Priority Score

Theory

Military triage- save as many soldiers as possible

In military triage situations, a utilitarian framework is employed to save the greatest number of wounded soliders in a mass casualty event

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3. Rank order patients who will die without critical care by $P(ICUSurvival)$ (Red $>$ Yellow)
4. Treat as many patients as possible in order of $P(ICUSurvival)$

Problems with military triage approach in the COVID-19 Pandemic

Three patients with COVID-19

28 year old female
- SOFA: 30% survival

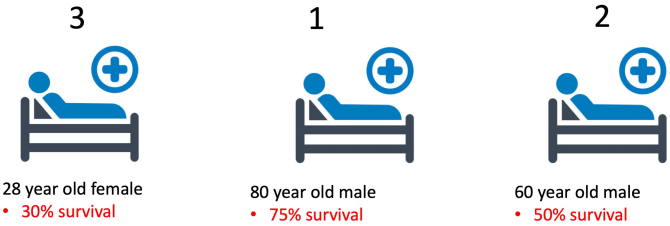
80 year old male
- SOFA: 75% survival

60 year old male
- SOFA: 50% survival

Who gets the one remaining ventilator?

New York ventilator allocation policy

Priority rankings under NY triage system



Goes against "youngest first" allocation principles.

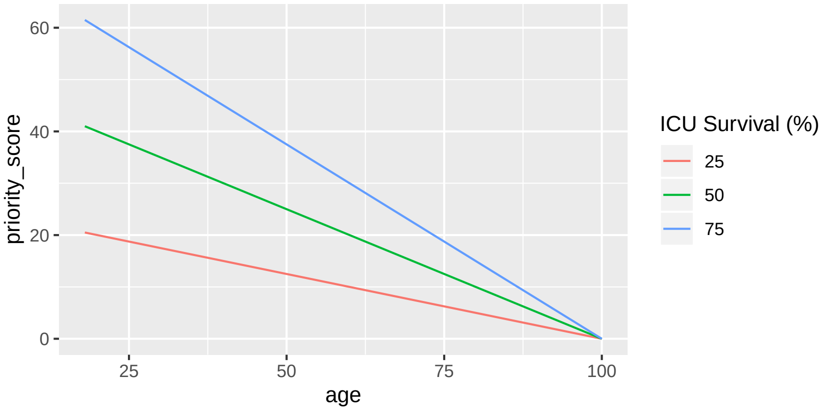
Maximizing life-years gained

An alternative **utilitarian** approach is to maximize life-years gained

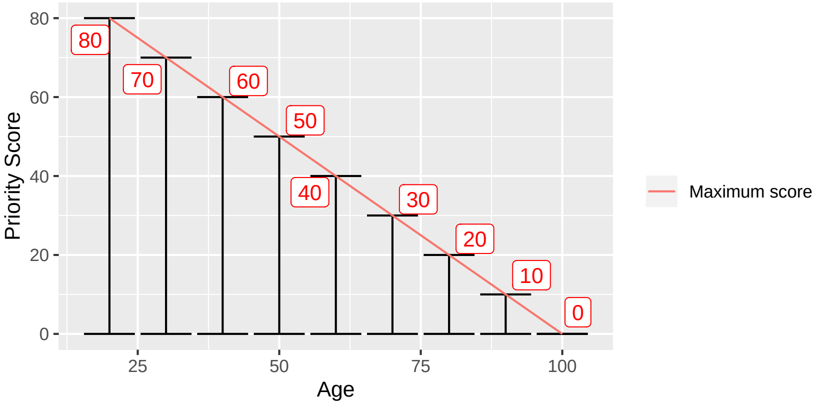
Priority Score that maximizes life-years gained

