

**Could a nurse robot cry?:  
Nurses' perspectives  
on medical robots**

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## CHAPTER 1 INTRODUCTION

“Our mission is to improve the health and well-being of our communities by combining the best of small town values with national standards of health care excellence.”<sup>1</sup>

### **The growth of technology**

It is the woman who attends her son’s wedding via robot<sup>2</sup>; it is that mini computer you hold in your hand and call a smartphone; it is the device that gives you directions; it is the program that allows you to turn photographs into works of art, and it is so much more. It is technology. This is where our fantasies have come to life, and the subjects of our storybooks and myths are everyday creations. Like a wild and wonderful wilderness, technology spreads out for seemingly ceaseless miles. There is a tangle of wires, chips, algorithms, and a myriad of objects that you cannot even recognize. Trails lead through the technology jungle promising at each turn what until that moment your mind could not imagine. As you start to walk you turn here and there as some bright object jumps suddenly out at you with a new skill to show, each more wondrous than the next. As you push further there are ever more wonders. From the boughs overhead we can pluck timesavers and tools on a whim. Then you come across a meadow full of apps, more than you can count. Further on there is a little stream of applications that runs along until somewhere you know it must reach an ocean. And, oh, all the devices! There are more and more and more devices. Here and there you step over an update, but it is not so much trouble as you pick it up and journey cheerfully along.

You are not alone here for there is something different that is also growing in this wilderness. They are the woodland creatures of the realm. They are the robots. At first you do not see them as they peak out at you still timidly. But in this wilderness, each day there are more

of them as they are given ever-greater capabilities. You watch them curiously, but soon are distracted by all the other shiny things. Your senses struggle to make sense of it all. The further you go the more there is to see. Soon new functions are falling on the path. The updates become larger and harder to hold. You turn another bend and something lands on your shoulder, then one on your arm. It is a mad blaze of lights and colors and inventions. Devices have begun to crowd the path you walk on. The landmarks you used to recognize are fading in the distance. But if you stumble chances are a robot is waiting to help you up.

A bit dazed, you still feel as though you could walk on forever, drawn in by the magic of it all, and you realize now that you cannot go back to before. So we journey on till the path gets narrower and less traveled or is lost completely. This then is the frontier; this is where the adventurers come. Beyond the known is boundless opportunity with as many spectacular innovations as potential pitfalls. It begs to be explored. The question is not now how far we can go, but how much we want to see and what we want to keep with us?

### **A hospital in the woods**

It is still early enough summer that the air is cool in the mornings and has not yet taken on Midwestern, summer humidity. Sunlight has barely begun to creep over the maple trees that surround the parking lot, as I pull into visitor parking. As the first rays reach the pavement I see the night shift beginning to trickle out the doors of this small community hospital. With a forest of maples and oaks all around, dotted here and there with walking trails for patients, it is restful and calm. It feels to me like a good place to heal. Sheltered in this nature I could convince myself that I am in the middle of nowhere. The hospital is small and serves in great part a rural community from rolling farmlands and small neighborhoods. Nearby is a town with tree lined

streets and old Victorian houses. The storefronts remain from times when the settlers were moving west. But the hospital is not as secluded as it appears. Not more than 30 minutes away is a city with one of the largest Midwestern universities, complete with a world-class medical system. This institution is tackling a plethora of the most complicated medical treatments drawing patients from across the country. Huge and constantly forward thinking, the university hospital is a research institution dedicated to the advancement of medical knowledge. It makes a stark contrast to this small hospital nestled among the maple trees.

I will call this small hospital Greenview for the purposes of this thesis. In part this is because I made a promise to my interviewees that I would find a suitable pseudonym, and partially because perhaps Greenview is not alone. There may be other small institutions across this country that provide what Greenview provides. If only I had the time and means to explore more and find out what other small hospitals are like. For now, this thesis focuses only on Greenview.

As the night shift walks slowly toward their cars squinting in the bright morning light, the hospital they have just left is still abuzz with action. The moment that I step through the sliding double doors, however, this fact is not entirely evident. I am greeted as I walk in by a cheerful elderly volunteer sitting at the information desk. Later I will learn that the volunteers at Greenview rotate through the week, always a smiling and caring face to welcome you and answer any questions or to push the snack cart through the halls and deliver mail. My initial reaction is one of shock at the age of these volunteers. Not one appears to be under seventy. After a few moments where the volunteer can't hear what I am asking, we finally understand each other and I am pointed in the right direction. As you move past the information desk there is

a pleasant coming and going of nurses and doctors through the halls, greeting each other as they pass and smiling to strangers like me.

This day starts off at Greenview like many other mornings with a staff meeting of administrators. As I sit down I notice that everyone seems to know each other and has something to talk about. I am pulled kindly into the conversation next to me. Slowly, as the leader of the meeting and the last few latecomers enter, the room quiets. Preliminaries are taken care of, a few people are assigned things to check up on for the next meeting, and a goal is set forth.

I find, as I attend more and more of these staff meetings all over the hospital as an intern, that this goal is ever present. It is the impetus behind the PowerPoints on how to work together to improve safety. It lies behind the goal to maintain exceptional patient satisfaction rates. It is present in the constant adjustment and review of hospital practices; indeed, it is somewhere in every smile and a part of every successful patient discharge. The goal is to give the best possible care to the patients, and to be “the best small hospital in America.”

This may sound like a bit of a lofty goal. This first time I heard it I was surprised, however, soon it made sense. Greenview has certainly been heading in the right direction. Greenview has remarkable patient satisfaction ratings with 82 percent of patients rating Greenview at a nine or ten on a rating scale of zero to ten. Zero being the worst, and ten being the best experience. This 82 percent rating is high above the national average of 68 percent high satisfaction.<sup>3</sup> Greenview consistently matches or surpasses national and state averages. The goal of this institution, and the reason they reach such ratings, is this desire to provide the best and most personal kind of care to their patients. This was the reason that I would ultimately choose Greenview as my research site. I knew beyond doubt that they take their work very seriously.

At this moment Greenview hospital is comprised of a human nursing staff. But, like so many other medical facilities, they stand on the brink, of what some would argue to be an inevitable future: a future of highly technological care. Already the hospital has joined with a large corporate health system. Like many small institutions the financial burden of managing a hospital can only be met by entering a health system. Their autonomy is waning under the constraints of configuring to a national hospital system's demands. While being part of a hospital system brings many new and needed changes to Greenview, including a complete renovation, it could someday mean mandatory technological changes too. One day these technologies could include medical robots. Indeed, the step toward robotics is already being taken in some form by many hospitals across the country.

This paper will consider what part medical robots should play in nursing at a small community hospital like Greenview. I hope to illuminate the important elements of care that human nurses provide, and how medical robots could potentially hinder, advance or be in harmony with this work. We will delve into medical robots themselves, the opinions and attitudes the nurses I spoke to have about medical robotics, and some of the questions that arise with a robotic future. What part should robots play in nursing, and what human qualities of nursing are irreplaceable?



## CHAPTER 2

### GREENVIEW'S VIEW ON ROBOTS

“Have you seen the Jetsons?”<sup>4</sup>

#### **Americans and Robots**

In anthropology classes I have learned about the complex relationship between humans and robots: how people see them in their world and what people want them to do. As I started to look into how hospital staff feels about having medical robots in their work environment, I knew that culture would certainly affect how the American hospital staff I was going to speak to would feel about these robots. The role that culture plays in how people react to having robots in their lives has already been the subject of much discussion and many studies. Often times the “Euro-American view”, or more specifically for our purposes the “American view,” of robots is contrasted with countries considered to be stereotypically more forward thinking about the uses of robotics. Perhaps the most obvious example of these countries to contrast with America is Japan. As I use the term American I fully understand that America has a wide array of people with diverse backgrounds and worldviews, which cannot be properly represented by one word alone. I also understand that the same is true when speaking about the Japanese, but for the sake of this thesis I will use these terms to speak about the stereotypes that have been attributed to the respective nations.

The broad view of Japan shows that the country as whole has an incredible willingness to bring the use of robotics into everyday life. The culture is so extremely inclusive of robotics that many Japanese people are willing to see a robot as having the capacity to perform integral tasks

in business and the home. The reasons for this disposition are, of course, a subject of some debate and there are several circulating theories.

One of the theories centralizes on the principle belief systems of each country. In Japanese culture there is less of a difference seen between what is considered natural from what is artificial (Kaplan 2004). The Shinto belief, which is prominent in Japan, does not have the same theoretical framework as Christian ideologies. It is focused more on maintaining purity and avoiding pollution. In the natural world even objects are embodied with essential qualities of existence. This belief allows even a robot to be considered part of the natural world (Robertson 2010: 12). It has also been suggested that views on robots can be linked to other prominent belief systems: Confucianism and Buddhism. These belief systems do not put the emphasis on creatures with souls in contrast to creatures without souls as Christianity does. Also, it is suggested that some forms of Buddhism hold that there are spirits in many objects. With this belief it may not be as hard to be comfortable with the autonomy of robots (Bartneck, Suzuki, Kanda, Nomura 2007: 219).

These ways of viewing the world are suggested to be in contrast with monotheistic religions where God is the sole creator of intelligence and man. This, coupled with the distinction about beings with a soul, would lead people from a culture of Christian or other monotheistic beliefs to be skeptical of anything that came close to resembling human intelligence and autonomy. They would, in this theory, be more likely to accuse the roboticist of “playing God.” Again, not having these Christian beliefs leaves room in Japan for robots, as well as artificial intelligence, to stand alongside humans. The theory automatically sets the Japanese beliefs in opposition to typical American beliefs. Religion is likely to factor into a nation’s

stereotypical feelings about robotics as it impacts many stereotypical viewpoints, but it is certainly not the whole story.

Robotics is on the rise in Japan, perhaps even more than in the United States. By 2016 there has been a hopeful prediction in Japan that every home will have a small household robot to help with chores (robocase.com cited in Robertson 2010: 7). Robots are also making their way into the healthcare and service industries. As with other developed countries the rise in development means a decrease in the number of children that have been born. As women have more opportunities in developed countries they tend to put off having babies until later (Yew 2012). In Japan this phenomena is taking place, and women are finding they have more autonomy with their careers than they would have if they got married, settled down, and had children (Usui 2005). Japan is facing a declining birthrate resulting in a severe population shortage. There is great need for domestic workers and care workers, especially for the elderly, which are increasingly a greater percentage of the population. America too faces an increasingly aging population. It has been estimated according to the United Nation's "World Population Prospects that by 2050 America's elderly will jump from roughly 12 percent of the population to over 20 percent (Cited in Tapus, Mataric, and Scassellati 2007: 36). Hospitals in Japan, as in America, are increasingly feeling this pressure of an ever-increasing patient population that is in need of labor-intensive support. It has been found that 90 percent of the patients in hospitals in Japan show signs of dementia and fit into the category of needing "continuous support from staff." However, there is also a shortage in staff. This results in extra overtime for the hospital staff and increased turnover rate for hospital jobs (Fuji, Naga, Yasuhara, Tanioka, Ren 2011: 459).

Clearly the Japanese are in need of more hands to complete this work. In Japan a solution for the staff shortage and the increasing need to support the elderly is to use robots to pick up the added work. Robots are seen by many conservative Japanese as a way to get the needed workforce without having to rely on immigration or foreign workers. In Japan there is a history of concern about foreigners along with a “tenacious ideology of ethnic homogeneity” (Roberson 2010: 9). The conservative Japanese would prefer to have robots care for the elderly or even work in childcare than foreigners. Some may see robots as a preferred solution to these issues, but do the Japanese really like robots more or have less concern about robotics themselves than Americans?

Aside from predispositions caused by the beliefs of the country, other theories suggest that popular culture may be responsible for the willingness to use robots. The thought is that Americans are inclined to be more fearful because of the narratives in Euro-American culture that portray robots and other artificial creations as being evil at worst and destructive at best. This conception is not without very reasonable academic backing, but it is also complicated by a series of stories that are not so very negative. It is very interesting to look at the traditional folklore of Euro-American culture. It is evident that where ideas originate might affect how Americans think about robotics.

Although it might not be immediately evident, as explained by Kaplan there is a “long tradition in the stories of the West of involving artificial human-like creatures” (2004: 7). The tales of human-like creatures and machines are sprinkled throughout Euro-American history from ancient times onward. In ancient mythology there are some quite happy tales of artificial creatures. The king of Cyprus, Pygmalion, creates a sculpture of the beautiful woman of his dreams. With a little help of the Goddess Aphrodite the sculpture is turned into a living woman.

Not interested in the other local woman and smitten with his creation he goes on to marry this now animated woman. The story ends happily enough. No doom and gloom here.

In the Jewish tradition there is a little more warning. The Golem is a creature formed by man. This story parallels the idea of “playing god” in a very literal way. As the story goes, there is a rabbi who seeks to recreate the way that God made Adam in the Old Testament. This rabbi forms his creature out of red clay, and for a while it serves as useful helper. When the Golem becomes too big and dangerous the rabbi must turn it back into clay (Kaplan 2004: 8). While this tale is somewhat cautionary it is not wholly negative. After all, the creature can be returned to its original material without too much strife. We learn, perhaps to be careful of what we create. The moral of many recent stories picks up on this need for care.

As Kaplan goes on to explain, romanticism in Europe in the 18<sup>th</sup> century perpetuated the idea that man should not delve too much into science and technology as these things distract man from his true nature. Stories like that of the Golem were retooled to reflect this negative attitude toward science. For example, Mary Shelly’s Frankenstein was written during this time.

Frankenstein is the quintessential story of man’s creation turning against him. In short, young Doctor Frankenstein tries to create a human from scratch. Horrified by the ugliness of his creation, he turns it away. The creation feels lonely and requests a female counterpart and naturally Frankenstein refuses to give it one, which, not surprisingly, results in a very angry monster. In the course of retelling the story one acquires one clear message: if you create something it may turn on you (2004: 10-11).

R.U. R. (Rossum Universal Robots) by Karel Capek was the first to use the term “robot.” In this tale man begins to create robots, though not what we consider robots, out of artificially generated human parts. These robots serve as slaves for the humans. This takes the inevitable

wrong turn when the humans begin to tinker with giving the robots something like a soul. The robots then decide that they no longer want to work for their human masters and, as you may have guessed by now, set out to destroy all mankind. The human race is only saved by a surprising, and somewhat disturbing, turn of events when two of these robots made of human flesh simultaneously fall in love and develop a more complete “soul.” The two lovers run away together implying that the human race still has a chance to continue on, which is certainly a thought provoking ending.

Isaac Asimov further cautioned of the dangerous potential of robotics. He wrote a series of short stories about robots and was the first to introduce the idea of the “Three Laws of Robotics.” These dictate,

First Law: A robot may not injure a human being or, through inaction, allow a human to come to harm.

Second law: A robot must obey any orders given to it by human beings, except where such orders would conflict with the First Law.

Third Law: A robot must protect its own existence as long as such protection does not conflict with the first or second law. (Asimov 1942 in Coekelbergh 2010:1)

These laws by their very existence suggest that we ought to be concerned about robots and note their potential to do harm to humans. The Laws seem to perpetuate the very fear they were intended to resolve.

This sort of cautionary literature has made a widespread debut on film. From movies like the Terminator series, to Transformers or even Disney's Wall-E, popular culture in the last decade alone shows a plethora of tales of warning. These films affirm the threat of using too much technology and the possibility of technology drastically altering the fate of mankind. IRobot, starring Will Smith, follows what happens when robots reinterpret those three laws created by Asimov. While there is a rather heart warming element of the robot Sonny who is wrongly accused of murder and really is a "good" robot, there is still an overall message of warning: be careful how much you rely on robots as they could twist those very laws that are used to control them and take over the world.

Not all the stories in American popular culture express wholly fear-mongering views. Star Wars is one of the best examples of robots serving as helpful tools and even companions that routinely save the day. Who doesn't know 3CPO and R2D2 and wouldn't say that they are full characters in the films with undeniable personalities. The Star Wars series provides a view of robots that coexist with humans, and even have a subculture of their own peacefully alongside the world of humans.

