


Artificial Intelligence and Robotics in Nursing: Ethics of Caring as a Guide to Dividing Tasks Between AI and Humans

Felicia Stokes JD, MA, RN, Director, American Nurses Association Center for Ethics and Human Rights¹  | Amitabha Palmer MA, ABD, Applied Philosophy, Research Assistant at Politics, Philosophy, and Economics Program at Bowling Green²

¹American Nurses Association, Silver Spring, MD, USA

²Bowling Green State University, Bowling Green, OH, USA

Correspondence

Felicia Stokes, American Nurses Association, Silver Spring, MD, USA.

Email: stokes.felicia@gmail.com

Abstract

Nurses have traditionally been regarded as clinicians that deliver compassionate, safe, and empathetic health care (Nurses again outpace other professions for honesty & ethics, 2018). Caring is a fundamental characteristic, expectation, and moral obligation of the nursing and caregiving professions (Nursing: Scope and standards of practice, American Nurses Association, Silver Spring, MD, 2015). Along with caring, nurses are expected to undertake ever-expanding duties and complex tasks. In part because of the growing physical, intellectual and emotional demandingness, of nursing as well as technological advances, artificial intelligence (AI) and AI care robots are rapidly changing the healthcare landscape. As technology becomes more advanced, efficient, and economical, opportunities and pressure to introduce AI into nursing care will only increase. In the first part of the article, we review recent and existing applications of AI in nursing and speculate on future use. Second, situate our project within the recent literature on the ethics of nursing and AI. Third, we explore three dominant theories of caring and the two paradigmatic expressions of caring (touch and presence) and conclude that AI—at least for the foreseeable future—is incapable of caring in the sense central to nursing and caregiving ethics. We conclude that for AI to be implemented ethically, it cannot transgress the core values of nursing, usurp aspects of caring that can only meaningfully be carried out by human beings, and it must support, open, or improve opportunities for nurses to provide the uniquely human aspects of care.

KEYWORDS

artificial intelligence, ethics, ethics of caring, nursing, robotics

1 | INTRODUCTION

Artificial intelligence (AI) and AI care robots are rapidly changing the healthcare landscape in part because of the growing physical, intellectual and emotional demands of nursing as well as technological advances. As technology becomes more advanced, efficient, and economical, opportunities and pressure to introduce AI into nursing care will only increase. Under these conditions, there is an urgent need to consider principles according to which interventions ought to be provided by a human or AI devices.

Nurses have traditionally been regarded as clinicians that deliver compassionate, safe, and empathetic health care (Brenan, 2018). Caring is a fundamental characteristic, expectation, and moral obligation of the nursing and caregiving professions and, thus once the caregiver–patient relationship has been created, there exists a moral obligation and to care for patients (American Nurses Association, 2015).

Along with caring, nurses are expected to undertake ever-expanding duties and complex tasks. Nurses are responsible for collecting data, determining diagnoses, making nursing care plans, executing care

based on best practices, using critical and clinical decision-making skills, safeguarding patient safety, providing patient assessments, patient education, just “being” with the patient, and a host of other less valued but essential tasks and activities, including stocking rooms, gathering supplies, obtaining labs and performing light housekeeping in patients rooms (Clipper, Batcheller, Thomaz, & Rozga, 2018; Liao, Hsu, Chu, & Chu, 2015). In many care settings, nurses face patients with chronic illness, complex patient and family dynamics, in addition to institutional pressures for shorter patient admissions (Clipper et al., 2018). These acts of nursing practice are critical to patient outcomes as well as to the daily functions of many hospital organizations. Yet, the design, development, and implementation of AI into healthcare practice are often done without consideration or input from nurses.

Etzioni and Etzioni (2017) have argued that the correct model for introducing AI into nursing care uses AI as partners, not substitutes, and tasks are appropriately divided between human and AI caregiver according to relative competence (i.e., comparative advantage). While we agree that the partnership model is broadly correct, the relative competence criteria for assigning tasks risks having efficiency overshadow caring as the central feature of nursing practice. In this article, we argue that an ethical division of tasks between AI and human caregivers maintains caring as the core value and practice of nursing and protects or expands opportunities for caring acts, expressions and attitudes. Although much of our discussion involves nursing, our conclusions extend to caregiving professions generally.

