OHSU Health System

COVID19 Hospitalization Estimates
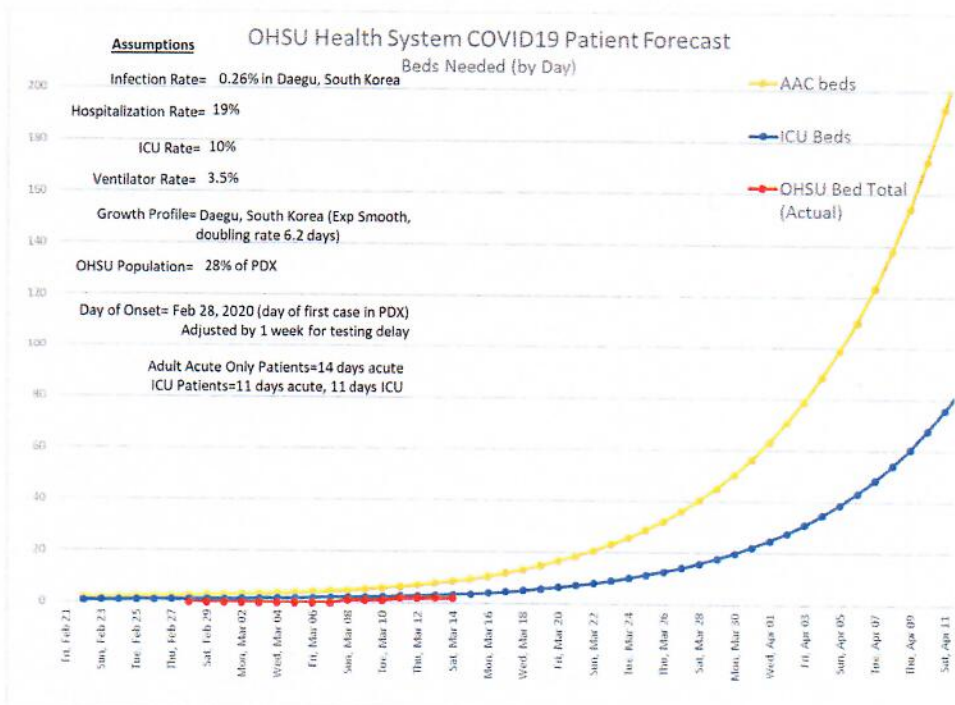
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Peter Graven, PhD

Office of Advanced Analytics, BIAA, OHSU

Executive Summary

The purpose of this report is to estimate the number of people who are likely to need hospital services at OHSU (including Hillsboro Medical Center and Adventist Health). Secondarily the model is used to assess the capacity of the Portland area. These estimates can be used to assess availability of beds, staff, and equipment for treating patients likely to need services.

This model uses results from an epicenter (Daegu region in South Korea) that has been hit by COVID-19 prior to Portland and uses their experience to predict ours. There are other localities in those countries with milder experience. However, that experience is because actions[1] used to curtail spread in the epicenters were applied pre-emptively to other localities before large infection rates were detected. For that reason, until we see national dictates, or local actions mirroring extreme measures of epicenters, Portland should expect to follow the path of other epicenters.

Results

OHSU Health System COVID19 Patient Forecast
Beds Needed (by Day)

Assumptions
- Infection Rate= 0.26% in Daegu, South Korea
- Hospitalization Rate= 19%
- ICU Rate= 10%
- Ventilator Rate= 3.5%
- Growth Profile= Daegu, South Korea (Exp Smooth, doubling rate 6.2 days)
- OHSU Population= 28% of PDX
- Day of Onset= Feb 28, 2020 (day of first case in PDX) Adjusted by 1 week for testing delay
- Adult Acute Only Patients=14 days acute ICU Patients=11 days acute, 11 days ICU

Legend: AAC beds, ICU Beds, OHSU Bed Total (Actual)

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[1] Wang, C. J., Ng, C. Y., & Brook, R. H. (2020). Response to COVID-19 in Taiwan: Big Data Analytics, New Technology, and Proactive Testing. JAMA. https://jamanetwork.com/journals/jama/fullarticle/2762689 Key Supplementary content found at: https://tinyurl.com/rnqbtkm

In order to smooth the incidence series so it does not just reflect the testing lags found in other countries. The counts of people are redistributed to follow the underlying exponential growth model parameter. Several modelers have used an estimate for the doubling time of 6.2 days[10]. Some estimates of the doubling time in the early period of china were as low as 2.5[11]. The Portland metropolitan area was presumed to have a cases beginning on February 1, 2020. From that period the expected number of infected was driven by the traditional exponential growth model shown below.

