 2016a, 2016b). This analysis of the nurse–patient relationship will inform designers and developers of the complexity of the nurse–patient experiences. The aim of this work is to flip the question from one in which we ask how to fit robots into healthcare to one in which we ask what kinds of robots would complement the nurse in his/her sacred role. This work gives voice to the nursing community and is a bridge between those practicing nursing and those creating the technologies for nurses to use in their practice.

Robots in Healthcare: What, Where, When, and Why?

Technology is not new to healthcare and healthcare is no stranger to technology. This simple statement does not render the introduction of any or all technologies in healthcare to be good; rather, it focuses the following discussion on the reality that robots are not entering a healthcare space that is free from other technologies. More specifically, robots are not interacting with nurses who do not already interact with technologies. The difference with robots is that they carry an expectation to solve many problems at once; to *care for* patients in the entirety of care as opposed to completing one small portion in the overall role of caregiver. Whether this notion stems from popular culture and how we see robots in movies or TV shows, or how we read about robots in the news is unclear; but in any case, it should be noted that the robots in 2018 are capable of completing a few tasks and not fulfilling the role of caregiver, as we know it.

For robot ethicist Shannon Vallor, "Carebots are robots designed for use in home, hospital, or other settings to assist in, support, or provide care for sick, disabled, young, elderly, or otherwise vulnerable persons" (2011, p. 2). Concurrently, Sharkey and Sharkey (2010) further explored the actual or potential functions of carebots such as, performing or providing assistance in caregiving tasks; monitoring the health or behavioral status of those receiving care or the provision of care by caregivers; and providing companionship to those under care. Today's common commercially available robots in healthcare are the tele-communications robots (e.g., RP7), surgical robots (e.g., daVinci surgical system, Amadeus surgical robot), delivery robots (e.g., TUG, HelpMate), sanitization and sterilization robots, and basic companionship robots (e.g., Paro).

An important aspect to consider here is the relationship that robots share with artificial intelligence (AI); AI is a form of software, with algorithms used to make predictions about patient diseases and/or forms of treatment. AI may be embodied in a robot to create an AI powered robot or it may run on a computer as an assistive device for a care provider in his/her decision making (e.g., mole analysis for detection of skin cancer by AI). For the purposes of this article, we focus on embodied robots that can be touched and interact with others in the human environment with or without real time direction from a human operator (e.g., with varying degrees of autonomy). Humanoid robots may or may not be powered by AI. Therefore, we do not consider software alone or avatars. This criterion of embodiment is important for our assessment of certain fundamental characteristics of the nurse.

The Care-Centered Value Sensitive Design Approach

Robots in healthcare are placed in one of the most morally charged contexts possible; literally life and death decisions are being made by the hour. For this reason, among others, these robots deserve ethical examination to explore their impact on the quality of life of those who use the robots as well as those who receive robot care. Consider, for example, the potential privacy and security concerns associated with robots roaming the hospital halls that have the ability, inadvertently or not, to collect information without discrimination. This action raises many ethical concerns for the reality that exists that not all persons are recipients of good care either due to a lack of resources or unfriendly caregivers. Robot design needs to be mindful in creating robot care that addresses the highest level of ethical standards if it is to elevate the quality of care.

The CCVSD approach is an ethical framework created to help guide robot designers and developers in their task of creating tools to assist care providers with an eye towards the incorporation of ethics within the design process (for more details on the CCVSD approach please see Van Wynsberghe, 2013a, 2013b, 2016a, 2016b). This framework conveys the incredible significance that each care practice has on providing care to the entire person, family or healthcare system. Care practices such as lifting patients are moments in the nurse–patient relationship where the nurse can assess adherence with a care plan and/or patient symptoms that establishes the human connection. To create a robot that removes the nurse from this role can do more harm than good. Yet context plays a role as we evaluate the functions robots will perform if they are used in home care as support, but not replacement of the nurse–patient relationship.

