

New Mexico Medical Advisory Team (MAT) Assessment

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| Workgroup Name: Clinical Care PPE Subgroup | Date: 4/3/2020 |
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Question or task for assessment or Protocol name/description

1. What is the clinical burn rate for PPE and how much PPE should the state have available to get through this crisis?

Recommendations

We recommend the following minimal supply stocks in Personal Protection Equipment (PPE) for the state of NM to supply hospitals with necessary protection during the COVID-19 crisis (in individual items) **for a 12-month time period:**

- Respirators (N-95 level or equivalent): 1,000,000
- Gowns: 1,300,000
- Eyewear/goggles/face shields: 700,000
- Gloves (all sizes): 6,300,000

The calculated burn rates per patient/24hrs are mathematically derived **under maximal conservation measures and recycling efforts:**

| PPE | Daily Burn Rate (24hrs) | # of Patients hospitalized at Peak Week | Daily PPE needed during Peak Week | PPE needed for 7-day par level at Peak |
|---------------------------------|----------------------------|---|---|--|
| N95 | 1.27 | 3,476 | 4,414 | 30,899 |
| Eye Shield / Goggles | 0.9 | 3,476 | 3,128 | 21,897 |
| Gloves | 8.6 | 3,476 | 29,891 | 209,235 |
| Gowns | 1.75 | 3,476 | 6,082 | 42,577 |

These calculations were estimated for hospitals and do NOT include ambulatory, ambulance services, skilled nursing facilities etc. under maximal conservation and recycling strategies.

Analysis, including triggers and thresholds if applicable

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Due to a lack of standard models to calculate accurate burn rates, we made very broad assumptions about burn rates as clinical patient interactions requiring PPE are highly variable. We recommend using these calculations with extreme caution, especially when using to calculate statewide estimated PPE needs. Validation against real-time box counts will be needed to fine tune and adjust supply levels during this crisis.

The recommended burn rates were derived from a mathematical model that included the nursing patient ratios, a mix of ICU and Med/Surg beds and additional staff entering rooms. The model assumes PPE is used with maximal preservation methods applied including continuous and intermittent use of PPE, cohorting of patients, sharing of staff responsibilities, and recycling methodologies implemented.

Extrapolations to state level and level of disease spread were based on the predictive model:

- Time period: 12 months
- Number of COVID-19 positive patients in NM: 1,226,943
- Rate of hospitalization: 3.75%
- Rate of ICU admissions: 1.25%
- Average hospitalization length: 12 days
- Nursing/Patient ratio: 1:2 (ICU), 1:5 (Med/Surg)

Validation:

Estimations from this model were validated through frontline staff at two large hospital systems in Albuquerque, and utilizing a box counting methodology from CDC (<https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html>). Both methodologies revealed PPE usage on site was higher by a factor of 10. We believe that this is due to the low number of hospitalized patients which has not yet led to maximum conservation implementation, as well as a lack of cohorting of patients.

Literature from clinical experience with influenza patients and SARS have revealed PPE usage higher by a factor of up to 20 (e.g. respirator usage during H1N1 in 2009 was 3-5/24hrs; during observational studies in the UK, 13 respirators were used/24hrs). Again, we believe this is due to the lack of cohorting and maximal preservation strategies (see references).

We believe that a continued evaluation of burn rates by using the CDC box counting methodology will allow for fine tuning and validation of these estimations. The Clinical Care Workgroup/PPE Subgroup will continue to further assess and develop a more detailed response to this question over the coming week.

Red flags, major concerns and recommendation sunset

There are no standard models available. All assumptions in this estimate are based on a locally developed mathematical model, validated by frontline medical staff experiences and limited box counts. The calculations do not include the migration of patients within a hospital (e.g. from ED to Med/Surg floor to ICU). They also do not easily consider all the ancillary services use of PPE (e.g. Radiology, Nutrition, Pharmacy, Environmental Services). This estimation is solely based on Acute Care facilities and does not include other care facilities (e.g. SNF) or ambulatory and ambulance services.

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Gaps in knowledge or science related to topic

Assessing PPE per hospitalization is a body of work that needs more time to be fully vetted, as there are a significant number of clinical variables to be addressed. Using the CDC box counting strategy and running it against the number of COVID-19 positive and PUI patients in the near future should allow for a higher degree of validation.

Level of consensus within workgroup

| Total | Moderate | Limited |
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| | X | |

Contributors

MAT Clinical Care – PPE Subgroup

- Norbert Topf, MD
- Jeff Salvon-Harman, MD
- Jon Femling, MD

References or resources for further information

The following references were used for validation purposes:

Institute of Medicine 2008. Preparing for an Influenza Pandemic: Personal Protective Equipment for Healthcare Workers. Washington, DC: The National Academies Press.

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Development of decision support documents to assist decision making during a pandemic influenza response: evidence for personal protective equipment and antiviral measures, Dr Kathryn Glass, Stephanie Davis, Laura Martich, Prof Geoffrey N Mercer, National Centre for Epidemiology and Public Health, College of Medicine, Biology and Environment, Australian National University

Personal protective equipment in an influenza pandemic: a UK simulation exercise
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