In this article, we initially review recent and existing applications of AI in nursing and speculate on future use. Second, we situate our ethical arguments within the recent literature on the ethics of nursing and AI. Third, we explore three dominant theories of ethics of caring and the two paradigmatic expressions of caring (touch and presence) and conclude that AI—at least for the foreseeable future—is incapable of caring in the sense central to nursing and ethics of caring. In the fourth section, we argue for two points: first, the comparative advantage principle for dividing interventions risks undermining caring as the central value and practice of nursing. Second, we offer an ontology of caregiving activities that captures the distinction between caring and non-caring interventions and suggest how these can be divided according to this ontology. Following this analysis, we will conclude that for AI to be implemented ethically, it must meet three criteria: (a) It cannot transgress the core values of nursing nor the standard values and principles of bioethics. (b) It cannot usurp aspects of caring that can only meaningfully be carried out by human beings. (c) It must support, open or improve opportunities for nurses to provide the uniquely human aspects of care.

2 | NURSING AND ARTIFICIAL INTELLIGENCE TECHNOLOGY

There is no consensus on what constitutes artificial intelligence (Bali, Garg, & Bali, 2019) and people unknowingly use artificial intelligence every day. Artificial intelligence is complex and deals with the “exploration, study, and design of machines and equipment that

stimulate human behaviors” (Liao et al., 2015, p. 140). In lay terms, artificial intelligence is the use of mathematical algorithms to carry out tasks that would otherwise require human intelligence (de Saint Laurent, 2018). Devices that are used in reasoning, problem-solving, judgements, knowledge plans, communicating natural language, and devices that use intelligent routing for travel, simulations, voice recognition and strategic web-based interactive games are all examples of using intelligence and data (Bali et al., 2019). This article will provide ethical considerations of caring for various AI types, including direct and indirect care, as well as other fundamental aspects of care such as physical and psychosocial needs of patient care.

Very broadly, the ostensible goal of any valuable technology is to solve problems or bring about improvements. Thus, it is worth considering some of the problems and challenges nurses face and how AI currently and in the future solves them. These challenges include staffing shortages, lack of experience or expertise resulting in poor judgement, documentation burdens, moral distress related to organizational constraints, and physical fatigue due to repeated actions such as lifting patients and multiple trips obtaining supplies or critical items for the delivery of care (Clipper et al., 2018; McBride, Tietze, Robichaux, Stokes, & Weber, 2018). The physical tasks increase nurses' workloads, pull them away from direct patient care, contribute to patient and family dissatisfaction, and increase financial expenditure for healthcare organizations (Clipper et al., 2018). There is no shortage of opportunities for AI and AI robots to perform tasks that prevent nurses from delivering quality patient care.

Already AI technology has begun to address some of these challenges. “Fetch and gather robots,” for example, assist nurses in obtaining supplies. The robot travels to the supply area, scans and gathers the necessary supplies and returns to the patient care setting (Clipper et al., 2018). These “hunt and gather” robots rarely interact with patients or families and allow more time for the nurse to spend at the bedside with patients and families. In addition, some robots, such as Robear, lift people in a safe manner and alleviate the physical toll imposed on nurses required to lift multiple patients several times per day (De Swarte, Boufous, & Escalle, 2018).

But AI can and will do more than simply lift, fetch, and gather. AI can and will also diagnose, feed, bathe and change bandages—and possibly do it better than humans. For example, MY SPOON™ robot provides feeding assistance (Barnard, 2017) and robot bathtubs offer automated soaping and showering (Beedholm, Frederiksen, & Lomborg, 2015). The ethical questions are *should* we employ AI to do every nursing task? And if not, why not? And for which tasks should we not? Answering these questions is a preliminary step towards the ethical use of AI in nursing.

3 | OVERVIEW OF THE ETHICS OF AI AND NURSING

The literature on the ethics of AI—both generally and in caregiving—covers a range of ethical concerns. Bostrom (2014), Hawking, Tegmark, Russell, and Wilczek (2014), and others offer dystopian

worries that AI will outsmart and come to dominate humans. Nurses who take this view might oppose introducing AI into health care on the grounds that their job will become obsolete (Locsin, 2016). Barnard and Sandelowski (2001) find a related trend in the nursing literature on AI technology wherein there is a tendency to see technology as depersonalizing, dehumanizing and in paradigmatic opposition to humane care. Sherry (2011) and Turkle (2011), on the other hand, worry that introducing robot caregivers replaces human-to-human interactions in the way online interactions have replaced face-to-face socializing. On this view, human-machine interactions are ethically pernicious since they offer only the illusion of friendship, companionship, and social connection.

