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 1,275 of the 38,171 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 637, and if it's only 25% as severe then it is reduced to 319. Current, and very preliminary, estimates find that omicron is from 25% to 60% as severe 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 severe	Expected if 1/4 as severe
80+	Unvaccinated	115	25.7%	30	15	7
80+	Vaccinated	116	18.4%	21	11	5
70-79	Unvaccinated	278	20.2%	56	28	14
70-79	Vaccinated	399	11.5%	46	23	12
60-69	Unvaccinated	627	14.5%	91	46	23
60-69	Vaccinated	945	7.0%	66	33	16
50-59	Unvaccinated	1,403	10.5%	148	74	37
50-59	Vaccinated	2,116	3.0%	63	31	16
40-49	Unvaccinated	2,237	6.8%	152	76	38
40-49	Vaccinated	3,592	2.0%	72	36	18
30-39	Unvaccinated	2,774	5.0%	140	70	35
30-39	Vaccinated	4,122	1.0%	40	20	10
18-29	Unvaccinated	5,580	3.3%	185	92	46
18-29	Vaccinated	8,469	1.0%	88	44	22
12-17	Unvaccinated	1,214	1.8%	22	11	5
12-17	Vaccinated	1,939	0.1%	2	1	1
5-11	Unvaccinated	1,260	0.9%	11	6	3
5-11	Vaccinated	192	0.1%	0	0	0
0-4	Unvaccinated	793	5.4%	43	21	11
0-4	Vaccinated	0	0.1%	0	0	0

Important to note that during this week, only 2,480 of the 38,171 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.

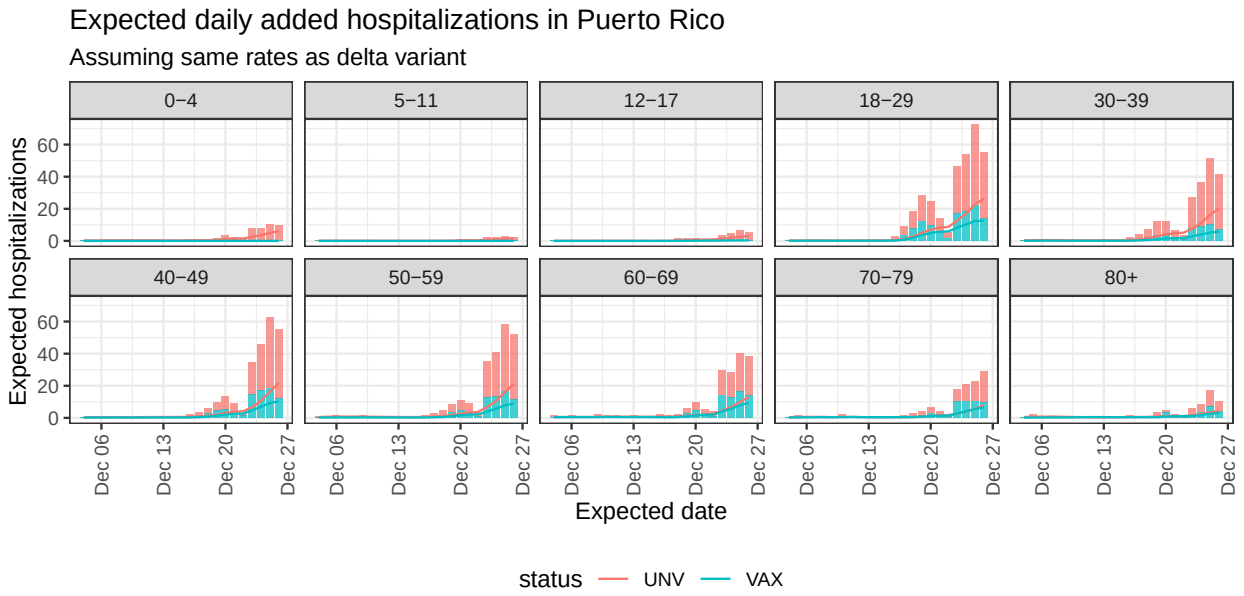

Figure 1: Expected daily new hospitalizations by age group and vaccination status. This plot assumes the same hospitalization rate as in the previous surge.

These can be added up to obtain totals:

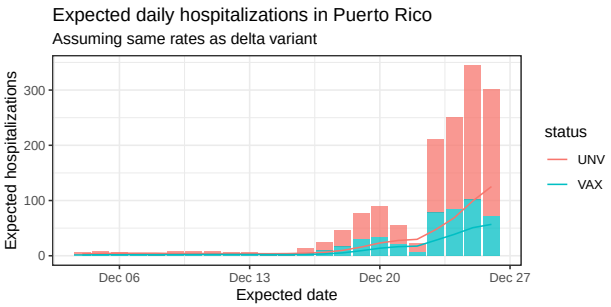

Figure 2: Expected daily new hospitalizations by vaccination status. This plot assumes the same hospitalization rate as in the previous surge.

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