December 27, 2021

Dear Drs. Carlos Mellado and Melissa Marzán,

Laboratory confirmed SARS-Cov-2 infections have exploded during the last two weeks: detected cases jumped from 100 per day to over 5,000 per day in just two weeks. A current concern is that hospitalizations will increase at a similarly rapid pace to levels that the health system is not prepared to attend. For this reason, I am sharing a preliminary statistical analysis and code that I hope you find useful. The code to run the analysis can be found here: https://github.com/rafalab/vacunaspr/blob/main/reports/hosp-pred.Rmd

The analysis computes hospitalization rates by age group and vaccination status during the previous surge, then uses these to compute the expected number of cases that will be hospitalized in this current surge. With the same rate as in the delta variant surge, we expected that 1,062 of the 33,991 cases detected the week ending on December 23, 2021 will be hospitalized. If the omicron variant is half as severe as the delta variant then this number is halved to 531, and if it's only 25% as sever then it is reduced to 265. Current, and very preliminary, estimates find that omicron is from 25% to 60% as sever as delta.

The table below shows us the expected hospitalizations per age group and vaccination status based on cases detected the week ending December 23, 2021:

Age group	Vaccination status	Number of cases this week	% of cases that were hospitalized for delta	Expected hospitalization	Expected if 1/2 as sever	Expected if 1/4 as sever
80+	Unvaccinated	102	25.7%	26	13	7
80+	Vaccinated	114	18.2%	21	10	5
70-79	Unvaccinated	223	20.2%	45	23	11
70-79	Vaccinated	389	11.5%	45	22	11
60-69	Unvaccinated	502	14.5%	73	36	18
60-69	Vaccinated	914	7.0%	64	32	16
50-59	Unvaccinated	1,053	10.5%	110	55	28
50-59	Vaccinated	2,054	2.9%	60	30	15
40-49	Unvaccinated	1,638	6.8%	111	56	28
40-49	Vaccinated	3,496	2.0%	70	35	17
30-39	Unvaccinated	2,123	5.0%	107	53	27
30-39	Vaccinated	3,984	0.9%	36	18	9
18-29	Unvaccinated	4,323	3.3%	142	71	35
18-29	Vaccinated	8,263	1.0%	86	43	21
12-17	Unvaccinated	887	1.7%	15	8	4
12-17	Vaccinated	1,892	0.1%	2	1	1
5-11	Unvaccinated	1,122	0.9%	10	5	3
5-11	Vaccinated	191	0.1%	0	0	0
0-4	Unvaccinated	721	5.3%	38	19	10
0-4	Vaccinated	0	0.1%	0	0	0

Important to note that during this week, only 2,244 of the 33,991 cases are older than 60. This number is growing and if transmissions from younger individuals is not stopped, the expected hospitalizations may grow rapidly. I therefore highly recommend monitoring the case tendencies among older populations. You can do this by examining plots such as the following that shows expected hospitalizations per day.

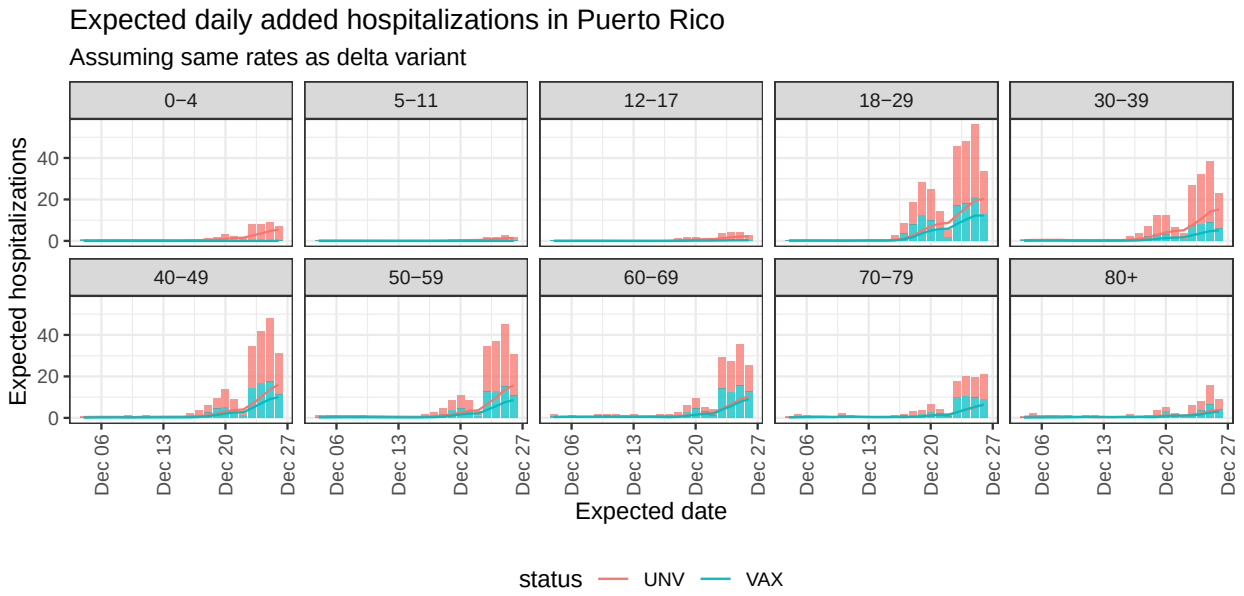

Figure 1: Expected daily new hospitalizations by age group and vaccination status. This plot assumes the same hospitalization rate as in the previous surge.

These can be added up to obtain totals:

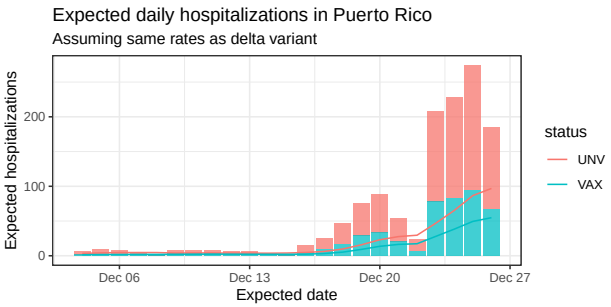

Figure 2: Expected daily new hospitalizations by vaccination status. This plot assumes the same hospitalization rate as in the previous surge.

I hope you find this analysis useful. As always, if you have any questions or concerns do not hesitate to contact me.

Best wishes,

Rafael A. Irizarry