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ARTICLE

REGULATING CARE ROBOTS

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ABSTRACT

Care robots already assist the elderly in some nursing homes around the globe and could be in widespread use in hospitals and private homes sooner than we think. These robots promise great hope for patients: robots can provide increased independence, assistance with daily living, comfort and distraction during procedures, education, and companionship during vulnerable and lonely times in patients' lives. Despite these promising features, there are a number of concerns; care robots, designed with the aim of winning patient trust and affection, have unprecedented access to personal lives as well as recording and sensory capabilities beyond any human. They pose significant risk to privacy, confidentiality, and autonomy, three patient interests integral to preserving trust in the medical system. Regulation of care robots will be necessary to safeguard these patient interests. This Article proposes a regulatory framework for care robots addressing four key stakeholders involved in care robot governance: the providers and institutions that deploy care robots, the manufacturers of such robots, and government agencies. This Article proposes some practical, concrete steps that each stakeholder can take now to begin to prepare for a future with care robots.

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INTRODUCTION

In a nursing home outside of Paris, residents stroll down the hallway hand in hand with a new friend.[1] It is petted, cooed at, hugged, kissed, and its attention is fought over.[2] Sometimes, residents tell it secrets that they would not otherwise share.[3] It is not a pet, a loved one, or a Clooney-esque medical resident. It is a robot named Zora, blue and white, rising to knee level and retailing at around $18,000.[4] In 2019, sixteen more nursing homes throughout France planned to debut Zora.[5]

1. Adam Satariano et al., *Meet Zora, the Robot Caregiver*, N.Y. TIMES (Nov. 23, 2018), http://www.nytimes.com/interactive/2018/11/23/technology/robot-nurse-zora.html [https://perma.cc/96JQ-Y8CR].

2. *See id.*

3. *Id.*

4. *Id.*

5. AFP News Agency (@AFP), TWITTER (Feb. 2, 2019, 9:35 PM), http://twitter.com/AFP/status/1091887796250324992 [https://perma.cc/V4E8-7BLN].

Thousands of miles away, in Tokyo's Shin-tomi nursing home, twenty different models of robots cohabitate with residents.[6] One woman cuddles a robot, another robot gently encourages a man as he walks down the hall, and a third robot leads a group of delighted residents in an exercise routine.[7]

Nursing homes like the ones in Tokyo and Paris are a window into the not-so-distant future, as robots are increasingly designed to interact directly with patients at bedsides and in homes.[8] "Care robots"[9] are unlikely to ever replace highly skilled medical providers, but they may increasingly play a role in supplementing lower-skilled work and providing new avenues for patient engagement.[10] They can enable independent living,[11] distract from painful procedures,[12] educate patients on disease management[13]—all while being companions and entertainers.[14]

Despite their many virtues, care robots could bring some significant drawbacks. The violation of trust would be intense if a doctor installed a video camera in a patient's home and watched her change, bathe, or use the bathroom. Equally, there would be outcries if a health care provider came into a patient's home and controlled or recorded what food the patient ate or whether she left the house. It would shock the conscience if a health care provider shared these types of intimate details of patients' lives with people who have no part in medical care. Patients must trust their providers to keep their secrets and maintain their dignity or autonomy, or they may mislead providers or avoid health care altogether.[15] Respect for privacy, confidentiality, and autonomy are thus core tenets of health care, codified in law and codes of ethics.[16]

Without regulation, care robots might engage in all of the scenarios above, so they substantially threaten these important values. Care robots, designed in an effort to win patient trust and affection, may have unlimited access to patients' personal lives, and they have recording and sensory capabilities far beyond those of human providers.[17]

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6. Malcolm Foster, *Aging Japan: Robots May Have Role in Future of Elder Care*, REUTERS (Mar. 27, 2018, 7:29 PM), http://www.reuters.com/article/us-japan-ageing-robots-widerimage/aging-japan-robots-may-have-role-in-future-of-elder-care-idUSKBN1H33AB [https://perma.cc/Q8M6-R5GN].

7. *Id.*

8. *See* Anna Masui, *Development of Care Robots Growing in Aging Japan*, JAPAN TIMES (Jan. 27, 2016), http://www.japantimes.co.jp/news/2016/01/27/national/social-issues/development-care-robots-growing-aging-japan/#.Xjwdm2hKhyw [https://perma.cc/9DVH-MB6B].

9. D. Fischinger et al., Hobbit – The Mutual Care Robot (ASROB-2013, IEEE/RSJ International Conference on Intelligent Robots and Systems, 2013), http://www.researchgate.net/publication/260361825_HOBBIT_-_The_Mutual_Care_Robot [https://perma.cc/L7AB-42D3].

10. *See* Amanda Sharkey & Noel Sharkey, *Granny and the Robots: Ethical Issues in Robot Care for the Elderly*, 14 ETHICS & INFO. TECH. 27, 29–34 (2012) [hereinafter Sharkey & Sharkey, *Granny and the Robots*] (describing the possibility of robots replacing humans to perform daily tasks for nursing home residents, such as cleaning or monitoring).

11. *See infra* notes 29–33 and accompanying text.

12. *See infra* notes 43–49 and accompanying text.

13. *See infra* notes 50–51 and accompanying text.

14. *See infra* notes 34–49 and accompanying text.

15. *See, e.g.*, AM. MED. ASS'N, CODE OF MEDICAL ETHICS § 3.1.1 (2016), http://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/code-of-medical-ethics-chapter-3.pdf [https://perma.cc/Y9N3-W2YP] (declaring respect for privacy and confidentiality as necessary for retaining patient trust in health care).

16. See *infra* Section II for a discussion of each of these patient interests.

17. Margot E. Kaminski et al., *Averting Robot Eyes*, 76 MD. L. REV. 983, 996–97 (2017).

They have neither knowledge of ethics nor social norms unless we instill them with this knowledge. Care robots will present many new challenges to health care regulation, such as how to determine provider and institutional liability, whether care robots are affordable, whether insurers should cover them, and how they should be governed for safety and quality.[18] This Article deals with the more preliminary, yet foundational, question of how care robots affect and will continue to change the patient experience. In the field of artificial intelligence (AI), this topic has become known as "machine medical ethics."[19] Without regulation to guarantee the basic tenets of privacy, autonomy, and confidentiality, the use of care robots threatens to erode patient trust in health care AI and the medical system generally. Absent some regulation, patients are likely to reject care robots. It is in the best interest of patients, providers, and robot manufacturers alike to get the response to this regulatory challenge right.

Some health policy and AI scholars might focus on the broader normative question of whether to permit care robots at the bedside at all. This Article presumes that care robots will be in widespread use, based on the fact that they are already being used in certain care environments, and instead turns to the question of regulation. Now is the time—before care robots are in widespread use—to prepare for this sea change in health care. This Article proposes a regulatory framework that addresses the providers and institutions that deploy care robots, the manufacturers of such robots, and the potential for agency governance over such robots. Notably, there are many other roles that AI can take in health care, such as predictive diagnosing, administrative functions, data analytics, research, and education.[20] This Article focuses squarely on the role of AI in direct patient caregiving.

Section I introduces care robots and their capabilities. It uses specific care robots to demonstrate their technical capabilities as well as possible uses in health care settings. Section I also highlights the social functions of robots, as this is likely to increase challenges to patient privacy, confidentiality, and autonomy, the implications of which Section II considers. Moreover, Section II explains how the use of robots will affect ethical norms in health care and patients' daily lives. Building off these considerations, Section III proposes a regulatory plan and recognizes four key stakeholders involved in care robot regulation: providers who deploy robots, health care institutions, care robot manufacturers, and government agencies that might be tasked with regulating this enterprise. This Article proposes some practical, concrete steps that each stakeholder can take now to begin to prepare for a future with care robots.

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18. For good overviews of the many legal issues that health care artificial intelligence raises, see generally W. Nicholson Price, *Artificial Intelligence in Health Care: Applications and Legal Issues*, 14 SCITECH LAW. 10 (2017); Nicolas P. Terry, *Appification, AI, and Healthcare's New Iron Triangle*, 21 J. HEALTH CARE L. & POL'Y 117 (2018) [hereinafter Terry, *Iron Triangle*]; Nicolas Terry, *Of Regulating Healthcare AI and Robots*, 18 YALE J. HEALTH POL'Y, L., & ETHICS 133 (2019), 21 YALE J.L. & TECH. 133 (2019) [hereinafter Terry, *Regulating AI*]; and Nicolas P. Terry, *Will the Internet of Things Disrupt Healthcare?*, 19 VAND. J. ENT. & TECH. L. 327 (2016) [hereinafter Terry, *Internet of Things*].

19. *E.g.*, Tatjana Kochetkova, *An Overview of Machine Medical Ethics*, *in* MACHINE MEDICAL ETHICS 3, 6–8 (Simon Peter van Rysewyk & Matthijs Pontier eds., 2015). This was the first book to broadly address the topic of medical ethics in robots. Topics are widespread and include machines and quality in health care, roles for nurse robots and sex robots, robot participation in assisted death, and other emerging topics.

20. Terry, *Regulating AI*, *supra* note 18, at 141–48.

I. CARE ROBOTS: USES AND CAPABILITIES

It is no accident that AI developers are targeting the health care industry. Robots[21] can address, at least partially, shortages in skilled labor amplified by the graying baby boomers.[22] At almost twenty percent of the United States' economy and growing, the health care sector is also flush with private and public money.[23] The successes of the da Vinci robot, which enables minimally invasive surgeries,[24] and a variety of health-related apps and wearables[25] suggest that patients and providers are amenable to AI in health care.

While early robots were purely mechanical devices designed to do tasks that were too dangerous or physically challenging for humans, robots are increasingly designed for much broader purposes.[26] In medicine, the latest development is the care robot, designed to interact with patients directly to provide medical and therapeutic care.[27] These robots can function as assistants, educators, and even companions, especially those that are enabled with social functions.[28] This Article presumes that the health care provider prescribes the care robot. Individuals who purchase such robots for private use outside of medical care—for example, for mere entertainment or as a personal assistant—may implicate different legal issues.

Part I.A surveys current care robots to describe their technological capabilities and uses in medicine. Then Part I.B discusses social functions of robots, an important dimension of care robot capabilities, that impact how patients interact with robots and what the ethical effects may be.

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21. This Article borrows the definition of robot that Professor Ryan Calo coined as "artificial objects or systems that sense, process, and act upon the world to at least some degree." Ryan Calo, *Robotics and the Lessons of Cyberlaw*, 103 CALIF. L. REV. 513, 531 (2015) [hereinafter Calo, *Robotics*]. While AI-informed medical technologies, such as chat bots or medical apps, could raise comparable ethical challenges, this Article exclusively focuses on robots and the concerns raised by their unique traits, highlighting physical presence, sensory capabilities, and other characteristics. For issues that other AI presents, see generally Price, *supra* note 18, and Terry, *Iron Triangle*, *supra* note 18.

22. *See* Fazal Khan, *Regulating Carebots for the Elderly: Are Safety and Efficacy Sufficient Standards of Review?*, BALKINIZATION (Oct. 31, 2018), http://balkin.blogspot.com/2018/10/regulating-carebots-for-elderly-are.html [https://perma.cc/38WT-L3KJ] ("Demographic trends predict that a looming crisis in the provision of long-term care that will grow worse over time, especially in the climate of restrictive immigration policies and proposals to block grant and cap spending on Medicaid, which devotes 2/3 of its funding to long-term care.").

23. Yasmeen Abutaleb, *U.S. Healthcare Spending To Climb 5.3 Percent in 2018: Agency*, REUTERS (Feb. 14, 2018, 4:07 PM), http://www.reuters.com/article/us-usa-healthcare-spending/us-healthcare-spending-to-climb-53-percent-in-2018-agency-idUSKCN1FY2ZD [https://perma.cc/UX9C-CP82].

24. *See How the Da Vinci Si Works*, NYU LANGONE HEALTH, http://med.nyu.edu/robotic-surgery/physicians/what-robotic-surgery/how-da-vinci-si-works [https://perma.cc/6QML-8EJR] (last visited Apr. 1, 2020).

25. Nathan Cortez, *The Mobile Health Revolution?*, 47 U.C. DAVIS L. REV. 1173, 1181–90 (2014); Terry, *Iron Triangle*, *supra* note 18, at 129–31; Nicolas P. Terry & Lindsay F. Wiley, *Liability for Mobile Health and Wearable Technologies*, 25 ANNALS HEALTH L. 62, 68–70 (2016).

26. *See* Calo, *Robotics*, *supra* note 21, at 538.

27. *See* Khan, *supra* note 22.

28. See *infra* Parts I.A and I.B for a discussion of examples of health and social care robots.

A. Medical and Technological Capabilities of Care Robots

A few examples of care robot models help demonstrate their potential. Some, such as Hobbit, are designed as personal assistants for the elderly and frail to enable independent living.[29] Hobbit can help people up, notify family or emergency responders of a fall, remind a person about appointments or medicine, provide entertainment, and fetch objects.[30] Less humanoid than other robots, Hobbit looks like a piece of medical equipment on wheels but with moveable arms, a touchscreen computer, and a screen that has a smiling animated face.[31] Researchers continue to hold controlled studies of Hobbit's functionality in various care settings, including homes.[32] A similar robot with a less dynamic name, the Care-O-bot 4, can hold trays, serve food, provide information, and complete other household tasks.[33]

Companionship is a frequent aim. Many are familiar with Paro, the therapeutic robot seal designed for elderly patients with dementia.[34] White and furry, the robot charges via a pacifier in its mouth.[35] The developers chose the seal design because it is exotic and less likely to draw unhelpful comparisons to real house pets, given that robots fall short of a perfect imitation of real life forms.[36] Paro has a variety of sensors that allow it to know when it is being held, petted, or praised and to respond with cooing and eye tracking.[37] Manufacturers are designing similar robot pets for those who prefer dogs or cats.[38] Studies of Paro suggest that it can enhance the social life and quality of life for people with dementia, particularly those with moderate or severe cognitive impairments,

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29. David Fischinger et al., *Hobbit, a Care Robot Supporting Independent Living at Home: First Prototype and Lessons Learned*, 75 ROBOTICS & AUTONOMOUS SYS. 60, 61 (2016) ("The basic motivation for the development of Hobbit was to combine the three main aspects of . . . decreasing loneliness, support in household tasks, medical and social assistance through remote communication . . . in one affordable robotic product (meaning around 15 000 Euro in costs for purchase) for aging in place.").

30. *Id.* at 61–62.

31. *Id.* at 61 (containing pictures of the "naked" Hobbit and the Hobbit robot prototype).

32. *See generally id.*

33. *See Care-O-bot 4*, FRAUNHOFER INST. FOR MANUFACTURING ENGINEERING AND AUTOMATION, http://www.care-o-bot.de/en/care-o-bot-4.html [https://perma.cc/Q3GQ-6DM2] (last visited Apr. 1, 2020).

34. *See Paro Therapeutic Robot*, PARO, http://www.parorobots.com [https://perma.cc/Q7AM-HF3L] (last visited Apr. 1, 2020). The seal made a pop culture splash in the Netflix sitcom *Master of None* in an episode where a character's grandfather and landlord share a fondness for the robot seal. Jack O'Keeffe, *Is PARO the Seal Real? 'Master of None' Will Make You Want the Adorable Robot*, BUSTLE (Nov. 11, 2015), http://www.bustle.com/articles/123205-is-paro-the-seal-real-master-of-none-will-make-you-want-the-adorable-robot [https://perma.cc/ABC9-9NVW].

35. Angela Johnston, *Robotic Seals Comfort Dementia Patients but Raise Ethical Concerns*, KALW (Aug. 17, 2015), http://www.kalw.org/post/robotic-seals-comfort-dementia-patients-raise-ethical-concerns#stream/0 [https://perma.cc/8UYP-N64B].

36. *See* Christopher J. Calo et al., Ethical Implications of Using the Paro Robot with a Focus on Dementia Patient Care (2011 AAAI Conference on Human-Robot Interaction in Elder Care, 2011) (manuscript at 21), http://www.researchgate.net/publication/221604198_Ethical_Implications_of_Using_the_Paro_Robot_with_a_Focus_on_Dementia_Patient_Care [https://perma.cc/GS6J-KKJM].

37. Wendy Moyle et al., *Exploring the Effect of Companion Robots in Emotional Expression in Older Adults with Dementia*, 39 J. GERONTOLOGICAL NURSING 46, 48 (2013).

