**COVID-19 treatment disparities**

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**Preliminaries.** For each risk group, there are two key unknowns: (1) the probability of (hospitalization/death) in the absence of treatment, and (2) the effectiveness of treatment against (hospitalization/death). These quantities are related to the observed cases/hospitalizations/deaths according to the following equations:

*# hospitalizations* = (*# untreated cases) (phosp)* + *(# treated cases) (phosp) (1-TEH)*

*# deaths* = (*# untreated cases) (pdeath)* + *(# treated cases) (pdeath) (1-TED)*

Here, the key unknowns are:

* *phosp* (probability of hospitalization in the absence of treatment)
* *TEH* (treatment effectiveness against hospitalization)
* *pdeath* (probability of death in the absence of treatment)
* *TED* (treatment effectiveness against death).

In terms of the available data, we have:

inpatientCovid = (covid22 – anydrug)\***phosp** + anydrug\***phosp**\*(1-**TEH**)

covidDeath = (covid22 – anydrug)\***pdeath** + anydrug\***pdeath**\*(1-**TED**)

Quantities in bold are unknown.

A few important points:

* *phosp* and *pdeath* are (by definition) expected to be different across risk groups: those in higher risk groups should have higher *phosp* and *pdeath.*
* *TEH*, and *TED* may also differ across risk groups. For example, treatment may be less effective in high-risk groups than in low-risk groups.

Some things we can do about this:

* At baseline, we can assume that the probability of hospitalization from COVID in the absence of treatment (*phosp*) is proportional to the probability of hospitalization from any other cause within each risk group. Same for *pdeath*.
* Furthermore, we can vary *phosp* and *pdeath* to “extreme” values to see how different they’d have to be from our baseline assumption to yield no effect.