(1) $Y = 1 * 2^{((\text{days since } 2/1/2020)/6.2)}$

Figure 1. Growth Profile, New Infected (tested) Cases Per Day Since Onset
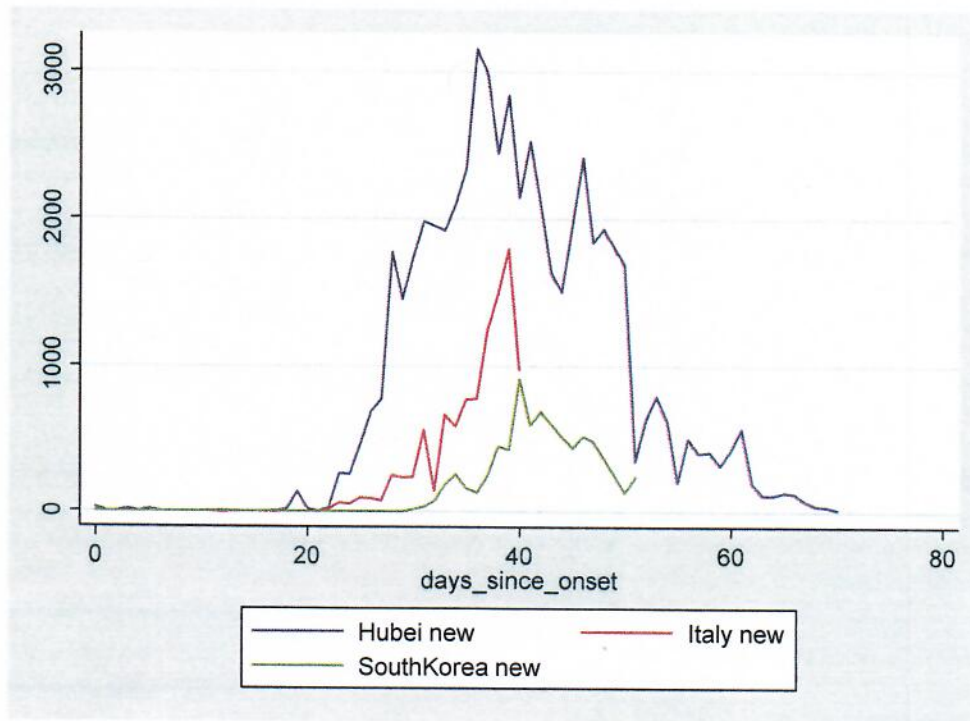
Interventions

Currently Oregon has deployed some NPIs that may cause incidence to decrease. We are working to estimate the impact and whether additional NPIs are needed. One study of data from China[12] indicated 3 particular actions

1) inter city travel bans,

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[10] Wu, J. T., Leung, K., & Leung, G. M. (2020). Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study. The Lancet, 395(10225), 689-697. Found at: https://www.sciencedirect.com/science/article/pii/S0140673620302609

[11] Lai, P. Y., Lee, Y., Liu, M., Ofori, S. K., & Roosa, K. M. Epidemic doubling time of the COVID-19 epidemic by Chinese province. Found at: https://www.medrxiv.org/content/10.1101/2020.02.05.20020750v4.full.pdf

[12] Lai, S., Ruktanonchai, N. W., Zhou, L., Prosper, O., Luo, W., Floyd, J. R., ... & Tatem, A. J. (2020). Effect of non-pharmaceutical interventions for containing the COVID-19 outbreak: an observational and modelling study. medRxiv. Found at:
https://www.worldpop.org/resources/docs/COVID_NPI/WorldPop_COVID-19_outbreak_updated_March_04_2020.pdf