38. Jacqueline Howard, *Robot Pets Offer Real Comfort*, CNN (Nov. 1, 2017, 10:48 AM), http://www.cnn.com/2016/10/03/health/robot-pets-loneliness/index.html [https://perma.cc/2NCH-JTP4].

and especially those who are agitated or nonresponsive.[39] Paro can be addictive even for people without cognitive impairments—workers in nursing homes often talk to and play with it.[40] In use in Japan and throughout Europe since 2003,[41] Paro is now a therapy "animal" in a variety of places, including eighty percent of senior homes in Denmark.[42]

Some robots serve as entertainers and cheerleaders. MEDi is a companion robot for children used to distract them during painful procedures.[43] MEDi sings, dances, tells jokes, asks the child for help with tasks, and toddles around at the bedside.[44] The robot can reduce pain up to fifty percent.[45] Initially used during more minor procedures like flu shots and blood draws, recent studies have explored MEDi's pain-reducing potential during longer and more serious procedures like intravenous line or catheter removals and brain-activity tests.[46] Zora, the aforementioned robot in Parisian nursing homes, is similar.[47] Zora can work with many different patient populations, including the elderly and children.[48] It tirelessly motivates, plays music, dances, and distracts with games during procedures.[49]

Other care robots are deployed as educators and skill builders. Robin, the toddler with "robot diabetes," plays with children and asks them to help it with its physical and social needs; through playing with Robin, the children learn how to self-manage their condition.[50] Robin has several roles: teacher of diabetes care concepts, affective companion to reduce stress, and coach to help patients comply with treatment.[51] Similarly, other robots teach social skills to children with autism,[52] like QTrobot.[53]

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39. *See* Moyle et al., *supra* note 37, at 51–52; Calo et al., *supra* note 36, at 21–24.

40. Calo et al., *supra* note 36, at 22.

41. *Paro Therapeutic Robot*, *supra* note 34.

42. Lillian Hung et al., *The Benefits of and Barriers to Using a Social Robot PARO in Care Settings: A Scoping Review*, BMC GERIATRICS, Aug. 23, 2019, at 1, 8, http://link.springer.com/content/pdf/10.1186%2Fs12877-019-1244-6.pdf [https://perma.cc/KB8G-HFMW].

43. Rich McHugh & Jacob Rascon, *Meet MEDi, the Robot Taking Pain Out of Kids' Hospital Visits*, NBC NEWS (May 23, 2015, 4:57 PM), http://www.nbcnews.com/news/us-news/meet-medi-robot-taking-pain-out-kids-hospital-visits-n363191 [https://perma.cc/SB6Y-86VN].

44. *Id.*

45. *Id.*

46. *Id.*

47. *See* Satariano et al., *supra* note 1 (describing how Zora visits patients during the day to combat loneliness and how patients have become attached to the robot).

48. *Meet Zora*, ZORABOTS, http://zorarobotics.be/index.php/en/zorabot-zora [https://perma.cc/7DZ4-L3FH] (last visited Apr. 1, 2020).

49. *Id.*

50. *Robot with Diabetes Developed in Hertfordshire*, BBC NEWS (Feb. 27, 2016), http://www.bbc.com/news/uk-england-beds-bucks-herts-35649790 [https://perma.cc/S2YA-L467].

51. Lola Cañamero & Matthew Lewis, *Making New "New AI" Friends: Designing a Social Robot for Diabetic Children from an Embodied AI Perspective*, 8 INT'L J. SOC. ROBOTICS 523, 527 (2016).

52. *See generally* Syamimi Shamsuddin et al., *Initial Response in HRI- A Case Study on Evaluation of Child with Autism Spectrum Disorders Interacting with a Humanoid Robot NAO*, 41 PROCEDIA ENGINEERING 1448 (2012).

53. Emily Waltz, *Therapy Robot Teaches Social Skills to Children with Autism*, IEEE SPECTRUM (Aug. 9, 2018, 6:50 PM), http://spectrum.ieee.org/the-human-os/biomedical/devices/robot-therapy-for-autism [https://perma.cc/X5EJ-J4JS].

QTrobot can see, hear, speak, and communicate in nonverbal ways with children.[54] Therapy robots in autism treatment may increase engagement during therapy sessions and encourage the child to engage in social behaviors through imitating the robot.[55]

Care robots may serve a variety of different functions, but they are all designed to interact directly with patients for therapeutic purposes.[56] As the next Part describes, many of them have well-developed social functions to aid them in such tasks.

B. Social Robots

Manufacturers design social or affective robots to elicit and respond to human emotion.[57] AI scholars refer to this robot response as social valence: the capability of the robot to create the perception in a human that the robot has or at least understands emotions.[58] Robot developers increasingly view social function as necessary for people to tolerate robots, especially those that live in close quarters with humans.[59] Robots may soon be working directly with the public in all sorts of settings, but few venues command the need for empathy and sensitivity so much as the bedsides of patients. Patients and families often face significant emotional strain in health care settings, such as the feelings related to tiredness, pain, isolation, old age, a serious diagnosis, or the impending death of someone dear. Social robots may appear to patients as though they understand their fear, pain, or sorrow and may reply with encouragement, persuasion, or something like empathy.[60]

These robots often function through complex neural networks trained to read human emotion via facial recognition and to respond accordingly.[61] Robot developers draw on extensive knowledge about human behavior and psychology to develop these neural networks.[62] Some robots, like Paro, are less developed and made to tug at human

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54. *Meet QTrobot*, LUXAI, http://luxai.com/qtrobot/ [https://perma.cc/S95K-4KM2] (last visited Apr. 1, 2020).

55. Brian Scassellati et al., *Robots for Use in Autism Research*, 14 ANN. REV. BIOMEDICAL ENGINEERING 275, 282–83 (2012), http://www.annualreviews.org/doi/full/10.1146/annurev-bioeng-071811-150036 [https://perma.cc/TU8D-HWPB].

56. Khan, *supra* note 22.

57. *See* Kate Darling, *Extending Legal Protection to Social Robots: The Effects of Anthropomorphism, Empathy, and Violent Behavior Towards Robotic Objects*, *in* ROBOT LAW 213, 213–14 (Ryan Calo et al. eds., 2016) [hereinafter Darling, *Extending Legal Protection*]. Professor Darling defines a social robot as "a physically embodied, autonomous agent that communicates and interacts with humans on a social level . . . through social cues, display[ing] adaptive learning behavior, and mimic[king] various emotional states." *Id.* at 215 (footnotes omitted).

58. *See* Ignacio N. Cofone, *Servers and Waiters: What Matters in the Law of A.I.*, 21 STAN. TECH. L. REV. 167, 172 (2018) ("Social valence . . . refers to when (real) people treat robots and other A.I. agents as human beings.").

59. *See* Kirsten Weir, *The Dawn of Social Robots*, 49 MONITOR ON PSYCHOL. 50, 52 (2018).

60. *See* Darling, *Extending Legal Protection*, *supra* note 57, at 218–19.

61. *See* Cynthia Breazeal et al., *Social Robots that Interact with People*, *in* SPRINGER HANDBOOK OF ROBOTICS 1349, 1362 (Bruno Siciliano & Oussama Khatib eds., 2008).

62. *See* Weir, *supra* note 59, at 52–53 ("When a person is interacting with a social robot, it should feel much more like you're interacting with a someone rather than a something . . . ." (quoting Cynthia Breazeal, PhD, Director of the Personal Robots Group at the Massachusetts Institute of Technology Media Lab)).

heart strings merely by being cute and appearing responsive.[63] Others have much more sophisticated capabilities, like Octavia, a social robot at the U.S. Naval Research Laboratory, that has the ability to recognize voices and to assess and analyze facial features, complexion, and clothing.[64] Manufacturers designed Octavia to be emotionally responsive: it smiles when it sees a fellow member of the team, appears confused when it does not understand something, acts surprised when someone says something unexpected, and furrows its brow or tilts its head when it is thinking.[65]

Some who study robot-human interactions suggest that robots will have their own ontological class; we will neither treat them quite like humans, nor treat them like mere objects or tools.[66] Soldiers sometimes treat robots as they would fellow warriors, throwing themselves into harm's way to protect the robot, awarding them Purple Hearts, and having gun salutes at robot funerals.[67] People asked to witness physical abuse of robots have reported feelings of emotional disturbance to such a degree that some AI scholars suggest we must protect robots from abuse lest it breed desensitization and callousness towards humans.[68]

Studies of robots in medical contexts suggest similar conclusions. Children interacting with Robin maintain eye contact, mirror its movements, help it if it falls over,

63. *See* Calo et al., *supra* note 36, at 21.

64. *See, e.g.*, Louisa Hall, *How We Feel About Robots That Feel*, MIT TECH. REV. (Oct. 24, 2017), http://www.technologyreview.com/s/609074/how-we-feel-about-robots-that-feel/ [https://perma.cc/H3BW-RKSS].

65. *Id.*

66. *See, e.g.*, Peter H. Kahn, Jr. et al., *The New Ontological Category Hypothesis in Human-Robot Interaction*, *in* PROCEEDINGS OF THE 6TH INTERNATIONAL CONFERENCE ON HUMAN-ROBOT INTERACTION 159, 159–60 (2011); Peter H. Kahn et al., *What Is a Human? Toward Psychological Benchmarks in the Field of Human-Robot Interaction*, 8 INTERACTION STUDIES 363, 364–65 (2007). "[P]eople are not confused about these categories or the means of their differentiation. We do not . . . talk to a brick wall and expect it to talk back, nor do we attribute to it mental capabilities or think of it as a possible friend." Peter H. Kahn, Jr. & Solace Shen, *NOC NOC, Who's There? A New Ontological Category (NOC) for Social Robots*, *in* NEW PERSPECTIVES ON HUMAN DEVELOPMENT 106, 117 (Nancy Budwig et al. eds., 2017).

67. Kate Darling, "*Who's Johnny?" Anthropomorphic Framing in Human-Robot Interaction, Integration, and Policy*, *in* ROBOT ETHICS 2.0: FROM AUTONOMOUS CARS TO ARTIFICIAL INTELLIGENCE 173, 174–75 (Patrick Lin et al. eds., 2017) [hereinafter Darling, *Anthropomorphic Framing*] (citing Joel Garreau, *Bots on the Ground*, WASH. POST (May 6, 2007), http://www.washingtonpost.com/wp-dyn/content/article/2007/05/05/AR2007050501009_pf.html [https://perma.cc/25Y7-EJB8]).

68. *See* Darling, *Extending Legal Protection*, *supra* note 57, at 217; David J. Gunkel, *The Rights of Machines: Caring for Robotic Care-Givers*, *in* MACHINE MEDICAL ETHICS, *supra* note 19, at 151, 163 (discussing how "we can decide to entertain the possibility of rights and responsibilities for machines just as we had previously done for other non-human entities, like animals, corporations, and the environment," rather than treat them as slaves). Professor Darling described one experiment that tested how rapidly people can bond with robots. Darling, *Extending Legal Protection*, *supra* note 57, at 222–23. In the experiment, Professor Darling gave participants robot dinosaurs and then asked participants to tie up, hit, and kill their robots. *Id.* at 222. Participants refused, protected the robots from others, and one removed the robot's battery to spare it pain. *Id.* at 222–23. In another fascinating example, children were brought to the Radiolab studio and asked to hold a Barbie, a Furby, and a hamster upside down. *Furbidden Knowledge*, RADIOLAB (May 31, 2011), http://www.wnycstudios.org/story/137469-furbidden-knowledge [https://perma.cc/64G3-5JKA]. The children were able to hold the Barbie upside down with little distress, but they often turned the Furby upright as quickly as the hamster, telling the podcasters that they were worried about hurting or upsetting the Furby. *Id.* The hamster presumably wiggled in fear, and the Furby told the children it was scared when upside down. *Id.*

pay attention to the things it pays attention to, greet it, and ask how it is doing.[69] In a study of an autonomous robot staying in a nursing home, "[e]mployees, visitors and users were seen greeting the robot, saying their goodbyes to it or waving at it when passing by. Many users also introduced themselves to the robot, asked it for its name or tried to begin a conversation."[70]

Social robot technology receives a strong assist from ingrained tendencies to anthropomorphize, ascribing the inanimate with free will and personality.[71] Professor Ryan Calo stressed that the threshold for anthropomorphism is quite low with people ascribing social roles to paper animation.[72] He argued that it is much greater with robots because they appear autonomous by moving around freely and exhibiting random, unexpected behavior.[73] Professor Kate Darling similarly posited that humans are wired to see robots differently than regular objects for three key reasons: physicality, autonomous movement, and social behavior.[74] To the first point, physicality, individuals react differently to objects in their own physical space.[75] These differing reactions explain why people might ascribe some agency to computers but even more to robots that are in embodied forms.[76] Second, perceived autonomous movement humanizes robots.[77] For instance, Professor Darling pointed to a report from the *Washington Post* on a six-legged robot that defused landmines.[78] Each time a leg was blown off, the robot continued onward until the colonel demanded that testing stop because it was inhumane to see "the burned, scarred and crippled machine drag itself forward on its last leg."[79] Lastly, evidence of social behavior (even mimicked) feeds human perceptions that the robot has agency.[80] Manufacturers deliberately design robots to falsely suggest to humans that they have independent mental states (or even moral culpability).[81] In one study, people playing cards with a robot warmed up to and treated the robot more like a

69. Cañamero & Lewis, *supra* note 51, at 534–35.

70. Denise Hebesberger et al., *A Long-Term Autonomous Robot at a Care Hospital: A Mixed Methods Study on Social Acceptance and Experiences of Staff and Older Adults*, 9 INT'L J. SOC. ROBOTICS 417, 423 (2017).

71. *See* Calo, *Robotics*, *supra* note 21, at 545–46; *see also* Darling, *Anthropomorphic Framing*, *supra* note 67, at 174.

72. *See* Calo, *Robotics*, *supra* note 21, at 545.

73. *See id.* at 545–46; *see also* Darling, *Extending Legal Protection*, *supra* note 57, at 218 ("The projection of lifelike qualities begins with a general tendency to over-ascribe autonomy and intelligence to the way that things behave, even if they are just following a simple algorithm. But not only are we prone to ascribing more agency than is actually present, we also project intent and sentiments (such as joy, pain, or confusion) onto other entities." (footnote omitted)).

74. Darling, *Extending Legal Protection*, *supra* note 57, at 217–18.

75. *Id.* at 217.

76. *Id.*

77. *Id.*

78. *Id.*

79. *Id.* (quoting Garreau, *supra* note 67).

80. *Id*. at 218; *see also* Gabriella Airenti, *The Cognitive Bases of Anthropomorphism: From Relatedness to Empathy*, 7 INT'L J. SOC. ROBOTICS 117, 124 (2015).

81. *See* Neil M. Richards & William D. Smart, *How Should the Law Think About Robots*?, *in* ROBOT LAW, *supra* note 57, at 3, 18–20.

person only after they found out the robot was cheating.[82] Robin sometimes wanders off or stops attending to the child during conversation, as a way of suggesting that the robot has agency to maintain the child's interest in it.[83]

The use of social robots also capitalizes on "involuntary biological responses," such as appearing humanoid to seem familiar to users or in animal form to tap into nurturing tendencies.[84] Robots that are less humanoid are sometimes "framed" with a name and a back story as a way to lead to more human-like treatment.[85] Many manufacturers design social robots using the "mutual care" model, playing into social psychology that suggests people are more likely to form bonds with and accept help from things that need care and tending.[86] In short, manufacturers deliberately design robots for people to anthropomorphize them, and this can be even easier when one has little understanding of how the technology works.[87]

Anthropomorphism is also played up in marketing. Jibo is a tabletop robot that tells jokes and stories, plays games, expresses likes and dislikes,[88] and can be adapted for up to sixteen different members of a family or a group.[89] In its marketing, Jibo's manufacturer stressed that Jibo was the "first social robot for the home who looks, listens and learns. Artificially intelligent, authentically charming."[90] It went on to tout how Jibo is a "part of the family" and a "big personality."[91] Zora, the beloved robot in the Parisian nursing home, is marketed as a steadfast and beloved companion: "Who helps you rehabilitate? . . . Who motivates you until you feel better? . . . Who keeps you fit? . . . Who cares? Zora cares!" and "She looks like she's your best friend—and she is. Feel free to give her a hug!"[92] The Care-O-bot 4 recalls visions of *Downton Abbey*: "While the concept for the Care-O-bot 3 was a more reserved, cautious butler, its successor is as courteous, friendly, and affable as a gentleman."[93]

82. Weir, *supra* note 59, at 53. Signs of increased social attention and humanization included making more eye contact with the robot, sharing interpersonal space with it, and using personal pronouns when talking about it. *See id.*

83. Cañamero & Lewis, *supra* note 51, at 535.

84. Darling, *Extending Legal Protection*, *supra* note 57, at 218.

85. Darling, *Anthropomorphic Framing*, *supra* note 67, at 174–75.

86. *See* Fischinger et al., *supra* note 29, at 70, 72. A so-called caregiver effect can make humans bond even more significantly with social robots. Sherry Turkle, A Nascent Robotics Culture: New Complicities for Companionship (AAAI Technical Report Series, 2006), http://web.mit.edu/~sturkle/www/nascentroboticsculture.pdf [https://perma.cc/3YVJ-7FTT]; *see also* Lara Lammer et al., Mutual Care: How Older Adults React When They Should Help Their Care Robot (Proceedings of the Third International Symposium on Human-Robot-Interaction, 2014) (manuscript at 1), http://doc.gold.ac.uk/aisb50/AISB50-S19/AISB50-S19-Lammer-paper.pdf [https://perma.cc/GA6W-JK79].

87. Darling, *Extending Legal Protection*, *supra* note 57, at 219.

88. *See* Weir, *supra* note 59, at 56; *Skills*, JIBO, http://www.jibo.com/skills/ [https://perma.cc/22LF-FVQ8] (last visited Apr. 1, 2020).

