

Digital Transformation of Healthcare

Ethics in Modeling

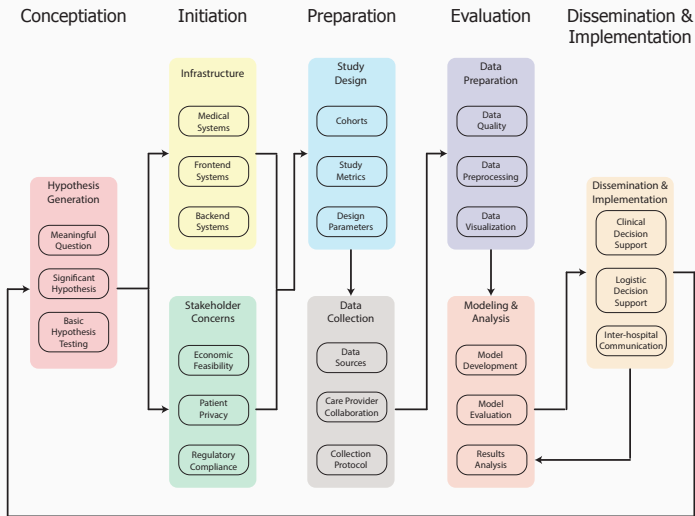
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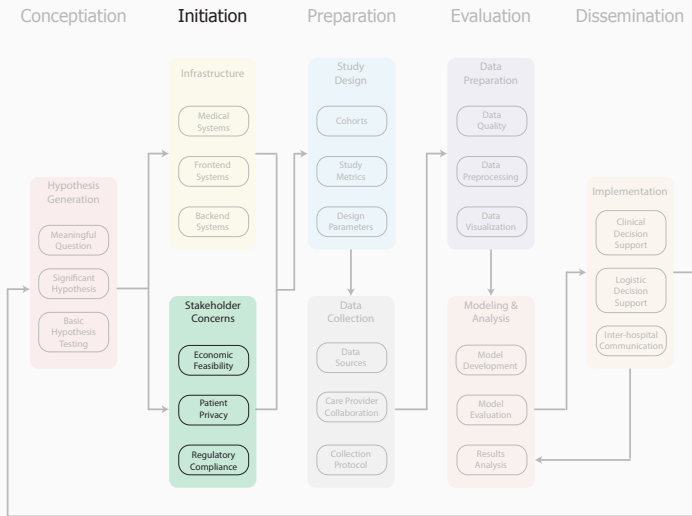
After this lecture students will be able to

- Define the costs associated with an intervention
- Differentiate between direct and indirect costs
- Locate estimates for direct and indirect costs
- Discuss Markov Chain Monte Carlo for modeling costs

Bioinformatics Pipeline



Economic Valuation



Case 1¹

- Risk assessments are used to inform decisions about who can be set free at every stage of the criminal justice system, from assigning bond amounts to even more fundamental decisions about defendants' freedom.
- ProPublica obtained the risk scores assigned to more than 7,000 people arrested in Broward County, Florida, in 2013 and 2014
- The formula was particularly likely to falsely flag black defendants as future criminals, wrongly labeling them this way at almost twice the rate as white defendants.
- White defendants were mislabeled as low risk more often than black defendants.
- Is this an ethical model?

¹<https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>

Case 2

- You are tasked with developing a protocol for all patients diagnosed with and begin treated for pneumonia.
- You decide to use all previous cases where patients were treated for pneumonia to build your neural network, with the inputs being the state of the patients at the beginning of the day and the outputs being the state of the patients at the end of the day?
- Are there any ethical concerns with this method of model building?
- How can you mitigate ethical issues before they arise?

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- Ethical concerns
 - Bias - are people being treated differently due to race, ability to pay without any evidence that there are improved outcomes
 - Negative outcomes - this model does not weight any outcome better or worse than any other, just uses what has been done before, e.g., if there is a novel treatment that does better than the standard protocol but has only been used in the past year, then it would be suppressed in this model
- Does a model need to be explainable to be ethical

Patient Privacy and Data Anonymization

- How Privacy is a fundamental right of patients, but how does that appear when dealing with models.
- Does all patient data need to be anonymized before feeding it into the model?
- Are there any negatives of feeding in anonymized data into a model?
- Where does patient consent fit in the era of big data?