Sharkey and Sharkey (2010) worry about the privacy implications of assistive robots, sometimes called carebots. For example, private conversations with carebots could be accessed by inappropriate audiences. Like Turkle (2011), they also worry about the ethics of creating machines that give the illusion of genuine emotional engagement. Sparrow and Sparrow (2006) argue that we should avoid carebots for the elderly because they are incapable of meeting the elderly's social and emotional needs. The inevitable replacement of genuine human contact with robots is detrimental to the well-being of elderly patients already prone to social isolation.

Not everyone is so suspicious of AI in nursing. For Sharkey and Sharkey (2006), emotional expression in AI bots is permissible so long as: (a) it is not manipulative, (b) developers are transparent about their designs, and (c) any harm is minimal. In "The Ethics of Robotic Caregiving," Etzioni and Etzioni (2017) continue the project of exploring the ethical use of AI in caregiving. They echo Sharkey and Sharkey's position that many of the concerns about emotional manipulation also apply to human caregivers and are overstated—but not irrelevant. Manipulation and deception are bad regardless of what is doing them. What matters is the size of the harm relative to the benefit.

Etzioni and Etzioni (2017) argue that many of the ethical concerns associated with AI caregivers can be mitigated so long as we treat them as partners rather than substitutes. The correct principle for evaluating the appropriateness of AI for a task is comparative advantage: "one should tolerate wide use of AI caregivers as long as they are not inferior to whatever human caregivers are available" (p. 184).

This opens the question about how nursing interventions ought to be partitioned between human caregiver and carebot. Etzioni and Etzioni (2017) only briefly describe the above comparative advantage principle. While they offer no detailed explanation for how tasks should be divided, they do offer a few examples. "AI caregivers are obviously vastly superior to human caregivers when memory and retrieval of information are at issue. Therefore, they are best charged with recalling which medications a patient has taken and their interactions and side-effects" (Etzioni & Etzioni, 2017, p. 184). Human beings, on the other hand, "are better at reading between the lines, listening not just to what people say but the way they say it, their tone of voice, and at touching" (p. 185). They conclude the section by observing that "[i]t seems most of the work involving the

details of partnering between human and AI caregivers has yet to be carried out" (p. 185).

To begin thinking about the ethical division of tasks between AI and humans, consider the following thought experiment: suppose we extrapolate technological possibility into the future and imagine a hospital where every aspect of nursing care is performed by an integrated system of networked AI robots. There is not a single human nurse in the facility. The tired and overworked nurses have been replaced by indefatigable attentive robots. The facility boasts a safety record superior to the barbaric days of human-delivered care. Continuously updating learning algorithms eliminates errors otherwise caused by fatigued or undertrained nurses. Labour cost savings have rendered health care more affordable.

Now, imagine you or a loved one is required, for health reasons, to enter this care facility. The AI robots execute all the nursing tasks perfectly—or at least much better than their human counterparts ever could. A friendly robot greets you at the entrance. You are impeccably diagnosed, your vitals are perfectly monitored and evaluated by the millisecond, and you are provided with every comfort you request. You even get to choose your carebot's personality. The carebot delivers a meal whenever you are hungry, and you do not even need to raise a finger to ask. The sensors on your body inform the integrated system that you are hungry and it signals the carebot. The meal is custom-made to suit not only your specific nutritional needs but also your individual gustatory preferences. A carebot bathes you, brings your medication on time, changes your bandages and feeds you. When you are feeling bored, you can watch your favourite movies and television shows on the hologram projector. What's not to like?

In this imagined facility, our medical needs seem to be well-attended to, and all tasks are performed perfectly. But most of us have a nagging intuition that *something* is missing: nursing care is not merely a collection of tasks. Nursing involves *caring*. In fact, caring is fundamental to nursing (Edvardsson, Watt, & Pearce, 2017; Morse, Solberg, Neander, Bottorff, & Johnson, 1990), and caring seems to include some *human* elements that AI cannot deliver. It should be noted that it is possible that at some point in the future, AI might be able to offer the distinctly human elements of care. For example, Locsin et al. (2018) suggest that, although probabilistic, with the advent of quantum computing and the predicted singularity, humanoid nurse robots (HNRS) capable of caring will not only exist but "be considered indispensable, so that acceptance, confirmation, revelation, and support of persons as caring in nursing may be achieved" (p. 146). They dedicate their paper to exploring the implications of "humanoid robots as 'beings' which are endowed with a caring capacity by possessing qualities to ably manifest caring" (p. 147). We set aside those speculations for now and focus on current and immediately foreseeable AI. Should future AI have the capacity for caring as we define it in this article, different implications may follow.