89. *Meet Jibo*, JIBO, http://www.jibo.com/ [https://perma.cc/W5MW-5LFM] (last visited Apr. 1, 2020).

90. *Id.*

91. *Skills*, *supra* note 88.

92. *Meet Zora*, *supra* note 48.

93. *Care-O-bot 4*, *supra* note 33.

Researchers continue to explore ways to improve the social valence of robots, such as how polite must a robot be to solicit patient compliance (polite, but not too polite),[94] how long should a robot maintain eye contact before it makes patients feel uncomfortable,[95] and whether people would mind robots touching them.[96] Manufacturers intentionally design social robots to seem humanlike,[97] but in reality they do not and cannot feel in the way that humans do.[98] Professor Jack Balkin presciently warned that we must never forget that robots have manufacturers, and so, social robots that appeal to our emotions do so because someone designed them to act that way.[99] Professors Neil Richards and William Smart agreed, cautioning against the tendency to ascribe robots with their own intent lest "we might hold the designers less responsible for its actions than a more robotic robot."[100] A robot does not have feelings or agency.

Still, one should take a moment and look up a few of these robots, watch some videos, read a little more about them, watch how people interact with them in person, and see how they hold a certain fascination.[101] One can imagine the interaction with one of these robots as a child; a lonely person; a person with cognitive challenges; or a person who is scared, in pain, or just bored. One can imagine the capabilities of these technologies in a decade—or three. Human instincts towards anthropomorphizing and careful design may make the robot irresistible. As increasingly sophisticated robots are being mainstreamed into daily life, humans must keep in mind how powerful a robot's

94. *See* Namyeon Lee et al., *The Influence of Politeness Behavior on User Compliance with Social Robots in a Healthcare Service Setting*, 9 INT'L J. SOC. ROBOTICS 727, 738–39 (2017).

95. *See* Christopher John Stanton & Catherine J. Stevens, *Don't Stare at Me: The Impact of a Humanoid Robot's Gaze upon Trust During a Cooperative Human–Robot Visual Task*, 9 INT'L J. SOC. ROBOTICS 745, 746–47 (2017). Stanton & Stevens found that "constant robot gaze can have a negative impact upon females trusting a robot's opinion, especially when they have confidence in their own judgment." *Id.* at 752.

96. *See* Tiffany L. Chen et al., *An Investigation of Responses to Robot-Initiated Touch in a Nursing Contex*t, 6 INT'L J. SOC. ROBOTICS 141, 141–42 (2014). In this study, the researchers found that patients were generally accepting of robots touching them but tended to favor instrumental touching for performing a task to that of providing comfort. *Id.* at 142.

97. Darling, *Extending Legal Protection*, *supra* note 57, at 219. "The emotional effect of social robots has the potential to strongly supersede the 'accidental' projection invoked by nonsocial robots, because it is intentional. In fact, it is often their main function." *Id.*

98. *See* Airenti, *supra* note 80, at 125.

99. *See* Jack M. Balkin, *2016 Sidley Austin Distinguished Lecture on Big Data Law and Policy: The Three Laws of Robotics in the Age of Big Data*, 78 OHIO ST. L.J. 1217, 1223–24 (2017); *see also* Deborah G. Johnson, *Computer Systems: Moral Entities but Not Moral Agents*, 8 ETHICS & INFO. TECH. 195, 201 (2006) ("Computer systems and other artifacts have intentionality, the intentionality put into them by the intentional acts of their designers.").

100. Richards & Smart, *supra* note 81, at 19.

101. For example, you might try the following video links: BBC, *Can Robots Take Care of the Elderly?*, YOUTUBE (Sept. 5, 2017), http://www.youtube.com/watch?v=XuwP5iOB-gs [https://perma.cc/YQR2-5MJY]; BBC Three Counties, *Robin the Robot Toddler with Diabetes*, YOUTUBE (Mar. 14, 2016), http://www.youtube.com/watch?v=BPmRRatjr7Q [https://perma.cc/3LUG-QFHW]; Financial Times, *The Soft Side of Robots: Elderly Care*, YOUTUBE (May 9, 2016), http://www.youtube.com/watch?v=ppPLDEi82lg [https://perma.cc/XN9M-TV4N]; VICE News, *Robotic Pets Are Helping Dementia Patients*, YOUTUBE (Oct. 7, 2017), http://www.youtube.com/watch?v=cFvGAL9tesM [https://perma.cc/JP9K-KNFD]; Zora Robots, *ZORA ROBOT*, YOUTUBE (May 7, 2016), http://www.youtube.com/watch?v=lO52sLF-u_4 [https://perma.cc/7VCG-PN2C].

appeal may be. Ultimately, the way humans interact with robots and how much access robots have in society will largely dictate the regulatory demands.

II. CARE ROBOTS: IMPLICATIONS FOR PATIENTS

The bedside of a patient is a unique space, full of ethical and regulatory standards, for good reason. Patients who are hospitalized or who have significant enough care needs to require in-home help are often vulnerable. They may be in pain or suffering from other symptoms. They may feel anxious or uncertain about their futures. They may feel isolated and alone. They may have compromised or diminished decisionmaking capabilities. They may be facing the most difficult tribulations of their lives. In addition to these feelings, there are significant power and information imbalances between patients and health care providers that place patients at risk of exploitation. Terrible tragedies mark the era when the profession of medicine was left unregulated and inattentive to patient interests and rights: Nazi doctors experimenting in concentration camps,[102] disabled children being infected with hepatitis at the Willowbrook State School,[103] Black men being left to die in Tuskegee from syphilis despite available treatment,[104] forced sterilizations,[105] and the use of patient bodies for commercial gain without their knowledge.[106]

This Section considers how care robots may implicate three important patient interests: privacy,[107] confidentiality,[108] and autonomy.[109] This is not a complete list, but it is meant to begin a conversation about how to regulate care robot use given the tremendous implications this use will have for patients' rights and trust in the medical enterprise. Other machine medical ethics issues will also have to be considered in the future if care robots gain ground, such as discrimination, implications for patient-doctor

102. *See generally* Dónal P. O'Mathúna, *Human Dignity in the Nazi Era: Implications for Contemporary Bioethics*, BMC MED. ETHICS, Mar. 14, 2006.

103. *See generally* Saul Krugman, *The Willowbrook Hepatitis Studies Revisited: Ethical Aspects*, 8 REV. INFECTIOUS DISEASES 157 (1986); Walter M. Robinson & Brandon T. Unruh, *The Hepatitis Experiments at the Willowbrook State School*, *in* THE OXFORD TEXTBOOK OF CLINICAL RESEARCH ETHICS 80 (Ezekiel J. Emanuel et al. eds., 2008).

104. *See generally* Allan M. Brandt, *Racism and Research: The Case of the Tuskegee Syphilis Study*, 8 HASTINGS CTR. REP. 21 (1978).

105. For an example of a Supreme Court case litigating involuntary sterilization, see *Buck v. Bell*, 274 U.S. 200 (1927). For a discussion of the law and ethics of involuntary sterilization and, specifically, *Buck v. Bell*, see Roberta M. Berry, *From Involuntary Sterilization to Genetic Enhancement: The Unsettled Legacy of* Buck v. Bell, 12 NOTRE DAME J.L., ETHICS & PUB. POL'Y 401 (1998).

106. For a famous legal case addressing this matter, see *Moore v. Regents of University of California*, 793 P.2d 479 (Cal. 1990) (en banc). For a comprehensive discussion of this legal issue, see generally R. Alta Charo, *Body of Research—Ownership and Use of Human Tissue*, 355 NEW ENG. J. MED. 1517 (2006), and Jennifer Lavoie, Note, *Ownership of Human Tissue: Life After* Moore v. Regents of the University of California, 75 VA. L. REV. 1363 (1989). For a discussion of the well-known and more recently explored controversy of Henrietta Lacks, see Laura M. Beskow, *Lessons from HeLa Cells: The Ethics and Policy of Biospecimens*, 17 ANN. REV. GENOMICS & HUM. GENETICS 395, 396–97 (2016).

107. *See infra* Part II.A.

108. *See infra* Part II.B.

109. *See infra* Part II.C.

relationships, and whether and to what extent care robots should be involved in end-of-life care.

A. Privacy

Privacy is an important obligation in medical care. Care robots may present serious challenges to safeguarding patient privacy. Patients value privacy in clinical settings, even sometimes preferring solitude.[110] That is, they prefer having some amount of control over being left alone, having private time with family, as well as keeping some information from providers.[111] Privacy is associated with a respect for the dignity of the patient.[112] Among a variety of privacy interests are physical privacy (such as personal space and modesty), associational privacy (maintaining privacy between the patient and her family or friends), and informational privacy (control over one's personal data).[113] Privacy is distinguished from confidentiality, which Part II.B discusses.[114]

Professional norms of physical privacy and modesty pervade modern health care. Patients undress apart from providers and are often given garments to protect their modesty—though admittedly the garments sometimes do a laughably poor job of this. Other examples of these professional norms include patients disrobing only in examination rooms with curtains, providers using gloves to handle sensitive body parts, and providers covering body parts not being examined during surgical and medical procedures.[115] Observations in clinical spaces are also typically limited to people who have clinical or educational reasons for being there.[116] Additionally, health care providers have norms to guard associational privacy interests.[117] Providers ask family members to leave before performing sensitive procedures.[118] Patients have authority over

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110. *See* Anita Allen, *Privacy and Medicine*, STAN. ENCYCLOPEDIA PHIL. (Aug. 20, 2015), http://plato.stanford.edu/archives/win2016/entries/privacy-medicine/ [https://perma.cc/HXP8-5NKY].

111. *See id.*

112. *Id.*

113. AM. MED. ASS'N, *supra* note 15, § 3.1.1. The American Medical Association also considers decisional privacy, related to "personal choices including cultural and religious affiliations." *Id.* This is an issue that Part II.C and Section III discuss.

114. Privacy and confidentiality are more easily distinguishable in the common law context than they are in health care ethics.

> Although claims of a breach of privacy and of wrongful disclosure of confidential information may seem very similar in a case . . . which involves the disclosure of an intimate personal secret, the two claims depend on different premises and cover different ground. . . .
>
> . . . [T]he most important distinction is that only one who holds information in confidence can be charged with a breach of confidence. . . . [A]n act . . . [of] tortious invasion of privacy . . . theoretically could be committed by anyone.

Humphers v. First Interstate Bank, 696 P.2d 527, 529–30 (Or. 1985) (en banc).

115. For some examples in an emergency room setting, see Yen-Ko Lin et al., *Building an Ethical Environment Improves Patient Privacy and Satisfaction in the Crowded Emergency Department: A Quasi-Experimental Study*, BMC MED. ETHICS, Feb. 20, 2013, at 1, 1–2.

116. Notably, these privacy limitations may vary across country and culture. *See* AM. MED. ASS'N, *supra* note 15, § 3.1.1.

117. *See id.*; *see also* Allen, *supra* note 110 ("The duty of confidentiality is a core consensus norm within health care." (citation omitted)).

118. *E.g.*, Sarah J. Beesley et al., *Let Them In: Family Presence During Intensive Care Unit Procedures*, 13 ANNALS AM. THORACIC SOC'Y 1155, 1155 (2016) ("Despite such advances, family members in adult ICUs

who gets to know about their medical condition.[119] Providers ask patients or their decisionmakers for consent before taking photos, even for medical educational purposes.[120] Patients, in the current system, have plenty of alone time and time apart from providers to discuss private matters with family members.[121] Providers also tend to avoid asking sensitive questions that do not go to the patient's care, for instance a provider is unlikely to ask whether a home is safe or happy unless she has concerns.[122]

Most people would be affronted or even stunned if providers did not honor these typical privacy norms. Yet privacy is typically respected through norms in health care, with minimal rules or laws. Take, for example, the American Medical Association (AMA) Code of Medical Ethics:

> Protecting information gathered in association with the care of the patient is a core value in health care. However, respecting patient privacy in other forms is also fundamental, as an expression of respect for patient autonomy and a prerequisite for trust.
>
> . . . .
>
> Physicians must seek to protect patient privacy in all settings to the greatest extent possible and should: (a) [m]inimize intrusion on privacy when the patient's privacy must be balanced against other factors[,] (b) [i]nform the patient when there has been a significant infringement on privacy of which the patient would otherwise not be aware[, and] (c) [b]e mindful that individual patients may have special concerns about privacy in any or all of these areas.[123]

The AMA guidance addresses recordings, audio or visual, of patients for specific purposes only, such as educational purposes.[124] When used for these purposes, the AMA requires that the patient provide informed consent for the recording and have the freedom to refuse or withdraw consent; it further requires the provider to safeguard privacy and confidentiality as greatly as possible and to restrict the use of the recording to its intended purpose.[125]

Care robots present unprecedented intrusions into the privacy of patients. Clinicians have limited times to see and hear from patients, but robots may be stationed at hospital bedsides indefinitely.[126] They do not need sleep, bathroom breaks, lunch breaks, or

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are still commonly asked to leave the patient's room during invasive bedside procedures, regardless of whether the patient would prefer family to be present.").

119. See *infra* Part II.B for a discussion about confidentiality of patient information.

120. *See* Allen, *supra* note 110.

121. *Cf.* Roni Caryn Rabin, *15-Minute Visits Take a Toll on the Doctor-Patient Relationship*, KAISER HEALTH NEWS (Apr. 21, 2014), http://khn.org/news/15-minute-doctor-visits/ [https://perma.cc/ZRW2-XAGJ] (discussing primary care doctors' increasingly short interactions with patients so they see as many as possible).

122. *See* R. Steven Daniels et al., *Physicians' Mandatory Reporting of Elder Abuse*, 29 GERONTOLOGIST 321, 321 (1989) (stating that many victims are not forthcoming about their abuse and many providers fail to acknowledge that any abuse has occurred).

123. AM. MED. ASS'N, *supra* note 15, § 3.1.1.

124. *Id.* § 3.1.3.

125. *Id.*

126. There is no precise answer for how much time providers spend with patients. One source suggests that doctors typically spend around fifteen minutes with a single patient, a byproduct of the old ways that

smoke breaks. They are unlikely to be subject to any employment laws about length of workday or access to vacation days. And many developers envision them in patients' homes, not just hospitals or nursing homes.[127] All of these factors increase the amount of exposure care robots have to patients' private lives.

Patients and family members may not realize that a robot's senses are superior to their own.[128] Robots with, say, thermal sensors might be able to see through walls or have superior audio capabilities and be able to pick up quiet conversations.[129] For instance, Zora is equipped with sonar and sensors in its head, hands, and feet that enable it to have a "perfect image of her surroundings."[130] Additionally, it has four microphones to hear its patients and "two high-resolution cameras that record every tiny detail."[131] A robot's ability to gather, record, and store information is also no match to that of humans.[132] A provider may forget an interaction in a few days, but a robot can indefinitely "remember" and store the information it gathers, the images it sees, and the stories it hears.[133]

These issues implicate privacy for patients, the people who live with them, and any visitors to bedsides or homes. In hospital settings, care robots at bedsides might witness and record more private activity than providers would typically encounter. For example, a care robot may capture unnecessary nudity of a patient or family members and convey that information back to providers monitoring the patient.[134] A care robot may also record visitors to the bedside or in the home.[135] The care robot can convey this information beyond those parties directly involved in the clinical care, potentially sending it to software companies or other commercial third parties.[136]

Home life presents even greater challenges. Care robots could record intimate audio or visual data of a person's home and the people in it.[137] They may capture the private health behaviors of a patient or family members, such as what and when they eat, how frequently they get up and move around, and whether they exercise.[138] Highly personal activities like family disagreements or sexual activity as well as restroom or shower use

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Medicare calculated doctors' fees. *See* Rabin, *supra* note 121. Nurses may spend more time with patients, but certainly no provider would spend anything close to the around-the-clock care that a robot can provide.

127. See *supra* notes 29–33 and accompanying text for examples of at-home robots, including the Care-O-bot 4 and Hobbit.

128. *See* Kaminski et al., *supra* note 17, at 996.

129. *Id.*

130. *Meet Zora*, *supra* note 48.

131. *Id.*

132. Kaminski et al., *supra* note 17, at 994–96.

133. *Id.* at 994–95. "With the massive memory hard drives available today, it would be possible [for a care robot] to record the entire remainder of an elderly person's life, but this is not something that they would necessarily consent to if they were able to." Sharkey & Sharkey, *Granny and the Robots*, *supra* note 10, at 32.

134. *See* Kaminski et al., *supra* note 17, at 996, 1017.

135. *See id.* at 994.

136. *See id.* at 995 ("Storing information allows for data analysis, which also allows inferences to be drawn about repeated behaviors. [Care robots] might infer illness, vulnerability, or other changes in physical or emotional well-being that make users more susceptible to advertising or particular marketing appeals."). See *infra* Part II.B for more on the issue of confidentiality.

137. *See* Kaminski et al., *supra* note 17, at 994–96.

