QUORA

## How do you decide between Discrete event simulation, agent based simulation and system dynamics while modelling healthcare systems?

Your question demands a lenghty discussion, which is byond my at the moment situaion stranded in a coffee shop. But I'll try to give you a short and general answer scince I am not a healthcare researcher too. To select between these modeling paradigms you need to know: (1) what are the differences between these methods, (2) what is the phenomenon that you want to model, and (3) what is the question that wish to answer with your model?

Discrete event simulation is a decades old methodology that is used to model pre-defined systems with predictable interactions. For example a queue system in a hospital registration is a good candidate. You can estimate the probabily of having new patients, the number of staff there ( resorces) and as a result you can simulate things like min, average, and max time each patinet has to wait to be registered. This model is good to answer to question like how many staffs should I have to reduce patint waiting time to 5 minutes and such. The cons is that your model is subject to strict assumtions: for example if there is an emergency you might understimated resources.

System dynamics is a bit more recent. It’'s good for particularly calculating the changes in a system fron one condition to another with estimating flow in system. For example you can take a look at SIR models, spread of desease. You can select different categories of people: unaffected, sick, under treatment and model the outbreak on population assuming different rates.

Agent based modeling is the most recent one and can be used for modeling somewhat unexpected (counterintuitive) behavior of individuals and see the overall impact on the system. For example you can model the behavior on individuals in emergencies, or you can model dispersion of deaseases like AIDS which highly depend on the behavior of individual people and less on the population at large. Hope that helps,