Our intermediate task is to specify the distinctly human elements of caring. From there, we may work towards guidelines for an ethical division of tasks between AI and human caregivers; one that ensures caring remains central to nursing practice. In the following sections,

we give an overview of three prominent accounts of caring and two paradigmatic ways of communicating caring. Our goal is not to advocate for a particular theory of caring. Rather we aim to show that individually and collectively, each account offers important insights into the constitutive conditions of caring and explains why current and near-future AI cannot engage in caring.

4 | ETHICS OF CARING

The theory of ethics of care or caring is a family of moral theories that focus on human interdependence and shared responsibility to one another as essential components of maintaining relationships and the experiences, activities and work involved in caring (Furst, 2017; Gilligan, 1982). Drawing on this framework, we describe three important accounts of caring from Tronto, Held, and Vanlaere and Gastmans and explore their implications for AI in nursing.

4.1 | Ethics of caring: Tronto view

Tronto (1993) outlines the four critical components of the caring process. The first component of caring is attentiveness, or awareness, which is an ethical quality that allows for meaningful consciousness of the needs of others. Second, care involves the assumption of responsibility for those needs and a plan to address them. The actualization of this plan is caregiving. Third, Tronto (1993) suggests that competence is a moral dimension of care that assumes a person would take on the responsibility of caregiving without being qualified to do so. Competence is not simply professional competence, but also the possession of the moral qualities required to provide good care (good care is defined by the goodness of the qualities of the person providing the care).

The final phase of the caring process relies on the individual in receipt of care and the reciprocal nature of relationships required for caring. Tronto (1993) suggests that the person in need of care will respond to the care he or she receives as a mechanism to communicate if the caring needs have actually been met. This final element of responsiveness requires the recipient of care to acknowledge vulnerabilities that create the needs for the caring process (Tronto, 1993).

On Tronto's conception of caring, AI can superficially meet some but not all components of caring. For example, although AI can be attentive and alert to patient needs, it is not clear that it achieves an ethical "meaningful consciousness" of those needs. Such a level of understanding would seem to require that AI have some conception of *what it's like* to be in the patient's position. This implies common experiences and subjective consciousness which most AI researchers agree that AI currently does not have (Wildt, 2019). Several researchers suggest that AI robot may one day possess what Ned Block (1996) calls *access consciousness*, i.e., a mental state's availability for use by the organism, for example in reasoning and guiding behaviour, and describes how a mental state is related with other mental states. Nevertheless, there is deep disagreement over

whether AI could ever have the kind of consciousness required for subjective experience (Manzotti & Chella, 2018). Without subjective experience, "caring," as understood by Tronto is not possible.

With respect to the second and third components, AI can in a superficial sense, assume responsibility for a patient or certain task but it is not obvious that it can do so in the same way a human nurse does. A nurse understands the moral significance of taking responsibility for another's well-being and the moral significance of failing to properly fulfil one's responsibilities. Nurses also respond appropriately to culpable failures through feelings of guilt, regret and shame. At least for the conceivable future, this is not true of AI.

On Tronto's view of caring, AI carebots lack critical capacities necessary for caring. This gives us some preliminary guidance with respect to how nursing tasks ought to be partitioned between AI and nurses. In so far as caring is essential to nursing, it follows that AI will not be ethically appropriate for tasks where caring acts and behaviours and the capacities that underlie them are essential features.

4.2 | Ethics of caring: held view

Held (2006) suggests that caring is both a value and a practice. Caring practice shows us "how to respond to needs and why we should. It is not a series of individual actions, but a practice that develops, along with its appropriate attitudes" (p. 42). Fundamentally, caring presumes people as relational and as interdependent beings. It requires a personal connection and a cultivation of relationships between the interests of the carers and the recipients of care (Held, 2006). It differs from benevolence since, on Held's view, caring is the characterization of a social relation rather than an individual disposition. Caring relations demonstrate attentiveness and responsiveness to each other's needs.

Caring and trust are distinct concepts; however, for Held, they are deeply connected since both are required for flourishing relationships and communities. Trust is established through caring acts and expressions, and, conversely, care receivers must develop (well-founded) trust in their caregivers in order to flourish (Held, 2006).

