Thesis Project Portfolio

Redesigning the Radiological Positioning Board

(Technical Report)

The Ethics of Technology and Human Error in the Hospital: Using Utilitarianism to Examine the 2017 Vanderbilt University Medical Center Incident

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

My technical and STS research projects are related through their focus on the topic of human error within healthcare settings and how engineers have a part to play in addressing the issue. If human error by healthcare providers was classified as a disease, it would be ranked as the third leading cause of death within America (Bindra, Sameera, & Rath, 2021). Although this is a major issue within the medical world, the problem can arise in many different forms. My capstone project focuses on designing a new product that prevents future injuries within the radiological imaging department. Meanwhile, my STS research delves into the ethical considerations of a specific case study involving human error concerning the misuse of a medical device.

My technical project aims to redesign a device that is currently used within the University of Virginia Medical Center in a way that prevents injuries of human error for patients. My capstone team designed a new positioning board for the Department of Radiological Imaging hat includes an audible alarm that prevents its prolonged placement under patients, which can cause injury. The board is used to lift patients out of the bed and provides for an unobstructed lateral X-ray. The device was also designed in a way that addressed other concerns within the current iteration such as using more hygienic materials and making placement easier and safer. The goal of out project is to design a new iteration of this device for further development and future use within the hospital setting, hoping to help combat against the larger issue of human error.

My STS research focuses on human error as well but in a way that analyzes the morality of such actions that could lead to such incidents. To do so, I explore the case study of former nurse RaDonda Vaught, who mistakenly administered the wrong medication which resulted in

the death of her patient (Kelman, 2022). This incident arose from an unnecessary safety protocol override of the hospital's automatic dispensing cabinet (ADC). My claim is that Vaught should be held morally responsible for this incident while the designers of the ADC are not liable for the actions of those who use their technology. To come to this conclusion, I use act utilitarianism to analyze the consequences of the decisions made within the case.

Working on these two projects simultaneously truly added value to each other. My technical work provided an opportunity to combat the problem of human error in a practical way through physically designing a way to prevent incidents such as that found in my STS research paper. Similarly, my STS research project provided motivation for designing something that could prevent such situations. Both of which have inspired me to use the knowledge and techniques provided through an engineering education to advance the care that is provided to medical patients. To conclude, both my technical and STS research projects have contributed to each other in a way that advances the technological response to human error.

References

Bindra, A., Sameera, V., & Rath, G. (2021). Human errors and their prevention in healthcare. *Journal of Anaesthesiology Clinical Pharmacology*, *37*(3), 328. https://doi.org/10.4103/joacp.joacp_364_19

Kelman, B. (2022, March 25). *Former nurse found guilty in accidental injection death of 75-year-old patient*. npr. https://www.npr.org/sections/health-shots/2022/03/25/1088902487/former-nurse-found-guilty-in-accidental-injection-death-of-75-year-old-patient