It seems that in Euro-American culture we have had a varied representation of robotics in our media, but it is true that the negative, "robots will take over the world and destroy us," view has a dominant place. It should also be noted that these stories make up a limited portion of all of the popular culture that Americans are exposed to. As Bartneck, Suzuki, Kanda, and Nomura suggest different cultures have different levels of media exposure to robots. Robots are more generally prevalent in Japanese media. Popular culture in Japan is also more likely to have robots playing the "good" hero and fighting against evil both human and robotic (2007). Therefore, people in Japan are exposed to less of the negative ideas about robots that are sometimes present

in American popular culture, and are more familiar with robots by virtue of having greater exposure overall.

There isn't a great deal of media coverage even about "Euro-American" culture's past with robotics. As early as the 17<sup>th</sup> and 18<sup>th</sup> centuries in robots there were experiments with creating android-like creatures that could simulate human activities. These creations could perform dancing or writing and were developed on the same technology that was used in the intricate clockwork of the time (Dautenhahn 2007: 679). It may be surprising just how common artificial creations similar to robots have been in history. Still it is not generally the focus of history lessons about technology, as in most American schools we learn about the telegraph, light bulb, and automobile instead of early dabbling in robotics. As a nation, it might be stereotypically stated, that American have not become focused on robotics, although more and more we see articles and news stories about robotic developments.

I will admit that I too subscribed to the stereotype of Americans as robot skeptics. As I began interviews at Greenview I was fairly sure that I would speak to many people who would profess a myriad of concerns about robots. I guessed that these would be based on fear and on media representations that inspired such feelings. It seemed that with such representations bombarding us how could Americans help but hold such views. All my academic knowledge at that point seemed to point in this direction. My first conversations, however, with the nurses at Greenview began with what would become a very eye-opening change of my previously held views.



## **Nurse Safety Counsel**

It is some months since the summer morning when I first attended a staff meeting at Greenview. I am back now to do interviews. The room where I am to have my first focus group discussion as part of Safety Council is deep within Greenview hospital. In order to get to it I must navigate a series of hallways. Although I have been there before it has been a while, and I get confused once. As I am standing between a hallway and a stairwell, a kindly janitor notices my confusion and offers directions. I am grateful for the assistance as he leads me in the correct direction, and at last I see the room where I am headed. It is a basement conference room, with walls covered in nondescript wallpaper, all the accessories of a projection screen, and a large rectangular table around which the nurses sit. The Director of Nursing, Ellen, is seated in the middle of one of the long sides of the table, and is engaging everyone in conversation. A long time leader at Greenview she has the mystic of tested wisdom. Her imminent retirement is met with sadness and worries for a future without her. As I peek in through the open door I am met with smiles and am ushered by Linda, the Education Director, to an open seat on the end of the table. Despite getting lost I have still managed to arrive a few minutes early. The group has some other business to attend to before they can speak with me, and I sit quietly in my seat watching them work. Looking around the table what I see is a group of about 20, comprised completely of middle-aged women. Most of the nurses wear badges that identify them as registered nurses (RNs).

Early morning or no this group is very focused on a particular safety procedure. I watch their serious faces and am impressed at the detail and the openness with which they discuss the problem. One of the key elements of the culture at Greenview is that anyone is allowed to speak their opinion, and the administration preaches that no one be judgmental. After a few minutes it

is my turn to speak. I introduce myself. There are more smiles and nods; a few of the nurses recognize me from my internship at Greenview the previous summer. Then I introduce the topic for our discussion. I can tell that this is a little bit of surprise, and a few nurses exchange looks across the table with friends. I can tell that robots are probably not an everyday topic of conversation at Greenview, and perhaps not exactly what they expected to hear about from me.

I start the conversation with a short slide show of pictures of robots. This is when I am surprised. From the start some of the most vocal of the nurses are downright positive about the use of robotics and excited to share the information that they already know. We hear about studies that they have read about or robots that they have seen in jobs previous to this. There is a feeling of collaboration as we talk about helpful uses for robots. A few others are less sure about the robotics. At the beginning of the slide show some of the initial comments are also skeptical, but more and more the nurses bring up important points about where robots could help streamline many of the procedures they already have in place.

The slides cover various types of robots that are being used already as well as some that are still being developed. I found that any concern that I might have seen was just a shadow of the assumed cultural norm and certainly not the essence of the nurses' feelings. It is true that the images were purposely selected to be of robots that are actually being integrated into hospitals, and a few perspective innovations. We didn't get into a discussion of strikingly anthropomorphic robots. These are not as of yet set to work in American hospitals, and I judged it would be at best counter-productive to focus on them and at worst fear-mongering. We did, however, look at one tele-presence robot with a strikingly feminine figure. This quickly became the subject of much laughter as the nurses joked about what their male doctors would think about using them.

The field of tele-presence has been growing rapidly. Tele-medicine, and the tele-presence robot, allows doctors to be able to be in contact with medical facilities from a distance through video and voice interaction. A screen is usually mounted on the front of the robot. These devices, equipped with their mobile capacities, allow the doctor to wheel around the medical facility at will via remote control. Some even have arms allowing the doctor simple caring or diagnostic capabilities. The doctor can be on vacation, in another office, or at home and still have a presence in the clinic or hospital.

As Markoff quotes a chief executive of IRobot, a large robot manufacturing company, “The beauty of mobile tele-presence is that it challenges the notion of what it means to be somewhere” (2010). And indeed, it does. The doctor can, through the robot, be “on the unit” in a way that phone or even Skype do not allow. There is an element with this robot that the doctor can sort of “hang out” at his or her desk, can see people coming and going, and maybe even socialize. The doctor, for example, is able to interact with the patients and their family more. He or she can pop into patients’ rooms to say hi and see how they are doing.

The hospital is an important area for tele-presence. There is a lot of promotion of this robot as a solution for remote health clinics and hospitals that cannot maintain a fulltime staff of experts on every ailment that comes through their doors. The tele-presence robot allows patients to “see” experts in the required field and the doctor to treat the patient as nearly as if they were both in the same room. Tele-presence can be used for psychiatry and mental health. The uses for tele-presence are not completely limited to medical facilities. Some are being developed for patients to take with them for the first portion of healing time after a surgery. This would allow patients to have “video consultations” with their doctor from the comfort of their own homes (Fitzgerald 2011). Tele-presence has also been much researched by the United States Military for

use in battlefield triage and hospitals. It is also considered for home bound elderly, and even has been adapted to hospice (Demiris, Oliver, Fleming, Edison 2004: 343). With tele-medicine the question arises: does it expand the doctor's ability to see patient? And in what instances would patients feel bad that the doctor could not see them in person?

The Greenview nurses and I also considered robotics in animal therapy. Animal-assisted therapy is the use of animals in a medical setting to visit with patients to provide a relaxing diversion that can aid in healing. This is now not limited to living animals. One of the most well known examples of an animal therapy robot is called Paro. It was created by Japanese roboticist Takanori Shibata and made to look like a young harp seal pup. Intended to promote relaxation and a feeling of companionship the robot weighs roughly six pounds, is covered in fake, antibacterial white fur and can perform a variety of movements. It responds to touch and sound (Roger, Guse, Mordoch, Osterreicher 2012:88). These little robots were intentionally designed to be a seal because few people have had real-life interactions with a seal pup and therefore do not come to the encounter with preconceived ideas. However, there have been some instances where well-intentioned dementia patients tried to allow the little seals to swim in hospital water features. The need to prevent the submersion of the robots has become a necessarily concern (Kidd, Taggart, Turkle 2006).

Dangerous waters aside, Paro has been well received. The study by Wada, Shibata, Saito, and Tanie found that patients were receptive to Paro and other simulated animal therapy, and that staff were appreciative of the technology. Indeed, the burnout scores of the nursing staff decreased with the addition of Paro (2004). Paro has not been the only robot to be well received.

The nurses also reacted to the chubby little courier robots in a similar way to what you might expect when someone is viewing pictures of puppies or children's toys. The courier robot is one of the robots set to take on a plethora of hospital tasks. Through mapping and sensors these robots are able to maneuver through the hospital bring different materials to where they are needed. There are various types to transport everything from mail, sterile products, laundry and so on (Özkil, Fan, Dawids 2009: 291). With a series of sensors they are able to avoid obstacles that they encounter in the halls (Evans, Krishnamurthy, Barrows, Skewis, Lumelsky 1992: 16-17).

Some of the nurses began to personify courier robots as they cruise around the halls in a hypothetical hospital. This occurs in many of my interviews with the nurses. The robots suddenly acquire a name and thereby a corresponding gender and even personality. In a later interview Wendy, the Director of Risk Management at Greenview, gives one such dramatized account,

I could hear people going, 'oh here comes Herbie. Hi Herbie.' She gestures to an imaginary robot, "It could be very functional and very new age. I mean that seemed like something that was decades away to be able to use something like that, but I think that we are at a time now where it is very real.

They all agree that while there may not be robots in their hospital yet, that robots are a very real part of healthcare that is only growing more and more common. Greenview staff members are not the only ones to welcome the idea of courier robots. Courier robots have also been shown to garner positive responses from other staffs. One study was shocked at the

readiness with which staff accepted courier robots. Indeed, the study notes that there was, “no astonishment, no awe” (Englberger 1998: 104).

During the slide show we also considered some of the future uses of robots, one being robots directly involved in patient care. We will discuss the nurses’ feelings on these robots later on. Generally, as the slide show wraps up there is still a noticeable air of enthusiasm. In the room the future seems to have gotten closer. “When you first said robots I have to say I was a little skeptical. I guess I don’t know much about them but now after the slides I have a lot of ideas about where robots could be used,” said Gloria. She wears a pale pink blouse that sets off her light brown hair; she works in radiology. The others around her nod in agreement. There seemed a consensus among those who felt that robots seemed strange at first that after looking at the slides they already felt a bit more confident about various types of medical robots. A little added knowledge appears to have helped them to envision where robotics could be used in the hospital. As I first hear this information it seems to confirm the theories that Americans don’t have as much exposure to robots and that is why they are concerned about using them. How, after all, can we expect someone to have any kind of opinion, positive or negative, about something if they aren’t informed? So I wonder if perhaps this could be the key to why nurses would be reluctant, if they are, about using robots in the hospital. Perhaps knowledge is really what is at the heart of how people feel about robotics, and if they don’t know enough it might correspond that it is hard to be positive. In my mind I wondered, does knowledge determine acceptance of robotics?

The answer, however, to that question from Greenview is a resounding no. Most of the nurses that I spoke to both at the safety council and throughout my interviews in Greenview generally admitted to having limited knowledge on robotics both for medical and other purposes.

When I asked the nurses about how much knowledge they felt that they had about medical robots only four people out of the 54 people I spoke to would rate their knowledge about robots above a five on scale from zero to ten. Zero on this scale being no knowledge, five being moderate exposure and understanding and ten being, of course, very well acquainted and understanding robots fully. There were 37, or 68 percent, of the nurses that I talked with who rated their knowledge as roughly a three or below.

Truly the staff that I spoke to at Greenview might not have had a great body of knowledge about robotics, but that's not to say that they did not have some idea about what a robot might be. Nearly every nurse that I spoke to was able to draw on some sort of previous exposure of robots, albeit not necessarily first hand exposure. When I asked one nurse where she had ever seen a robot her response was, "Only in the movies, in Star Wars." Still, that was enough to give her some image of what a robot is.

Each nurse at Greenview did have some sort of idea of what he or she considered to be a robot and what object would not qualify as a robot. These qualifications usually did center on exposure in the media. Most of the nurses replied in similar ways to the Star Wars comment putting their ideas of robots into the context of where they had seen examples of robotics in the media.

"Have you seen the Jetsons?" exclaims one of the nurses at another early morning counsel meeting. She has been standing at the back of the room watching the slides, but suddenly now steps forward becoming animated. Heads around the table nod in agreement and smile. "That is what I thought of right away. They had that housekeeper robot..." She goes on to describe Rosie the Robot. Indeed, the Jetsons came up again and again when nurses spoke about

using robots to help complete tasks. Rosie the Robot is evidently a very vivid childhood character for those who watched the Jetsons in their youth. The cartoon features a futurist family of four who live in a world of buildings on little orbiting islands; there is even an orbiting golf course. The family deals with the unique, yet very familiar trials, of a futuristic life. In this cartoon Rosie the Robot is a blue household robot trimmed in white metallic lace who not only was able to care for the house but also bring her own fair share of attitude to the family dynamic. For a certain generation, this, along with Star Wars movies, is one of the primary images of what a helpful robot is. Both these examples are very positive portrayals of robots: benevolent and helpful.

It is interesting that no one brings up other negative images of robots in popular culture when they were speaking about what they consider a “real” robot to be. In fact, the images of IRobot and other media representations never come up in conversation either among the older nurses or among the younger nurses. It seems that negative media about robots haven’t permeated these nurses’ thoughts about robotics when considering real world application. Whether or not they are exposed to the same positive representations like the Japanese, there is a disposition of openness toward robotics. Even those few who are skeptical or who maintain a negative attitude toward robotics in general do not cite this sort of image as a reason that they do not have a positive position on robotics.

As I mentioned, knowledge at Greenview does not seem to be a deciding factor in how people feel. For the most part I find that people are positive. Most of these nurses did not have much prior knowledge of robotics yet maintained an open mind. To better understand this opinion I wanted to know how these nurses felt about robots in general not just in the hospital



setting. I asked nurses to leave the hospital aside for a moment and talk to me about how they would feel about having robots in their homes.

This, to me, was an important question: would you consider having a robot in your home? If you are willing to have robot in your home it is very telling about how you feel about robotics as a whole. Firstly, you aren't scared enough of it to keep it separate from your most intimate space and you clearly trust it not to do harm. Second, even if you have concerns those concerns do not surpass the capacity you see the robot having to be a practical and helpful addition to your household. Third, you are comfortable in your ability to operate technology and do not see something like a robot as being too technical to be easily handled.

You can imagine with my initial belief in the stereotype that the people I was interviewing would likely be skeptical and uninterested in having robotics in their work life let alone in their house, how great my surprise was at the enthusiasm that I found for having a robot to help with tasks around the house. Again I was amazed at how positive the nurses were. With the exception of a few outliers, having knowledge of robots also didn't have any effect on how the staff felt about the use of robotics in day-to-day life in the home. In my own mind it seems a little creepy to have an autonomous little creature moving around and cleaning my things. In conversations with some my peers I found that they too, shared some of these feelings of unease. Something about it didn't sit right with me, but when I brought up this topic at the first staff meeting I was met with a chorus of enthusiastic exclamations about how wonderful indeed it would be to have a little robot to clean things up. In fact, many of the nurses already owned a Roomba, the small robotic disk that maneuvers around the house sweeping up and vacuuming. They praised this device highly. "I love my Roomba," stated one of the RN's. "It's great, I wouldn't give it up," she adds with mock defensiveness. And I had to steer the conversation back

to robots as many of the women around her began to ask details about life with the Roomba considering if they would want to have one.

By now it should be clear that the nurses at Greenview were not frightened of robotics, and it was not long before I found that my findings were born out in other studies. Americans do not it would seem have as negative an opinion of robots as is stereotypically stated. Indeed, Americans have even tested out higher than Japanese in some studies about robotics. A study by Bartneck, Suzuki, Kanda, and Nomura found that while it is true that people with different cultural backgrounds have differing opinions on robots, participants in the study from America actually had the least negative attitude, especially when it came to interfacing with them. Japanese apparently have more concerns about the emotional and societal effects of working closely with robots. The study attributed this opinion to the fact that the Japanese have greater real life exposure to robots (2007). As a side note, I am not sure if this is a red flag but it certainly seems a concerning fact that should be kept in mind. This study turns on its head the idea that Japanese want robots to do everything for them, and Americans want nothing to do with them. That, however, is a debate that is the subject of other writings and not the focus of this thesis. For this thesis the study highlights the idea that a person's culture affects the person's attitude toward robots. However, Americans cannot be locked in as people who have a negative or fearful impression of robotics compared to the Japanese.

Similarly, each cultural attitude of robots brings with it a different understanding of what a robot will be capable of doing or what role they have in the culture. According to a study by Nomura, Kanda, Suzuki, Han, Shin, Burke, and Kato Americans were found to see robots as having less emotional capacity. Of the Americans in the study 49% of those in the study assumed

that a robot can have no emotional capacity while, 82% of the “Japanese respondents assumed the emotional capacity of humanoid robots at the degree equal to humans or to some extent”(2007:3). Here we can see the distinction is not if we are opposed to the thought of using robots because of some prejudice, but a difference in how Americans understand robots.