$$PriorityScore = P(ICUSurvival) * (100 - age)$$

Priority Score vs. Patient Age, by Probability of ICU Survival



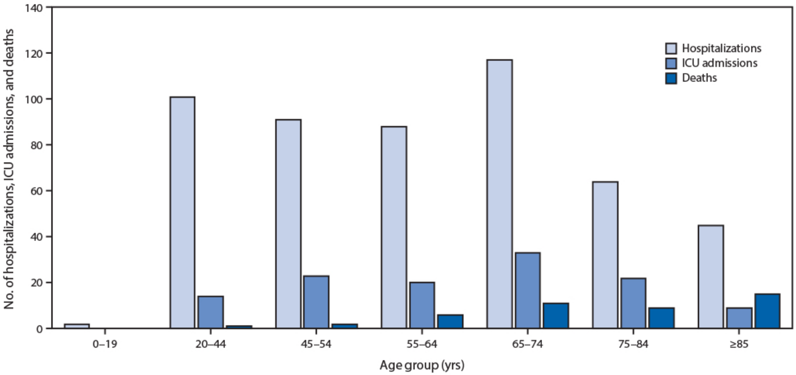
Range of possible priority scores by patient age



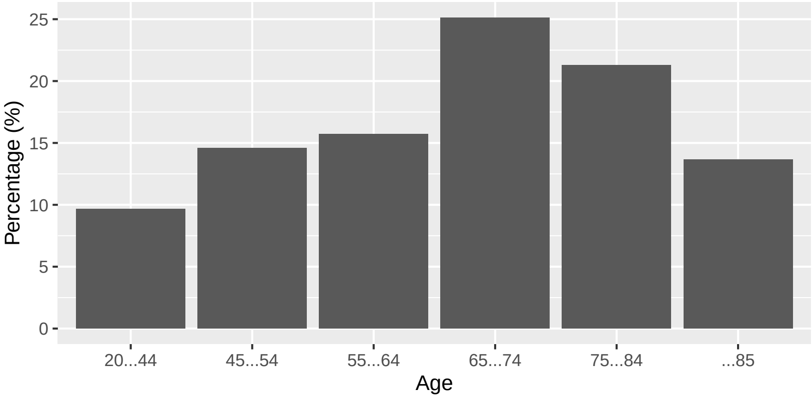
Simulation using CDC data

Data source

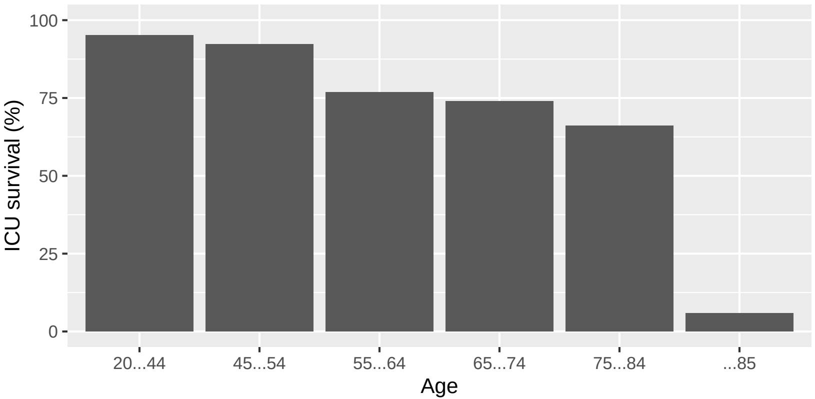
We took data from the CDC report Severe Outcomes Among Patients with Coronavirus Disease 2019 — United States, February 12–March 16, 2020



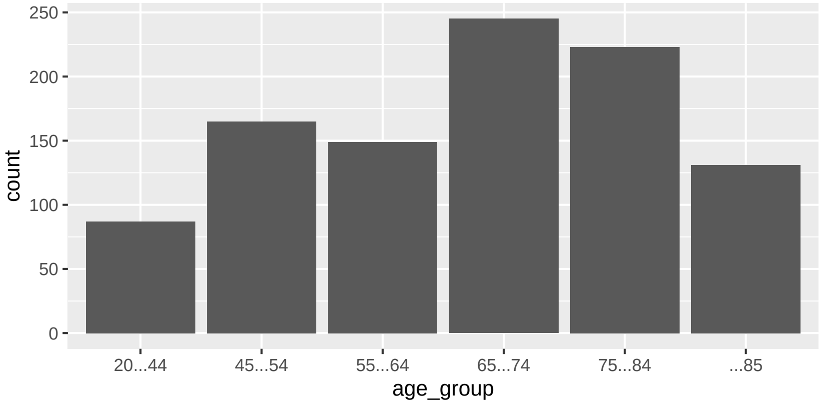
COVID-19 Age Distribution of patients requiring ICU