Even more than Tronto, Held's view of caring excludes AI. AI cannot engage in caring so long as AI is incapable of internal attitudes because caring is a practice that requires appropriate attitudes (rather than a series of individual actions). AI may superficially *perform* caring by demonstrating attentiveness and responsiveness. However, since Held's view characterizes caring as a reciprocal and interdependent *social* relation, AI is excluded from the possibility of caring practice. Relations with AI are not reciprocal or interdependent in the moral sense required for caring between persons. When AI fails to perform or demonstrate caring, moral attitudes such as blame or anger are not fitting since the relations between AI machines are not moral relations. Finally, the tight relationship between trust and caring also seems to exclude AI. AI could presumably mimic some caring acts that elicit trust, however, unlike trust, which is presumed to be a moral concept, trust in AI is best characterized as a non-moral attitude. Such attitudes are best understood as assumptions

about reliable and predictable performance rather than about the other's internal caring and benevolent attitudes that motivate trust (McLeod, 2015). Also, trust implies that we can be betrayed and it is unlikely that we can be betrayed by AI carebots in any moral sense.

4.3 | Ethics of care: Vanlaere and Gastmans view

Vanlaere and Gastmans (2011) apply a personalist approach to the ethic of care to suggest that people care because failure to do so diminishes the personhood of the potential carer and recipient of care. The personalist approach limits care to the personal material needs of an "actual human being." Vanlaere and Gastmans (2011) argue that care concerns involve more than attentiveness and the ability to tune into the emotions of another. This approach requires the carer to act in a responsible manner, given the determination of the proper nature between the people, the vulnerability of the people and the context in which caring takes place (Vanlaere & Gastmans, 2011). Care starts from a sentiment that is required for one to act in a morally responsible way (Vanlaere & Gastmans, 2011). Out of this care, dignity develops between the carer and the recipient of care (Vanlaere & Gastmans, 2011). Care contains an internal moral obligation that exists as part of being a human being and this caring confirms the human dignity within the carer and the recipient of care. If care is delivered obligatorily without the sentiment, it could cast doubt on the value of the care being delivered.

Under the Vanlaere and Gastmans (2011) view, care extends within the realm of human beings. Artificial intelligence, or any replication of human emotional intelligence, is not sufficient to meet the elements of ethics of caring. Vanlaere and Gastmans (2011) make a deliberate argument of caring that recognizes personhood and human characteristics such as human dignity, emotions and vulnerability. As of now, artificial intelligence, including care robots and other human appearing devices do not possess emotional intelligence equivalent to humans. Although programming exists that allows some AI technology to exhibit human-like emotional responses such as the ability to detect emotions through verbal and non-verbal cues, AI has not been capable of emotional reasoning, or predicting or understanding human emotion (Kumar, Singh, & Chandra, 2018). Therefore, the ethical analysis to support the use of artificial intelligence through the lens of the Vanlaere and Gastmans (2011) ethics of caring is not currently supported by AI technology.

5 | SYNTHESIS OF CARING VIEWS AND THE ESSENTIAL ELEMENTS OF NURSING CARE

Despite the differences between the three accounts, an important consensus emerges on the constitutive conditions for caring. Various articulated, the three theories converge on two central features of caring. First, caring requires a relational and reciprocal relationship between *moral* agents (Pettersen, 2011). Second, caring

implies a *moral epistemology* that includes "taking experiences into account, exercising self-reflection and sensitive judgments where contextual differences are attended to" (Pettersen, 2011, p. 55). These conditions exclude AI from the practice of caring since AI, as we currently know it, fails to instantiate these conditions. So, while there may not be unanimous agreement on the exact necessary and sufficient conditions for caring, there is sufficient agreement across theories to explain why AI cannot care in the sense that is foundational to nursing practice.

Why does this matter for how nursing interventions are partitioned between human and AI caregiver? Let's return briefly our original thought experiment. We elicited the intuition that *something* important is missing in a hospital devoid of human nurses despite the fact that every task is efficiently, safely and proficiently carried out. If we assume that caring is a central feature of nursing and that AI cannot provide caring, then it follows that not all aspects of nursing can or should be performed by AI—namely, the ones that require caring.