Americans it seems are more likely to see robots as helpful machines, not individuals in the same way as humans and not capable of emotions. Americans do not have an inherent fear of the use of robotics. Indeed, patient interest in robots is one of the driving forces in hospitals’ decisions to acquire surgical robots (Greenaway 2008:4).

I was still so startled with my new findings that not only were the nurses at Greenview not shying away from robotics, but that they would welcome a robot in the home to help with household task that I shared my findings with my mother. My mother, who keeps an excellent house and is, in fact, a practicing RN herself, looked at me out of the side of her eyes, “Of course they are fine with having robots in their home- they know about housework,” she stated, “House work isn’t easy, who wouldn’t want something to help out. Or someone.” The last comment was made with a poignant look in my direction. Although she was perhaps in part alluding to the spoiled life I may or may not have led at home, her words do bring to light a very important point in this discussion. Nurses, in general, are practical. From my experience they see where things could be improved, their tasks could be made easier, and they are enthusiastic about this prospect. For them a robot, that can make their load a little lighter and their day a little easier, is a welcome prospect. These nurses’ enthusiastic response shows a readiness to add helpful technology into their lives where it can be useful, but there is a limit to their enthusiasm.

The nurses at Greenview have become accustomed to acquiring new technology. They recently converted all their paper files to an electronic form. This process was arduous, involving teams of staff trained as computer specialists as well as classes for the entire staff of Greenview, to allow for a speedy transfer to the electronic system. The date of “go-live” was planned out weeks before so that there would be minimal loss of efficiency. Despite these efforts, from the tales that I heard told of the transfer to electronic records a year later it was certainly not a simple project. Everyone had to adjust to the new system, but it ultimately has worked out greatly in part to the patience and hard work of the staff. Even with the added stress and a complete overhaul in how everything at the hospital was done, the staff weathered the technical storm gallantly. A year later most of issues have been resolved, although there are still some reoccurring issues with the new software. These nurses understand what it means to introduce a new form of technology. While I would not describe the nurses at Greenview as being enamored with any technology for technology sake I would not say that they saw the excruciating process of reworking the records systems as futile. Most of the staff I spoke to professed that it was worth the effort.

The staff did not see the struggle of integrating robots as a reason not to introduce robots. When it comes to the working at the hospital the nurses seemed to be happy so long as the new technology proves to be more efficient and cut down on the many tasks that they are trying to juggle. Most of the nurses that I spoke to admitted that they were generally overworked. They deal with a lot of stress in their work lives and there is the personal challenge of working a job that often interferes with the schedule of family life. So again they are willing to put in the time for a switch over, if in the end the hospital becomes more efficient.

Their attitude seems to be shared by nurses in other places. Hospital staffs' perspective on what robots should be used for, or indeed on how staff like working with robots has not been widely researched. Although robots would be their everyday tools, it seems that the staff have been somewhat neglected in research. In a few manufacturers' articles there are vague statements that staff appreciate the robots. These usually cite the time saving or workload lightening qualities of the robots as the main source of staff appreciation.

One study by Crawford, Grussing, Clark and Rice looks at staff attitudes about using pharmacy robots through the process of the robots being integrated into the work place. The study found that if staff were introduced to the technology properly and could have "a say" in the function of the robotics and how they were implemented this could boost both morale and productivity (1998:1907). The staff was positive about the pharmacy robot, just as staff that I spoke to at Greenview was positive about the similar electronic system that they have for their pharmaceuticals. Pharmacy robotic systems are distantly connected to patient care, but the study helps to point out positive staff attitude to a helpful system such as a robotic pharmacy system that promotes productivity in the hospital. The study also acknowledges that this type of study, of staff feelings on medical robots, is "sparse." Indeed, while the study was done 15 years ago, it is still one of the limited studies of staff's actual feelings about robotics.

Since it became clear that the nurses did not have a prejudice against technology or against robotics in general, and they were not even scared off by the prospect of introducing a new system, we must focus very closely on what would cause these nurses to find grounds to be concerned about technology. For, indeed, they did have concerns. What concern is so great that they would forgo the efficient robots? The issue is as simple and obvious as one can imagine.

Some smaller issues came up that we will discuss further. The main concern of the nurses when it comes to robotics is centered on the very reason that the hospital exists: the patients. Every nurse that I spoke to brought this issue up in some capacity. And even with their excitement about having robots, in the end the conversation always turned to the patients. The excitement of the potential new toys faded away, the faces became serious, and a fierce loyalty to their patients came out.

I saw a selflessness in the nurses that I spoke to that was both amazing and extremely encouraging at the same time. Indeed, that in itself could be the subject of an entire paper, but in short they care very much about their patients. They care in ways that I wonder if one can really understand without being a nurse. Often, it seemed in my discussions with the nurses, that this care for the patients translates into putting the patients before themselves continually. I found right away that try as I might to quiz each of the nurses about how having medical robots would impact their lives; it was nearly impossible to keep the any of the nurses focused on themselves for long. Sooner or later we always returned to the patients. And it was then that we began to discuss robotics in earnest.

### **Special population concerns**

Indeed, the nurses' main concerns about medical robots in the hospital are centered, almost completely, around their patients. They make valuable points as we consider the use of medical robots as many robots could have impacts on how patient care is performed. While staff perception is somewhat neglected in research, the patients' attitudes and reactions to medical robotics are the focus of the majority of the studies that research the use of robots in hospitals. Manufacturers and researchers alike have worked to understand how people will react to

different types of robots used, and which of their features (aesthetic design, color, voice...) will affect how people react to them. It is, of course, an obvious and important question to ask. If robots are introduced into a hospital setting, researchers and hospitals both want to know how the patients will react to them, and in this discussion too we should consider how the patient feels. Reactions have generally been mixed, although many sources highlight positive patient responses.<sup>5</sup> Many of the nurses that I spoke to were extremely concerned about the use of robotics because they were not certain that all of the reactions from the patients would be positive or that a robot would always be the best means of care. While many of nurses acknowledged that perhaps certain patients could find robots to be a fun diversion and exciting new element of the hospital, there were certain patient populations that they especially worried about.

“We have to be aware of the past experiences [of patients] because with some people there would be an inherent bias and hurdles to get over,” brought up an administrator at Greenview as we spoke about how she felt the patients would feel having medical robots working in the hospital. Past experiences, she acknowledged could cause reactions to robots in both directions. Many patients would find robots a welcome and interesting part of their care, but past experience could also make them distrustful and reluctant to have a robot as part of care. It is a natural jump to speculate for younger patients who are more used to technology it could perhaps be a comfortable and, even, welcome addition to the hospital, while older people might tend to have a harder time getting used to robots.

It is a rainy afternoon in late fall. I am in a building across the parking lot from the main hospital, though still surrounded by the same thick stands of maple trees. The building contains

mainly outreach offices and the hospital hotel where out-of-town visitors are able to stay while their loved ones go through treatment. The building, also, is the home of Greenview's Homecare Unit. The Homecare Unit at Greenview is one of the pride and joys of the hospital. They have an excellent satisfaction rating and are considered to be a model for other homecare units at surrounding hospitals. The majority of their patients are elderly men and women who, although they are still able to live independently at home, require the assistance of a nurse visit at least once a week or so. The patients are unable to easily get to the hospital for an appointment so the Homecare Unit provides the welcome service of in-home care. The patient is usually still relatively functional and the type of treatments they require varies greatly. If a patient has a stroke or other ailment they can require everything ranging from physical therapy to help with medication or blood work. These are exactly the kind of patients that have become the focus in the development of robots to aid medical care in the home.

I have arranged to meet with the Homecare nurses at their weekly staff meeting, which takes place in a conference room on the top floor of the building. I am eager to hear what the homecare nurses will think about providing their patients with robots to assist with providing care. Slowly the nurses trickle into the meeting. It is calm and quiet as we wait for everyone to arrive; here and there someone makes a comment. However, as soon as I introduce myself and start explaining what I want to talk about the room comes alive. Almost immediately the subject comes up of what their patients would think about an in-home robot and what it would be able to do for them. At the homecare meeting the nurses look around at each other, dubiously shaking their heads. I press them further about what they think would be the problem with providing their patients with robots.



I don't think that they would like it. We have simple machines used for checking blood pressure and other things, and we cannot get our patients to use them. I have one patient, and even after I explain it to him over and over. I mean I color-coded the buttons and wrote down the order to press them. I went over this with him and his wife, and I still could not get him to use it. He just couldn't understand. With patients like this it wouldn't work. They don't know how to interact with the technology, which makes them not want to. Don't get me wrong we do have some great patients, but 98% of them have a very hard time with any sort of technology.

Said Jody from the center of the room. She is a well-liked member of the staff and seems to be speaking for the staff. The other nurses agree with her: they struggle too with getting patients to routinely use even basic medical technology.

This seems to be a serious challenge with robots that interact with the elderly. Many of the patients simply do not know, even minimally, how to interact with technology. This can sometimes translate into them simply not wanting to use the technology. It is concerning that lack of understanding about robotics could potentially cripple any interaction with them.

“I worry that if I gave some of my patients something like that they would just turn it off or stop using it like the other technology that we give them,” reported one of the nurses. Even with robots that use voice command or other interfaces that may seem more intuitive, it's important to remember as a nurse explained to me that some of the patients simply have no context for such interaction. A robot would have to be able to function completely without mechanical prompting and even if it could respond to voice or other direction you have to

wonder if the patient would want to interact with it. I ask the nurses what other reasons cause patients stop using the technology that they already have. Many of the nurses stated that some of the patients easily became frustrated the moment that the technology doesn't respond or work properly.

“Frustration,” says a nurse with smooth black hair and a gentle smile. She had been trying to find a place to jump into the conversation for a while now and I could tell what she had to say was important, “if something breaks down especially or doesn't work right easily they get very frustrated. They struggle anyway making it work, and when it breaks down they can get very frustrated.”

This seems to me to be one of the huge issues with robotics as with all technology. What do you do when something malfunctions? For anyone breakdowns and malfunctions could be one of the most frustrating parts of the use of robotics, especially in the home. Anyone who has had a computer crash knows the feeling. This very winter break I found myself sitting in front of my blank gray computer screen as it kept loading and loading indefinitely. I tried, unsuccessfully, several times to revive the computer but nothing worked. As I at last gave up altogether on it, I began to think about what a mechanical failure could mean in other situations. While I was certainly annoyed to have lost all my newest pictures, most of my music, and a preliminary outline of this paper, I was otherwise unharmed. When it crashed, my day and my world carried on. But what do you do when your health provider refuses to respond or crashes unexpectedly? The situation, admittedly a worst-case scenario, has the potential to be extremely dangerous, let alone frustrating, as some of the other homecare nurses brought up.

Many of the other nurses in other areas of the hospital suggested malfunctions as a potential trouble with robots. However, for a trained nurse working in the hospital with an IT

crew on call a breakdown would likely be only a momentary slowdown as with any mechanical malfunction. There are, however, tangible solutions to this issue. An IT crew, for example, could be arranged to help with problems. Certainly a system of backups of some sort and replacements could be developed. We can be assured that these concerns are something that manufacturers are well aware of and working on, even if they don't like to talk about it actively. Helpful IT and troubleshooting technicians might be able to come to the aid of patients to help solve problems so that small malfunctions wouldn't build up to resentment. In the case of robots that help in the home an IT crew would, of course, have to have mobile capacity as problems would occur at the homes of these patients who are already homebound.

Robots that are automated are particularly seen as tools to help with the care of the elderly, however, the ethical concerns of this use of robotics is highly visible and controversial. There are a host of concerns that have been tied to the elderly's use of technology, "The potential for the reduction in the amount of human contact; an increase in the feelings of objectification and loss of control...deception and infantilisation" to name just a few (Sharkey, Sharkey 2012: 27).

The reduction of human contact is one of the most pressing concerns. Already there has been much work with "smart homes" and various automated systems that could help elderly so that they could be treated and cared for while remaining in their own homes without needing an extensive staff. One study found a group of progressive elderly who welcomed such technology, so long as it was improved their security and could be relied upon. The study found that the participants soon began naming their robotic devices. Speaking to the robots was sometimes the only social interaction that these people had all day (Rantz, Marek, Aud, Tyrer, Skubic, Demiris,

Hussam 2005: 44). The study acknowledged that this could not completely replace social interaction with other humans, but suggested it augmented human interaction. Others are not so positive about the nature of these interactions. People may bond with their assistance robots, but some experts warn that these “misplaced personal relationships” with robots can have negative effects in the long run (Metzler 2010: 122). Will we leave the elderly with robots as their main social interaction, because we do not have people willing to care for and socialize with them?

Loneliness is a huge concern with the elderly, particularly those that remain in their homes. A study nearly ten years ago in 2004 by Wada, Shibata, Saito, and Tanie looked at staff and patient reactions to robots at Day Service Center for the elderly. Already, ten years ago there was much concern about the raising rates of the elderly and the need for more nursing staff to care for them. This study focuses on Nurse Burnout Syndrome, where nurses are too overworked and stressed to care properly for patients, as one of the key impetuses for using robotic care (1780). Animal therapy robotics was something the study considered as an aid in alleviating loneliness in patients. Animal therapy is an example of robotics that combats loneliness but does not seek to replace human interaction. The study found that visits from animals can factor greatly into the relevance of loneliness (Banks, Willoughby, Banks 2008: 173). This study used AIBO, a small robotic dog. It can make sounds and some movements. These little robots were compared with the impact of real dogs. The study found that the AIBO reduced loneliness just as much as a living dog, although there was a sense of attachment to the living dog that was greater but was not “statistically significant” (Banks, Willoughby, Banks 2008: 176). While studies like this suggest that robotic animals could help with loneliness in the care of the elderly, others have criticized the use of such robots saying that it diminishes the elderly. That in effect we would be treating them even more like children by supplying them with toys and expecting them to feel

less lonely. We no longer have a culture where elderly remain in the home surrounded by family, and yet how do we provide them with the social interaction that they need, especially if they remain independent in their own homes? It is a complicated balance, how much and what type of robotics to use, for the staff that works with this population.

The elderly are not the only population of patients at Greenview, however, that could find the use of robots to be challenging. One of the standouts is Greenview's Behavior Health unit, or the psychiatric unit of the hospital. For the patients that come to this unit the use of robotics could actually have a negative effect on the preexisting conditions that brought them into the hospital. Back at the morning council meeting in the main hospital the concern is raised. Nancy works in the Behavior Health unit at Greenview. She works with patients that suffer from anything from depression and Alzheimer's to schizophrenia and psychosis,

I work on a psychiatric unit. A robot will not work well with the paranoid patients who are having delusions about technology. Also, we get many older patients who do not even trust computers, let alone robots. I can only imagine what would happen if we brought a robot into the room. It would only perpetuate their anxieties.

Nancy said, regarding how her patients would react, that this would severely limit what robots could do in that unit. Not only would it be difficult if they had robots working actively in their care, but even if there were robots in the halls assisting with other tasks it could pose a problem. She was worried that not only would these robots potentially increase anxieties, but that

some patients would have trouble interacting with them because they were already having trouble knowing what is real and what is not. Even tele-presence robots she said could cause challenges.

A few of our patients have legal needs. We have tele-court that we take some of these patients to if they can't leave the hospital to go to the courtroom. The judge is on a screen. Basically it is like Skype. We have had trouble with many patients who don't believe that even this is real. We have had many incidents with patients who refuse to be respectful or act appropriately because they just don't believe that it is real.

This would certainly make it difficult for some patients to interact with a doctor via tele-presence robot. There may not be a simple solution for the Behavior Health unit about what they can or could not use robots for. Certainly for some patients robots might actually be harmful or at very least anxiety increasing and could not be used. However, more and more people use Skype to speak with their therapists. We might wonder how far this could extend. Could a robot be used to help patients with depression and other mood disorders?

