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<div align="center">The Machine Challenge</div>

The US healthcare system faces many challenges from which I find overtreatment is very interesting. Overtreatment occurs when the patient is treated or examined for which is not required or relevant. The national health bill for unnecessary care or medical waste is nearly between 700 million to 2.6 trillion dollars(1). According to the Dartmouth Institute for Health Policy and Clinical Practice, 30 percent of Medicare spending goes to care that is unnecessary or harmful. A study published in Health Affairs estimated the U.S. spends $4 billion on breast cancer overtreatment alone (2). The interesting aspect of overtreatment is that it is expensive and also hurts patients from side-effects to death and almost no effort is put into reducing it. Overtreatment is often caused due to the failure of diagnosis; a wrong diagnosis leads to an expensive treatment as the patient is treated with multiple actions before they receive the proper treatment. The challenge is to reduce medical waste and to detect the proper diagnosis with minimal effort and cost. Solving such challenges will reduce the cost as well as help the patients to recover faster.

There has not been significant improvement in resolving the issue of overtreatment, as for the most part the diagnosis is wrong and the overtreatment at that point is inevitable. Even though, both the EMR and EHR consists of many reach data, it is normally used to access records rather than using for prediction of diagnosis. All patient's data should be collectively gathered and used to predict the diagnosis of the patient. It is understandable that patient confidentiality should be maintained but there are ways to go around the issue. Even though, in the recent years there has been improvements in big data and extracting important data , a more in depth focus is needed for understanding patient symptoms and problems. Collective data and analyzing similar symptoms is the improvement that is needed in the current health informatics tools and system.

The innovation that is needed to analyze and compare such prediction is machine learning and data mining. Artificial Intelligence is also necessary for prediction eventhough the final decision has to be made by the doctor but with the help with the data. As stated by Harvard Science Review, "ML's primary use in the near future will involve data analysis. With each patient comes large bulks of data including X-ray results, vaccinations, blood samples, vital signs, DNA sequences, current medications, other past medical history, and much more. However, we still are not able to efficiently obtain, analyze, and reach conclusions well. One of the major challenges is integrating the data obtained for each patient into one system, as that will allow for efficient communication between providers, allow for rapid data analysis, and give providers all the information they need to accurately treat their patients. Once a single database can be established, the benefits of ML can be reaped. Machine learning then can be involved in patient diagnosis and treatment. It is important not only in emergency medical situations, but also in general primary care and in specialized physicians as well. For example, ML can be used to predict mortality and length of life remaining using physiological patient vitals and other tools including blood test results, either in the immediate future, such as for a traumatic car accident, or in the long-run, such as for cancer. Most significantly, ML models can be used to help physicians diagnose patients" (3). Many companies and startups, including Enlitic, MedAware, and Google, has well directed projects focusing on

improving AI and into the healthcare system and the future for such marketplace will be more demanding. (4)

Although Artificial intelligence and machine learning is the future, adapting such technologies in all of healthcare systems is very difficult. Healthcare systems are difficult to change and are not interested spending revenues into platforms that may not bring more income. The other issue is with the rise of such technologies, it brings a debate on human ethics. "Some believe that our advancements in machine learning will reach a point at which we no longer need human physicians, which would significantly hurt the economy, workforce, and patient experience in clinics. Many are afraid that when they come into a doctor's office, they will no longer have that physician-patient contact and connection, but instead must confront a machine. When building and training machine learning systems, access to large databases of patient information is needed." (5). The strength of this platform will be that it can predict and give suggestion to the doctors which will minimize the medical waste and make the treatment faster, cheaper and effective but the other downside is that the liability of the hospital increases as they own the technologies.

Works Cited

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