At this point, one might be tempted to conclude that the correct division of tasks between AI and nurses parallels the division between caring and non-caring tasks. However, this division overlooks the fact that caring often is not a particular task but rather it is a way of doing tasks accompanied by an internal set of attitudes and dispositions that require certain moral capacities. In the next section, we describe two paradigmatic ways of communicating caring—touch and presence—and suggest that AI is incapable of successfully communicating caring in these ways. It follows that an ethical division of tasks between AI and human caregivers must somehow identify activities and concerns closely tied to caring *and* paradigmatic means of communicating caring versus those that do not.

6 | HUMAN TOUCH

Healthy human relations all demonstrate respect for one's status as a moral agent and protect dignity (Korhonen, Nordman, & Eriksson, 2015). A caring touch is one way to recognizing dignity. In the healthcare setting, caring touch also brings about comfort, security, enhancement of self-esteem and reality orientation (Fredriksson, 1999). Although robots can obviously touch patients, their touch does not communicate the same interpersonal messages as human touch—at least not without deception or delusion. Clever programmers and prosthetics can mimic human emotion and touch, but these android touches do not carry with them the same interpersonal and social messages of care.

Android touch cannot be a caring act because, as we have seen, AI lacks the two essential attributes for caring: being moral agents in reciprocal social relations and a "moral epistemology of care includes taking experiences into account, exercising self-reflections and sensitive judgments where contextual differences are attended to" (Pettersen, 2011, p. 55). Since current and near-future AI lack these attributes and capacities, android touch cannot communicate genuine caring, although it can mimic it. This goes some way in

explaining the intuition that “something” is missing in a hospital with only AI nurses. In so far as caring is a basic feature of ethical nursing, it follows that AI carebots should not be implemented in ways that significantly eliminate human touch.

7 | HUMAN PRESENCE

Dr. Lennart Fredriksson has done significant research evaluating the value of presence, touch and listening within and ethics of caring conversation. Fredriksson (1999) discovered that the meanings of touch, presence and listening were essential in a caring conversation and later became the elements of the ethics of caring conversation. Fredriksson (1999) found that a caring presence is not only a physical presence but separated it into “being there” and “being with.” He defined “being there” as “an interpersonal and intersubjective phenomenon where presence is being present *for* someone” (Fredriksson, 1999, p. 1171). However, “being with” is “an interpersonal and intersubjective mode of being, but where the structure follows a different pattern than that of ‘question’ and ‘answer’, namely that of ‘gift’ and ‘invitation’” (Fredriksson, 1999, p. 1171). There is significant value in “being with” an individual being cared for that creates a deep connection to acknowledge suffering and help that person explore a way out of the suffering to move forward for optimal outcomes (Fredriksson, 1999).

Caring conversation and presence are foundational and uniquely human contributions to nursing and other caregiving professions. Although they can mimic them, AI carebots lack the moral agency and moral epistemology necessary for genuine caring conversation and presence. This helps explain our intuition in the dystopian thought experiment that something is missing. It follows that ethically implementing AI robots into nursing requires that we avoid implementations that usurp opportunities for caring conversations and presence and seek implementations that open opportunities for more.

8 | ETHICAL DIVISION OF INTERVENTIONS AND THE ONTOLOGY OF TASKS

Etzioni and Etzioni (2017) conclude “The Ethics of Robot Caregiving” by acknowledging that “[m]uch more work is needed to spell out the more effective divisions of labor and forms of cooperation between AI caregivers and humans” (p. 187). Our goal in this section is to advance what we presume will be an ongoing analysis. Our first step was, via thought experiment, to elicit the intuition that there is some necessary human element of caregiving. We suggest that this is *caring*, then explore the concept of caring and two paradigmatic means of its communication in caregiving. Drawing on the ethics of caring literature, we also suggest that AI carebots cannot deliver genuine care since they lack at least two constitutive conditions for caring: reciprocal relations involving moral agency and a moral epistemology. It follows that an ethical division of labour between human and AI caregivers will seek

to protect or support caring and opportunities for its communication delivered by humans. In working towards our proposal, we must consider various ontologies of tasks since caregiving interventions or skills cannot be obviously divided according to caring or non-caring. Furthermore, as we have discussed, caring is not always intrinsic to tasks but is often an attitude or a way of caring out an activity.