This is not a new question. In the 1970's Joseph Weizenbaum created the computer system ELIZA which can create a dialogue similar to that of a psychiatrist's with all the appropriate comments like, "how does that make you feel?" and questions using key words of the confidants' complaints. Weizenbaum was surprised by the enthusiasm with which his students at MIT took to the system. Soon students were pouring their hearts out to the computer. They knew that they were their only audience, and that the computer did not have advice or

coping methods to contribute and yet still students were eager to use the system. Perhaps this is only an elaborate for system venting, but how can we say for sure what the students received out of speaking to the computer system? While this type of system clearly has not, even 40 years later, become widespread practice in mental health care, we must be aware that the capacity and potential is out there. Not only that, but also that people, even those with full knowledge of the limitations of a computer, could still be willing to engage with it.

While the above concerns are valid and certainly could affect robot use in Greenview, they are limited to only two of the patient populations of the hospital. But there is another concern that centers on patients. Nearly every nurse brought up this concern in every group of nurses that I spoke to at Greenview. It is also the concern that the nurse stated was most critical and with which the most was at stake. The concern is that with medical robots integrated widely into patient care there would be an effect on “person-to person” contact: this personal care is so essential to what Greenview provides to its patients.

## CHAPTER 3

### WAIT, WHAT ARE MEDICAL ROBOTS?

“Well...how I would define a robot is interesting. I have only seen one in the movies, in Star Wars.”<sup>6</sup>

**ro·bot, /'rō,bät/**

Until now I have been writing as though we all know what we mean by robots, but a robot is not obvious. This became clear as I spoke with the nurses. At some point during my interviews inevitably the interviewee would turn to me and with a puzzled expression would ask, “What is a robot anyway?” To which, I would respond with fumbling and vague answers that usually ended in something like, “and I’m going to be doing more research on this.” It always made me feel a bit silly, after all this whole thesis is about medical robots, and one would think I should be able to lock down a go to definition before starting interviews. The answer to the question “what is a robot?” however, is not straightforward. The fact that most people pondered this question when I talked to them shows that a commonly accepted, and all encompassing definition is not obvious – at least not to those of us who are not roboticists.

True to my word, I did do more research on the definition. You will not be surprised that I have not been able to come up with just one definition. I did, however, find that there are certain attributes and elements of a robot that combined with the qualities they seemingly should possess begin to give a picture of what they are. I do not pretend to have the answer myself, but would like to provide for you some samples of how experts and laymen have tried to explain this definition.

Let us look first at widely distributed definitions of robots. In a quick web search that anyone might do as of February 8, 2013 a Google states that a robot is defined as,



## Noun

1. A machine capable of carrying out a complex series of actions automatically.
2. (esp. in science fiction) A machine resembling a human being and able to replicate certain human movements and functions. (Google 2013)

This layman definition terms the robot most basically as a machine, but limits it completely to those that function autonomously. It also stresses that any humanoid robots, robots that resemble people, are most prominent in science fiction. It is interesting to note that science fiction has made its way into the very definition of the thing. Also, this definition allows that robots are able to “replicate” human movement and function, which gives a great deal of credit to the ability of robots.

Miriam-Webster Dictionary online has its own claims about robots. This website states that the noun means,

- 1 a: a machine that looks like a human being and performs various complex acts (as walking or talking) of a human being; *also*: a similar but fictional machine whose lack of capacity for human emotions is often emphasized
- b : an efficient insensitive person who functions automatically
- 2: a device that automatically performs complicated often-repetitive tasks
- 3 : a mechanism guided by automatic controls (Miriam-Webster 2013)

Miriam-Webster goes straight to the humanoid robot as the first definition, although it does define it as a “device” that can perform repetitive tasks or be functional automatically in the second and third definitions. Interestingly this definition too stresses the fictional robot, even attributing a lack of emotional capacity to these portrayals. The same insensitivity that is reflective in portion B of the first definition, which spells out how the noun can, in fact, be used to define a person who is insensitive. This reminds us that the term robot has several functions, not least of which, as a somewhat derogatory term for a human. This could point to some of the connotations that have begun to be associated with the word “robot.”

Let us consider one last common dictionary source, as of February 8, 2013 Dictionary.com stated that a robot is,

*noun*

1. a machine that resembles a human and does mechanical, routine tasks on command.
2. a person who acts and responds in a mechanical, routine manner, usually subject to another's will; automaton.
3. any machine or mechanical device that operates automatically with humanlike skill.

*adjective*

4. operating automatically: *a robot train operating between airline terminals.*

(Dictionary.com)

This definition too stresses the humanoid robot as the definition of robot and also the

term as it is used for an unemotional and insensitive person. Lest we forget how this word has become used in our speech it also notes the use of robot as an adjective for something that is automatic.

As we delve into more academic definitions and discussion of robots, I think that these layman definitions should never be far from our minds. For the purposes of this paper I will be considering only the mechanical use of the term robot, leaving aside “robot” as a human with certain unappealing qualities.<sup>7</sup>

Robots exist in the layman’s world and imagination, but they have another scientific and academic arena where they also reside. The roboticists and people that study robots, like any expert, have their own intricate and nuanced ways of speaking about robotics. Firstly, there is an understanding that the term robot was coined in 1920 by the playwright Karl Capek in his play R.U.R. The term comes from the Czech word “robota” which roughly translated means labor or hard work.

Institutions that work with robots have set out general definitions. The Robot Institute of America defines a robot as, “A reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks (Cited in Speich, Rosen 2004: 983)” Notice here that humanoid is not a part of the definition. Robots are stressed to be something that is programmed and takes part in movement.

As University of Michigan Anthropology professor Jennifer Robertson describes,

A robot is an autonomous or semiautonomous device that performs tasks either according to direct human control, partial control with human supervision, or completely autonomously. Industrial robots look like pieces of machinery, where as to be called a humanoid, a robot must...have a body that resembles a human (head, arms, torso, legs) and it has to act like a human... (Robertson 2007: 373).

Here robots are certainly not only defined as autonomous, but are equally robotic even under complete human control. They need not look like humans to be robotic, although that is certainly a possibility in the humanoid robot. We see that in these definitions the scope of robot is broader. They are not as fixated on the humanoid robot. There is also not an association in these definitions of robots with science fiction.

Napper and Seaman, a somewhat older source, consider the definition of robots to be greatly affected by the tasks a robot is performing. An industrial robot, for example, is defined by the dirty, dangerous, or repetitive tasks that are not desirable to humans (1989: 227). Clarke also adds three essential elements to our image of what a robot is. These are the robot's "programmability," "mechanical capability," and "flexibility" (1993). These are the sorts of properties that show a robot is able to complete a variety of tasks, and that it can be programmed for many functions. Many sources that I have found must in some way clarify that the specific qualifications of the robot that they wish to speak of. An example of such a qualification is,

"For the purposes of this paper, the focus will be on a subset of robots, those programmed to duplicate human functioning. This include devices or systems that do not

necessarily have a humanoid appeared and that can be controlled by human operators or behave independently” (Borenstein 2011: 87).

It is never a simple process to get at the exact robot that one is talking about, although the last qualification by Borenstein is relevant for many of the robots that will be discussed in this thesis.

Artificial intelligence (AI) is another issue somewhat connected to robotics. Work with AI began in 1956, but was mostly concerned with understanding human thinking until the 1980’s when it began to be studied with a goal of creating systems replicating human intelligence (Dautenhahn 2007: 679). While artificial intelligence began with simple systems, for example chess playing systems on computers, it has only become more and more complicated and farther-reaching. Now researchers are looking into how they can create social intelligence. This is challenging task for the researchers, but is extremely important in AI’s connection to robotics.

With AI and robotics, it is the body of the robot that becomes the means through which the algorithms are able to act in physical space. This concept among roboticists is known as “embodied intelligence” (Robertson 2007: 378). All definitions include the robot in space performing actions, be it completely autonomous or human prompted. Perhaps this is key in understanding that a robot is more than your average machine. After all, the robot is able to perform tasks with some level of “intelligence,” if not with complete autonomy, and this implies a sort of agency that we do not usually associate with other mechanics (Robertson 2007: 378). AI, therefore, is a part of this embodied intelligence that seems to be one of the defining elements of robotics.

## **A brief history of medical robots**

Medical robots may be a relatively new creation in the scope of human existence; however, they have already achieved an interesting history. From the very beginning the field of robotics has had a rapid evolution and growth. Robots began on the manufacturing lines in the automotive industry. The first industrial robot in America was put on the assembly line in 1961 at General Motors (Francis, Winfield 2006: 99). These industrial robots were faster and more exact than the humans they replaced and have since been integrated throughout not only automotive assembly lines but also manufacturers in many other industries.

Robotics made its debut into medicine with surgery. The first medical robots were more or less modified industrial robots. The robot went through the motions of the surgery much like how it worked on the assembly line. The surgeon was not actually as involved in early surgeries as they are now in robotic surgeries. Concerns about ethics soon steered robotic surgery away from using industrial robots (Greenaway 2008: 40). In the 1980's these robots performed only limited procedures. A robot performed the first laparoscopic cholecystectomy in 1985. But by 1989 there was more growth in the field. A robotic arm was developed by Computer Motion, Inc. to control an endoscope and camera allowing the physician better visual aids during robotic surgeries, and a shift was made to integrating robots into assisting the surgeon.

Planning surgeries with robots requires that a variety of images be taken. In 1988 X-rays were used to provide images preoperatively. Then ultrasounds were used as a means of imaging, especially for bones (Cinquin 2011). In the 1980's, also, the National Aeronautics and Space Administration (NASA) started to research on telemedicine and simulation (Francis, Winfield 2006: 99-100).

Since the 1990's researchers have considered robotics for battlefield hospitals. Robots could aid diagnosis, and also be used for remote surgery where the doctors could actually perform procedures remotely (Green, Hill, Jensen, Shah 1995: 326). In 2005, the Defense Advanced Research Projects Agency extended this by launching a program to develop a robot that could both diagnosis and treat with limited surgical capacities. This robot is aptly named Trauma Pod (Garcia and Low 2010).

By the 1990's robots were being used to allow for less invasive surgeries. Several small incisions would be used along with cameras to allow the surgeon to perform procedures without the larger incisions previously needed. These were still only used limitedly in the 1990's however, due to the immense amount of training needed for the surgeons to be able to complete these procedures (Greenaway 2008: 40). Also in the 1990's robotic systems for drug counting and distribution began to be used in pharmacies. These systems were able to provide more accurate counting of medications (Crawford, Grussing, Clark, Rice 1998: 1907). Such automated counting systems have been widely used in hospitals across the country including Greenview.

Today there are two robots systems are used in surgery: ZEUS and da Vinci. Da Vinci is perhaps one of the most well known robot systems and is what most people think about when they think of robots in surgery, and medical robots for that matter. This is partially due to the variety of surgical procedures that the da Vinci is able to complete making it a popular investment for hospitals. Also, da Vinci has is widely advertised by the hospitals that use them.

Today images for robotic surgeries are generally obtained through "optical 3-D localizers" which use magnetic sensors as a means to determine the shapes of organs or bones (Cinquin 2011). All this information is inputted into software, which is used to develop the plan

for the surgery. This includes what movements the robot will have to perform and how the surgeon will manipulate the robot in the surgery.

Although robots perform more and more surgeries they are still very expensive. A surgery robot can cost up to \$2.3 million and a 2011 study found that the annual cost of upkeep is around \$135,000. In 2011, robots performed 360,000 surgeries and the number has only risen since then (Pho 2012).

Many people feel that robots are an inevitable and fast approaching part of our future. As Reid Simmons, a professor at Carnegie Mellon told National Geographic, “In five to ten years robots will routinely be functioning in human environments” (Carroll 2011: 66-85). Industrial robots are now being transitioned into robots that could help around the house (Johnson 2012: 24), and of course another one of those human environments that will likely be on the forefront is the medical field. In early 2013, the Food and Drug Administration (FDA) approved the first autonomous tele-presence robot to be used in hospitals. This robot can navigate around the hospital with a sophisticated sensor technology (iRobot Corp 2013). New robots are consistently entering the market, and the possibilities are nearly endless when it comes to robotics,

Robots are being developed for physical monitoring and physical assistance, as well as for simple tasks such as meal preparation and removing bed linen. Socially assistive robots are starting to be used in areas such as a stroke rehabilitation and dementia care. A robot for guiding people around and giving reminders in an assisted-living facility has been developed. (Broadbent, Kuo, Lee, Rabindran, Kerse, Stafford, and MacDonald 2010: 608)



It seems they are everywhere. There are robots that are developed for children with autism spectrum disorder (ASD), which help to generate social interaction. The robot helps children practice interacting. The qualities of robotics, such as consistency and predictability, help the children with ASD to feel comfortable engaging (Tapus, Mataric, Scassellati 2007: 37). Robotic simulators are making their way into medical school, where students are able to practice everything from common emergency room situations to childbirth on increasingly more realistic robots (Roach 2005: 100). One robot called, TriageBot, has been developed to take vital signs and “detect problems” so as to help reduce waiting times in busy emergency waiting rooms, while the military works to develop an autonomous flying robot that can remove wounded soldiers or civilians from dangerous areas such as battlefields or toxic spills (“Robots to the Rescue- Emergency Robots” 2012). “Intelligent pills” can take images of intestine walls, and are being developed to perform actual reparative functions. Some of these intelligent pills and “worms” have remote control capabilities (Cepolina, Micheline 2004: 25-26). One need only open up a technology magazine or journal about robotics to appreciate how this list could go on and on.

With the continued development of new tasks for robots there is constant work on the best means of communication with these devices. There is already development of voice recognition, and gesture recognition is among one of the many new innovations. Research is being done to improve upon this in surgery as robots are developed that are able to recognize the gestures made by surgeons. The robot would be able to function as scrub nurses, to assist the surgeon and with the ability of gesture recognition would not need manual prompting to, for example, show images or present tools (Venere 2011). The next steps in innovation remove the

need for visual gesture or speech at all. From the early 2000's there has been work with controlling robots with the mind, by harnessing the controls of the robot to the electrical patterns of the brain (Nicoleis, Chapin 2002).

We can only imagine what capacities could be developed in the future. Not only will work continue to be done to improve surgery but also as we can see more and more robots are being developed to help with other aspects of the hospital. This thesis will be concerned chiefly with robots that could become increasingly involved in assisting the nurses in hands-on patient care. An example of this type of robot is the "nursing assistant robot." These robots can assist with lifting patients, which is ultimately much desired assistance for nurses, but they also are developed to interact with patients taking on many other nursing tasks including taking vital signs or even leading patients by the "hand" (Chen, Kemp 2010: 367-368).

### **The "Uncanny Valley"**

Parts of the unknown wilds of our technology wilderness are starting to be mapped. Truly, for there are some areas which many are learning to avoid. We have seen that robots are hard to define simply as one set thing because of the variety of forms that they take. Robots can range from the most simple of industrial robot to the most life-like humanoid robot created by Japanese roboticist Hiroshi Ishiguro complete with fake hair and skin (Robertson 2010: 22). This range has been important in the development for robots in the hospital. As medical robots are created, many manufacturers take great measures to make sure that the robots are designed so that no one feels repulsed or disturbed by the robots. In other words they stay away from an area known as the "uncanny valley."

The “uncanny valley” is a term that was coined by Japanese roboticist Masahiro Mori over 40 years ago. He accurately describes the “eerie sensation” that can be felt when people encounter a robotic mechanism, such as a prosthetic appendage or robot, that too closely resembles the human body. From a distance the robotic elements are nearly acceptable as human, but with close inspection they are clearly not. This moment where something could be almost human but turns out to be robotic makes the whole interaction “uncanny” or for lack of a better word, creepy. He asserts that these sorts of emotions are only amplified when an entire robot body too closely resembles a human (MacDorman, Kageki 2012: 98-100).

Mori found in his work with robots that a robot or robotic mechanism would be more easily accepted if it were not made to look too human. As MacDorman and Kageki translate, his designed aimed for only a “moderate degree of human likeness (2012:100).” He believes the whole feeling of creepiness does not lie only in a fear of a replication of human beings. Instead, he suggests that the stiffness of robotics actually reminds us of the stiffness of death, which naturally stirs an eerie feeling. While Mori promotes only a moderate likeness to be used for practical robots, he also urges, with a philosophical spirit, that researchers map out this valley of robotics so that we can better understand what it is that make us human (MacDorman and Kageki 2012: 100). Robots become both a practical tool, as well as a means for philosophical pondering. There is still not a great deal of empirical data to support Mori’s theory, but his ideas are widely known and taken into account by many roboticists (Blow, Dautenhahn, Appleby, Nehaniv, Lee 2006: 469).