The CCVSD approach is a framework of elements that examines and explains the care practice as one understands how a robot could enhance or hinder the provision of care. The elements are care practice (e.g., lifting, bathing, feeding, etc.); actors (e.g., nurse and patient vs doctor and patient vs porter and patient); context (e.g., hospital, nursing home, hospice, etc.); the type of robot (e.g., fully autonomous, assistance, etc.); and the manifestation of care values. For the latter, the manifestation of care values, the goal is to describe the care practice with all actors involved as an expression of values. These values come from the work of care ethicist Joan Tronto and are attentiveness, responsibility, competence, and reciprocity (Van Wynsberghe, 2016a). The idea is to evaluate a care robot based on how it is able to enhance or diminish these values. In order to do this, we must have an understanding of how these values come into being through the nurse's actions and care practices. Hence, the application of the framework involves a detailed narrative of the care interaction.

The CCVSD places the focus on the nurse; the nurse's care practice is useful in exploring the essence of excellent care, such as showing moments where care practices and care providers can be evaluated. A weakness is that this approach focuses on the system (i.e., the care practice) rather than the distinct components of the system. To be more specific, the CCVSD does not allow space to understand the human experience of nursing for designers to translate; yet, the human experience of the nurse is always present in every task he or she fulfills. The following story is just one example of how nurse caring is essential:

> Her grief was obvious. The gravity of her loss was apparent; perhaps, because I could commiserate with her fertility struggles or because all too often I found myself providing care to women in her situation. She was just a year younger than me, and she was my patient in the recovery department after suffering a miscarriage in the second trimester of her pregnancy. Still groggy from the anesthesia, I could sense that she was hoping that the loss of her unborn

child was just a dream; but, reality quickly set-in as tears began to trickle down her face. There was a momentary pause, where I tried to find words of comfort that I could offer her. It was in that silence that I asked her, "May I pray with you?" Initially, she appeared confused, but she quickly beckoned approval of my request. We shared a prayer, tears, and a box of Kleenex as we held hands. Our time together was limited to roughly a 60-minute stay in the Post Anesthesia Care Unit (PACU); though the interaction was brief, the memory of the encounter has stayed with me for years.

This vignette is evaluated applying the focal care values of the CCVSD approach, namely, attentiveness, responsibility, competence, and reciprocity as a way of understanding the various moments in which the nurse practiced the essence of nurse caring (Van Wynsberghe, 2013b). The nurse exercises her skills of attentiveness and competence in her immediate assessment of the patient's cause for distress and loss. The nurse does not leave the situation in light of there being no need for physical hands-on care (e.g., no bed change was needed, no catheter was needed, no blood to be taken); in other words, the nurse took responsibility for caring for this patient at *this moment* in time. Moreover, the nurse engages in a reciprocal form of care which engaged the patient, and care happened with the patient rather than to the patient. Thus, in using the CCVSD approach, we can identify the moments in which the various values are manifest. There are some elements revealed through this vignette, which go beyond the values of attentiveness, responsibility, competence, and reciprocity. Consequently, a broader framework to account for the richness of care made tangible through this vignette is needed. To expand the CCVSD approach we turn to The Nursing As Caring Theory.

Theoretical Framework for Caring Relationships

The Nursing As Caring Theory (Boykin & Schoenhofer, 2013) is a theoretical foundation used to draw attention to the nurse's experience of nurse caring. Boykin and Schoenhofer (2013) state:

the nursing situation is a shared lived experience in which caring between nurse and nursed enhances personhood . . . [And further state]

caring is the intentional and authentic presence of the nurse with another who is recognized as person living caring and growing in caring. Here the nurse endeavors to come to know the other as caring person and seeks to understand how that person might be supported, sustained, and strengthened in his or her unique process of living caring and growing in caring. (p.13)

The Nursing as Caring theory postulates that everyone is caring and that caring is a dynamic process that allows growing in caring. Within this theory is the Dance of Caring Persons. The Dance of Caring Persons represents a relationship model to understand "caring for" and "caring about" persons. As one examines the dynamic movement of the nurse–patient relationship, the Dance of Caring Persons offers insight into how these relationships are lived through caring. The image of this "dance" is circular and fluid with those caring for and those caring about guided by the nursing situation. Within the nursing situation, one embraces that knowing of self is essential to being able to care for others (Boykin & Schoenhofer, 2013). Knowing is a key ingredient for caring relationships. Knowing constitutes explicit, implicit, and direct knowledge; all with the intention of helping the other grow (Mayeroff, 1971). As one understands knowing as it relates to the Dance of Caring Persons, one should wonder how a robot would "know" in a caring relationship.