The partnership model between nurses and AI proposed by Etzioni and Etzioni (2017) can be variously interpreted depending on one's ontology of nursing activities. Etzioni and Etzioni (2017) suggest that, instead of substitution or replacement, AI and human caregivers work as partners using the comparative advantage criteria for dividing labour. One possible ontology is to itemize all the various skills, tasks and subtasks that caregivers do, evaluate whether AI or humans have a comparative advantage and assign tasks based on whichever has the comparative advantage. However, if nursing and caregiving generally are conceived of as a collection of skills, tasks and subtasks, then there is no good reason to suppose that AI will not eventually have a comparative advantage over humans for all skills and tasks. Such a position eventually obviates humans and justifies the objectionable AI-run hospitals in our thought experiment. On this model, caring evaporates from nursing since it is best described as a practice and value rather than a skill, task or subtask.

Etzioni and Etzioni seem to presume that comparative advantage for humans not only exists but will last. However, AI can already interpret emotions through facial and vocal cues (McStay, 2018). In fact, the Emotion Research Lab through their facial action coding system (FACS), is already *better* than humans at reading between the lines through detecting facial emotion microexpressions (facial expressions of emotion that last from as little as 1/30th of a second; Jaokar, 2019). There is no reason to believe AI will not also surpass humans in reading emotion in voice.

If we adopt a task and skill-based ontology, the central practice and value of caring are crowded out of nursing. The model implies that human caregivers only have a place so long as they possess a comparative advantage at some task or skill-based aspect of caregiving. But there is no good reason to suppose this advantage will be preserved over time for any skill or task. If we assume, however, that caregiving is not merely a collection of tasks and skills but is fundamentally about caring—broadly understood as an activity or way of acting requiring moral capacities and agency, reciprocal relations and emotional dispositions—then we achieve two goals. First, we have some general guidance according to which nursing tasks, roles and responsibilities can be ethically partitioned between human and AI caregiver. Second, we preserve the place of humans in caregiving professions.

9 | ETHICAL DIVISION OF TASKS AND ONTOLOGIES OF CARING

In developing our solution, we must first briefly describe two possible ontologies of professional caregiving interventions. The first is direct versus indirect care. Direct care interventions encompass

tasks where the caregiver has direct interactions with the patient, such as insertion of an intravenous catheter, medication administration or counselling during a time of grief (Archibald & Barnard, 2018; Potter, Perry, Stockert, & Hall, 2018). Indirect care involves activities performed away from but for the benefit of the patient or a group of patients (Butcher, Bulechek, Dochterman, & Wagner, 2018). This includes documentation, evaluating patient information and interdisciplinary collaboration (Potter et al., 2018).

The second ontology is fundamental versus non-fundamental care (Archibald & Barnard, 2018; Kitson, Muntlin Athlin, & Conroy, 2014). Broadly, the fundamentals of nursing care are a collection of areas of concern and tasks that ensure that the physical and psychosocial needs of the patient are met (Kitson et al., 2014). Fundamental care includes safety, prevention and medication, communication and education, hydration, feeding, elimination, respiration, personal cleansing and dressing, temperature, rest and sleep, comfort and relief from pain, dignity, privacy, mobility, respecting choice and expressing sexuality (Kitson et al., 2014). Other activities are non-fundamental or subservient to fundamental care.

We suggest that, as a default ethical division of interventions, a human caregiver be involved for all activities at the intersection of direct care and fundamental care. Why? First, fundamental care, better than any other ontology of caregiving, identifies paradigmatic caring activities and areas of concern in nursing and caregiving. Second, direct care, for its part, represents the tasks where human touch, presence and caring conversations are most able to occur. It follows that the activities at the intersection of direct care and fundamental care are paradigmatic caring activities and opportunities for communicating caring. Since an ethical use of AI preserves, supports and protects caring in caregiving professions, these activities at the intersection are not permissibly taken over entirely by AI carebots. Otherwise, there is a risk that caring, opportunities for caring and communicating caring vanish from caregiving environments.

Consider an example. Feeding and cleansing appear in both ontologies. They are both paradigmatic examples of caring activities and present opportunities for communicating caring through touch and presence. As mentioned earlier, there are already AI robots capable of feeding and bathing patients. They might even do it more efficiently and safely. However, turning these activities over *entirely* to AI carebots eliminates caring from caregiving. We suggest that an AI bot can permissibly take over the *mechanical* task of feeding; however, as a default policy, a human caregiver ought to still be present for conversation or company. Following Etzioni and Etzioni (2017), we agree that AI should work as partners; however, we disagree that comparative advantage be the primary criteria for dividing tasks.