138. *See id.* at 994.

could all be at the "fingertips" of the robot and perhaps stored indefinitely.[139] The home also presents special associational privacy concerns. For instance, how much information should a loved one be able to obtain from a care robot? One can imagine, for example, a mother of a teenage boy with cancer might demand access to the recordings of the care robot that resides in her home, and one can just as easily imagine why that teenager may not want his parent to have access to what happens in his private time.[140]

Care robots do not have an innate understanding of privacy norms, specific to health care or more generally.[141] Plenty of evidence suggests, also, that patients and family members do not safeguard their privacy around robots.[142] As discussed earlier, robots have sensory capabilities that are unlike humans.[143] Absent an understanding of any specific robot's capabilities, people may not be aware that the robot can see through walls or hear sounds through shut doors or several floors below.[144] People who do know these capabilities may be hard pressed to avoid the "prying eyes" of a robot. However, because the robot is a physical presence, it can place itself in the path of the patient or follow the patient, disrupting solitude and privacy.[145] Some patients may feel the robot is pursuing them or even, in some cases, physically threatening or confining them.[146] Those who lack knowledge of a specific robot's capabilities are less likely to attempt to guard any private information.[147] The omnipresence of robots may only exacerbate this issue. As Professor Nicolas Terry observed, robots could fade into the background and become a fixture in the family, with people forgetting that the robot also functions as a window into the household for the health care provider and, possibly, commercial third parties.[148] Patients may find they have little opportunity for solitude or alone time with family as the robot may forever be present.

In addition to inadvertent disclosures, many people may want to share information with robots, especially social robots.[149] If social AI works the way it is designed to (and

139. *See id.*

140. *See Confidential Health Care for Minors: Code of Medical Ethics Opinion 2.2.2*, AMA, http://www.ama-assn.org/delivering-care/ethics/confidential-health-care-minors [https://perma.cc/D7Q7-EWWA] (last visited Apr. 1, 2020) (discussing the ethical duties of physicians when treating unemancipated minors who request confidential care).

141. *See generally* Kaminski et al., *supra* note 17 (advocating for technological designs that address home robots' boundary violations).

142. *See, e.g.*, M. Ryan Calo, *Robots and Privacy*, *in* ROBOT ETHICS: THE ETHICAL AND SOCIAL IMPLICATIONS OF ROBOTICS 187, 194 (Patrick Lin et al. eds., 2012) [hereinafter Calo, *Robots and Privacy*]; Kaminski et al., *supra* note 17, at 994–97.

143. Kaminski et al., *supra* note 17, at 996.

144. *Id.*

145. *See id.* at 997–98.

146. This of course goes to a more general concern for personal safety between the robot and patient. A number of people have raised concerns about the physical presence and strengths of robots, particularly among frail and elderly patients or children. *See, e.g.*, Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C. DAVIS L. REV. 399, 417–18 (2017) [hereinafter Calo, *Artificial Intelligence Policy*] (discussing general safety concerns of robots); Miguel A. Salichs et al., *Study of Scenarios and Technical Requirements of a Social Assistive Robot for Alzheimer's Disease Patients and Their Caregivers*, 8 INT'L J. SOC. ROBOTICS 85, 92 (2016).

147. Kaminski et al., *supra* note 17, at 996–97.

148. *See* Terry, *Iron Triangle*, *supra* note 18, at 155 (suggesting that the endless presence of the robot may make people forget it is there).

149. Kaminski et al., *supra* note 17, at 997.

as early evidence suggests), then it will be more than a mere device; it will be a companion, an educator, and a personal assistant for patients.[150] Patients (and family members) may share private and sensitive information as part of a process of seeking companionship and emotional or professional support.[151] People inadvertently divulge things to Alexa, Amazon's household virtual assistant, that they would never put in a survey.[152] Notably, over a million people have proposed marriage to Alexa in the last year,[153] a nod to the degree to which the public anthropomorphizes, befriends, and confides in technology.[154] More so, humanization and feelings of trust occur when humans perceive the robot as an expert that can help them.[155]

Care robot use threatens to intrude on the private lives of patients in ways both known and unknown to the patient. Unnecessary and harmful privacy intrusions will need to be minimized where possible, and patients will need to be put on guard of these risks at the outset.

B. Confidentiality

Confidentiality is a closely related concept to privacy. Confidentiality relates to how providers handle sensitive and private information once they have obtained it.[156] The primary concerns are what types of information the robot gathers about the patient, with whom it may share that information, and under what terms.

Confidentiality has long-standing special legal protections in the context of health care. It must be assured so that patients are able to share fully their medical information to best enable providers to fully treat them. The Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule[157] and the Health Information Technology for Economic and Clinical Health Act,[158] in their most basic forms, require covered entities like hospitals and health care providers to safeguard private health information.[159] They

150. Darling, *Anthropomorphic Framing*, *supra* note 67, at 176–77.

151. *See* Sharkey & Sharkey, *Granny and the Robots*, *supra* note 10, at 32.

152. *See* Sapna Maheshwari, *Hey Alexa, What Can You Hear? and What Will You Do with It?*, N.Y. TIMES (Mar. 31, 2018), http://www.nytimes.com/2018/03/31/business/media/amazon-google-privacy-digital-assistants.html [https://perma.cc/C5MW-BJS2]. Social media also provides an example of the amount of personal sharing people will do whether they do so for approval from others through likes or because they perceive those spaces to be more anonymous. Darling, *Anthropomorphic Framing*, *supra* note 67, at 178.

153. Paige Leskin, *Over a Million People Asked Amazon's Alexa To Marry Them in 2017 and It Turned Them All Down*, BUS. INSIDER (Oct. 10, 2018, 6:36 PM), http://www.businessinsider.com/amazons-alexa-got-over-1-million-marriage-proposals-in-2017-2018-10 [https://perma.cc/7RUP-FCS6]. She turned them all down. *Id.*

154. *See generally* Darling, *Anthropomorphic Framing*, *supra* note 67.

155. Kaminski et al., *supra* note 17, at 997.

156. *See supra* note 114 and accompanying text.

157. 45 C.F.R. pts. 160, 164 subparts A & E (2019).

158. Health Information Technology for Economic and Clinical Health (HITECH) Act, Pub. L. No. 111-5, tit. XIII, 123 Stat. 226 (2009) (codified at scattered sections of 42 U.S.C.).

159. Covered entities include most health care providers and health care plans. 45 C.F.R. § 160.103. These entities must safeguard individually identifiable health care information from disclosure except in explicit authorized uses. *See id.* § 164.306.

also restrict when that information can be used or disclosed to others.[160] Providers also have common law confidentiality obligations[161] as well as ethical ones.[162]

Care robot use poses obvious challenges to confidentiality that are akin to other privacy concerns. Particularly, the unique threat to confidentiality resides in the capability of care robots to gather high-fidelity, constant information about patients, their family members, and the private workings of households.[163] Robots may elicit secrets from patients that significantly implicate confidentiality rules. Social robots that can form bonds with patients and others are likely to only increase secret telling.[164] In the Parisian nursing home, a resident told Zora about what caused her bruises, while she refused to tell providers.[165] In another example, children with cancer told a robot about their hopes for the future when they did not share this information with adults.[166]

Some of the information that care robots gather is kept safely within the protective boundaries that HIPAA establishes. Care robots who work in hospitals, for example, are clearly subject to HIPAA regulation, as are those who work in patients' homes but are provided by health care entities.[167] While HIPAA protects such information from dissemination outside of the health care setting, some unnecessary information may still be inadvertently shared within the team.[168] For instance, audio and visual recordings might capture the prescription drugs of a family member.[169] Even when HIPAA applies, it may be complicated in this context. HIPAA mandates that patients have access to their health care data, and the Future of Life Institute, a research organization dedicated to maintaining humanity in the midst of technological change, agrees that people should have access to data about themselves that AI generates.[170] Presumably all information from a care robot would go into the medical record. But the amount of data a care robot may obtain is unmatched, making the scope of storing and sharing uncertain.[171] The record could be so vast as to be meaningless for patients.

160. For instance, sharing of protected health information is permissible in the course of medical care or when the patient requests information. *Id.* § 164.502.

161. *See, e.g.*, Hague v. Williams, 181 A.2d 345, 349 (N.J. 1962); McCormick v. England, 494 S.E.2d 431, 436–37 (S.C. Ct. App. 1997).

162. *See, e.g.*, AM. MED. ASS'N, *supra* note 15, § 3.2.1; ANA CTR. FOR ETHICS & HUMAN RIGHTS, AMERICAN NURSES ASSOCIATION POSITION STATEMENT ON PRIVACY AND CONFIDENTIALITY 3 (2015), http://www.nursingworld.org/~4ad4a8/globalassets/docs/ana/position-statement-privacy-and-confidentiality.pdf [https://perma.cc/CA4F-NTCA].

163. Woodrow Hartzog, *Unfair and Deceptive Robots*, 74 MD. L. REV. 785, 797 (2015) (noting that the use of home robots presents a unique opportunity to access information about the interior of the home).

164. *See* Calo, *Robotics*, *supra* note 21, at 545–50.

165. Satariano et al., *supra* note 1.

166. Minoo Alemi et al., *Clinical Application of a Humanoid Robot in Pediatric Cancer Interventions*, 8 INT'L J. SOC. ROBOTICS 743, 752 (2016).

167. *See* Terry, *Iron Triangle*, *supra* note 18, at 155–56.

168. *See, e.g.*, Kaminski et al., *supra* note 17, at 994.

169. *Id.*

170. *Asilomar AI Principles*, FUTURE OF LIFE INST., http://futureoflife.org/ai-principles/?cn-reloaded=1 [https://perma.cc/JH4G-HGB5] (last visited Apr. 1, 2020).

171. *See* Kaminski et al., *supra* note 17, at 995; Terry, *Iron Triangle*, *supra* note 18, at 155.

More worrisome, scholars have stressed that care robots may in some cases reach beyond HIPAA.[172] While health care information is already considered to be special and worth protecting, care robots could harvest even more sensitive information: nudity unrelated to treatment, sexual activity, bathroom activity, as well as private medical and personal information about nonpatients.[173] HIPAA does not clearly protect any non-health-related information.[174] Audio and visual recordings may capture, for instance, information unrelated to the health care transaction, like personal bank statements.[175] Or recordings may capture nudity or sexual activity of the patient or family member not in the course of medical care.[176] HIPAA mainly deals with the gathering of health information in health care spaces and therefore has not adequately considered the special intimacy of the private home.[177] All HIPAA protections also drop off if the patient or her family buy or lease the robot from anything other than a covered health care entity.[178] And large data companies that HIPAA does not govern may de-identify or collect some of the data in aggregate form, resulting in another gap in legal protections.[179] Also, when more than one patient uses the same care robot, it is unclear whether patients can intentionally or haphazardly stumble upon protected information from another clinical encounter.

Robots are in many ways the perfect spy—and there is no shortage of people who would want this private information.[180] Clinicians, family members, hospitals, researchers, commercial third parties, and big data companies will frequently demand this information for uses that are counter to or at least unrelated to the interests and

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172. *E.g.*, Terry, *Iron Triangle*, *supra* note 18, at 154–55.

> Even within the HIPAA-protected space, security and data quality issues are close to a breaking point . . . . However, increasingly clinical, wellness, fitness, and medically-inflected data are collected and processed outside of that HIPAA-protected space by entities to whom HIPAA does not apply. . . .
>
> As they proliferate robots undoubtedly will pose similar privacy and security risks.

Id.

173. *See* Kaminski et al., *supra* note 17, at 996–98.

174. Specifically, HIPAA addresses "[p]rotected health information," which it defines as "individually identifiable health information" that is "transmitted by electronic media[,] maintained in electronic media[,] or transmitted or maintained in any other form or medium." 45 C.F.R. § 160.103 (2019). "Individually identifiable health information is information that . . . [r]elates to the past, present, or future physical or mental health or condition of an individual; the provision of health care to an individual; or the past, present, or future payment for the provision of health care to an individual" and either (a) identifies the individual, or (b) provides a "reasonable basis to believe the information can be used to identify the individual." *Id.*

175. *See* Kaminski et al., *supra* note 17, at 994, 996–97.

176. *See id.* at 1017.

177. *See* Terry, *Iron Triangle*, *supra* note 18, at 154–55.

178. *Id.* at 156. HIPAA only extends to covered parties, which include health plans, health care clearinghouses, and health care providers that transmit information electronically. 45 C.F.R. § 160.103. HIPAA also governs business associates of any of these entities. *Id.* Definitions of these entities are available at 45 C.F.R. § 160.103. While the Federal Trade Commission (FTC) may offer some protections there, beyond HIPAA, they are not specific to health care. *See* Hartzog, *supra* note 163, at 792.

179. HIPAA does not govern de-identified data, though there are certain standards to ensure that the information cannot be re-integrated and made identifiable again. 45 C.F.R. § 164.514.

180. *See, e.g.*, Piers Ford, *The Economy of Connecting*, HEALTHCARE IT NEWS (Dec. 27, 2019, 5:00 AM), http://www.healthcareitnews.com/news/europe/economy-connecting [https://perma.cc/9YYD-855Q] (discussing the growing market for health care data).

well-being of the patient.[181] Health care providers can use care robots to monitor a patient's progress and health remotely.[182] The algorithms that care robots employ may recognize patterns that implicate a patient's health in ways the providers cannot.[183] But clinicians may also use it to monitor patients' activities—for example, to see if a patient is complying with medical advice.[184] Population health researchers may also find such data useful, especially if care robots become widely used across the population.[185] Family members may want to use robots to monitor the health and safety of their loved ones,[186] sometimes with or against the patient's wishes.[187]

Commercial enterprises have enormous interest in this information, whether about the specific individuals or integrated into the collections of big data.[188] Data mining for commercial purposes already occurs in health care contexts,[189] but care robots' level of access to patients, their ability to solicit information through charm, and patients' lack of awareness of the capabilities of robots to gather and store information are disconcerting. Insurance companies may long for this data to vary pricing;[190] employers may want it to be better informed about their employees' health, wellness-related behaviors, and home lives; and marketers may want it to pounce on every consumer with ever-more-tailored advertisements.[191] Even the most innocuous information is desirable to some companies:

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181. *See, e.g.*, Beverly Cohen, *Regulating Data Mining Post*-Sorrell*: Using HIPAA To Restrict Marketing Uses of Patients' Private Medical Information*, 47 WAKE FOREST L. REV. 1141, 1141 (2012) (discussing data miners' practice of purchasing prescription data to aggregate and resell to pharmaceutical manufacturers for marketing purposes).

182. *See* Sharkey & Sharkey, *Granny and the Robots*, *supra* note 10, at 31–33 (discussing ways robots can assist in monitoring health and safety of patients and the potential downsides of relying on that technology).

183. *See* Calo, *Artificial Intelligence Policy*, *supra* note 146, at 420–21 (discussing AI's capacity to recognize patterns that people otherwise would not).

184. See *infra* Part II.C for more on the implications of this for patient autonomy.

185. *See* Jane R. Bambauer, *Dr. Robot*, 51 U.C. DAVIS L. REV. 383, 395–97 (2017). Such studies may, of course, implicate research ethics and informed consent laws. *See id.*

186. Amanda Sharkey & Noel Sharkey, *Children, the Elderly, and Interactive Robots: Anthropomorphism and Deception in Robot Care and Companionship*, IEEE ROBOTICS & AUTOMATION MAG., Mar. 2011, at 32, 32 (stating that care robots may "reassure absent families about the well-being of their elderly relative by monitoring and reporting on their health").

187. *See* Aaron Smith & Monica Anderson, *Automation in Everyday Life: 4. Americans' Attitudes Towards Robot Caregivers*, PEW RES. CTR. (Oct. 4, 2017), http://www.pewresearch.org/internet/2017/10/04/americans-attitudes-toward-robot-caregivers/ [https://perma.cc/75TU-NUQA] (discussing that older adults are less enthused with the concept than eighteen- to forty-nine-year-olds).

188. Jack M. Balkin, *Free Speech in the Algorithmic Society: Big Data, Private Governance, and New School Speech Regulation*, 51 U.C. DAVIS L. REV. 1149, 1154–60 (2018); Brent Mittelstadt, *Ethics of the Health-Related Internet of Things: A Narrative Review*, 19 ETHICS & INFO. TECH. 157, 160 (2017).

189. Sam Thielman, *Your Private Medical Data Is for Sale – and It's Driving a Business Worth Billions*, GUARDIAN (Jan. 10, 2017, 5:00 PM), http://www.theguardian.com/technology/2017/jan/10/medical-data-multibillion-dollar-business-report-warns [https://perma.cc/V58A-6RQX]; *see also* Terry, *Iron Triangle*, *supra* note 18, at 156–57.

190. *See* Danielle Keats Citron & Frank Pasquale, *The Scored Society: Due Process for Automated Predictions*, 89 WASH. L. REV. 1, 4 (2014) ("Algorithmic predictions about health risks, based on information that individuals share with mobile apps about their caloric intake, may soon result in higher insurance premiums.").

191. *See, e.g.*, Kaminski et al., *supra* note 17, at 995.