Yet, being part of this dance is not limited to those who only provide direct care. Nurse administrators and members of the healthcare team are all part of the dance; in fact, anyone can join the dance. One must keep in mind that the Nursing as Caring Theory was created when humanoid robots were only in the imagination of TV shows like *The Jetson's* or *Star Trek*. So the question is: Can robots join the dance? Barnard (2017) states robots "will not understand emotion in a human sense and know compassion in the same way. While emotional responses may be programmable based on an algorithm or protocol; robots will never experience or express compassion as human beings do" (p. 154). Without the capacity for emotion or compassion, it is a stretch to equate a robot providing care with a caring nurse–patient relationship. To appreciate any answer to this question, an understanding of what constitutes a caring nurse–patient relationship and the current capacity of humanoid robots needs to be explored. For this,

we take a closer look at the caring nurse–patient relationship.

The Caring Nurse–Patient Relationship

As we begin to understand the caring nurse–patient relationship, we start with what constitutes a *therapeutic relationship.* The word therapeutic is derived from the Greek term *therapeuein*, which means to minister to or attend to another (Koloroutis & Trout, 2012). Krishnamurti (2007) states that everything in life is related to something or other; concluding that relationships are in fact a method of discovering self and others. Therapeutic relationships differ from social or collegial connections, mainly because throughout therapeutic interactions the nurse provides care without the anticipation of receiving anything in return. It is expected that the nurse offer compassionate care, authentic touch, genuine presence, and anything else that would support the healing process. It is believed that vital to promoting a sense of healing is the nurse's ability to connect or bond with the patient; presumably, bonding is not automatic and transpersonal transcendence is a key component of this encounter. The therapeutic nurse–patient relationship is not merely "being nice" or conforming to scripted behaviors and attitudes; authentic nurse–patient relationships are grounded in caring science (Koloroutis & Trout, 2012).

Some authors are cynical and suggest that methods of measuring the efficacy of therapeutic relationships is flawed; however, accepting that the therapeutic nature of nurse–patient relationships is beyond measure diminishes the benefits of these interactions (Stewart, 2005).

Regardless, the impact of the nurse–patient relationship has been widely documented in literature. To date, studies show that effective therapeutic nurse–patient relationships positively correlate with enhanced patient satisfaction, improved patient outcomes, increased patient compliance, and reduced the nurses' exposure to lawsuits. In other words, patient outcomes largely depend on the nature and quality of the relationship between the patient and the healthcare provider (Drew, Chatwin, & Collins, 2001).

The Nature of Therapeutic Caring Nurse–Patient Relationships

Therapeutic caring nurse–patient relationships, which arises in the care environment, involves both the nurse and patient becoming interactive; engaging in the relational activities of sharing thoughts, feelings, and experiences, while expressing desires and needs is essential. Behavioral observations suggest that common themes begin to emerge in nurse–patient therapeutic dyads. The following will discuss four key elements of a caring therapeutic relationship, those being: bonding, empathy, touch, and being with.

Bonding

Attentive tending or the intentional actions taken by the nurse to understand the status of the patient under his/her care; medical condition, needs, and circumstances unique to the patient are just some aspects of bonding (Sugarawar, Koyama, & Tanabe 2017, Tejero, 2016). Establishing a bond can conceivably result in knowing, and k*nowing* the patient informs the therapeutic relationship. Centering on the other and acknowledging centering cues are a few ways of coming to know the patient (Koloroutis & Trout, 2012). Using knowing, intentional caring practice and behaviors throughout the nurse–patient encounter allows for an open, honest exchange and bonding will occur. However, even as robot care is in its infancy in healthcare, the use of robots in many other areas is present and there is evidence of bonding reported. Gorrett (2018) describes a story of the funeral for a fallen *soldier*, who was a robot. This robot, named Boomer, was a MARCbot used as a forward agent to detect bombs in the path of where the soldiers needed to go. This robot was awarded a Purple Heart and Bronze Star. While the robot may not have demonstrated the emotion of bonding, it is clear the soldiers *bonded* with the robot. The robot served a valuable purpose for the soldiers to do their work. In light of this, nursing should anticipate how, where, when, and what robot bonding will be in nursing care; an intentional decision for nurses. This is an area for further exploration.

