Methods

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|   | Respiratory Therapist | Intensivist | Hospitalist | Critical Care Registered Nurses | Pharmacists |
| Demand Data  | Institute for Health Metrics and Evaluation (IHME) COVID-19 Health Care Utilization Projections (currently 04-08 version) |
| Staffing Model  | UCSF Healthforce Center - Rough Guide to Emergency Hospital Staffing for COVID-19 Response (Under Surge Staffing).  |
| No. of 12-Hr Shifts per week  | 4 |   |
| Case load per FTE per ICU shift (Non-surge/Surge) | 4 / 6 | 7 / 10 | N/A | 1 / 3 | 8 / 30 |
| Case load per FTE per acute care shift (Non-surge/Surge) | 8 / 12 | N/A | 10 / 18 | N/A | 8 / 30 |
| Supply Data | AHA Annual Hospital Survey FY 2018 | PECOS PUF 2020.01 | PECOS PUF 2020.01 | National Sample Survey of Registered Nurses 2018 | BLS Occupational Employment Statistics 2019 |
| NPPES 2020.04 | NPPES 2020.04 | BLS Occupational Employment Statistics 2019 |
| Medicare Part B PUF 2017 | Medicare Part B PUF 2017 |   |
| Notes on Supply | AHA AHS reports number of RTs in every hospital. We aggregate it up to state level. | We identify intensivists using a list of critical care medicine taxonomy codes from NPPES data and critical care specialty in PECOS data. We then find which intensivists billed Medicare for ICU services in 2017. Intensivists register in NPPES after 2017 are included as active intensivists. | We identify hospitalists using two methods: 1) we identify self-reported hospitalists using specialty or taxonomy codes from NPPES and PECOS and we confirm that they billed inpatient E&M services in 2017 using Medicare PUF. 2) we identify physicians with primary care specialties (IM, FM, OB/GYN) in PECOS data. We then find which physicians billed Medicare for inpatient services for more than 90% of their E&M services in 2017.  | We first calculate the ratio between hospital-based RNs and hospital-based Clinical Nurse Specialists (CNSs) for every state using NSSRN. | We obtain hospital-employed pharmacists from BLS OES data for every state. |
| We then identify the proportion of hospital-based RNs who provides critical care (Critical Care RNs) in every state using NSSRN. Eight states are lumped into 2-state regions. We applied the same proportion for every state. |
| We obtain number of RNs + CNSs employed by hospitals in every state from BLS OES (i.e., the registered nurse category in OES includes both RNs and CNSs). We apply the proportion of RNs-to-CNSs o to back out the number of hospital-based RNs in every state. We then apply the proportions of Critical Care RNs to estimate the number of Critical Care RNs in every state.   |
| Non-COVID-19 Patients | Medicare Hospital Cost Reports: We take the total number of inpatient days for hospital and total number of ICU patient days (annualized to Calendar Year 2018). We divided those number by 365 to get the average daily non-COVID-19 occupancy of general acute care hospital beds and ICU beds. When relevant for acute care beds, we applied 25% reduction in occupancy to account for cancellation of elective procedures. We do not apply reduction in ICU occupancy as we see it as a hard demand.  |
| Calculation | We assume all professions satisfy COVID-19 demands first and then serve other non-COVID-19 patients. We divide the demand data from IHME (multiply by 3.5 to adjust for shifts) by case load to calculate the number of FTEs needed for every profession. We then compare the demand data (in FTEs) against the supply data with various health care worker attrition rate (to account for sickness, fatigue, and/or other reasons). We categorize the states by whether they have enough supply for every profession under 3 different demand scenarios (low, mean, high). We then present number of providers available for non-COVID-19 patients (if any left) and average patients every remaining provider need to take care of (if any left). We only present shortage/surplus for the future date with highest demands.  |