> Artificial intelligence is increasingly able to derive the intimate from the available. This means that freely shared information of seeming innocence—where you ate lunch, for example, or what you bought at the grocery store—can lead to insights of a deeply sensitive nature. With enough data about you and the population at large, firms, governments, and other institutions with access to AI will one day make guesses about you that you cannot imagine—what you like, whom you love, what you have done.[192]

This is the phenomenon that Professors Danielle Citron and Frank Pasquale called "the scored society," where people are ranked and rated based on algorithms without their knowledge or consent.[193]

There is also the very real possibility that some of these devices could be hacked, a concern that goes to both bodily and information privacy. Malicious third parties could use the unprecedented access to our personal spaces for reasons of extortion, abuse, or other harmful aims.[194] The concerns of other existing technology, like wearable devices, pale in comparison to concerns of the misuse of data available in a care robot at the bedside or home. The relationship between a robot and a person could even be leveraged to manipulate, troll, cause violence, or con people through the robot.[195] Imagine a hacked care robot living in the home of an elderly stroke patient that asks the patient to enter banking information for some seemingly legitimate purpose.[196]

Exceptions to confidentiality will also be implicated. Providers are mandatory reporters of child abuse and are typically required to disclose if a patient poses a harm to herself or others.[197] Care robots may witness events in the home having to do with the safety or well-being of the patient, though not clearly health-related information, such as violence, abuse, or unsafe housing conditions. Patients may also disclose information. They may think of the robot as a direct line to the provider and may use the robot as a quasi-real-time nursing hotline. In forming relationships with robots, they may divulge secrets while seeking emotional support. For instance, what if the Parisian nursing home patient had told the robot her bruises were because her husband or a worker pushed her

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> By recording large amounts of information, companies may be equipped to know what time daily showers happen or when homeowners are typically out of the house. They might infer illness, vulnerability, or other changes in physical or emotional well-being that make users more susceptible to advertising or particular marketing appeals.

Id.

192. Calo, *Artificial Intelligence Policy*, *supra* note 146, at 421.

193. Citron & Pasquale, *supra* note 190, at 2–8.

194. *See generally* MILES BRUNDAGE ET AL., THE MALICIOUS USE OF ARTIFICIAL INTELLIGENCE: FORECASTING, PREVENTION, AND MITIGATION (2018), http://arxiv.org/pdf/1802.07228.pdf [https://perma.cc/MLT7-A66D]; Calo, *Robots and Privacy*, *supra* note 142, at 193–94.

195. Calo, *Robots and Privacy*, *supra* note 142, at 193–94.

196. This would be similar to Professor Hartzog's example of the Roomba that manipulated its owner. Hartzog, *supra* note 163, at 806. Robots that humans have connected with may have leverage points that third parties could abuse. *See id.*

197. Of course, the laws and ethics may vary depending on the context. For ethics guidance, see *Preventing, Identifying & Treating Violence & Abuse: Code of Medical Ethics Opinion 8.10*, AMA, http://www.ama-assn.org/delivering-care/ethics/preventing-identifying-treating-violence-abuse [https://perma.cc/YU46-AEB4] (last visited Apr. 1, 2020). For more on such duties, see generally Daniels et al., *supra* note 122, and Carolyn J. Sachs, *Mandatory Reporting of Injuries Inflicted by Intimate Partner Violence*, 9 VIRTUAL MENTOR 842, 842 (2007).

down? Or what if a child told her diabetes-educator robot, Robin, that she no longer wants to live? Generally, providers owe responsibilities to patients and third parties when they know of imminent dangers. Such incidents typically happen in real time for clinicians, but with care robots there could be an intermediary, begging the question: what are clinicians' responsibilities and how frequently must they monitor these machines for such information?[198]

Care robots provide a potentially unrivaled window into private American households. Who can and should have access to this information, and what limits should there be on gathering it in the first place, will be critical dimensions for safeguarding patient privacy in the future.

C. Autonomy

Autonomy demands that providers respect patient values and preferences in health care delivery.[199] To respect autonomy, patients must provide consent for medical care that is free and informed, and providers must clearly convey the risks, benefits, burdens, and alternatives of treatment.[200] Patients have freedom to refuse medical care for virtually any reason, so long as they have the capacity to make medical decisions.[201] Part of informed consent and respect for autonomy is that patients should be free from coercion or duress in medical decisions.[202] That is, providers or others should not attempt to influence patient decisionmaking in matters of health. Autonomy can also take on a broader meaning in ethics, a general sense of independence and freedom from interference in one's life.[203]

Informed consent and informed refusal have long-standing protections in the common law. Providers can be found liable for negligence for failing to properly obtain informed consent or battery for failing to obtain any consent prior to procedures.[204] Ethical codes also demand respect for patient autonomy. The AMA Code of Medical Ethics opinion on informed consent asks that physicians present clear information on a patient's diagnosis; explain the purpose, benefits, risks, and burdens of treatment; and

198. Care robots could even theoretically increase exposure of provider abuse. A care robot may be recording the actions of providers in, say, nursing homes or health aids that visit patient homes. Especially if providers do not know the capabilities of the robots, robots may capture images, sound, and other evidence of physical or even financial abuse, raising a whole different question of how frequently most institutions monitor and act when such abuse is witnessed.

199. *See generally* Jukka Varelius, *The Value of Autonomy in Medical Ethics*, 9 MED., HEALTH CARE & PHIL. 377 (2006).

200. *Informed Consent: Code of Medical Ethics Opinion 2.1.1*, AMA, http://www.ama-assn.org/delivering-care/ethics/informed-consent [https://perma.cc/PHC4-JL5A] (last visited Apr. 1, 2020). For a general overview of the major tenets of informed consent, see RUTH R. FADEN & THOMAS L. BEAUCHAMP, A HISTORY AND THEORY OF INFORMED CONSENT (1986).

201. *See Informed Consent: Code of Medical Ethics Opinion 2.1.1*, *supra* note 200.

202. *See id.*

203. Nir Eyal, *Informed Consent*, STAN. ENCYCLOPEDIA PHIL. (Jan. 16, 2019), http://plato.stanford.edu/archives/spr2019/entries/informed-consent/ [https://perma.cc/2DNV-XDEH].

204. *See, e.g.*, Saxena v. Goffney, 71 Cal. Rptr. 3d 469, 477–78 (Cal. Ct. App. 2008); Humboldt Gen. Hosp. v. Sixth Judicial Dist. Court, 376 P.3d 167, 170–72 (Nev. 2016); Allison v. Brown, 801 S.E.2d 761, 767–69 (Va. 2017).

ensure patient understanding of this information.[205] It also urges providers to not withhold information from patients, except in rare circumstances, such as emergency situations in which people lack decisionmaking capacity.[206] In such circumstances, patients have a surrogate decisionmaker.[207] Nursing ethics similarly demand respect for autonomy and specifically state that patient decisions should be free from "deceit, undue influence, duress, coercion, or prejudice."[208] In some instances, ethical codes also contemplate more physical elements of autonomy. For instance, nursing home regulations and ethical codes place significant restrictions on the use of restraints on patients.[209]

Care robot use poses a number of challenges to obligations to respect autonomy. Others have raised worries about the impact of AI on informed consent generally.[210] If providers make clinical decisions based on algorithms in which the provider herself is unable to explain how she came to this decision, how can she protect and ensure free and informed consent for the patient?[211]

While care robots can be used to empower patients to live independently from others and potentially stay in their homes instead of facilities,[212] such robots could also be constant sources of surveillance of patients, perhaps used to police individual behaviors in ways and to degrees we have not seen before.[213] In the context of elder care, Professor Fazal Khan said patients worry about the effects of robots on their autonomy:

> [Patients] can envision the benefits of such technology, they can also envision how it might be used to constrain their autonomy and that they might be powerless to resist. In other words, they do not want to be infantilized or subject to paternalistic controls that limit their ability to assume risks that adults are generally allowed to engage in (e.g., a glass of wine, cigar,

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205. *Informed Consent: Code of Medical Ethics Opinion 2.1.1*, *supra* note 200.

206. *Withholding Information from Patients: Code of Medical Ethics Opinion 2.1.3*, AMA, http://www.ama-assn.org/delivering-care/ethics/withholding-information-patients [https://perma.cc/DX4C-GMAH] (last visited Apr. 1, 2020).

> Truthful and open communication between physician and patient is essential for trust in the relationship and for respect for autonomy. Withholding pertinent medical information from patients in the belief that disclosure is medically contraindicated creates a conflict between the physician's obligations to promote patient welfare and to respect patient autonomy.

Id.

207. *Decisions for Adult Patients Who Lack Capacity: Code of Medical Ethics Opinion 2.1.2*, AMA, http://www.ama-assn.org/delivering-care/ethics/decisions-adult-patients-who-lack-capacity [https://perma.cc/44EV-JFVN] (last visited Apr. 1, 2020).

208. AM. NURSES ASS'N, CODE OF ETHICS FOR NURSES WITH INTERPRETIVE STATEMENTS § 1.4 (2015), http://www.nursingworld.org/coe-view-only [https://perma.cc/HA2U-86CC].

209. *Use of Restraints: Code of Medical Ethics Opinion 1.2.7*, AMA, http://www.ama-assn.org/delivering-care/ethics/use-restraints [https://perma.cc/2SK2-TXPB] (last visited Apr. 1, 2020) ("All individuals have a fundamental right to be free from unreasonable bodily restraint.").

210. *E.g.*, NUFFIELD COUNCIL ON BIOETHICS, BIOETHICS BRIEFING NOTE: ARTIFICIAL INTELLIGENCE (AI) IN HEALTHCARE AND RESEARCH 5 (2018), http://www.nuffieldbioethics.org/assets/pdfs/Artificial-Intelligence-AI-in-healthcare-and-research.pdf [https://perma.cc/79CC-XEUY].

211. *See id.*

212. *See* Tijs Vandemeulebroucke et al., *The Use of Care Robots in Aged Care: A Systematic Review of Argument-Based Ethics Literature*, 74 ARCHIVES GERONTOLOGY & GERIATRICS 15, 20 (2018).

213. *See id.*

> consensual sex, etc.) even though such acts might be detrimental to their physical or mental health.[214]

A poll that asked elderly people about their thoughts on care robots suggests they see tradeoffs. Most agree that preferences and autonomy of users are paramount but also agree that cooperating with robots may be an appropriate requirement for accepting them into one's home.[215]

Whether and how a patient complies with medical care or practices healthy behaviors is something that has largely been concealed from providers and family, but patient noncompliance may be more readily visible where care robots are involved. Care robots could create a nanny state where robots tell on patients, informing providers, families, and third parties about all sorts of conduct or statements that patients would prefer providers otherwise not know. One can imagine how a care robot could report that a patient refused to take lifesaving medication, failed to walk once a day as a doctor directed, or exhibited some other form of noncompliance.[216] Programmers and providers have to decide what information should get reported back to a provider because it is relevant to a patient's health and what is not. Programmers also have to consider the proper limits to autonomy. What if a patient solicits help from a care robot to harm herself—for instance, as care robots provide medication, what if a patient solicits an overdose level from her care robot?

There is also the question of what providers should be allowed to do with this information. There are at least three key ways that providers might use this information that could be harmful to patients. The first way is that they might use it to refuse or deny patients specific clinical procedures.[217] Those who have worked in hospitals are familiar with how a surgeon may refuse to operate on a patient because she thinks the patient will recover poorly postsurgery based on a subjective assessment of the patient's health behaviors.[218] Another example is when an organ transplant panel decides to refuse an organ to a patient who they do not believe will comply fully with antirejection therapies.[219] The second, and more extreme, way is that providers may use this data to ditch noncompliant patients.[220] The third way is that hospitals and health care providers

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214. Khan, *supra* note 22. In another study of elderly people and their preferences on care robots, there were mixed responses to health-promoting behavior via robot. Some thought it would be helpful, others emphasized that patients sometimes refuse cooperation for good reason (like if physical therapy is painful), and others worried that we do not typically cajole healthy behaviors for other populations. *See* Sandra Bedaf et al., *Can a Service Robot Which Supports Independent Living of Older People Disobey a Command? The Views of Older People, Informal Carers and Professional Caregivers on the Acceptability of Robots*, 8 INT'L J. SOC. ROBOTICS 409, 415 (2016).

215. Bedaf et al., *supra* note 214, at 413–14.

216. The latter example is taken from a qualitative study on care robot use in elderly populations where there is hypothetical tension between a provider who wants a patient to move more and a patient who uses the care robot to move less. Heather Draper & Tom Sorell, *Ethical Values and Social Care Robots for Older People: An International Qualitative Study*, 19 ETHICS & INFO. TECH. 49, 53 (2017).

217. *See* Laura L. Katz & Marshall B. Paul, *When a Physician May Refuse To Treat a Patient,* PHYSICIANS NEWS DIG., http://physiciansnews.com/2002/02/14/when-a-physician-may-refuse-to-treat-a-patient/ [https://perma.cc/KLS5-HCK3] (last visited Apr. 1, 2020).

218. *See id.*

219. *See id.*

220. *See id.*

might use data on noncompliance or general lack of healthy behaviors as defenses in torts claims. For instance, a hospital may try to argue that a patient was contributorily negligent for a bad postsurgical outcome.[221] All of these uses may affect patient-provider and patient-robot trust and raise important questions about what amounts to improper coercion or oversurveillance of patients through care robots.

Care robots present an opportunity to influence patient decisionmaking. Should manufacturers design care robots to incentivize or entice a patient into compliance or to punish a patient for noncompliance? As discussed earlier, some patients may feel threatened by the presence of a robot.[222] Far more extreme, robot developers have been testing a robotic smart home for patients with dementia.[223] This home would be designed with a variety of sensors and wearables to track or control a patient's movement through her own home and to limit her options with respect to what spaces she can access.[224] It would not be a large leap of imagination for this technology to be used in other contexts to control a patient's ability to turn on a stove or access food cupboards.[225] When would such conduct rise from a level of permissible and helpful nudging[226] towards coercive and paternalistic practices?[227] Currently, AI developers are studying how polite robots need to be to ensure compliance with recommended health behaviors.[228] Others are asking whether it is appropriate to design a robot to only respond if the user asks nicely.[229]

Care robots could effectively be used for behavioral engineering at the population level as well. Professor Woodrow Hartzog insightfully observed that developers uniquely design robots to manipulate people by mimicking human socialization.[230] This is dangerous, he warned, because "they are without shame, fatigue, or internal inconsistency" and because robots are "scalable, so the decision to design a robot to manipulate humans will impact hundreds, if not thousands or millions of people."[231]

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221. *See* Calo, *Robots and Privacy*, *supra* note 142, at 192–93 (suggesting that private and government parties may seek to use robot data in litigation).

222. Salichs et al., *supra* note 146, at 95.

223. *See generally* Sumit Majumder et al., *Smart Homes for Elderly Healthcare—Recent Advances and Research Challenges*, 17 SENSORS 2496 (2017).

224. *See generally id.*

225. Sharkey & Sharkey, *Granny and the Robots*, *supra* note 10, at 33.

226. For foundational work on this topic, see generally RICHARD H. THALER & CASS R. SUNSTEIN, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS (2008). For this topic in the context of AI development, see generally Jason Borenstein & Ron Arkin, *Robotic Nudges: The Ethics of Engineering a More Socially Just Human Being*, 22 SCI. & ENGINEERING ETHICS 31 (2016).

227. Darling, *Anthropomorphic Framing*, *supra* note 67, at 177–78 ("It may be great that we can emotionally motivate people to walk more by giving them the sense of nurturing a digital flower. What else can we get people to do? Can we get them to vote? Buy products? Serve someone else's interests? And as our technology gets better, robots have the potential to be Fitbits on steroids. Perhaps we should let people choose to be manipulated, so long as the outcome is positive. But it is not clear what constitutes a positive outcome." (citation omitted)).

228. *See generally* Lee et al., *supra* note 94.

229. *See, e.g.*, Draper & Sorell, *supra* note 216, at 53 (explaining how a woman's care robot was programmed to "so that it will not do things for her if she asks sharply or in a demanding tone").

230. Hartzog, *supra* note 163, at 804–05.

231. *Id.* at 804.

Professor Ian Kerr, in a prescient piece written over fifteen years ago, noted the prospect of robots or AI to manipulate the public for commercial aims, a trend he called the "californication of commerce."[232] Professor Kerr was worried that "bots could be programmed to infiltrate people's homes and lives *en masse*, befriending children and teens, influencing lonely seniors, or harassing confused individuals until they finally agree to services that they otherwise would not have chosen."[233]

Indeed, companies may use machines, which are known to be more trustworthy than people, to gain people's trust and then use this trust to manipulate and influence them for their own interests.[234] Examples of this emotional manipulation can already be seen in care robots. Robots modeled for homes of people with dementia may ask the patient, "Please, don't leave me alone" or "I would like you to stay closer to me" to prevent the patient from wandering into unsafe areas of a house and then notify the caregiver that the patient has wandered.[235] The same robot can build trust and connection by reminding patients about loved ones with photos or updates (like, "Today is the birthday of Teresa, your daughter") and can engage in open-ended listening in which it asks the patient about her life, work, and hobbies.[236] Providers and manufacturers of robots may even design robots to manipulate patients for other purposes. For instance, Professor Calo hypothesized that because patients can hold devices more accountable for errors if they "meet" them before surgery, hospitals or device manufacturers might want to control patient access so as to influence their own legal risks.[237] The very design of these robots is, in part, a manipulation of various human tendencies to convince us that the robots have agency and free will.[238]

This conclusion serves as an important reminder that these decisions are by design. If a robot encroaches on privacy or autonomy, it is because programmers decided it should or, at the very least, failed to prevent it from doing so—and one should ask why and to what end.