Empathy

The concept of empathy is abstract and especially ambiguous; therefore, identifying a single, universally accepted definition becomes difficult. Beddoe and Murphy (2004) define empathy as ". . . the capacity to understand and respond to clients' emotions and their experiences of illness" (p. 306). Stebnicki (2007) describes empathy

as transcending, namely it is ". . . more than just listening, attending, observing, and responding to another person with unconditional positive regard" (p. 322). Empathy, as described by Decety (2012) is the space in which providers are able to experience the mind, body, and behaviors of others. Empathy promotes a therapeutic and caring environment, an interaction that is beneficial to both nurse and patient. Empathy requires a "lived experience," implies reciprocity, and at this point is limited to the person-to-person interaction (Van Wynsberghe, 2013a). Within the robotics community, empathy in the human-robot interaction has attracted growing attention of late. Researchers study how humans empathize with robots (Riek, Rabinowitch, Chakrabarti, & Robinson, 2009; Vallverdú & Casacuberta, 2015) as well as how robots that exhibit empathy are more appealing for humans to interact with (Leite et al., 2013; Looije, Neerincx, & Cnossen, 2010). The significance of empathy in the nurse–patient therapeutic relationship needs to be a central feature of an ethical evaluation of the robot introduced into this space.

Touch

Patients' attitudes and perceptions about touch within nursing practice vary. Few existing studies have examined patient preferences regarding touch. Touch is integral to the nurse–patient relationship; however, touch in the therapeutic sense differs greatly from touch that naturally occurs in typical life situations (Chang, 2000). Consider for example a friendly tap on the shoulder to ask someone to move over versus the touch required to insert a catheter or to take a blood sample. The purpose differs between the two, as does the very sentiment underpinning the touch. A search of the literature reveals that the functional aspects of physical touch can be classified as task-oriented touch (or touch while performing a task, such as bathing or repositioning), instrumental touch, emotional touch (a form of nonverbal communication which influences the safety, security, well-being, or esteem of the patient), touch for orientation, protective touch (the use of protective equipment when interacting with a patient, such as the use of gloves or restraints to prevent harm to patient or nurse), touch to alleviate pain and fear (effleurage), and healing touch (Chang, 2000; Vortherms, 1991). Despite being a form of communication, the existential impact of touch in the nurse–patient relationship is often times overlooked. Intentional touch may enhance aspects of the nurse–patient relationship and may better convey messages between the nurse and patient. Touch is a highly studied aspect of the human robot interaction and in fact, the field of tactile human–robot interaction is dedicated to this (Argall & Billard, 2010). Interestingly, touch in robot interaction has been studied as it concerns the safety implications for the human counterpart, but little research has been done on the ethical implications of human–robot touch (Arnold & Scheutz, 2017). While safety is paramount, we put forward here that the ethical significance of touch is deserving of greater attention.

Being With

The idea of *being with* or *being present* extends beyond the physical proximity a nurse may have to a patient; presence is the essence of the nurse–patient relationship. To be *present*, the nurse needs to be attentive, accountable, sensitive, open, and an active listener (Schaffer & Norlander, 2009). "Nursing action takes on a different meaning in intervening to be present" (Schaffer & Norlander, 2009, p. 11). For some patients, acts by the nurse such as responding to the call bell are meaningful in demonstrating presence. For other patients, sitting quietly and listening is impactful too.

Expanding CCVSD to Include Co-Presence and Touch

By uncovering certain elements that are central to the nurse's lived experience of caring, we can focus on two criteria or elements that demand attention in the CCVSD approach; being with, also described as co-presence, and touch. The significance of being with or co-presence for CCVSD come in the form of a question. One must ask what it means for the robot to be co-present, is it possible and further is it desirable? To shed light on an answer to this let us return to the theory of the "Nursing as Caring." We began by laying out that "the nursing situation is a shared lived experience in which caring between nurse and nursed enhances personhood" (Boykin & Schoenhofer, 2013, p. 13). Keep in mind the robot may exhibit co-presence only as interpreted by those using the robot or receiving care. We interpret any relationship robots may or may not develop with caregivers or care receivers through our own human lens.

With this in mind one might be so bold as to ask, what is the difference between a nurse collecting data and a robot collecting data? The difference is the nurses engages in intentional care practices to build healing relationships through empathy, bonding, touch, and being with, which goes beyond collecting data. There will be moments in which the nurse must sit and "do nothing," sit and be still without physically caring for a patient, as a way of "being with" when providing care. These moments reflect the nurse's valuation of the patient as a person deserving of dignity—a valuing of the personhood of the patient. This "dance" the nurse engages in with others remains dynamic, sacred, and oftentimes beyond simple explanations.