While manufactures will not go in the direction of the valley others have answered Mori’s call to explore. Some roboticists have taken it upon themselves to adventure into the “uncanny valley” and push the limits of what humans will accept with robotics. Hiroshi Ishiguro,

mentioned before, is a Japanese roboticist that has taken it upon himself to venture into the frontier. He was been responsible for the creation of some of the most human appearing robots. Ishiguro is also interested in the philosophical limits of robot and human interaction (Carroll 2011: 76) While as of yet his robots could not be completely confused with real humans they do indeed resemble human beings with their skin and hair. Their movements, however, still lack the fluidity of their inspiration. For my part I find them to be deep within the uncanny valley, and possibly terrifying. Still he is searching to move ever closer to replication as he seeks to reach the philosophical bounds of humanity through replication.

Many of the medical robots used in America today have been designed particularly so that they steer away from the uncharted depths of the “uncanny valley.” Their designers are completely focused on the practical uses of robotics, which, of course, does not include challenging their uses philosophically. There is a whole science in itself of how to make the robot appear acceptable to the people who are interacting with it. Studies with names like “Matching Robot Appearance and Behavior to Tasks to Improve Human-Robot Cooperation” exemplify the delicate art of creating appealing robots (Goetz, Kiesler, Powers 2003: 55).

Roboticists realize that an interaction between a robot and a human is likely to be very different than an interaction between two humans. The question is still open as to what unique ground rules there will be for human and robot interaction. Of course, appearance will play a role in first impressions and perhaps in how interactions take place. Whether a robot is cute and personified or plain and mechanical may indeed affect how people choose to interact with it. Robot researchers find that when expressions are able to shift in the interaction, instead of remaining static, people respond more positively (Blow, Dautenhahn, Appleby, Nehaniv, Lee 2006: 469-474). Therefore an animated robot promotes a complex interaction.

The face is an important part of human interaction. It is how we are able to judge how other people are feeling, and is essential for engaging with others. Physiological studies have found that appearances and attractiveness have an effect on how we judge and therefore treat other humans (Cited in Blow, Dautenhahn, Appleby, Nehaniv, Lee 2006: 469). This is an all-important consideration for those creating medical robots. The robots must be attractive in a way that makes people happy and willing to work with them and have them around in the hospital. A robot that gives off a friendly feeling is more appealing. Some of the more humanoid robots, not necessarily for hospitals, are small in stature so as to more resemble a child and to be non-threatening (Kanda, Miyashita, Osada, Haikawa, Ishiguro 2008: 732).

Similarly color, rounded features, and other aesthetic concerns are highly developed so that the layman interacting with a robot accepts the device as something to interact with (Kanda, Miyashita, Osada, Haikawa, Ishiguro 2008: 725). The courier, or transport robots, are already being integrated into hospitals across the country and are an excellent example of how design is an essential element in robotics. These robots are designed many times with cartoonish features so that they appear to be cute, non-threatening tools (if I can really label them as tools).

It might be surprising though that we see a need to have features such as eyes, mouths, and human-like arms on a robot at all. Despite the fact that they are only tools, they are nearly always given some kind of character or personality in their features. They are different than other medical technology since they are intended to interact with humans at a more elevated level. As a note, surgery robots, which never interact with a conscious patient, are not given the same character or features as readily. These truly do resemble what one thinks of as “machinery”, although it is also of note that even many industrial robots, which usually look like the task they do, have also been given eyes or some sort of features. It seems that this sort of design, even if

does nothing for the function of the robot, perhaps helps the humans that interact with these machines to find them agreeable. Perhaps it is reassuring for us humans when we notice something acting autonomously to at least be able to see the thing as having some kind of recognizable features. I do not pretend to have the answer to this.

The endless possibility of design means goes hand in hand with the endless possibility of function. As I learn about all the work that goes into design and appearance I realize how carefully robots are crafted so as not to scare me, so that I will be drawn to them, and so that I will be happy to use them. How much, I wonder, are my opinions shaped by things I cannot control, but by things like the gut reactions I was born with to things that are cute and cheerful?

### **Robot mistakes**

There has been some discussion in articles and papers on the subject of robots about who will be responsible when things go wrong when a robot is working in personal care. In this new world perhaps we will need to lie out new rules. An article in the Economist goes so far as to say that, “laws are needed to determine whether the designer, the programmer, the manufacturer or the operator is at fault” if something goes wrong (2012). This may certainly be a concern with robotics in uses outside of the medical environment. Within hospitals medical robots are in some ways just new technologies in a long line of new machines that are integrated into hospitals everyday. Hospitals already deal with this issue of responsibility as medical machines that are already being used regularly malfunction or are improperly used. Wendy, the Risk Management Director at Greenview, explains the system that they use for responsibility,

It would be the hospital's liability because we are the owner of that machine. And it could become a products liability with the manufacturer of the machine. We have this now with any of equipment in healthcare. We are held to a standard of responsible care and operation, training and using it properly. Also, not using it if there are signs of defect and reporting that promptly. The company owns the responsibility of proving education and warranty up to a point. But then also the company or the hospital has to maintain the functioning.

If there were to be a problem with how the robot were handled then the hospital would solve it, but if there a mechanical malfunction does not result from lack of upkeep or misuse then the manufacturer could be brought into the case as the responsible party. Right now checks are in place with medical robots. As we have mentioned, currently there are no medical robots that are performing tasks or surgeries that could not be completed by qualified personal if necessary. Because of this there is a natural safety net; the surgeon could always step in to handle the surgery. Should the technology advance beyond human ability new safety or liability issues might arise (Greenaway 2008).

Liability does not end with error. Wendy goes on to explain that there is,

The potential for misuse and accessing information that you don't have a right to. If there is any type of composite of information in the robot, which is like the electronic system for accessing the information and tracking the persons names. You have to be careful that people can't have access to that information through the robot that shouldn't.

The robots could potentially have a great deal of personal information in their systems that would obviously need to be safeguarded. Although we would hope that only people with good intentions enter a hospital, this is not always be the case. Even nosy family members could pose a problem to confidentiality. There need to be conscious safeguards so that people are not able to misuse a robotic system for ill purposes, or even for benign infringements on privacy. One of the ethical debates in robotics is how to mediate the necessity for robots to retain so much personal information about people, while being able to also keep it private (Metzler 2007: 122). Already with electronic records there are passwords and other methods to make sure that only the right people have access to the correct information. Robots must also have similar safeguards, although if they are acting autonomously it is interesting to think how this would be developed.

### **Not all that glitters is gold**

Even with robots that don't verge on replacing direct patient care roles not all people are positive. In the newspaper, magazines, and on television robots are so often touted as being superior to humans, for example, in surgery they are more precise, tireless, and so on. Local hospitals blast the news of their new da Vinci robot. At a cursory glance it seems like robots are the bright shining way of the future, as infallible as they are exciting. For a while in my research I came across many articles dealing with moral concerns, but found very little information that was down right negative. I was surprised, then, when one morning I turned on the television and the first thing I that comes on is an ad for "badrobotsurgery.com." As you can tell from the title alone, it presented a very negative view on medical robots. It was one of those TV lawyer



commercials, full of dramatic music, promising the mistreated patient money for damages from medical procedures. This ad was focused on the di Vinci Robot. The website claims a myriad of complications brought on by the robot surgery, warning that these could include death.

“The over-use of robotic surgery in benign gynecological cases can cause many problems that may not have occurred if the surgeries were performed directly by a doctor. Robotic surgery can severely injure the bowel, bladder and blood vessels. Some of these injuries can even occur without the surgeon knowing it, which can lead to severe complications if left untreated.” (badrobotsugery.com 2013)

This is certainly a fear-mongering ad, however, I found that not all the information was fabricated. Serious complications have been discovered with robot surgery, which were never a problem with conventional surgery. Although the robots are able to provide faster recovery and less invasive procedures it seems that undergoing these surgeries has entirely new risks. For some robotic surgeries the patient must be positioned in different ways than in conventional surgery with a human surgeon. In certain gynecological procedures this position can cause complications, such as cardiovascular effects (Ghomi 2012: 28). One of the most shocking complications is “facial trauma and corneal abrasion.” These injuries to the patient’s face and eyes, not found in the conventional form of these surgeries, are caused by the position of the robotic device over the body of the patient. Although there have been measures taken to prevent this with the use of facemasks and padding on the patients faces, research has shown that even these precautions do not always prevent the injuries from taking place (Ghomi 2012: 30). Taken

from a medical journal for OBGYNs this information is neither alarmist or falsified, but shows that robots are not, as of yet, always better than the humans they assist and replace.

Even without new side effects not everyone is thrilled with the idea of robots. As we have discussed, the cost of robots is extremely high even if having robots could act as a draw for patients. Already many hospitals are facing new budget cuts and a need to scale back. Right now robots are expensive both to purchase and keep up. Some warn that this may slow the rise of medical robots (Pho 2012). Although being tight on money could also be an incentive to have more robots to streamline services. Time will tell how budget cuts affect the integration of robots into the hospital.

Joe, works part-time at Greenview, and also has a manager position in the emergency room of a large urban hospital. He mentions that another hospital, about an hour or so from Greenview had medical robots for a while but then got rid of them, “because they didn’t bear any fruit.” Although I did have time to ask him further about what this means, it is perhaps a marker of where we are in the process of integrating robots. With new technology the beginning is often a time of trial and error. Not all robotic systems are proven to be helpful additions, and many surely will be discarded as the technology continues to improve. Still if there is a starting point, it implies a future. The first trial might not work, but what comes next?

## CHAPTER 4

### TO BE A NURSE

“Being a nurse means sometimes you go home after your shift and cry because of what you have seen and the empathy you feel for the patients. Would a robot do that?”<sup>8</sup>

#### **Person-to-person care**

We will return now to the issue of personal care that was never far away in any of my conversations with the nurses. It comes in many names, person-to-person care, human-to-human care, personal care of course, and even “tender care;” all of which I will use interchangeably. In essence, the contact that the nurses at Greenview make with their patients as people is of paramount importance to the healing experience of the hospital and to the nurses’ own experience in the work place. When it came to directly making contact with the patient and helping them to heal the nurses, one after another, stated that, “a robot would not be the same.” And by not the same, they mean that the robot would be unable to accomplish the task in the same capacity as a human caretaker does when interacting with the patient.

As part of each focus group I asked the nurses to fill out a small survey so that I could better get on record what each individual felt about robots aside from the opinions expressed in group discussion. I wanted to make sure that everyone had a voice whether speaking or not. Below follow just some of the many answers to the question, “what is your greatest concern with the use of medical robots?” There were many more who cited the loss of personal care or simply wrote “patient contact,” but in the interest of space I have left out the shorter remarks,

The loss of human contact. Direct patient care is so important; I do not think I would like to see it replaced. To do certain jobs such as carriers, or cleaning sure, but the connection to the patient cannot be lost.

All direct contact should be person-to-person. We should never lose contact with our patients.

The loss of focus on the patient with robots worries me. It also could mean a loss of hands on care.

[Robots] are just too impersonal.

Listening and adapting behavior, compassion?

Not emotional quotient for patient care.”

[Robots] can't react the same way a human can.

The lack of physical contact, which is reassuring to patients.

I worry about their ability to connect in a meaningful way with the patients.

I worry that to use robots would decrease human touch.

I worry that they would end up replacing people, and that patients would like the personal touch in the hospital but not be able to receive it.

[Using robots in care] seems like a very impersonal means to personal improvements.

How will the patients feel? They may wonder, ‘Why won't the doctor physically come and see me?’

If there is less personal contact with the patients the patient may feel that they are not being cared for without seeing that nurse face-to-face.

It makes our focus the impersonal aspects of care.

It is not personal, and this is especially hard for the elderly group.

The patients may miss the personal relationships with the physicians and staff.

The patient should feel cared for, and not like part of an assembly line.

What these nurses value is evident. They are not fulfilling any stereotype; they are not scared of technology. Instead, these nurses are confident in how they do their job, and believe in what they are able to provide for their patients by being there as a person to help the patient heal. Their main concern with robots is that should a robot try to replace a human in certain tasks, the robot would be unable to give the patient the kind of care that the nurses believe to be so important in the healing process. The nurses' concern is not unfounded. Research has shown that patients too fear that involving robots in too many of the interactions in hospitals could diminish the "personal element" in hospitals (Broadbent 2010: 610).

### **Community within the hospital**

It is a clear November day, and this time in coming to Greenview I am sitting in the lunchroom of the Woman's Health Center of Greenview Hospital. The Woman's Health Center is located in a bright, relatively new building just adjacent to the hospital across a small creek. It sits beyond the woodlands that surround the hospital, and faces out onto meadows and trimmed lawns that are now turning brown as winter approaches. The sun can reach in here with greater force than the shaded main structure of the hospital. Indeed, the windows of the lunchroom are filled with light from the cloudless sky outside. Again, I am attending a staff

meeting around a rectangular table. This table, however, is much smaller than the one in the basement of the main hospital. Around it clusters the Woman's Health Center's staff of twelve. There are two people on each end of the table with me making a third on one end. I hardly feel like the narrow room can possibly contain us all. We are press together elbows bumping. Each staff member has brought their lunches to the meeting but I cannot tell on the cluttered table where one lunch ends and the other begins. I wonder if they are squeezed into this room for today particularly, but I am assured by chorus of cheerful voices that it is always like this. They seem to be very content and comfortable. It can only be described as a truly jolly gathering. There is much laughing, and different and lively conversations spring up in various parts of the room as soon as the introductions are over. Wondering what I should do and how to get the attention of the lively bunch I sit quietly for a few minutes. I struggle to try to catch all of what is going on around me as conversations jump from the better pay that male nurses receive, to the good looks of their favorite weatherman on the local television station. Somehow everyone seems to find a space to speak, and I too am soon drawn into conversation with the director of the Center who is seated beside me.

Violet, the director, has been a long time employee of Greenview. Her job is to oversee the staff as well as the day-to-day workings of the Woman's Health Center. An enthusiastic and out-going person she is in her element in this lunchroom among her co-workers. She has also done work at one of the large hospitals close by, but has remained at Greenview longer than anywhere else. She certainly is kept busy here. The Woman's Health Center provides a variety of services for their patients. They are able to handle simple check ups as well as tackle more complicated gynecological procedures. They are dedicated to providing their patients with only the best possible care, and the center, as Violet explains to me, tries to create a pleasant

atmosphere where the patients feel comfortable coming. “The patients like it here and they just love [Doctor James]. He is really great and we love him too. We have a great staff all around, I think that’s why our patients like it here.” She says this proudly, noting that this is an accomplishment since many of the medical complaints their patients come in with are challenging and emotional.

Around the table is the complete staff of nurses, secretaries, and the one doctor. Doctor James is probably one of the only males that regularly set foot in the center, and the only male in this side of the building where the staff rooms and offices are. All the nurses and other staff are female. He is seated at the far end of the table, backed a bit into the corner, and looking over some papers that he has brought with him to lunch. He looks up now and then, but rarely speaks. Catching my eye with a smile Doctor James explains that he has learned to stay out of the conversations. “I just sit here and keep out of trouble,” he jokes as the nurses closest to him start talking about the local weatherman’s looks again.

The sense of community in this unit is palpable. It is also a great example of what I have seen throughout the hospital, although perhaps here at the Woman’s Health Center may be somewhat in the extreme. I sense that the staff is very comfortable around each other. They seem to each know each other well; each has a place in the group and are aware of what each others’ places are. Many of the nurses have been working together for numerous years. Violet explains to me that she has been here much longer than she had ever expected. In the noise of the room I don’t catch how long she has been working here, but it counts in the decades. She likes it so much here she says that she never could leave. She enjoys the whole community of the town that surrounds the hospital, and feels connected to it through her work. Again she states that she

is very happy for what they are able to provide for the patients here, and her fellow staff around the table echoes this sentiment.

I am coming to understand that there are many things that make up what it means to be a nurse at a small hospital like Greenview. It starts in lunchrooms like this, and spills out into the rest of the hospital. The community within the hospital has developed among staff that has come to know each other well over years, if not decades, of working together closely. The culture of the hospital is important to the nurses that work here. This culture being both what they experience and what they provide to the patients. I asked all the nurses that I spoke to how important they felt the positive culture of their workplace was to them in their professional careers. There were only three out of the 54 people of the staff that I spoke to who rated the importance a positive culture as under an eight on a scale from one to ten. One being that culture is unimportant, and ten standing for culture being a pivotal reason they work at Greenview and extremely important to their work life. Indeed, 36 of the 54 or 66 percent of the staff rated at the most important, ten, and 96 percent rated the importance of culture at or above an eight.