III. THE NEED FOR REGULATION OF CARE ROBOTS

As care robots, especially social ones, come to the bedside, they threaten the privacy, confidentiality, and autonomy of patients in ways that could harm patients and challenge their trust in AI and health care more broadly. Now is the time to consider how best to regulate care robots, before they are mainstreamed into medical practice. AI will not be an improvement for patients if it becomes an end-run around the long-held standards developed over decades for the betterment of patient care and well-being.

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232. Ian R. Kerr, *Bots, Babes and the Californication of Commerce*, 1 U. OTTAWA L. & TECH. J. 285, 288–89 (2004).

233. *Id.* at 312.

234. *See id.* at 310.

235. Salichs et al., *supra* note 146, at 92.

236. *Id.* at 93. Or robots may be used to manipulate the providers who use them. *See* Darling, *Anthropomorphic Framing*, *supra* note 67, at 175. One hospital provided its robot with a name and a back story after finding that this made employees more tolerant of the robot's mistakes, ultimately cutting down on complaints for the company. *Id.* Of course, the concern here is that this may be manipulating employees to approve of and like the robot, even if it performs a poor job.

237. Calo, *Robotics*, *supra* note 21, at 547.

238. *See generally* Darling, *Anthropomorphic Framing*, *supra* note 67.

This Section identifies four stakeholders important for the regulation of care robots: health care providers,[239] health care institutions,[240] care robot manufacturers,[241] and government agencies.[242] Each Part proposes concrete initial steps for each stakeholder to begin the process for preparing for the advent of care robots at bedsides. These proposed steps suggest that no single regulatory effort is sufficient and, instead, a multilayer process is necessary. This is unsurprising because layers of safeguards also exist in other facets of medical care.[243]

A. Responsibilities of Providers: Codes, Licensure, and Informed Consent

The health care provider is the one foremost responsible for upholding ethical standards in clinical practice.[244] Providers should still be responsible for upholding these obligations to patients, even when care robots are involved. The robot presumably is only involved in patient care at the behest of the provider.[245] This relationship places an onus on health care providers and entities to scrutinize the issues that widespread care robot use will raise in advance and plan ahead for how to address these issues. This anticipation and planning will be a complex process because, as Part III.C discusses, some issues may be better addressed at the robot-manufacturer level. But holding providers accountable for maintaining ethical standards puts pressure on them to work with developers and demand certain standards of development. After all, there is no market for care robots if providers are not willing to use them in clinical care.[246]

This Part does not go into detail about provider liability, as this merits a separate analysis. Certainly, though, more thought will need to go into what constitutes the proper standard of care by which providers integrate care robots into practice.[247] Instead, this Part proposes three concrete steps that providers collectively should take to prepare for

239. *See infra* Part III.A.

240. *See infra* Part III.B.

241. *See infra* Part III.C.

242. *See infra* Part III.D.

243. For instance, devices and drugs have one layer of regulatory protection (FDA governance), providers have another (medical malpractice and state licensure), and institutions a third (medical malpractice, hospital licensure, etc.). *See generally* INST. OF MED., TELEMEDICINE: A GUIDE TO ASSESSING TELECOMMUNICATIONS FOR HEALTH CARE 83–115 (Marilyn J. Field ed., 1996), http://www.ncbi.nlm.nih.gov/books/NBK45448/pdf/Bookshelf_NBK45448.pdf [https://perma.cc/5YDN-2FF3].

244. *See AMA Principles of Medical Ethics*, AMA, http://www.ama-assn.org/about/publications-newsletters/ama-principles-medical-ethics [https://perma.cc/3KWV-K9Y6] (last visited Apr. 1, 2020).

245. Individuals who bring care robots into their homes separate from or against medical advice might require a different regulatory scheme. For instance, an individual who bought Zora for assistance or entertainment would not be a patient and would not be covered by the same legal and ethical protections. *See supra* note 178 and accompanying text.

246. *See* Marcello Ienca et al., *Ethical Design of Intelligent Assistive Technologies for Dementia: A Descriptive Review*, 24 SCI. & ENGINEERING ETHICS 1035, 1048–49 (2018) (observing that the absence of ethical considerations is often a major obstacle to the uptake of new assistive technologies and may cause distrust in consumers).

247. This consideration should include questions of how much due diligence a provider should perform in ensuring that a care robot safeguards privacy, confidentiality, and autonomy. Future legal analysis should explore whether there are affirmative defenses for providers if the manufacturer is at fault, whether and to what extent there is institutional liability, and who is eligible to "prescribe" a care robot.

care robots: (1) revising ethical codes, (2) considering licensure issues, and (3) considering informed consent.

1. Revise Ethical Codes

Professional bodies often create codes of ethics that represent the ethical standards of a particular field. Prominent codes for physicians include the AMA Code of Medical Ethics[248] and the American College of Physicians Ethics Manual.[249] Many specialty medical groups also have codes or ethical opinions, such as the American College of Obstetricians and Gynecologists,[250] the American Psychiatric Association,[251] and the American Academy of Orthopaedic Surgeons.[252] Other health care providers have their own codes, such as the American Dental Association[253] or the American Nurses Association.[254]

These professional codes function to promote professional self-regulation, providing standards by and for that profession. Professional bodies may stipulate that their member professionals comply with the standards of the code or face discipline within the organization. For instance, the AMA's Council on Ethical and Judicial Affairs (CEJA) investigates and holds hearings when members or applicants for membership engage in possible ethical misconduct, typically after a finding of state medical board discipline.[255] CEJA may expel a current member, deny an application for membership, or discipline an existing member through probation, suspension, or censure.[256] CEJA's penalties carry weight beyond membership in the AMA. In some cases, its penalties must be reported to the National Practitioner Data Bank.[257] This information may then follow

248. *Code of Medical Ethics Overview*, AMA, http://www.ama-assn.org/about/publications-newsletters/code-medical-ethics-overview [https://perma.cc/WGL8-KWMJ] (last visited Apr. 1, 2020).

249. Lois Snyder Sulmasy & Thomas A. Bledsoe, *American College of Physicians Ethics Manual: Seventh Edition*, 170 ANNALS INTERNAL MED. S1, S1 (2019).

250. AM. COLL. OF OBSTETRICIANS & GYNECOLOGISTS, CODE OF PROFESSIONAL ETHICS OF THE AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS 1 (2018), http://www.acog.org/About-ACOG/ACOG-Departments/Committees-and-Councils/Volunteer-Agreement/Code-of-Professional-Ethics-of-the-American-College-of-Obstetricians-and-Gynecologists [https://perma.cc/SD74-7VF3].

251. *Ethics*, AM. PSYCHIATRIC ASS'N, http://www.psychiatry.org/psychiatrists/practice/ethics [https://perma.cc/YK4B-E2VE] (last visited Apr. 1, 2020).

252. AM. ACAD. ORTHOPAEDIC SURGEONS, PRINCIPLES OF MEDICAL ETHICS AND PROFESSIONALISM IN ORTHOPAEDIC SURGERY (2002), http://www.aaos.org/contentassets/b5bdb0610ad4411cbe400ce53a2ccdab/principles.pdf [https://perma.cc/L8SJ-ZBEH].

253. AM. DENTAL ASS'N, THE ADA PRINCIPLES OF ETHICS & CODE OF PROFESSIONAL CONDUCT (2018), http://www.ada.org/en/about-the-ada/principles-of-ethics-code-of-professional-conduct [https://perma.cc/8FPE-UUFQ].

254. AM. NURSES ASS'N, *supra* note 208.

255. *CEJA Rules for Review of Membership*, AMA, http://www.ama-assn.org/councils/council-ethical-judicial-affairs/ceja-rules-review-membership [https://perma.cc/W67L-PZT5] (last visited Apr. 1, 2020).

256. *Id.*

257. *What You Must Report to the NPDB*, NAT'L PRACTITIONER DATA BANK, http://www.npdb.hrsa.gov/hcorg/whatYouMustReportToTheDataBank.jsp [https://perma.cc/C3WL-3JAB] (last visited Apr. 1, 2020). Medical malpractice claims of a certain amount, state licensure actions, medical privileging actions, health-related convictions, and exclusion from Medicare/Medicaid must also be reported. *Id.*

the physician throughout her career.[258] Hospitals query the National Practitioner Data Bank when making privileging or hiring decisions, as do state licensing boards when physicians apply to new states.[259] Codes are sometimes codified into law or promulgated through regulations.[260]

In their highest sense, codes articulate aspirational goals for professionals. As Professor Mark Rothstein observed, in this way they are distinct from law because "the law usually sets minimum standards of what must be done. By contrast, codes of ethics of health professionals and scholarship in bioethics generally set loftier goals . . . ."[261]

Health care providers should now begin to revisit ethical standards for whether they must be altered, or health care providers and lawmakers governing the practice of health care must write special opinions and laws to address care robots. Providers who venture into the use of care robots are going to need special ethical guidance to help them navigate this complex terrain. Such a project will also help to raise the profile of robot ethics as an important and forthcoming challenge, posing a threat to patient well-being and raising obligations on the part of the clinician.

Codes should be altered to provide useful guidance for care robot use. For instance, providers owe a duty of confidentiality and privacy to patients. This duty may be impossible to preserve when using care robots without working with the developers to build robots that, at the outset, have certain protections in place (for example, robots designed not to follow a patient into a bathroom or robots that can blur images that are sensitive and unrelated to clinical care).[262] Obligations on the provider may look different: the provider will not only have to respect the patient's privacy, but she will also have to work with developers to attain certain specified safeguards detailed by the code. Providers will have unprecedented access to information about patients' decisions and health care behaviors.[263] Accordingly, there may need to be new ethical standards written to address when it is proper to use such information in a way that is harmful to a patient, such as in litigation or in refusing to provide further medical care.

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258. Andrew C. Harvan, *The ABCs of the National Practitioner Data Bank: What Physicians Should Know*, PA. MED. SOC'Y, http://www.pamedsoc.org/detail/article/national-practitioner-data-bank-part1 [https://perma.cc/59D4-DPWB] (last updated July 31, 2018).

259. *See General Information*, NAT'L PRACTITIONER DATA BANK, http://www.npdb.hrsa.gov/guidebook/AGeneralInformation.jsp [https://perma.cc/UTD7-2YGR] (last visited Apr. 1, 2020).

260. Typically, in ethics, standards are codified into state licensure processes. One example is the ethical standards in medical practice acts that doctors agree to comply with as a condition of their licensure and by which they can face suspensions, probations, or even loss of license. The AMA Code of Medical Ethics regularly provides annotations published in editions of the Code of the many times each year that courts cite and rely on each of its ethical opinions. Other health professionals have similar obligations with respect to state licensure and renewal. Standards can also be codified into federal law. For instance, research ethics standards are codified in the Common Rule at 45 C.F.R. pt. 46, subpart A (2019). Some standards may also be found in state common law, *see, e.g.*, *In re* Quinlan, 355 A.2d 647, 667–69 (N.J. 1976), or federal common law, *see, e.g.*, Washington v. Glucksberg, 521 U.S. 702, 710–11 (1997).

261. Mark A. Rothstein, *The Role of Law in the Development of American Bioethics*, 20 INT'L J. BIOETHICS 73, 84 (2009) (emphasis omitted).

262. *See* Kaminski et al., *supra* note 17, at 1009–20.

263. See *supra* Part II.A for a discussion of the patient data that care robots could have access to and the resulting implications for patient privacy.

Another issue is how frequently must providers review robot data for signs of abuse in a patient household, and does the mere presence of the robot trigger that obligation or something greater? A robot would be poorly suited to independently address child abuse or suicidality, yet the robot's presence, recording, and conveyance of that information back to the provider could trigger the ethical responsibilities of the provider as a mandatory reporter.[264] There will need to be programming in the robot to alert the clinician or perhaps other parties like first responders or police, similar to how a care robot can currently alert family members or ambulances when a patient falls.[265] Health care providers may also want to explore the threshold question of when and if care robots are ethically permissible.

Codes have always been an important dimension of professional self-regulation in medicine and more broadly. Organized medicine, nursing, and state medical boards, as well as other disciplines, should begin to review these standards now for issues that care robots may raise in the future.

2. Revisit Licensure

Providers must be held accountable for breaches of autonomy, privacy, and confidentiality involving a care robot. While medical malpractice liability is outside the scope of this Article, licensure is another way to promote quality in health care. Providers may not be able to control every aspect of the care robot, given that we cannot always perfectly predict robot behavior.[266] But providers should be held accountable for those issues that can be predicted and, additionally, should have a system for regularly monitoring the robot and addressing its behavior when the robot does unpredictable things.

Every state has a medical board that issues licenses for physicians to practice in that state. Other boards also exist for other medical professions, like nursing. Specific requirements exist around education and training, as well as character and fitness.[267] State medical boards also handle renewals of licenses, continuing education, and provider discipline.[268] When there are disciplinary issues, the medical board can censure a provider, place her on probation, monitor her, mandate that she take certain courses, or suspend or terminate her ability to practice in the state.[269]

State boards should play an active role in evaluating the effects of care robots on patients and how they affect the licensure and disciplinary processes of health care providers. The Federation of State Medical Boards (FSMB), the national body that

264. *See* Daniels et al., *supra* note 122, at 323.

265. *See* Fischinger et al., *supra* note 29, at 71.

266. *See* Calo, *Robotics*, *supra* note 21, at 534.

267. *See, e.g.*, *Requirements*, W. VA. BOARD MED., http://wvbom.wv.gov/Requirements.asp [https://perma.cc/3QEE-WXFA] (last visited Apr. 1, 2020).

268. *E.g.*, *Continuing Education – Medical Doctors*, W. VA. BOARD MED., http://wvbom.wv.gov/Cont_Med_Education.asp [https://perma.cc/86RV-BBEN] (last visited Apr. 1, 2020); *Requirements*, *supra* note 267.

269. *See, e.g.*, W. VA. BD. OF MED., LICENSING AND DISCIPLINARY PROCEDURES: PHYSICIANS; PODIATRIC PHYSICIANS AND SURGEONS § 11-1A-12 (2019), https://wvbom.wv.gov/download_resource.asp?id=568 [https://perma.cc/HQ6P-DT4C].

supports statewide licensing boards,[270] should take the lead on reviewing licensure and discipline for care robot issues. Because many of the challenges that care robots create are universal, it makes sense, especially early on, to consider standards and rules that could govern care robot use by practitioners in every state. The FSMB should work with the states to develop model guidance for how state boards should address licensure and disciplinary issues that using care robots raises. For instance, what would constitute unethical use of a care robot? When should a provider be ethically responsible for a breach? Should a provider be held responsible in a way that should harm her good standing at the state level? Moreover, should there be special licensing for providers who use care robots, or would the regular licensure system suffice? Lastly, if there should be special licensing, what types of special educational programs or certifications should be in place?

Individual states and professional societies will almost certainly consider these matters independently, but the FSMB is a natural starting place.[271] The FSMB should also begin engaging other provider disciplines besides medical doctors in discussions about how care robots may be used differently across professions and care settings. Inevitably, there will be much debate about the scope of practice issues in care robots, such as who can prescribe a robot, who is responsible for monitoring it, etc. Early conversations across the various disciplines may help to address issues before they crop up. An alternative is to consider federal law that governs medical practice with respect to care robots; however, this is unlikely given that medical practice is typically left to the states to regulate.[272]

3. Develop Standards for Informed Consent

A cornerstone of patient protection and autonomy is informed consent. Informed consent is a process by which the provider conveys the risks, benefits, burdens, and alternatives of treatment and the patient gives consent for care.[273] Informed consent is paramount to preserving patient autonomy and respecting patient values and preferences.[274] The duty to obtain informed consent falls on the provider.[275] Thus, providers need to begin considering informed consent for care robot use, as it will be their ethical responsibility to ensure that the risks and benefits are fully explained.[276] In doing this, providers should work with robot manufacturers and others to gain a better understanding of the risks and benefits that care robots pose for patients.

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270. *About*, FED'N STATE MED. BOARDS, http://www.fsmb.org/ [https://perma.cc/LR8P-4QUD] (last visited Apr. 1, 2020).

271. Also note a critique that medical societies may have inherent conflicts of interest. Bambauer, *supra* note 185, at 397 (explaining the AMA is consistently "one of the leading spenders for lobbying efforts in Washington, D.C.").

272. Myrisha S. Lewis, *Halted Innovation: The Expansion of Federal Jurisdiction over Medicine and the Human Body*, 2018 UTAH L. REV. 1073, 1087.

273. *See generally* FADEN & BEAUCHAMP, *supra* note 200.

274. *Id.* at 7–9.

275. *Id.* at 3.

276. Of course, this Section assumes the device has already been approved by whatever agency will control its release on the market and the doctor is now permitted to prescribe or use it.

Foremost, informed consent respects patient autonomy and allows a patient an important voice in the decision of whether to use care robots in the course of her treatment.[277] Informed consent may also address some of the privacy and confidentiality concerns that using care robots raises, since patients would be put on better notice about the capabilities of the robot in advance of its use.[278] What constitutes informed consent in this context will develop more as the issues are better understood, but there are still concerns to address now.

