

Sociotechnical Synthesis

STS 4600

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During my last few semesters of my undergraduate career everyone was affected by the COVID-19 pandemic. These events highlighted the flaws in the United States (U.S.) healthcare system that have been in place for years. As someone who has had a passion for healthcare and medicine for many years, it was disturbing to see how this disease progressed. The progression was not the only disturbing thing, but how minority populations were among the most affected medically and financially. This further showed how the U.S. healthcare system is flawed and unevenly distributes their medical services, with subpopulations being underserved. The U.S. healthcare system is set up in a way that creates a burden on all of us. I used this as motivation for my STS research paper, and looked into how the actors in the U.S. creates an economic burden for all its users. The goal of the paper was to investigate the main contributors to U.S. healthcare spending and the debt it creates. It also investigates how key actors create an unstable network to aid the rise in healthcare spending and the ethical considerations of new medical technology. This relates to my technical topic, optimizing surgical planning for patellar instability pathologies, as this project could have the potential to decrease medical bills by avoiding unnecessary surgery. However, if done wrong could contribute to medical debt.

In my STS research paper, I found that the main contributors to the U.S. are long-term treatment, emergency room (ER) visits, and medical technology. The most prominent long-term healthcare is cancer. The cost of treatment varies greatly depending on the time of cancer it is and the age of the patient, with much of the debt coming from end of life care. ER costs were also a contributor to healthcare debt and a deteriorating factor of receiving medical care. My research revealed that the 2006 Massachusetts healthcare reform legislation, which mandated health insurance. It showed that health insurance coverage can decrease the use of the ER, lowering medical bills and provide higher quality of care to patients. My research also revealed that medical technology is a main contributor to high medical bills, and it's the major reason why healthcare spending is increased. With the increased sophistication in technology, there is an increased price tag. This in turn has caused a decrease in accessibility to healthcare. As an

engineer I have to consider the ethics of my designs, including my technical project, will be used and if it will contribute to healthcare debt.

My technical project is looking to optimize surgical planning for patellar instability pathologies. This is done by creating patient-specific biomechanical models to simulate surgeries of correct patellar instability. This requires a full leg MRI, opposed to a normal partial leg MRI. We are currently using data given to us by a local company, but once implemented into the clinic this could drive up medical bill costs. Currently, surgical planning for patella instability surgery is very subjective, with few quantitative measurements and much of the success is accredited to the surgeon's experience in the field. Dislocation rate has nearly 50% incidence rate, potentially requiring a second surgery. My technical group is trying to remove the subjectiveness in surgical planning to help optimize surgical outcomes.

Conclusion

My technical project has been educational and rewarding to work on thus far. However, working on this project while conducting my STS research has raised ethical questions to me. I have to consider the cost of my technology and that it does not contribute to the medical debt, without providing significant medical benefit. If successfully completed, my technical project could help eliminate the need for secondary surgeries, but if done wrong could contribute to the medical debt. I also want to make sure that this technology is accessible to all. Completing both projects simultaneously helped me evaluate my role as an actor in the healthcare network and how my designs, once integrated, can have a drastic effect on people's lives.