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EECS 598 W'13
HW1

"Compare and contrast foreseeable computing risks of the Therac-25 in the 1980's with foreseeable computing risks facing wireless networked medical devices of today."

Much like the AECL looked to utilize cutting edge technology with the Therac-25 by removing old fashioned hardware interlocking safety mechanisms with state-of-the-art software, the push to make devices wireless in the medical industry (and others) today can be seen as an attempt to push state-of-the-art technology to make existing products better. The question is how much it is really necessary. Much like software was in the 1980's, wireless technology today is viewed by many as somewhat of a mystery. It's not necessarily well understood by those who are not educated in its field, and its benefits do not necessarily outweigh its risks. However, it has the potential to dramatically improve quality of life in hospitals by freeing people who would otherwise be confined by wired devices.

AECL took a substantial risk when they designed the Therac-25 by completely placing their faith in the software. Unfortunately they did not have the experience or system practices in place at the time to guarantee its success, as is evidenced not only by the software bugs that resulted in needless deaths, but also by a very frightening inability to address the problem when faced with extreme pressure from the regulatory bodies of two major countries and countless hospitals. Really, it was a risk that didn't need to be taken; at least to the degree that they took it. There was no need (except money) to remove the hardware interlocks that made the Therac-6 and Therac-20 work successfully for years, even though the Therac-20 has similar software bugs as the Therac-25. Wireless can be viewed in the same light today. Many wireless devices do not really need to be wireless; it's just an added luxury. Introducing wireless technology introduces many more variables that can go wrong with each system. And how does one exhaustively test the safety of wireless devices? What happens if someone moves a patient out of range when using a medical device? What happens if a hospital plugs too many wireless devices in a single room that all communicate over the same frequency? A wireless device may work in a controlled setting, but could become unreliable when introduced to unknown factors present in a hospital. It's possible that the risk might be not worth it for many life-critical machines.

But wireless networked medical devices are different and we live in a different era. Technology in general has exploded since the 1980's and the average person is much more technologically savvy than the average person was back then. Operators, while still prone to mistakes often caused by complacency, are better equipped to tackle the challenge of learning new technology because most adults have lived with technological advancement their entire lives. In addition, good design practices and policies have been put in place, partly due to the Therac-25 and similar failures. By remembering our history, many mistakes can be avoided and extra effort can be spent on ensuring device safety.

It seems the real truth behind the failure with the Therac-25 is not that using software was a bad decision, but that AECL make several poor business decisions that impacted the way their engineers designed the Therac-25. It's not the software's fault, or even the software programmer, for the problems AECL faced. The design was flawed from the beginning…the minute they removed the hardware safety interlocks and did not pour enough resources into the quality control. The exact same situation is present today in wireless networked medical devices. Designed properly, wireless devices have the ability to improve health care beyond what is presently available, but can only do so when properly designed from the beginning. If we can learn from the Therac-25's mistakes, then we should know that relying on wireless technology, which most people do not understand, without properly considering the safety fallbacks should it fail, will potentially result in experiences very similar to the Therac-25's.