First, patients should be explained the purpose of the robot in their care. Is it meant to assist, educate, monitor, or achieve some other goal?[279] Understanding the purpose of the care robot may help patients establish boundaries about whether they are comfortable with the robot for that particular use. For instance, if the robot is mainly meant for companionship, patients may not find that desirable and may ask to remove a robot from their care plans.

Second, patients should be able to "lift the curtain" and receive information on who makes and owns the robot, how the robot works, what its capabilities are, and what it is really manufactured to do.[280] Social robots, in particular, may work best when they are perceived as social agents and not tools.[281] Patients' ability to ascribe autonomy to robots may have some therapeutic benefit, but the thing that makes these robots useful for patients is the very thing that also makes them dangerous: patients accepting them as some version of helper and confidante and providing them sensitive information, unwitting to where that information may wind up or how it might be used.[282] A better understanding of the robot means patients are better able to guard themselves against privacy and confidentiality breaches.

Third, patients should be warned of the risks and burdens of this technology so they can make an informed decision about whether they would like to use care robots. This warning may include benefits that the patient would not otherwise be aware of, such as the positive effects of care robots' social functions on health outcomes for patients.[283] Regarding risk, providers must particularly inform patients about possible implications for privacy and confidentiality,[284] including making patients aware of the potential private information that robots may capture.

This disclosure must explain to the patient and household members the audio and visual recording capabilities of the robot, including how far it can see or hear and whether

277. *See* FADEN & BEAUCHAMP, *supra* note 200, at 7–9.

278. *See* Daniel Schiff & Jason Borenstein, *How Should Clinicians Communicate with Patients About the Roles of Artificially Intelligent Team Members?*, 21 AMA J. ETHICS E138, E139–41 (2019); *see also* Kaminski et al., *supra* note 17, at 1018–20 ("It is hard to participate in robot privacy settings if a user does not know what the robot is actually doing.").

279. See *supra* Part I.A for a discussion of the wide variety of roles that care robots may play in patient care.

280. *Principles of Robotics*, ENGINEERING & PHYSICAL SCI. RES. COUNCIL, http://epsrc.ukri.org/research/ourportfolio/themes/engineering/activities/principlesofrobotics/ [https://perma.cc/5PAR-XE4Z] (last visited Apr. 1, 2020).

281. Darling, *Anthropomorphic Framing*, *supra* note 67, at 176.

282. See *supra* Part II.B for a discussion of confidentiality concerns care robot use creates.

283. *See, e.g.*, McHugh & Rascon, *supra* note 43 (suggesting pain reduction with the use of MEDi).

284. *See supra* Parts II.A and II.B.

it can see through substances. It should also provide information regarding the data management plan for the robot, including whether family members can receive any information, what other third parties will obtain information, as well as how long and in what manner data will be stored. The risks that unwanted parties could hack devices and access information and the likelihood of such an occurrence should also be disclosed.[285] Lastly, the disclosure should state what types of information the robot will gather and when HIPAA will or will not protect that information.[286] Providers must explain to patients how frequently they obtain data from the robot. Patients may expect the robot to be a substitute for, or twenty-four-hour hotline to, the provider. Since a patient may assume that the provider knows what the robot knows, providers will need to stress that patients may need to reach out directly to the provider, to emergency responders, or to others if they want immediate responses, depending on the capabilities of the technology.

Patients must also understand the alternatives to care robots. No patient should be forced into accepting a care robot. For example, if a provider would like to send a patient home with a care robot, the patient should be given the choice to refuse after learning about the risks and benefits of that decision. Providers should also make clear whether care robots are complete replacements for human providers or whether patients will still have access to human providers when needed.

A few challenges with informed consent will need to be addressed over time. First, care robots appear to be frequently targeted at patients with lack of decisionmaking capacity, for example patients with dementia or children.[287] In these populations, surrogate decisionmaking is usually permitted,[288] but it is problematic in this context; few other clinical treatments raise such challenges to autonomy, privacy, and confidentiality, and these systems may allow more control over loved ones than has ever been possible before. For these reasons, surrogate consent may be inappropriate in some cases. Second, informed consent may be complicated by the sheer amount of information given about the robot and the fact that patients may not fully understand how the robot works, though this is often a broader challenge in informed consent with respect to complex procedures or devices.[289] And, of course, informed consent alone is not enough. This proposal contemplates informed consent alongside other regulatory efforts to ensure the safety and ethics of care robot use. Lastly, care robot use may have implications for people besides patients, whether in hospitals or homes. Family members and loved ones who interact with the patient may also find themselves under the glare of the monitoring capabilities of the care robot.[290] More thought will need to go into balancing the interests of the patient and respecting her wishes while also honoring and guarding the rights and interests of loved ones.[291]

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285. See *supra* Part II.A for more on the capabilities of care robots and privacy implications.

286. *See supra* notes 167–179.

287. *See* Sharkey & Sharkey, *Granny and the Robots*, *supra* note 10, at 36.

288. *Decisions for Adult Patients Who Lack Capacity: Code of Medical Ethics Opinion 2.1.2*, *supra* note 207.

289. *See* Schiff & Borenstein, *supra* note 278, at E139–41.

290. See *supra* Part II.A for a discussion of privacy concerns for both the patients and other people who come into contact with a care robot.

291. More thought could go into how this parallels other fields of medicine or law that offer similar challenges. For instance, genetic testing implicates not just the patient but also family members and raises similar

B. Institutional Responsibilities: Leading Through Ethics Committees

Health care institutions should safeguard patients from any harms resulting from the care robot use. Institutions should begin to prepare for care robots by reviewing policies and procedures, examining risks and benefits of technology, and considering whether care robots will be useful for their patient populations. This Article proposes that ethics committees take the helm in evaluating these issues at the institutional level.

Ethics committees may function to review individual ethical matters related to specific patients, but they also frequently issue guidance and policy for the hospital and provide ethical education and outreach.[292] Ethics committees arose out of a number of high-profile court cases addressing refusal of life-sustaining therapies.[293] Most notably, in *In re Quinlan*,[294] the Supreme Court of New Jersey permitted the hospital to withdraw Karen Quinlan's ventilator if the hospital ethics committee agreed and the court granted legal immunity for ethics committees in New Jersey that make such determinations.[295] While such a committee focused more on patient prognosis, the idea of committees of hospital workers focusing on ethical issues grew in favor.[296] Ethics committees are a softer form of regulation, as they do not typically mandate any particular action, but health care providers often find it very difficult to go against the advice and expertise of the committee.[297] Moreover, ethics committees create hospital policies and procedures that providers must follow.[298]

In some instances, ethics committees have more teeth. For instance, Institutional Review Boards (IRBs), which monitor internal research protocols for compliance with research ethics standards, are mandated through the Common Rule, the federal law governing IRBs and human subjects research.[299] Institutions that engage in human subjects research must have IRBs, and these IRBs must take on specific forms.[300] For instance, IRBs must have at least five members, diversity in their membership, and appoint scientific experts, nonscientific experts, and at least one member who is a lay person unaffiliated with the hospital.[301] Committees that handle special populations, like children or prisoners, are expected to seek out members with specialized training and knowledge about those populations.[302] Members are not permitted to review protocols

concerns about autonomy and privacy. *See generally* K.G. Fulda & K. Lykens, *Ethical Issues in Predictive Genetic Testing: A Public Health Perspective*, 32 J. MED. ETHICS 143 (2006).

292. George Annas & Michael Grodin, *Hospital Ethics Committees, Consultants, and Courts*, 18 AMA J. ETHICS 554, 557 (2016).

293. *See id.* at 554–55.

294. 355 A.2d 647 (N.J. 1976).

295. *In re Quinlan*, 355 A.2d at 671; *see also* Annas & Grodin, *supra* note 292, at 554 (discussing *Quinlan* as a significant impetus to the formation of modern ethics committees).

296. *See* Annas & Grodin, *supra* note 292, at 554–56.

297. *Id.* at 555.

298. *Id.* at 557.

299. 45 C.F.R. §§ 46.108–46.109 (2019).

300. *Id.* § 46.101.

301. *Id.* § 46.107. Diversity in membership includes diversity in "race, gender, and cultural backgrounds and sensitivity to such issues as community attitudes." *Id.*

302. *See id.* §§ 46.201–46.207 (pregnant women, human fetuses, and neonates); *id.* §§ 46.301–46.306 (prisoners).

for which they have conflicts of interest.[303] IRBs also have an obligatory set of ethical standards to follow when reviewing research.[304] Members must evaluate protocols for topics related to risks versus benefits and informed consent, among others.[305]

In addition to ethics committees, many large health care institutions also have ethics consultation services.[306] Ethics specialists who work on the ground to provide individualized ethical advice for specific cases staff these services.[307] Consultants review medical records; have discussions with providers, family members, and patients; and generally provide insights based in both law and ethical discourse.[308] Professor Mark Aulisio argued that ethics consultants are important in modern medicine because medical decisionmaking is increasingly complicated, providers encounter a variety of patients with distinct and differing values systems, and there is an increasing expectation that patient autonomy and individual rights be respected.[309] Similar to ethics committees, while the advice of consultants is not mandatory, health care providers are often likely to give deference to these ethics professionals.[310]

At the institutional level, ethics committees and ethical consultation services will be integral in addressing ethical challenges related to care robot use. Like special committees for animal and human subjects research, institutions might consider having special- or subcommittees of their larger ethics committee dedicated solely to the issues that the use of AI and care robots raise in the clinical setting. Because of the serious, complicated, unique, and somewhat unanticipated issues that care robot use presents, more stringent requirements could be beneficial.

The care robot committee could be used to evaluate when care robot use is appropriate (in what settings and for what type of patients), how to monitor the degree of care that care robots provide, how to evaluate specific care robots for compliance with ethical standards, and how individual clinicians will use care robots. IRBs could be very useful models to explore as federal law stringently regulates them, which may be necessary for any care robot committee, as well, given the high stakes involved in care robots. Federal guidance could provide ethical standards for what a good care robot ethics committee's membership looks like; for instance, ideally the committee would include health care providers of different training and specialty backgrounds, patients, lay people, ethicists, and robotics experts. A care robot committee could also staff an ethics consultation service that has some specialization in care robots to handle providers' and patients' concerns for care robot use. Lastly, such a committee could lead institutional efforts to revise and develop policy to address care robot use in that institution. The committee can also consider whether there are special issues related to medical staff, privileges, and employment worth addressing. Additionally, they should

303. *Id.* § 46.107.

304. *Id.* § 46.111.

305. *Id.*

306. *See generally* Karel-Bart Celie & Kenneth Prager, *Health Care Ethics Consultation in the United States*, 18 AMA J. ETHICS 475 (2016).

307. *See* Mark P. Aulisio, *Meeting the Need: Ethics Consultation in Health Care Today*, *in* ETHICS CONSULTATION: FROM THEORY TO PRACTICE 3, 9–19 (Mark P. Aulisio et al. eds., 2003).

308. *Id.* at 10–11.

309. *Id.*

310. *See id.* at 4–5.

consider whether there are specialty safety issues that care robot use poses unique to their facilities. Hospitals, nursing homes, and other entities can also begin the broader project of studying and gaining familiarity with this technology, considering if its right for their institutions and their patients, and weighing what the tradeoffs will be.

C. Responsibilities of Manufacturers

Some of the privacy, confidentiality, and autonomy issues that care robot use poses are most easily addressed at the developer level in how the developer designs and codes the robot.[311] However, unlike health care providers, robot manufacturers are not currently subject to any medical ethical requirements, and many lack familiarity with health care and medical ethics rules.[312] Care robot manufacturers should take the lead in developing standards in concert with health care providers and institutions. They should take the possible harms and challenges that care robots raise seriously. Developers have an interest in making care robots that are tolerable to patients and health care workers. This Article proposes the development of a code of ethics and educational system for AI developers venturing into this area, as well as more consideration into how to build robots to reflect health-care specific ethical values.

1. Developing a Code of Ethics and Education for AI Development

A primary model for regulating robotics generally to date has been AI developers' self-regulation.[313] This has been heavily criticized for being insufficient.[314] Codes are only the initial step in regulating AI in this context.[315]

One weakness is that codes or mission statements constitute forms of soft governance, meaning there are no consequences for breaking codes.[316] Too much focus on ethical codes might mean there is no accountability for adherence.[317] Initial studies on codes in AI also suggest that they do little to change developers' practices.[318] Codes

311. *See* ALEX CAMPOLO ET AL., AI NOW INST., AI NOW 2017 REPORT 33–34 (Andrew Selbst & Solon Barocas eds., 2017), http://ainowinstitute.org/AI_Now_2017_Report.pdf [https://perma.cc/TR76-DDGP].

312. *See id.* at 32.

313. *See id.* at 32–34 (discussing the "soft governance" of industry standards and technical practices).

314. *E.g.*, *id.*; MEREDITH WHITTAKER ET AL., AI NOW INST., AI NOW REPORT 2018, at 9 (2018), http://ainowinstitute.org/AI_Now_2018_Report.pdf [https://perma.cc/57FS-NTDB] (noting that ethical principles and guidelines for the creation and deployment of AI technologies "have little measurable effect on software development practices if they are not directly tied to structures of accountability and workplace practices").

315. *See* CAMPOLO ET AL., *supra* note 311, at 32–34 ("While these efforts set moral precedents and start conversations, they provide little to help practitioners in navigating daily ethical problems in practice or in diagnosing ethical harms, and do little to directly change ethics in the design and use of AI." (footnotes omitted)).

316. *See id.*

317. *See id.*; Bryan Casey, Note, *Amoral Machines, or: How Roboticists Can Learn To Stop Worrying and Love the Law*, 111 NW. U. L. REV. 231, 234–35 (2017) (observing that law, not ethics, will be necessary to get AI developers to comply).

318. *E.g.*, WHITTAKER ET AL., *supra* note 314, at 31 (citing an example of how Google specifically prohibits development of technologies that contravene human rights but was recently outed publicly for developing a search engine for the Chinese e-market that would censor information, at the behest of the Chinese government, and in clear violation of Google's mission). In another study, engineers were told to explicitly consider a code of ethics in their decisionmaking, but this had no effect on their practices. *Id.* (citing Andrew

are critiqued for being too theoretical and not providing enough practical support for on-the-ground ethical decisions.[319] Codes have too frequently in the AI context been made through insular processes—developed by and for AI manufacturers—and thus only address certain issues. To that end, some argue that codes almost always wrongly presume that all AI should move forward rather than allowing for dialogue about certain AI that may simply be ethically unacceptable.[320] Codes also must be constructed carefully to avoid legal challenges.[321]

Codes in health care, in contrast, sometimes have enforcement structures already in place.[322] Moreover, health care ethics provides a body of complex standards that ethical and medical providers make, so it is not prone to an AI-vision only. However, there are still challenges in thinking about how to apply these standards to the context of AI given that such codes typically speak only to health care providers.

An early starting place is to convene a national working group of clinical ethicists, physicians, the FSMB, lawyers, AI developers, patient groups, and others to develop a "Code of Ethics for Care Robots" that draws from the robust literature on medical ethics and robotic ethics. The recent development of governance boards and ethics committees to work alongside AI developers[323] could serve as a model.

Educating AI developers on ethics and ethical codes is also an important component.[324] While codes alone have mixed or poor success at reshaping behaviors in the context of AI, providing historical and media accounts of controversies does appear to encourage developers to be more introspective in their work.[325] Basic ethics training could be possible for developers.[326] Also, a rich history can be drawn upon to explain the

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McNamara et al., *Does ACM's Code of Ethics Change Ethical Decision Making in Software Development?*, *in* PROCEEDINGS OF THE 2018 26TH ACM JOINT MEETING ON EUROPEAN SOFTWARE ENGINEERING CONFERENCE AND SYMPOSIUM ON THE FOUNDATIONS OF SOFTWARE ENGINEERING 729, 729 (2018), http://dl.acm.org/doi/10.1145/3236024.3264833 [https://perma.cc/2MCE-TN33]).

319. *See* CAMPOLO ET AL., *supra* note 311, at 32–34.

320. *See, e.g.*, WHITTAKER ET AL., *supra* note 314, at 31 ("Rather than asking fundamental ethical and political questions about whether AI systems should be built, these documents implicitly frame technological progress as inevitable, calling for better building.").

321. Calo, *Artificial Intelligence Policy*, *supra* note 146, at 408–09. Professor Calo noted that ethical codes of conduct for professions are sometimes invalidated by the federal government, for instance, as restraints of trade and that any efforts to develop such codes "should pay attention to the composition and motivation of the authors of such principles, as well as their likely effects on markets and on society." *Id.* at 408–09. Most codes of ethics in health care have withstood legal challenges and still stand, but occasionally an opinion has been struck down, typically for trade concerns. One example of such a challenge was an American Society of Reproductive Medicine opinion on payments for egg donors that plaintiffs alleged to be a violation price-fixing laws. Kamakahi v. Am. Soc'y for Reprod. Med., 305 F.R.D. 164, 196–97 (N.D. Cal. 2015) (permitting two egg donors to intervene as plaintiffs); *see also* Robert L. Klitzman & Mark V. Sauer, *Kamakahi vs ASRM and the Future of Compensation for Human Eggs*, 213 AM. J. OBSTETRICS & GYNECOLOGY 186, 186 (2015).