In addition to asking the question of whether or not a robot can and should be capable of co-presence, we must also ask to what degree a robot ought to engage in touch with patients. In order to understand the intimacy of touch, often emotionally charged moments, these experiences would need to be reduced to easily digestible packets of information that can be programmed into a robot. The design of tactile human–robot interactions are programmable tasks and they are, to date, focused on safe encounters between human and robot. Human–robot touch can be to provide information and cues to the human, to ensure safety of the human and/or robot, or to provide information to the robot needed to fulfill its function. However, in each of these cases, it is necessary to understand there is a greater dimension at work when it comes to touch. Designers must include an ethical awareness of how humans and robots can interact through touch beyond safety. There is an ethical boundary to maintain when we are touched or touch others. For the nurse, the use of touch is viewed as a sacred action, one not only meant to provide care but also to provide comfort, emotional support, compassion, as well as restore personhood or dignity.

The above section explores forms of therapeutic touch and thus the question that CCVSD analyses must address is which ones, if any, should a robot be programmed to fulfill? Robot design has the capacity to provide actions that patients would interpret as "human touch." Robots can perform many useful tasks. Robot design can provide a useful addition into the caring practice while at the same time maintaining a boundary between task-oriented actions from more sacred actions. The other forms of touch mentioned in this article, for example, healing touch, emotional touch, and protective touch make tangible the sacredness of the nursing role. These forms of touch pay tribute to the unique skills of the nurse in his /her role and move the analysis away from the care practice and into the realm of the human experiences.

In summary, it is essential that nurses and their leaders be present, intentional and integral in the design process of healthcare robots. Moreover, robot care is obliged to perform in a manner that maintains the sacred nurse–patient relationship. Whether it is setting ethical practice standards for touch, co-presence or bonding, nursing professionals must embrace this new and exciting technology. The CCVSD approach can account for certain elements of the lived experience of nurses in his/her role and further translate these elements into concrete suggestions for designers to consider in their design process. With this in mind, the CCVSD approach can, and should, extend beyond an analysis of the care practice to focus on the lived experience of the nurse following the introduction of a care robot.

Conclusion

We live in a world where the presence of technology is accepted and expected. Development of healthcare robots began two decades ago and continues at a rapid pace; for this reason alone it is time for the professional nurse to reflect on the role that robots *should* have on the nurse–patient experience. This article is a call to nurses to take the lead and define *how* these robots will and should be used in clinical practice. It is the nursing professions moral duty to protect the sacred nurse–patient relationship and maintain ethical patient care. The calls for nurse leaders, designers, and developers to maintain ethical design and evaluation as the use of robots in healthcare expands. The question remains: Just because it can be done, should it be done? Ethical considerations are not new to nursing care and using frameworks such as the CCSVD can provide a clear direction.

Lastly, can or will robots join in the "dance" for caring persons? While the answer most likely will be widely debated, it is these authors' position that nurses committed to caring need to make room for robots somewhere in the dance. The capacity of robot care to enhance the nurse's environment and provide technical care to patients is irrefutable. By adding the elements of empathy, touch, and co-presence to the list of values

of attentiveness, responsibility, competence, and reciprocity from the CCVSD approach, we were able to show how robust an ethical framework for evaluating care robots needs to be in order to capture the richness of the nurse–patient therapeutic relationship. The values of the CCVSD approach overlap with the assumptions of Nursing as Caring being that a caring relationship is a shared experience (reciprocity), nursing is a discipline and profession (competence), personhood is enhanced through participating in the nurturing relationship (attentiveness) and all persons are caring by virtue of their humanness (responsibility). Integrating both ethical and caring frameworks can serve the nursing profession as it wrestles with the role and function robots will perform. Every nurse has stories to tell. The stories that stay with us are rarely about how fast the intravenous therapy (IV) was inserted, how timely the medications were given or the instructions delivered; rather, they are stories that transform us come from connecting and living the human experience. Yet in today's healthcare environment, the growth of technology often overshadows these moments. As technology advances seemingly to replace many caregiving functions, we must remember that some human experiences are not programmable.

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