The staff culture is a key focus of the administration as well. There are sincere efforts to promote a healthy and supportive community. These measures are taken with the idea that, if the staff is comfortable and feel supported by the community they will be able to provide better and safer care to the patients. The impact of the staff's sense of community on the care that patients receive has been found to be statistically significant. Something in the staff culture is transmitted to the patients (Meterko, Mohr, Young 2004: 497).

The jolliness of this particular lunchroom at the Woman's Health Center translates into the work environment of the unit floor where the patients and visitors are taken in as short-term members of the same community. This was not the first time that I had been to the Woman's



Health Center at Greenview. I have walked around this unit while I was still an intern at the main hospital before I had begun to do research for this thesis. Violet had kindly offered to give me a tour and explain the work that they did as we walked around the unit. I remember the experience clearly greatly in part because it was such a positive one. The staff welcomed me as I meandered around the floor with Violet. They smiled and introduced themselves asking about my school. They questioned me cheerfully about my experiences so far in my internship. When I went to leave they welcomed me to come back whenever I wanted, little did they know I would take them up on it.

Remembering this first experience as I returned to do my research helped me to understand what this “person-to-person care” really means. The way that they treated me here somehow made me feel that I mattered to them and that I was clearly welcome to be there. Indeed, I had no hesitations in contacting them for interviews. I can certainly see why their patients would feel comfortable coming there.

True to the enthusiasm of the group, nurses and staff of the Woman’s Health Center were eager to talk about robots with me. As with all my other conversations, it was only a matter of time until the matter of person-to-person contact and personal care came up. This staff too emphasized how important it was for the patients to have this type of care. As we spoke it became clear that not only did they feel that this personal care was something that was essential to their patients’ experiences at the unit, but that it was also something that was important to themselves, especially the nurses. For the nurses all over the hospital, part of what kept them coming to work each day was having this type of connection with the patients. I pressed them on

this issue - what was it that made nursing a rewarding career for them? Why is the personal connection important for the nurse too?

### **What it means to be a nurse**

Aside from staff culture and rapport among that staff that helps to promote the healing community in the hospital, there are aspects of nursing that influence both patients and the nurses on a very personal level. I asked the nurses what it was like to work with their patients and to be able to help them to heal. Susan, one of the Woman's Health Center nurses, seated directly to my right seemed to sum up what I had heard from many others, "Amazing. It is just amazing. I mean I think that is why I, and so many of us, decided to do this job. There is a connection with that other person, and empathy that is just incredible," she halted for a moment as if trying to decide how she could explain it more. "Incredible," she finally repeated. The other nodded. This is what I hear across the hospital, "It is incredibly rewarding. You get to help someone through sometimes one of the most challenging moments in their life. It fulfills you."<sup>9</sup> It seems that the connection is a little more than words can easily describe, but that there is something overwhelming but also very personally fulfilling about doing this sort of work.

Nurses not only are selfless in their devotion to helping their patients but, for most of the nurses I spoke with, this selflessness in nursing was also what made doing the work such a fulfilling experience. "It's just awesome," chimes in a nurse across the table, but faltering she too struggles to find words to express herself. To understand more fully what it is that nurses themselves experience as they work with their patients I went back to my books and articles trying to understand a little about who "the nurse" is.

As I have mentioned before the nurses that I spoke to are very hard working and very devoted to their patients. This is apparently a pretty well-known fact and there have been many studies about nurses and their interaction with patients. It seems that the people who go into nursing by and large identify with a few key personal values. It has been found that there are “three fundamental professional values of nursing: human dignity, equality among patients, and prevention of suffering.” These are the values that have been found to permeate the population of nurses in this country from young to old, experienced to inexperienced. In an interesting side note, it was also found by the same study that the importance of the professional and personal value of human dignity increases with a nurse’s length of experience in the workplace. Indeed, it seems that these values are not just values that the people who choose to be nurses have in common, but they are also values that are generated from and reinforced by doing the work of nursing (Rassin 2008: 625-626). I saw this in the nurses I spoke with. They voiced the concern that their patients be treated properly and with human dignity as central to all concerns about robots. They feel the human connection is critical, partially because it reaffirmed their patient’s own sense of dignity, “There are certain issues that need one-on-one contact, and face-to-face care,” stated one of the long time nurses at the Safety Council Meeting. For her it was a not just the practical side of nursing, but a matter of respect as well.

Nurses come to their work with these values and simultaneously develop strength in the values that are parallel to the values the essential of the work that they do. Working within your value system it has been suggested helps to provide a satisfying work experience, and as do the relationships that nurses develop with the people that they treat. In short, these relationships are mutually beneficial. The nurses are finding that their job helps to make their lives meaningful

and facilitates personal growth (Kutaka 2002: 98). The relationships to the patient can be the most common nurse and patient relationship where there is minimal connection. An example of this being when a patient is merely coming to the hospital because of some minor or small routine concern, and where the nurses is only in contact with the patient for a short period of time. In this situation there is little opportunity for more of a connection to develop (Morse 1991:458).

There are also, of course, much more connected relationships. In a very connected relationship the nurse will have been with the patient for some time and/or the patient is going through something that is extremely serious. In these cases an emotional bond can develop on both sides, and the nurse becomes a more integral element in the patient's treatment. Still in every case the nurse has the possibility of being a supporter, confidant and advocate for the patient making sure that they get the care that they need and are represented correctly to family and other staff (Morse 1991: 458).

The above-mentioned emotional connection can be very intense, but was also the reason that many nurses cite for why they do the job that they do. People who are often going through, "one of the most challenging moments of their life" in the hospital and the nurse has the unique opportunity of being there to help them through it and experiencing the other side of giving care. In a quote that Morse shares in from a study on nurses we can see an instance where the connected relationships develop and what the key factor is that makes that connection so important to the nurse and patient. We also see how this is relevant to the discussion of medical robots. As Morse quotes,

There was a woman...– she had no family. The ex-husband – they weren't divorced then – knew she was in labor, but didn't show up. She had an anencephalic. We tried to induce her. It took a long time, and, well, the baby lived. The baby was alive when it was born. And she ended having a Caesarean but, well, they decided they wouldn't do anything – usually we don't have to do anything with these babies – they go to ICU and die there, but [this time] they decided to let it die [here]. She was in intensive care just because it was quiet, and I thought 'How am I going to deal with this? So I asked her what I could do for her to help her be with the baby while it expired, and she asked me if she could have a rocking chair – she just wanted to get out of bed and rock it till it died. I went to NICU and got her a chair and helped her out, because she had just had a section 2 hours before that. She was in the chair. I strapped her in and made her comfortable, and then, in about an hour, the baby died. And so she and I bathed it together and we wrapped it and cried a lot together...I'll never forget her.... But I think she appreciated the humanness. The fact that I could cry with her or that it would upset me as much as it upset her...She had no one. I remember staying a couple hours late with her, so she wouldn't have to meet anyone else. And when I left, we hugged one another. And that was meaningful – a hug. (Morse 1991: 458-459)

This story shows how important that human connection was not just to the woman but also to the nurse. The fact that there was someone there to bring the rocking chair to the woman and help her out of bed; the fact that there was someone there to share the experience with her

even though she had no family or friends; the fact that she had someone to grieve with her – this was what made the “humanness.” As the nurse says, there was someone who was there to be “upset” with the woman. For this nurse being able to be that person was ultimately incredibly meaningful. We can see what it meant to her for she remembers the event clearly even though the survey took place long after incident (Morse 1991: 459). The nurse mentions how it was the “humanness” of the event that made the connection so profound. For the nurse she was able to provide that humanness. In effect, her only job during the whole story that she tells is providing humanness. At that point there was no more “medical” care that she could give to the woman or her newborn child but nonetheless she was working. She stayed overtime. Her work at that moment was clearly no less important to the patient or herself. This is what nurses provide, and this what they regard as being important to themselves and their fulfillment in their work. Indeed, it is their work.

When I described this situation from the quote to one of the nurses of Greenview she replied,

This sort of thing happens everyday, maybe not exactly a baby dying, but something intense like that. That is why we do this job. So we can be there for people, we can get them what they really need in those hard times. So we can bend some minor rules like getting the rocking chair from the other unit. Nurses do that kind of thing all the time.

She smiles. Perhaps she is thinking of her own experiences. But if she is, she does not share them with me.

In caring for their patients, nurses often take it upon themselves to advocate for their patients getting what they “really need.” And what they really need I imagine can range anywhere from the rocking chair, the attention of the doctor, the medication they need, or just someone there who cares about them to pop-in and check on how they are doing. It is true that an over-involved relationship can be so taxing emotionally that it becomes unhealthy for the nurse, but a supportive and connective relationship that the nurses I spoke to advocated is beneficial for both nurse and patient (Morse 1991: 466).

It should not be assumed that the nurse’s role is to be a parental like figure hovering over the patient making sure only that they are provided what they need and heal. Indeed, in ideal relationships between the patient and the nurse, the nurse is able to become someone who empowers the patient to invest in their own healing and treatment, and to take an active interest in supporting their own body. This can be one of the most rewarding parts of nursing. For the nurse to see his or her patient, especially challenging patients, make personal steps to understand and work toward their own treatment or recovery shows nursing at its best (Doss, DePascal, Hadly 2011: 8). It also exemplifies what a complicated process nursing is. One must not simply treat but must provide solidarity, and inspire the patient to care for himself all while being an emotionally grounding figure. While certainly not all nurses have mastered these finer skills of nursing, many nurses are very accomplished.<sup>10</sup>

This is only the briefest and most cursory explanation of all that goes into being a nurse. Hopefully though it shows some of the depth of the task of nursing. Having spent only a brief time now in the hospital I feel that I can only barely scratch the surface of all that goes on between the patient and the nurse, and the interaction is endlessly fascinating.

### **Hard to define: care**

There are elements too that are important not to lose by focusing only on the patient-nurse relationship. We must remember that the nurse is not only there for the patient, but also for the family of the patient. Providing what, for the sake of simplicity, can be boiled down to the simple word: care. I have used it already in this paper. But it, like why people become nurses and what it is like to be a nurse and, for that matter seemingly every other term in this thesis, is hard to define. Perhaps in a way, care is what it means to be a nurse. Care brings together what the patient and family get from the experience but also what the nurse gets from being able to provide that care.

A study by Bush and Barr looked at how nurses define caring. They put together a composite of what the nurses they spoke to defined care as, which I think points out the important things that we must think about as we try to understand more about what the nurses at Greenview experience as they care for their patients.

Caring--it's so difficult to define it's something you do, like empathy for the patient you are with--it's similar to loving. It's more than just a feeling... it's being sensitive to the patient's needs.. Caring means showing concern for a patient and family. Caring is an emotional feeling that brings about actions--it precipitates how you treat someone. Empathizing... caring behaviors occurred mostly when I stopped doing my routine and listened to them and heard what they really felt they needed. And then again, acting as a mediator with the physician. we try to pull everybody together, so that something can be done, we're acting as a patient representative. Caring is a feeling you have inside... it carries into the



actual physical caring for the patient...you really feel and use your feelings when you care for these persons...Caring includes the families. You have to explain that I'm here to be with you, to recognize your needs and tell me just by the flick of your finger or the flick of your eye, at this time, are you hurting...eye contact, and answering his questions.... You kind of put yourself in their position and how you'd want to be taken care of yourself.... A lot of the reward is feedback from the patients and their families... My being there made a difference... I made it a little more human. and it's like, Wow! You actually helped someone...it's not dollars and cents, it has to be something else...the reward I get from caring is just a reward to myself... (Bush, Barr 1997: 390-391)

These comments help to illuminate some of the intangibles that are ever present with providing care, and the very personal reward that comes from being a caregiver. Perhaps care comes down to these things, but perhaps it is also so much more that this thesis cannot flesh out. In my interviews a key aspect of being able to provide proper care for a patient was being able to adjust to the different and varied aspects of human interaction, adjusting to how different people act on different days.

“It’s the ability to adapt,” stated one of the nurses back at the Homecare Center. “People are able to adapt to other people’s particular feelings or emotions on that day.” This she stated as being an important element of her work as she travels to her different clients’ houses each day. She must be ready if they are in a good or bad mood, and be able to tease out anything that they are not telling her from how her patients or their family members are acting.

Indeed, it seems that being able to understand what people are not telling you is one of the finer aspects of good nursing. The nurses at the Woman's Health Clinic are on to this. As we sit crunched up around the table, my knees practically bumping up against hers, Rachel, the young nurse practitioner begins to speak. She is tall, blonde, commanding in her quiet gentleness. The room quickly takes a more serious tone, and for a moment the weatherman is forgotten, and she is the only one speaking. She begins to speak what it nurses as humans are able to distinguish,

I think it is really important to have people because there are things that you can tell. Sometimes some one may say they are fine, but it could be "Fine" or "Fine." Inflection is really important in patient care. There are things you can tell, and I don't know if a robot would be able to do that.

Rachel demonstrates how small the differences in those inflections can be and yet we can all clearly tell that she is stating very different things with those statements. These she explains, with the help of two nurses on either side of her, are the little things that aid in making nursing such a complicated task. Researchers already working with robots, attest that robot will need to be able to differentiate between people that are introverted and extroverted in order to provide best care. The nurses at Greenview see this as something that can only come from having human empathy and understanding of the patient. As the Woman's Health nurses tell me, you have to be ready to figure out where the patient is "really at" and this is not always easy even for the most experienced caregivers. Sometimes you can get a patient what they want, if they are open enough to tell you, other times you have to figure out and get them what you know from your

professional experience is what they need. It can be a bit of a puzzle but one that is ultimately mentally stimulating, a process that Rachel and her co-workers enjoy.

### **Robots in nursing**

Shoulder to shoulder and knee-to-knee in the lunchroom I find that I am feeling strangely comfortable in this setting. As we have begun to touch on these fine points of caring for patients the conversation shifts from nursing itself and back to robotics. We begin to talk about the future of robots. We speak about what they are being developed to do and if there really is a limit to what robots could be able to do. Some of the nurses talked about how it always seems nearly impossible that robots could be developed to do certain things, but then it happens and there they are doing the sort of things that were once science fiction ideas. Again, Rosie the Robot comes up. They all seem well aware that just because it is unimaginable does not mean that it is impossible.

Violet speaks about this transfer from the hypothetical to the real, from her own experience with courier robots at the other, large hospital that she used to work at,

They are strange, at first. I used to work at [a large Midwestern hospital] where they had robots to transport things. The first time I saw one I thought that it was really weird. I saw it in the hall and I thought, ‘what is it going to do? Is it going to follow me?’ Then he turned a corner and I saw oh, okay he knows where is going. He knows his way around like any other person.

She pauses, “I just called him a person didn’t I?” she laughs looking a little confused.

“Yes,” says Rachel, “and you called it a ‘he’ too.” We discuss this interesting evolution. That the courier robot, that is becoming a part of many hospitals around the country, can so quickly change from an image in a roboticist mind to an object that can be spoken about with a gendered pronoun.

Even the thought that it might “follow” you, shows that something about it gives the impression that it might have the capacity for independent thought. She, also, refers to the robot as “knowing” the way. Again, to give the robot the ability to know is to give it a sort of life. We talk about this interesting fact. Animals and humans can “know” the way. We have never, until robots, seen something that does not have a living mind and yet still has some capacity to “know.” “Knowing” and with it “understanding” are cognitive faculties that are still not fully understood in humans. How and to what extent robots are or could be endowed with these is still a subject of research and debate (Wallach 2010:246)

Something about robots makes us able, if not inclined, to personify them. The office toaster, which sits precariously on the windowsill with the November sunlight bouncing off its bright black surface and with a notice hanging over, “Please unplug to save electricity,” is never referred to as a he or she. Does the toaster “know” when the toast is done? It certainly is able to turn off at the proper time. Perhaps it does in some way know, perhaps in the same way that courier robot “knows” its way around the hospital. We all look at the toaster now, considering the never before thought of powers of the humble black box. The courier robot navigating through the halls may know in the same way as the toaster, but why does it feel like something much more? It is, after all, autonomous. Why does it seem to know its way around “like any other person?” Do we need to rethink our understanding of what it means to navigate around the world?