322. *See* CAMPOLO ET AL., *supra* note 311, at 33.

323. Bernd Carsten Stahl & David Wright, *Ethics and Privacy in AI and Big Data: Implementing Responsible Research and Innovation*, 16 IEEE SECURITY & PRIVACY 26, 32 (2018).

324. *See generally* Judy Goldsmith & Emanuelle Burton, Why Teaching Ethics to AI Practitioners Is Important (AAAI-17 Workshop on AI, Ethics, and Society, 2017), http://www.researchgate.net/publication/317264699_Why_Teaching_Ethics_to_AI_Practitioners_is_Important/link/592ecfc2aca272fc55c641a4/download [https://perma.cc/NP72-EBNP].

325. WHITTAKER ET AL., *supra* note 314, at 31.

326. Goldsmith & Burton, *supra* note 324.

historical roots and purpose of ethical protections for patients in privacy, autonomy, and other contexts.[327]

2. Building Care Robots To Reflect Ethical Values

The working group should consider ways that robot design can minimize harm to privacy, confidentiality, and autonomy. Currently, two competing models exist in terms of how to build values or ethics into robots: (1) the moral machine model, where manufacturers build robots capable of independent ethical thought;[328] and (2) the value alignment model, where manufacturers program robots with certain values or preferences in their code.[329] Importantly, regardless of the model, thoughtful robot design can reduce a number of important risks that using care robots poses to patients.[330]

Proponents of moral machines believe developers should build ethical reasoning into robots, with much debate over what the ethical framing might be (for instance, whether the robot would be framed to consider core principles in medical ethics, such as beneficence and autonomy, or ethical theories, such as consequentialism and deontology).[331] Of course, if developers directly programmed robots with ethical theories, new issues of regulation would exist. Providers and institutions may push back even more against any possible ethical or legal responsibility with respect to the robot. We cannot anticipate exactly how a robot will respond to coding, and two robots with the same code may respond differently. Such a design would require robot manufacturers to study greatly and evaluate medical ethics, as the ethical issues raised in that field are unique.

In value alignment, the values can be ethically neutral; it is more about helping the robot learn and understand human preferences.[332] This model may work well in the context of care robots when there are clear standards that do not require complex ethical reasoning. For instance, to program a care robot to act in a certain manner when it

327. *See supra* notes 102–106 and accompanying text.

328. Wendell Wallach has been a leading scholar in this topic. See, for example, WENDELL WALLACH & COLIN ALLEN, MORAL MACHINES: TEACHING ROBOTS RIGHT FROM WRONG (2009).

329. Shannon Vallor, *Value Alignment and Machine Ethics*, *in* CONTROL AND RESPONSIBLE INNOVATION IN THE DEVELOPMENT OF AI AND ROBOTICS: DRAFT FINAL REPORT 28, 28 (Wendell Wallach ed., 2018), http://www.thehastingscenter.org/wp-content/uploads/Control-and-Responsible-Innovation-FINAL-REPORT.pdf [https://perma.cc/VW6H-FA65].

330. *See, e.g.*, A. van Wynsberghe, *Service Robots, Care Ethics, and Design*, 18 ETHICS & INFO. TECH. 311, 313–14 (2016) (advocating for a "care centered value sensitive design approach").

331. *See generally* Hutan Ashrafian, *Artificial Intelligence and Robot Responsibilities: Innovating Beyond Rights*, 21 SCI. & ENGINEERING ETHICS 317 (2015). Probably the earliest example of this work is Paul Sieghart & John Dawson, *Computer-Aided Medical Ethics*, 13 J. MED. ETHICS 185 (1987). Sieghart and Dawson developed a machine to aid ethics deliberations. Some critique the progress of moral machines as having not gone far enough to be useful yet. *E.g.*, Kyle Bogosian, *Implementation of Moral Uncertainty in Intelligent Machines*, 27 MINDS & MACHINES 591, 591 (2017) (finding "projects to implement moral reasoning in artificial moral agents so far have failed to satisfactorily address the widespread disagreement between competing approaches to moral philosophy" and arguing, in the alternative, "to design machines to be fundamentally uncertain about morality").

332. Vallor, *supra* note 329, at 28–29 ("[M]any supporters of value alignment present their approach as simply a practical translation of utilitarian ethics: that is, a mechanical path to an ideally rational and ethical decision calculus by means of a machine learning method for understanding—and remaining behaviorally aligned with—individual and/or aggregate human preferences.").

encounters (auditorily or visually) financial records, prescriptions, diagnoses, or other identifiable information, it would not need to understand the ethical underpinnings of privacy and confidentiality. A robot developer could simply program it to have certain responses, such as to blur out that information when transmitting it back to the hospital and third parties or to store that data in special folders and require a password override for people to have access to it.[333] As another example, developers could program robots to "learn" how to pixelate or blur out video of nudity (perhaps with some patient-driven override or special exception for access where it is medically necessary) or to not follow patients into the bathroom.[334] A manufacturer could program a robot to go to "sleep" and stop audio or visual recordings when a patient requests private time, if appropriate.

D. Responsibilities of Regulators

To ensure that AI developers face real consequences for harm that care robots may cause to patient privacy and autonomy, a regulatory agency must be tasked with monitoring and ensuring compliance with standards. Certainly, whichever agency regulates care robots will need to have extensive expertise in health care and patient concerns. The preferred model is to house care robot regulation in the U.S. Department of Health and Human Services (HHS), which encompasses most facets of health care regulation, and to have HHS work in concert with other agencies that might also regulate robots more generally.

1. Health and Human Services

HHS is a sprawling agency regulating most aspects of health care,[335] with the exception of the regulation of medical practice, which is left to the states.[336] HHS includes many specialty agencies, such as the Centers for Medicare and Medicaid Services,[337] the National Institutes of Health,[338] the Agency for Health Care Research and Quality,[339] and the Health Resources and Services Administration.[340] For purposes of care robots, two agencies within HHS are paramount: the Food and Drug

333. *See* Kaminski et al., *supra* note 17, at 1009–20.

334. *See id.* at 1012, 1017, 1019.

335. *HHS Organizational Chart*, U.S. DEP'T HEALTH & HUM. SERVS., http://www.hhs.gov/about/agencies/orgchart/index.html [http://www.hhs.gov/about/agencies/orgchart/index.html] (last updated Jan. 13, 2020).

336. Lewis, *supra* note 272, at 1087.

337. The Centers for Medicare and Medicaid Services governs our public health insurance systems. *See* CTRS. FOR MEDICARE & MEDICAID SERVS., http://www.cms.gov/ [https://perma.cc/3YJT-5XVD] (last visited Apr. 1, 2020).

338. The National Institutes of Health leads major medical research around the country. *Impact of NIH Research*, NAT'L INSTS. HEALTH, http://www.nih.gov/about-nih/what-we-do/impact-nih-research [https://perma.cc/4K96-AC78] (last visited Apr. 1, 2020).

339. This agency invests in efforts to improve quality in health care delivery. *Mission and Budget*, AGENCY FOR HEALTH CARE RES. & QUALITY, http://www.ahrq.gov/cpi/about/mission/index.html [https://perma.cc/TEX5-SYB4] (last visited Apr. 1, 2020).

340. This agency is tasked with improving access to care for the uninsured and those vulnerable to health care discrimination. *See About HRSA*, HEALTH RESOURCES & SERVS. ADMIN., http://www.hrsa.gov/about/index.html [https://perma.cc/3GXX-6N67] (last visited Apr. 1, 2020).

Administration (FDA)[341] and the Office for Civil Rights (OCR).[342] The two agencies would need to work in careful coordination with one another to regulate various aspects of care robots. Other parts of HHS may also supplement regulation.

The FDA has traditionally governed early care robots, such as Paro.[343] It is likely that the FDA will need to play some role in the regulation of care robots because care robots share some common traits with other medical devices (in terms of general safety, approval for use in various settings, etc.). However, the privacy, confidentiality, and autonomy issues that this Article raises are not in the wheelhouse of the FDA, which is why other agencies like the OCR will be critical.

The FDA regulates three different classes of devices.[344] Class I devices are low-risk devices such as elastic bandages;[345] the risk of harm that robots pose is too great to fall into this category. Paro the seal and the da Vinci surgical robot are Class II,[346] or moderate-risk devices, regulated alongside motorized wheelchairs or pregnancy test kits.[347] Paro is much closer to modern care robots than da Vinci, but it still is not a good representation of care robots' enhanced mobility, recording, and social capabilities, among other traits. Governing only ten percent of medical devices, Class III devices typically "sustain or support life, are implanted, or present potential unreasonable risk of illness or injury."[348] This class of devices include implantable pacemakers and breast implants.[349] While Class III is closest to the profound implications of care robots, the idea of regulating care robots in the same class as breast implants is preposterous. Care robots are likely to present dramatically higher stakes when it comes to safety. Thus, the FDA should begin thinking about how it could best regulate this more intensive medical device. For instance, the FDA could develop a new and distinct category of medical devices (or perhaps several) to address health care robots specifically, including special issues that care robot use raises. But this would be a significant departure for the FDA and would certainly require additional resources and capabilities for that agency.

Even with more resources and capabilities, the FDA will fall short in regulating many of the dimensions of care robots that this Article raises. Nobody tells secrets to breast implants; or if they do, breast implants do not record and convey those secrets back to doctors or commercial third parties. These differences are where HHS's OCR comes in. The OCR is tasked with regulating a number of patient and provider interests (including civil rights statutes, exercise of conscience, etc.) and, most importantly for

341. FDA, http://www.fda.gov/ [https://perma.cc/U2PV-FQX3] (last visited Apr. 1, 2020).

342. *Office of Civil Rights*, U.S. DEP'T HEALTH & HUM. SERVS., http://www.hhs.gov/ocr/index.html [https://perma.cc/F7GS-2UUF] (last visited Apr. 1, 2020).

343. *See* Takanori Shibata, *Therapeutic Seal Robot as Biofeedback Medical Device: Qualitative and Quantitative Evaluations of Robot Therapy in Dementia Care*, 100 PROC. IEEE 2527, 2527 (2012); *see also* Price, *supra* note 18, at 10–11 (discussing FDA regulation of new medical technologies and devices).

344. *Learn if a Medical Device Has Been Cleared by FDA for Marketing*, FDA, http://www.fda.gov/medicaldevices/resourcesforyou/consumers/ucm142523.htm [https://perma.cc/58KW-TTXB] (last updated Dec. 29, 2017).

345. *Id.*

346. Calo et al., *supra* note 36, at 20.

347. *Learn if a Medical Device Has Been Cleared by FDA for Marketing*, *supra* note 344.

348. *Id.*

349. *Id.*

this paper, HIPAA. HIPAA broadly addresses many of the concerns that Part II.B raises around confidentiality. The statute and the agency could be stretched to reach the related but distinct concerns about autonomy and privacy (especially the latter), as well as the confidentiality gaps that care robots pose for HIPAA. Of course, congressional action would likely be needed for any form of expansive regulation. However, under similar principles to HIPAA, the agency could address which design elements robot manufacturers must integrate to avoid privacy breaches.

Although no agency is perfectly tasked at the federal level with addressing health care ethics issues, the OCR is the closest through its work in discrimination, exercise of conscience, etc. State licensing boards could be an alternative; after all, boards do offer the most familiarity with codes of ethics and with clinical ethics matters. This is a weaker option, though, as boards are not tasked with governing privacy laws and also lack the power and efficiency of a centralized agency.[350] Thus, HHS and the OCR can take the lead in working together to develop early guidance for how to prepare for this unique new aspect of health care. Other agencies in HHS may also be involved to address matters of access, quality, research, and other topics that care robot use also certainly raises.

2. Other Agencies Outside of HHS

This Article advocates for a health care-specific form of regulating care robots. Needless to say, care robots are only one subset of robots, and it is likely that other agencies will govern robots generally. Other possibilities may include Federal Trade Commission (FTC) governance or the development of a new agency dedicated to robots. HHS will need to collaborate with any such agency.

Professor Calo advocated for a new "Federal Robotics Commission" (FRC) to regulate some of the issues that robots present.[351]

> The institution . . . would not "regulate" robotics in the sense of fashioning rules regarding their use, at least not in any initial incarnation. Rather, the agency would advise on issues at all levels—state and federal, domestic and foreign, civil and criminal—that touch upon the unique aspects of robotics and artificial intelligence and the novel human experiences these technologies generate.[352]

Professor Calo proposed this, instead of other existing agencies, out of fear "that we will continue to address robotics policy questions piecemeal, perhaps indefinitely, with increasingly poor outcomes and slow accrual of knowledge."[353] The model is designed

350. Having robot manufacturers do business with fifty state medical boards would be problematic. This is one reason why the FDA is a centralized federal agency, so that drug and device manufacturers have one-stop shopping in getting regulatory approval in our country. *Cf.* RYAN CALO, THE CASE FOR A FEDERAL ROBOTICS COMMISSION 15 (2014), http://www.brookings.edu/wp-content/uploads/2014/09/RoboticsCommissionR2_Calo.pdf [https://perma.cc/VA4Y-X46A] ("We have in the past formed formal institutions around specific technologies, for the obvious reason that understanding a technology or set of technologies requires a dedicated staff, and because it can be more efficient to coordinate oversight of a technology centrally.").

351. *Id.* at 11–12.

352. *Id.* at 3.

353. *Id.*

for flexibility.[354] It is meant to address the regulatory needs of robots at this time, which are comparatively minimal to other industries, as a fledgling technology.[355] The FRC would get the lay of the land with respect to what issues robots present and could then expand accordingly to regulate the field as needed later.[356] The FRC, Professor Calo proposed, would also advise other federal agencies on robotics issues where necessary and advise federal, state, and local lawmakers.[357] This new commission would be small to start, with a "handful of engineers and others with backgrounds in mechanical and electrical engineering, computer science, and human-computer interaction, right alongside experts in law and policy."[358]

If Congress creates a primary agency to regulate robots, HHS will need to work in partnership with it. Short of that, this model should be leveraged early in the process of regulating care robots to develop useful guidance. I propose adding to Professor Calo's vision of the FRC by having a special subset of that commission dedicated to AI in health care, and even more narrowly, care robots. This subcommission could be populated with FDA and OCR officials; bioethicists; lawyers; health care providers; and robot manufacturers. It could be tasked with considering the regulatory demands of care robots and the implications for federal, state, and local laws governing medical practice and health care. Indeed, such a subcommission could also be the driving force behind the code of ethics that Part III.C discusses. Implications for privacy, confidentiality, and autonomy would need to be considered, as well as broader health law regulatory issues like malpractice or quality standards.

Alternatively, Professor Hartzog has advocated for the FTC to regulate robots.[359] Professor Hartzog noted that many robots will raise significant consumer protections issues like "fraud, privacy, data security, failure to exercise reasonable care and the exploitation of the vulnerable."[360] He also argued that the FTC will be well suited to handle new and not-yet-anticipated consumer protection issues that robot use raises.[361] HHS officials could work alongside the FTC, similar to how it currently does for health care privacy matters. The FTC governs some privacy protections for consumers, while HHS administers the specialized protections related to HIPAA and health care privacy.

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Care robot use raises unique circumstances that no existing governing body perfectly addresses. This Article advocates for putting care robot regulation in the hands of a health care specialized agency, even if robots are generally regulated elsewhere. The closest and best fit is HHS, specifically the FDA and the OCR, through expanding their regulatory protections in devices and confidentiality/privacy respectively to begin to address unique issues care robot use raises. HHS can work in concert with other agencies

354. *Id.* at 11.
355. *See id.*
356. *Id.* at 11–12.
357. *Id.* at 12.
358. *Id.* at 11.
359. Hartzog, *supra* note 163, at 824–31.
360. *Id.* at 787–88.
361. *Id.* at 825.

that more generally regulate robots. Also, if any advisory or other committees are formed to begin early work on robot ethics, then HHS should be involved to offer and develop expertise in the care robot dimension. Regardless of the precise regulatory mechanism, entity governance will be critical for safeguarding patients and ensuring safety in care robot use.

CONCLUSION

Care robots have the potential to improve patients' lives, act as aids to independent living, function as educators, and provide distractions from the pain and vulnerability of the bedside. But we do not yet fully understand the ways that robots may shape the lives of patients or how patients may interact with them. Early signs suggest that patients will form intimate relationships with care robots that, in addition to their proximity to patients' homes or bedsides, could mean unprecedented intrusion into patients' private lives. Privacy, confidentiality, and autonomy are under significant threat because of care robots, and thus patient trust in medicine is also threatened. If we are not to lose ground in patient protections, and if we are to enhance the benefits and reduce the risk of care robots, we must find ways to address the unique ethical issues they raise and the usual ones they exacerbate. Regulation will be integral to hold providers and entities accountable for maintaining standards while using care robots, ensure that manufacturers build robots that uphold these standards, create useful governmental oversight, and put patients fairly on notice of any remaining risks and tradeoffs. Ethical regulation of care robots is one critical component in the broader task of ensuring that care robots of the future will be tools for social good.