Finally, our recommendations are guidelines, not mandates since other values and concerns must be taken into account. Resource availability and patient preference (i.e., patient autonomy) may override our recommendation that, at minimum, a human caregiver be present in the room for activities at the intersection of the direct and

fundamental care. Care facilities may be short-staffed or a pressing medical emergency may require that AI occasionally completely take over a core caring responsibility. Similarly, some patients might prefer AI carebots without human accompaniment and these requests should be accommodated when appropriate. Nevertheless, our position is that, barring these two possibilities, the default policy ought to be that, at minimum, a human caregiver be present (in the sense of caring presence) in the room for any activity or area of concern that is both direct care and fundamental care. Such a policy ensures that caring and caring touch and presence are protected in caregiving practices.

10 | ETHICAL USE OF AI OUTSIDE OF THE NEXUS OF DIRECT AND FUNDAMENTAL CARE

Our primary claim is with respect to labour at the nexus of direct and fundamental care; however, we offer some broad guidelines for labour outside of the nexus. Ethical use of AI technology requires that decisions to introduce or expand use must be guided primarily (although not exclusively) by the central features of the theory of ethics of caring. It follows that implementation, to be ethical, must meet three criteria: first, it cannot transgress the core values of nursing—i.e., caring. Second, it cannot usurp important aspects of caring that can only meaningfully be carried out by human beings. Third, it must support, expand or improve opportunities for nurses to provide the uniquely human aspects of care.

As we have seen, and areas of concern outside the nexus fall into two broad disjunctive categories: (a) direct or fundamental care (but not both) and (b) indirect or non-fundamental care (or both). In the first category, reasons for human involvement will be mixed but will often be strong—but not as strong as for interventions where the categories overlap. The reasons can also point in the other direction. In the second category, the three criteria above may favour delegating entirely to AI.

To illustrate the latter point, consider tasks such as retrieving items in a supply closet or preparing medicine. Such indirect and non-fundamental tasks are best suited for AI carebots since it does not remove opportunities for caring, touch or presence. In fact, more opportunities open for human caregivers to spend quality time with patients occur when relieved from such tasks. As such, there are positive ethical reasons to delegate such tasks to AI carebots.

With respect the first category, each area of concern will probably require individual consideration. Consider direct but non-fundamental care. The three criteria suggest that, *ceteris paribus*, there are still strong reasons to favour human involvement in direct care since relying exclusively on AI for such tasks eliminates opportunities for caring touch and presence. Alternatively, areas of concern that are fundamental but that are achieved through indirect care interventions might not require human involvement but merely human oversight.

11 | CONCLUSION

In this article, we continue Etzioni and Etzioni (2017) analysis of how caregiving activities ought to be partitioned between AI and humans. While we agree that the partnership model is broadly correct, we disagree that comparative advantage ought to be the principle according to which tasks are divided. Such a principle risks reducing caregiving to tasks and skills for which AI will eventually have a comparative advantage.

Instead, we argue that any division of tasks or skills between AI and humans in caregiving professions must preserve caring and caring touch and presence as the core concern. Since AI lacks the capacity for caring and genuine expressions of care, activities most closely associated with caring ought to always have some degree of human involvement. However, tasks that detract from caring are not only permissibly taken over by AI but perhaps ought to be taken over.

For practical guidance in ensuring caring as the guiding value for dividing tasks between AI and human caregiving professionals, we need an ontology that tracks this division. Since no one ontology tracks this distinction perfectly, we suggest that whatever inhabits the nexus of direct care and fundamental care best captures the activities and concerns most closely associated with caring and expressions of care. It follows that these activities ought never to be fully turned over to AI or AI carebots. At the other end of the continuum, activities that are either non-fundamental or indirect care may permissibly be taken over by AI so long as three conditions are met: first, it cannot transgress the core values of nursing—i.e., caring. Second, it cannot usurp important aspects of caring that can only meaningfully be carried out by human beings. Third, it must support, expand or improve opportunities for nurses to provide the uniquely human aspects of care. The three criteria also ought to be applied to activities that are either direct care interventions or non-fundamental care (but not both).

Finally, all this comes with some caveats. First, patient-guided care must respect individual diversity. Some patients may prefer AI caregivers for some or all activities. Second, insufficient staff or other resources may occasionally require trade-offs that involve using AI in nexus areas. None of this undercuts our recommendation that, *ceteris paribus*, humans be involved in nexus areas.

ORCID

Felicia Stokes  <https://orcid.org/0000-0001-7939-3078>

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