As we speak more about the courier robot we talk about the need to transport things around the hospital to different units and to the patients. There are many things that need to get around the halls. Someone has to move these objects, and more and more hospitals make use of courier robots. The nurses attest to the efficiency that that they could provide.

“But we have volunteers to do that sort of thing already,” says one of the nurses suddenly. The whole room is startled. “The volunteers are the ones that bring around the snack trays and things.”

It’s as if all of a sudden the spell has been broken. In an instant I am transported back to entering the hospital on the first morning of interviews and being greeted by the smiling, elderly volunteer. I feel a sudden pang thinking that that person could possibly have some of their tasks replaced or limited. In one swift exciting move, those sorts of moments of welcome could be lost forever. When the snack tray came around, there would not be a friendly volunteer but instead a little courier robot. Maybe it could still say good morning to you, but what would have changed at Greenview?

### **What is at stake?**

There has been a large focus on what can be gained by having robots in hospitals. This comes from the developers of the robots and also from the excitement of the efficiency and improvements that are possible when robots are used. There is some caution about how patients will react to the use of robots and much research into how to make these machines more palatable to patients and staff so that the robots trying to help them do not put off people. There has not been as much focus on the more subtle things that could be at stake of being lost because of the increasing use of robotics in direct patient care and nursing tasks.

There is the obvious connection with a nurse coming into the patients' room and being able to have a human interaction, but there are other things that are less obvious that also might be at stake with use of various types of medical robots.

Much like the conversations about the Roomba one of the first examples of a robot that came up when the Woman's Health Nurses were speaking about where a robot would be helpful was cleaning. It seems easy to imagine a robot could assist with the cleaning up of patient rooms. The various nurses were talking for quite a while about this when Doctor James, who has otherwise been sitting quietly in the corner this whole time, finally speaks up,

I was thinking here about having a robot to help with cleaning. But then I really thought about it. Sometimes some of our most important information comes from things that our patients tell the cleaning staff. They are there. A person to talk to, the patient confides in them and they end up finding out things that we would never have know without them. Sometimes I have found out a problematic diagnosis in this way. If you used a robot that opportunity would be lost. Who knows what we would miss?

This sort of small interaction is completely outside of the actual treatment of the patient can sometimes play a huge role in-patient being able to get the right care. Something like this may not immediately come to mind when thinking about a robot entering the hospital but is a valuable thing that some places might not want to lose. There is no way to know whom the patient is going to feel most comfortable with and is going to open up to. Sometimes that quiet

caring presence of the person cleaning the room can be more comfortable to confide in than the MD or even the nurse.

In this thesis we have mentioned that there have been programs in robotics meant for the person to open up to. We saw the program that college kids were excited to share their feelings with. Is it possible to equip a medical robot with this sort of program? Would patients feel comfortable opening up to a medical robot?

The woman's health clinic has an intern, Jamie. Her job is specifically to work with the social media and the technological presence of the hospital. Having just graduated from her undergraduate education the previous spring she was still starting out. She is a kind and encouraging presence in the room. She is proclaimed by her co-workers to be the most technologically skilled and comfortable member of the group. "I think I would feel silly speaking to a robot," Jamie said as I asked the group what they thought about people turning to the robot as a confidant. "It would just seem so strange to just start talking to a robot, and I wouldn't want to confide in one." And as for the patients, the nurses don't think that in an outpatient situation there would be much chance of a patient getting involved in conversation with a robot even if the robot prompts conversation. It's an interesting question, and one that certainly requires more research.

Another nurse at the far end of the table says that she might talk to a robot, but then hesitates, mentioning that it seems a little like surveillance. In this example is that cleaning staff has the understanding to know what is pertinent information to tell the doctor and what is not. We can assume they did not relay every conversation with patients back to the doctor. It is complicated to create technology that interacts with patients but doesn't feel like it is in effect spying on them. Something about a robot that records the conversation "feels" different than a

hospital cleaning person who happens to strike up a conversation while they are changing the sheets or cleaning the room. In order to know what people say to a robot all conversations would have to be monitored.

There are some elements of hospitals that have already begun to change dramatically. Again Doctor James spoke up, recalling past experiences before he came to Greenview. Although he does not use robotic surgery in his practice at Greenview, he has had some training with surgery robots like many of his colleagues,

So much of what we do relies on eye contact and nonverbals (with scrub nurses.) When you get training to work with robots [in surgery] that is one of the things that doctors miss most and have to get used to – not having eye contact. You have to try to figure out different ways to find out that information. Nonverbals are so huge and so important. We need that information and it is really hard to figure out how to get that information without [the nonverbal queues].

Without the non-verbal communication and eye contact from the nursing staff during a procedure, surgeons have to readapt everything that they do in surgery to be able to work with these new systems. The loss of eye contact is no doubt a startling change for doctors who have been used to relying on it throughout their practice. And yet, there is a whole other generation of doctors who will have spent their entire education with the new technologies. They quite possible would find such eye contact just as startling if they had it, as they will be used to



working with robotics alone. As Doctor James said, he had to learn to find the same information in different ways, but he says that it is harder and he isn't sure if he is really getting the same information. He has to find more of the information out on his own, but he laments the loss of the watchful eye of the scrub nurse as well. If Doctor James misses the eye contact and communication with the nurse in his experience with robot, would the patient miss it as well if robots are used in other aspects of caring such as nursing at a small hospital like Greenview?

### **Level of integration**

Certainly different places have very different needs when it comes to medical robotics. A military field hospital that it is in some remote part of the world and is handling the initial triage and care from that battlefield is in a very different situation from a place like Greenview. A large research institution is also very different. And each of these places has a different level where robotics can help.

The Military has keen interest in robots. Robots have already been used in Iraq, where tele-presence robots have allowed doctors to remotely travel around the halls of Baghdad hospitals to check on patients in critical condition. Other robots are used so that surgeries can be completed remotely. One doctor, Kevin Chung, who worked with medical robots and the military in Baghdad hospitals, admitted that the robots could never replace physical presence but in this dire situation they were able to extend his "capabilities" in an ultimately very needed way (Roberts 2009: A9).<sup>11</sup> For this type of place the use of tele-presence robots and even remote surgery could not just be very helpful additions but could in fact be indispensable upgrades. They could seriously change the way that these types of care facilities are able to provide care.

Remote Hospitals too could greatly grow through the use of certain types of robotics that would allow them to connect to the information, specialist, and treatment that otherwise their patients might not get. Even the large research institutions could find means where in their large buildings and expansive halls a variety of robots could be very helpful.

Every hospital must decide how much they want to give over to robotics and how much they want to rely on humans. Greenview, like other small institutions, may want to maintain their culture of personal and human care. For them personal care is an essential part of the identity of the hospital. Greenview prides itself on its small and personal atmosphere. We have seen that part of its satisfaction ratings hinge on being able to make people feel individually cared for. Next to me Susan says,

The patient will feel that they are not getting the personal experience that [Greenview] is known for. A lot of our patient satisfaction is based on the personal care that they receive here. I think that people would lose the personal touch of the hospital [if there were robots completely patient care tasks].

Greenview cannot afford to give up this personal care. Not only for the belief that it is vitally important to nursing and healing, but also because it is a crucial aspect in the service that Greenview provides and is a big selling point for the hospital. For people who don't want to go to the large research institutions Greenview is a more manageable and comfortable place. It is personal in every part of the hospital. Although I got lost in its twisting basement halls it is nothing compared to the mammoth labyrinths of its neighboring large medical facilities. And

everywhere caregivers work to make care personal. As a small institution they have a unique opportunity to be able to provide this type of care.

I have attended many of the staff meetings and administration meetings at Greenview and I notice that there is much talk about how often each person is visited by a nurse to check in on them. There is a conscious effort that the patient feels the human contact, that the nurse explains carefully to the patient all their actions in helping them. This is the additional reason all the nurses and staff there cling to this idea so dearly. And it is very important not only to themselves but to the whole institution of Greenview.

“I think that maybe technology can help with [nursing] but it can’t ever completely replace it.” Susan continues. The other nurses echo this. They are confident that they cannot be replaced. They are confident that there is something about the contact between humans that cannot be replicated, what they do as people in their jobs is of immeasurable value. They are confident that there is a line over which robots should not try to step.<sup>12</sup>

As the lunch meeting begins to wrap up, this seemed to be the consensus. There were some things that maybe a robot could do that would help the hospital but there were other things that just couldn’t replace the human care. This answer leaves a gaping question that is perhaps one of the most important things to consider with robotics in any hospital, but particularly for the small hospital. Where should the line be drawn between human and robotic?

## CHAPTER 5

### ROBOT TASKS V. HUMANS TASKS

“Robots couldn’t take over everything. It could to be progressive, but we have to look at the priorities. [We still need] to use people for the touchy, feely things.”<sup>13</sup>

#### **What kind of help could robots be?**

As we have seen there are some tasks that the nurses are comfortable with a robot completing, however there were also other tasks that they refused to turn over to robots. There seemed to be a sort of line that showed up in my conversations. It always alluded to but was never concretely defined. What is the point where a robot would no longer suffice in the place of a human, and a human is needed? There were elements that nearly each of the nurses cited as being key to where this line might lie.

Take for example the Roomba, the little automated vacuum and sweeper the nurses I interviewed at the first council meeting were so excited about; this is a perfectly “acceptable” robot. Like a medical robot that does not take away from the human aspects of care, the Roomba does not infringe on best parts of life at home. Those that already own a Roomba are extremely fond of it because it completes tasks that they have no desire to do. While cleaning it steers well away from the uncanny valley. It is as a simple disk which only sweeps or vacuums. It does not attempt any significant social interaction. It only replaces a simple, repetitive task that you would otherwise have to complete. It does not replace anything that nurse’s feel they would “miss.” They do not ask it to help the children to do their homework; they do not ask it to provide

emotional support after their long day; it does not take the dog out for a walk or complete any of the domestic tasks of a more complicated and valued nature.

I am sitting now in a coffee shop on the edge of campus. Outside it has begun to drizzle, and the place is full of a noisy mixture of students and local patrons. I look around hoping that I have come to the right place and, forever attached to my own technology, repeatedly checking my email to make sure I have got it right. Today I am meeting with Wendy, director of Risk Management for Greenview Hospital, who we have already met in this thesis. She has an important role at the hospital for it is she who handles all of Greenview's patient complaints and malpractices lawsuits. Usually she tries to settle with patients before they take legal action but if it comes to that she will take the case to court. Because of this role, she is very invested in the safe practices of Greenview, and that the hospital is a community of careful and safe medical treatment. She has also worked at Greenview for many years now, raised both of her two children near the town, and sent them to universities within the state. Wendy is connected to Greenview both in history and spirit like so many of the long time staff that I have met there, many of whom she knows well.

I see her come through the door and wave. She comes over quickly and sits down. Her red lipstick is bright against the gray outside. After chatting for a moment about school and the cold of impending winter we get down to the business of discussing medical robots in Greenview. She too echoes the idea that robots should perform the tasks that are not too involved in human care and do not infringe upon the task of "nursing" or caretaking are ideal especially for Greenview.

Repetitive manual tasks that don't involve human beings. Stocking things, etc. and we have our Pyxis machines – those kind of things can be time-savers and also safety-promoters, but do not take away from the human dynamic where the human dynamic is important [for the patient.]

The Pyxis machines are one of the technologies that the hospital already has that fit well into this category of “automated but acceptable.” The Pyxis machines are used to control the distribution of prescription medications to the patients. The machine has a series of checks and safeguards to ensure that people only receive the proper medication in the proper amounts and at the proper time.

Since Greenview has started to use these machines, they have seen a substantial decrease in the amount of medication errors that occur. This shows wonderfully that using some technologies can not only add to the efficiency of the hospital but, also, can truly improve the safety of the patients and the care provided by the nurses. This type of machine is something that a Risk Manager like Wendy can get excited about. Medical errors cannot only be extremely harmful to patients but are a big liability for the hospital. A small hospital like Greenview, which is already struggling to make ends meet, only has so much money to spend on lawsuits. There is serious cost benefit in the investment both in actual monies and patient safety. Also, there is a great time saving element for the Pyxis Machines and other medication dispensing machines like the ScriptPro 200. The systems reduce the manual workload of pharmacists and their technicians allowing everyone to focus on more stimulating work such as patient interaction (Crawford, Grussing, Clark, Rice 1998: 1912). Even with these machines completing counting and identification work the pharmacist is by no means out of the picture. They must still be

responsible for double-checking the work and making sure that the machine has counted the correct medication, correctly (Williamson 2012).

Still the Pyxis machines serve only as dispensers for medication. The machine itself does not present the medication to the patients. Human interaction is still very necessary as the nurse operates the machine to get the medication for the patient and give it to the patient with a glass of water or what is needed to take the medication. In this way the use of the Pyxis machine has not changed the fundamental act of caregiving that occurs when the nurses is presenting the patient with their medication: this means it is below “the line.” They fit rather comfortably in the role of tools for the pharmacist.

The nurses that I spoke to all over the hospital openly embraced robots that could help with nursing tasks behind the scenes. I asked the nurses what tasks they would find useful for the robots. If the robot should not do the tasks that directly help the patient, how could a robot help them? Many of the nurses were very comfortable with the idea of robots in surgery, despite Doctor James lamenting the loss of eye contact with scrub nurses. Perhaps this could be partially due to the fact that surgery robots are one of the most publicized types of robotics, and people can already imagine how they work. It is not hard for the staff to imagine how a robot would a welcome addition because of its ability to stand up well to the riggers of performing surgery. As one of the nurses in the morning Safety Council meeting stated, they are “not tired, not emotional, not impaired.” The long hours of concentration are nothing for a robot, which clearly does not get distracted either emotionally or from fatigue. Practically they are easy to sterilize. These are the arguments that manufacturers also champion this analysis of surgery robots. After all, the patient is unconscious so there is not conscious human-to-human interaction for the

patient to miss out on. If there was a robot to greet the patients when they come-to, that would be a very different matter.

Still even robot surgery is not devoid of human activity. For the most part the doctor is working “through” the robot. The surgeries are directed and supervised by the surgeon. As Doctor James said, the surgeons are trained to use these robots. These robots do not function with complete autonomy. The robots do perform some small elements of the surgery based on preset guidelines. The renowned de Vinci system for surgery requires a doctor. Researchers caution that the robot, which mimics the movements of the doctor, is still only as good as the surgeon behind it. And they stress the need for surgeons to have proper training on with the robotic systems (Schneider 2012). Just because these robots have become well known and are perhaps more common than other types of medical robots does not mean they are surefire ways of having a good surgery. While they can provide minimized pain and scaring they still rely on human operators and the skills of those surgeon remain vitally important. As technology pushes forward, however, we can be sure that researchers are doing work so that more and more tasks can be completed by the robotic system alone.

The courier robot was also favored as a time and effort saving technology. “Those who bring medications from the pharmacy or other items from other places. For example bringing blood or if they can take things to other places like the lab [would be great],<sup>14</sup>” commented one of the nurses at the Greenview Safety Council meeting. Being able to have a quick means to transport things is important for many large hospitals. Yet even in a small hospital it is useful, and over and over the nurses mentioned how helpful they thought they would find it. Again, this robot is seen to be distanced enough from direct patient care, though it is a presence in the hall



ways of the hospitals and patients would have to interact with them in some capacity. This might not be the smoothest transition; recall Violet's initial fear that a courier robot would follow her, but it isn't unconceivable that we could all get very used to them maneuvering around the hospital. Even in the Behavior Health Clinic perhaps patients would have less trouble with robots if someday such robotics were the norm.

We have seen that having a robot to replace cleaning duties was debated, but several nurses suggested that it would be very helpful provided the patient was not present. In the case of turnovers of rooms it could be effective and time saving. Although there did always come up in conversation that fact that there were staff whose job it was to perform these tasks and the robots would be replacing human workers. This was one of the only areas where job competition becomes more concerning for Greenview staff.