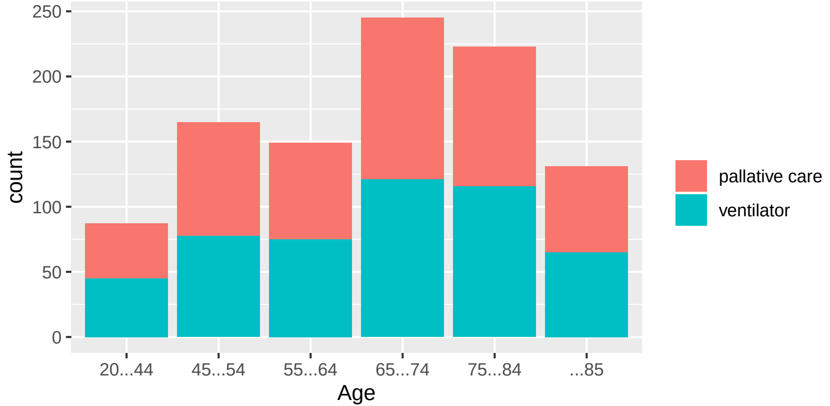
COVID-19 ICU survival by Age in the US per the CDC



Simulated ICU population



Lottery allocation

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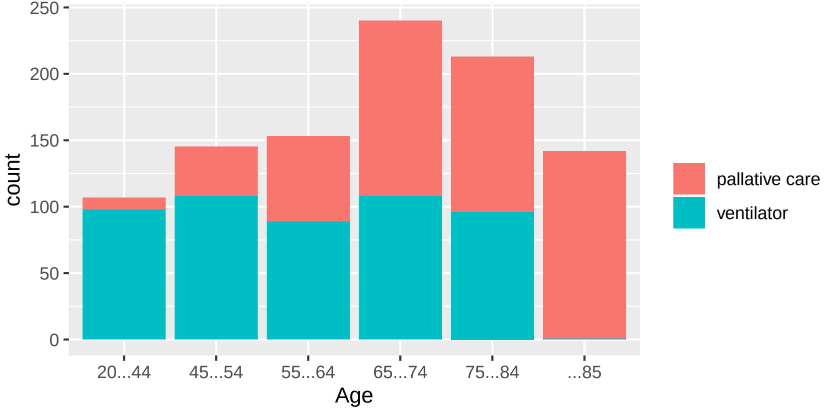
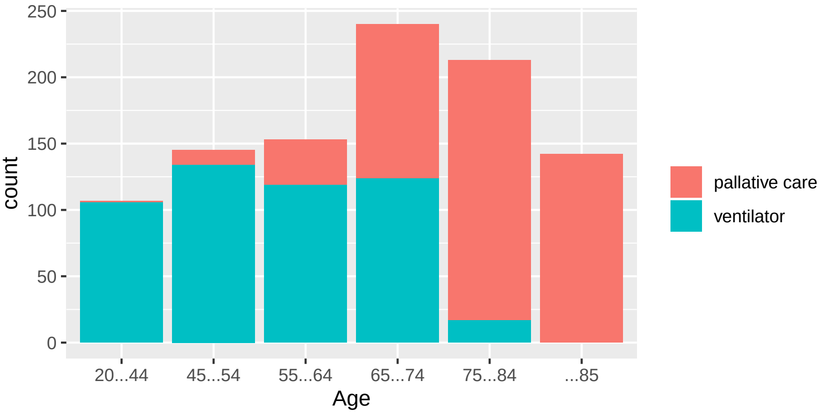
Random assigment of vents, ignoring age and $P(ICU survival)$. A lottery allocation of 500 ventilators would save 323 out of 1000

Maximizing ICU survival



A ICU survival triage system of 500 ventilators would save 457 out of 1000 patients admitted to the ICU. A lottery saves 1.9223×10^4 out of a total of possible 3.3927×10^4 (57%).

Maximizing Life-years gained



A life-year prioritization system of 500 ventilators would save 429 out of 1000 patients admitted to the ICU. Maximizing life-years gained saves 1.9738×10^4 out of a total of possible 3.3927×10^4