When it came to robots that actually interacted with the patients there were still a very few robots that actually made the so-called "cut". The animal therapy robots were appreciated by many of the nurses. Those that care regularly for the elderly, like the nurses in the Homecare Unit, were guardedly optimistic about how these little robots could interact with the patients. They already work with some slightly automated stuffed animals with their patients. There was a little automated kitten that could make a few movements. Some of the patients they said were really open to these and enjoyed them. The Paro, which I discussed with them, is certainly the top of the line version of this sort of robot. The nurses especially thought that for children who were too sick to be in contact with a real animal would find this wonderful. Greenview, itself, does not have a pediatric unit. At first I was surprised that after so much push back about robots

working with the patients that suddenly with Paro there was not problem. However, it shortly dawned on me that once again this is not at all infringing on a human roles. Obviously animal therapy is not something that the nurses do, and does not constitute human-to-human contact. Recall that Paro was accepted nearly equally with real dogs in one study. So Paro is welcomed as something that could only add to the patient's experience and not take away from the type of care that they would receive.

Therapy, in general, seems to be an area where the same concerns about robots do not apply so strongly. The nurses also were excited about the possibility of using the robots that can help with physical therapy. Ellen, the Director of Nursing, was particularly excited by the prospect of exo-skeletons. The exo-skeleton robots were very intriguing to many of the nurses that work with patients with physical disabilities or in physical therapy. Exo-skeleton robots usually fit around an appendage and aid the patient with movement.

According to Pons the exo-skeletons, "transfer power between person and robot." Fitted around the legs of a patient who cannot walk, for example, they provide the needed motion and strength to help the person walk again (2008: 6). For the nurses from Homecare, as we have said, the idea of having an exo-skeleton was exciting. They felt it could help greatly that would help their patients with disabilities. For example after a stroke, the patient could go through more repetitions and an exercise with a robot than a human caretaker would be able to help the patient to complete. "The type of medical robots I think would be useful for therapeutic issues, and are something that I would like to have help me," said one of the nurses from Homecare. She still allowed that a person would have to be present with the patient, or at least there would still need to be a physical therapist overseeing the therapy process. Here robots are able to add on to the nurse's capabilities to support in a way that is beyond the human caretaker's capacity.

The feelings about the tele-presence robots were a bit less straightforward. The nurses that I spoke with mainly saw tele-presence robots as a better way for they themselves to communicate with doctors. They already have to use telephones to speak with doctors that are not in the hospital, but have found that this can lead to confusion. They hoped that perhaps tele-presence would better help them to convey what was going on to the doctor: it would be easier in some cases to “show” the doctor what was happening. It would help nurses to express the emotions that might be surrounding an incident or patient. It seems that this type of robotics has the potential to actually aid the hospital staff in providing personal care. The nurses could use these devices so that they were communicating more fully with the doctors and would be better able to get the patient what they “need.” As we have seen this ability is very important in nursing.

Doctors who already make use of this technology echo the nurses’ ideas about the tele-presence robots. At a medical center in Kansas the general surgeon uses a medical robot so that he can keep up with his hospital and office practice. By utilizing the tele-presence technology he is able to make rounds at the hospital from his other office. The nurses that work with this surgeon say that the tele-presence form of communication is better than the previous phone conversations because the doctor is able to be more attuned to the patient and receptive to more information. The head nurses does however, mention that the tele-presence robot has created more work for the nurses as they come to the room with the tele-presence robot (with doctor on screen) to help move furniture and facilitate the interaction. The nurses must also take over some of the physical exams for the doctor (Leigh 2006: 38).

Tele-presence to me seems to stand on both sides of the line. It is a robot device and yet very human– the doctor is still very present. It is an extension of the human experiences verses the replacement of human experience that is found with some other robot devices. While this might seem like a perfect sort of melding of robotic and human others were not convinced. Some nurses still worry that it could still feel impersonal to have the doctor show up on the screen and could for some possibly feel like the doctor does not have time for them. On the other hand there was no question about the assistance that it could provide for the nurses themselves.

All these robots that the nurses were excited about the possibility of using fall below that line where human contact cannot be replaced. It is something in the individual and everyday interaction of the hospital staff with patients, as well as the very hard moments in the hospital, that the nurses wish to be preserved as an interaction between fellow humans. When it comes to the side of nursing such as empathy, reacting, and adapting the particular patient in the particular situation these are where the nurses saw what that they provide to the patient could not be replicated. They cited the type of care that we have discussed. The ability to be there for their patients on a personal level cannot be replicated. The particular act of caring as a nurse, they hope to maintain as solely a human action.

There may be a happy medium as my interviews suggested. Perhaps somewhere where that line can be drawn we would find that the integration of robots with human care comes together in a way that is beneficial. This may be a challenge, but there are pointers toward it through out discussion with medical staff. Clearly the nurses at Greenview, despite not using robots in their everyday, could envision what they would want robots to do and what they would not.

The robot nurse remains a cut off point that may not be singular to Greenview. It is a subject that will need a great deal more study, and as I have allowed before would likely be conditional to the location and particular health facility. I had several informal conversations with nurses from large research hospitals over the course of my research. Joe, from the urban hospital, laughs his way through the robot conversation. Although expressing his desire for courier robots to be added to his unit, “to bring water bottles,” he does not suggest that they would be integrated into hands on nursing.

If I may take the liberty to loosely quote these conversations, one nurse from a large University research hospital nearby said, her voice heavy with something like sarcasm, “It would be like having Siri taking care of you.” Then she laughed, shaking her head at me and returning to her work carrying on a cheerful conversation and making her patient laugh with her. Siri is the iPhone voice recognition system that allows you to maneuver the functions of your cell phone with your voice. In my personal experience I have only ever really seen it be used as a party trick. I distinctly remember a Christmas dinner with my cousins gathered around the new phone interrogating Siri to supply us with humorous answers to the questions we googled. It was easily cast aside once the food arrived at the table. I realize that I have not used the system since. I wonder if the nurse shares my ambivalence for the system and if that is what I detected in her voice, but I cannot know for certain. It seemed that for her the robot nurse was still a futuristic joke, but this is simply not the case.

### **Robots are quick learners**

Even through Wendy, like her many of her fellow Greenview nurses, is not ready to give over the “touchy feely” parts of care taking to robots this is happening. We have to the look at

the implications as more and more technologies are being developed that would be able to do just that. In 2010 there were already five companies in American that were already selling robots with automation. This type of robotic systems allows robots to maneuver in space, such as navigating through hospital halls (Markoff 2010). It is the type of function needed for a robot to begin to take on nursing tasks.

The more that robots become involved in medical care the more that they will be faced with unpredictable situations. A robot could end up making “decisions” that have life-or-death results. This type of situation could force a robot to take a moral side in order to handle the situation. But how to we give machines moral agency; should we set limits on their moral capacities? (“Morals and the Machine” 2012) As Violet from the Woman’s Health Center considered, can a robot think?

Giving robots the capacity to make any kind of judgment is extremely difficult both technically and intellectually. There has been some study of how a programmer could instill a robot with some kind of moral caretaker ability. As we have seen nurses, like those interviewed at Greenview, set a high standard on the care of others, to the point of selflessness. In a way they follow a certain set of moral guidelines in their decision-making. Some argue that robots, as unemotional and repetitive creations, might be better at following those guidelines than some humans (Wallach 2010: 244-245). This of course is complicated. Even if robots were programmed to make some sort of universally acceptable moral judgments, the moments when moral decisions are required are seldom simple situations. As Galhaus considers, the human caretaker often applies the rules to particular situation. The ‘right’ action may not completely follow or may be slightly different from the “rules.” The human caregiver may be better able to appropriately follow, bend or disregard rules to come to the out the proper action in an

“unsolvable” situation. From experience and empathy a human caregiver, for example, will go get the rocking chair of another floor. How might a robot bend rules in a similar situation?

(2012:833)

Galhaus warns that we must, also, be careful of our inclination to trust. While we may be able to understand the emotions and motivations of a human caregiver we cannot make the same assumptions about the actions of a robot. The robot is not working for the good of the patient, but is merely machines that must follow procedure and the algorithms it is programmed with.

Therefore, we are better able to rely on the values that are instilled in well-practiced caretakers, than those that are projected onto a medical robot (2011: 833-836). Galhaus, like the nurses at Greenview, argues for the value of the emotions that human caregivers have. While we might be tempted to say that they could be distracting, they may in fact be at the very heart of what good care is and should not be laid aside lightly. Galhaus goes so far as to use the robot as a foil for how a good doctor. Galhaus urges caregivers to steer away from to “robotic” of decision-making (2011:887). The term robot is an adjective we recall for the emotional distracted and cold human. This is certainly the extreme position on the ethics of robots, but it is relevant as this is just what robots are being created to do: help humans with decision-making.

As I finish writing my first draft of this thesis an article in the Atlantic by Jonathan Cohn reports on how Watson, a super computer created by IBM, is being developed to work in healthcare. It has a complicated processing system that can compute vast quantities of information, through which it is hoped that Watson can be an aid in the diagnosis process. By being along side the doctor in patient consultations, it can take in the information and then suggest possible diagnosis and solution. Watson is programmed to convey multiple possibilities, “each with its own level of confidence” (2013). Watson fuels the debate, not if nurses are

needed or not, but whether or not we need doctors. As this debate rages, we see the same principals from this thesis come up as supporters of doctors cite the many other facets of their job from presence at the bedside to reassuring patients' families (Cohn 2013).

Humans have an astonishing ability to personify, and it's amazing how quickly we do. The article by Cohn about Watson claims that it can "convey doubt" and that it "got better" at Jeopardy the longer it played it. These sorts of descriptions, the ability to doubt and to improve, are strikingly human. Even at the Woman's Health Clinic the director quickly went from talk about a courier robot to giving it a gender and bridging on a personality. This is a wonderful yet dangerous ability. As we are warned by Galhaus, when it comes to healthcare we must be careful not to give too much lest we become trusting of something where decision-making is not founded on experience and a conventional definition of wisdom. It may be easy to say no to robots in nursing now, but this may become harder as we grow more accustomed to the technology, which we remember is designed so that we want to use it.



## CHAPTER 6

### CONCLUSION

“We must be careful not to lose the fact that the patient in the bed is a human being and not a robot themselves. Human contact is important.”<sup>15</sup>

#### **Questions about the future**

Someone must make this decision of how much we will involve robots in patient care. Who is going to decide what each hospital should provide in means of care and what sort of technology should be used? Greenview, according to their website, was founded in 1970. For many years it functioned as its own institution, with its own CEO, making decisions with the help of the local board and the national standards of care. The little hospital in the woods was in total control of its future, its building, everything. But as we have discussed Greenview has merged with a large hospital system because times have changed and surviving as an independent small hospital is extremely difficult. The CEO and board of the hospital no longer have complete control of what happens to their hospital, of what rules they enforce, and what technology they use. Their mission, however, has not changed. They still seek build on their “small town values” of personal care and community to reach their goals of providing the best possible care. As we have seen, the nurses of Greenview stress the importance of what they feel they can provide to their patients as one human to another.

We seem to be running on a slope gaining momentum as we go. Robots are already becoming part of healthcare, and their capabilities only grow. This thesis now verges dangerously close to the philosophical debates that seem to engulf robotics: can a robot do everything a human does, and is there something special about humanity? Mori might be right

that there is something inherent about robots that seem to make us reflect upon ourselves. We must consider what it is that a human nurse's humanity has to give to the patient; what is the value in one human interacting face-to-face to heal another? It is a question of whether the "tender care [or person-to-person care] is essential to the health of patients or just a desirable element that can be replaced (Scopelital, Giuliani, Fornara 2005).

Who, after all, is going to make the decisions for these hospitals about whether they want medical robotics and what they want them to do? Should decisions be made for America as a whole, and perhaps the right decision is different for different types of facilities? The technologies of today compel us to consider these issues. We, the small-town nurse, the hotshot surgeon, the researcher, the family doctor, the military medic, the remote health-worker, the anthropology student, the hospital system executive and the patient must consider the type of care we wish to receive and from whom or from what.

### **Still, only the beginning**

In the wilderness sit the adventurous stopping only for the briefest of moments as they journey forward to the truly unknown. They cannot stop for long at a junction in the road where many the beginnings of many paths fan out. From the undergrowth a robot beckons as if to say, "Hurry, don't stop now. You must decide. We have so far to go."

The adventurers are many, but we can see four. They sit under the shade of a Megabits tree. There is the roboticist like Ishiguro and Mori, full of the philosophical interests of robotics. He is ready to challenge us.

"Why not go further? There is so much more that we can do with robots."

Then there is the manufacturer, ready to promote the practical and profitable uses of these creatures, “Yes and think of all the timesaving properties. The staff will be more efficient. Robots aren’t tired, they aren’t emotional, and they are sterile. It may be an investment at first, but then think of how much money it can save in the long run.”

The naysayer jumps in, “But think of the unwanted side-effects in robotic surgery.”

“But,” says the manufacturer, “we can work that stuff out. We can fix those technical issues you know we can.”

“Wait,” says the nurse, who has come bravely along with Healthcare, “Wait, what about me. What about what I do because I am a human. What about the humanity that I share with my patients.”

Healthcare stands next to her not yet fixed completely on which way to go. The naysayer has turned back. The manufacturer has trotted off deeper into innovation.

The daring roboticist turns to the path toward the valley and for reaching the limits of how close to humans a robot can come. He quotes Ishiguro, as he goes,

You believe I am [a real human], and you believe that [a robot] is not. But this distinction will become more difficult as the technology advances, If you finally can’t tell the difference, does it really matter if you’re interacting with a human or a machine (Carroll 2011: 76).

“Yes,” cries the nurse, “It does matter. There are some things that only humanity has to give patients.”

I look back over my shoulder as I leave the Woman's Health lunchroom. For now only a toaster sits on the windowsill. But healthcare is standing at the junction, already stepping into this technological future, and I wonder as I leave Greenview, which path will healthcare follow?

#### AUTHOR'S NOTE

In concluding interviews in April of 2013 I am informed that as of June 2013 Greenview will be integrating tele-medicine into the Emergency Room. Tele-presence technology will be used to consult specialists in a variety of fields, including psychiatry. The decision to use this technology comes was mandated by the health system, not made by Greenview administration or staff.

## ENDNOTES

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<sup>1</sup> This is the real hospital mission statement taken from “Greenview’s” website.

<sup>2</sup> Source: Glazer, Emily 2012 When a Robot Becomes the Life of the Party. *The Wall Street Journal* CCLIX(57): A1-A4

<sup>3</sup> Patient Satisfaction ratings taken from *ratings.lifescrypt.com* and *hospitals.findthebest.com*.

<sup>4</sup> I was asked this over and over again when I spoke with nurses and staff about what they know about robots and how they feel. The Jetsons is one of the most common popular culture references that staff I spoke to have for robots.

<sup>5</sup> These patients’ responses have not been the focus for this paper; however there have been a wealth of studies that investigate how patients report their feel about having robots care for them.

<sup>6</sup> Interview with Risk Management Director. November 2012.

<sup>7</sup> The word robot is also descriptive of the human performance. The dance, “The Robot,” is another example of how the word is used in colloquial language.

<sup>8</sup> Follow up interview with Behavioral Health Nurse. March 2013.

<sup>9</sup> Behavior Health Nurse. October 2012.

<sup>10</sup> I would like to also nod to the fact that not all nurses are highly skilled. I know through my own personal experience, and the experiences of others, not to mention my research, that not all nurses have a good bedside manner. I do not want to focus for this paper on the “bad nurses” let it suffice that we all know that they exist.

<sup>11</sup> Since the 1990’s researchers have considered the uses of robots in battlefield hospitals not just for diagnostic work but also for remote surgery (Green, Hill, Jensen Shah 1995: 326). In 2005, the Defense Advanced Research Projects Agency extended this by launching a program to develop a robot that could both diagnose and treat patients with limited surgical capacities. This robot is aptly named TraumaPod (Garcia, Low 2010)

<sup>12</sup> This paper does not cover the importance of physical touch for a patient; however, I realize that this is an area where much research has been done. There has been research that suggests that physical contact with patients is extremely beneficial in the healing process. To start further research on this topic I suggest the following sources, understanding that there are many other fine sources for more information on this topic.

<sup>13</sup> Interview with Risk Management Director at Greenview. November 2012.

<sup>14</sup> Nurse Safety Council. October 2012.

<sup>15</sup> Women’s Health Clinic. November 2012.

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