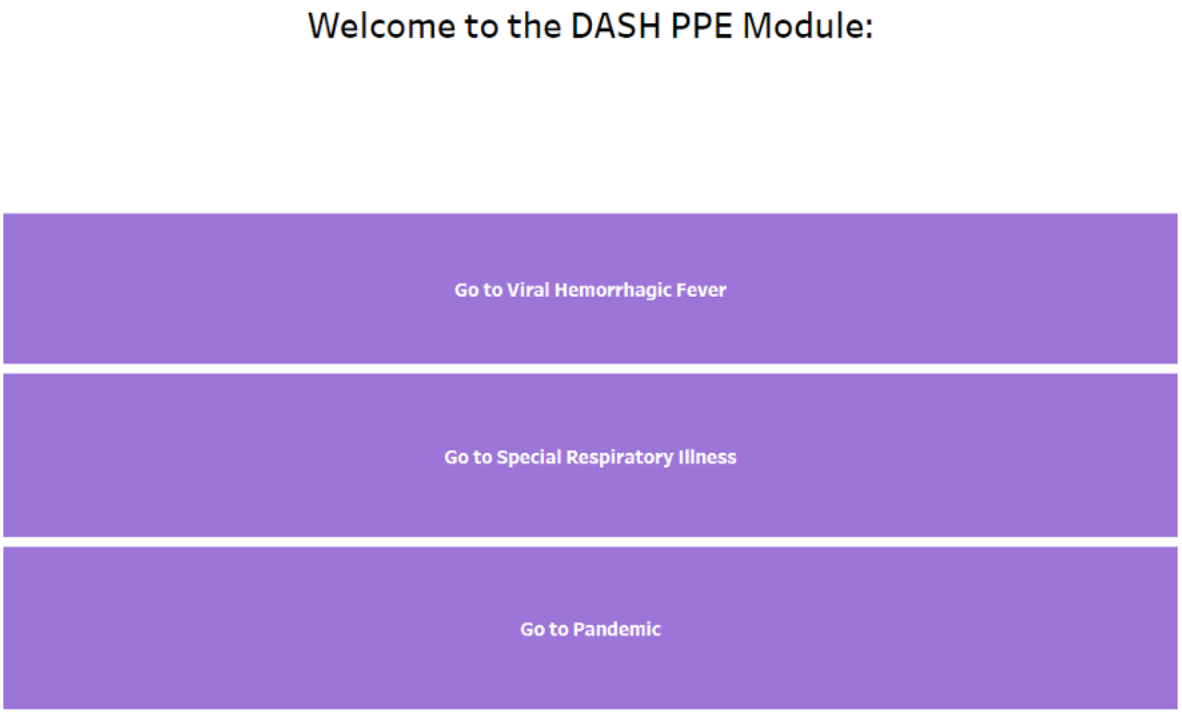
Table of Contents

Index Page and Tableau Navigation

From the Index page, select the scenario for which you would like to use the Disaster Available Supplies in Hospitals (DASH) Personal Protective Equipment (PPE) Module to estimate your hospital's needs.



There is a Tableau toolbar at the bottom of each screen of the DASH PPE Module .

Do not use the first four icons:

The remaining three icons provide the following functionalities:

- Click on the share icon to send a link with your inputs to a colleague. You can also save the link in your browser so you may return to your work in progress at a later time.
- The download icon allows you to download and save or print any screen.

- Click on the full screen icon to view any page in full screen mode.

NOTE: Your browser settings may force the module to reset after a period of inactivity. If the module resets, you will need to re-enter your inputs. If you are not able to complete the entire module in one sitting, we encourage you to either:

- Click on the download icon and select "Image" to save a .png of the current screen or select either "PDF" or "PowerPoint" and then "This View" or "Specific sheets from this workbook" after you complete each special pathogen of concern, or
- Click on the share icon and bookmark the URL.

Additional details on both options may be found in the How to Save Inputs and Results section of these instructions.

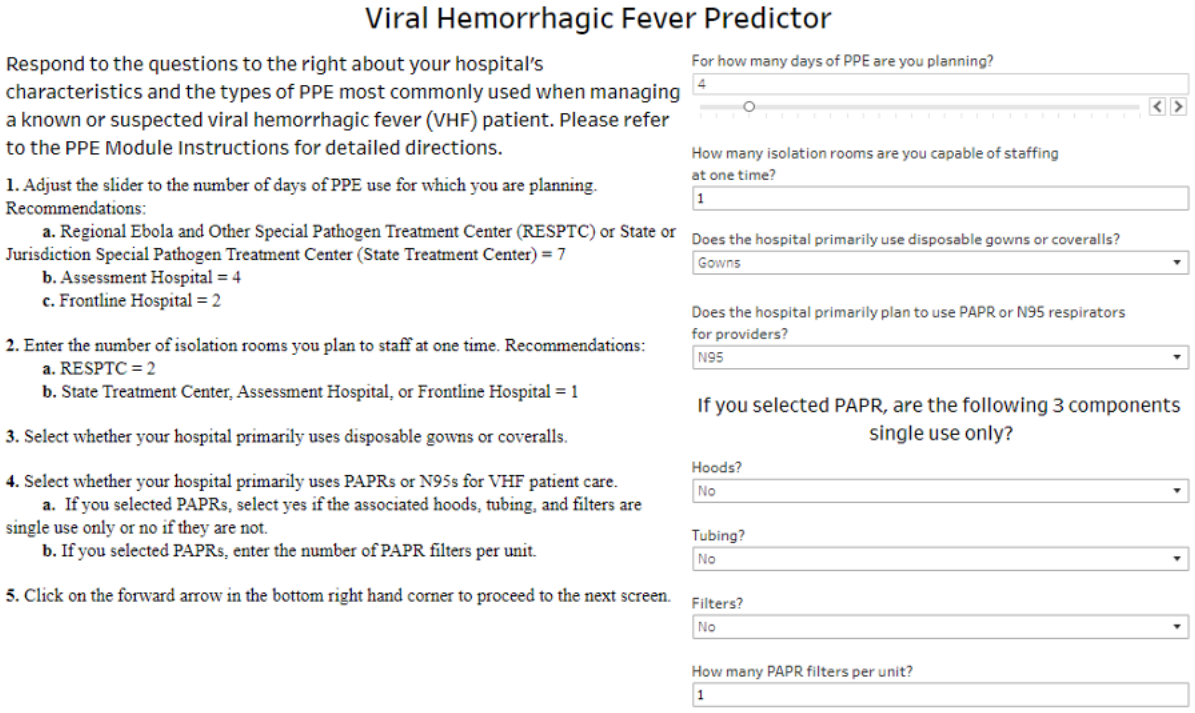
For assistance using the DASH PPE Module, please contact askasprtracie@hhs.gov or 1-844-5-TRACIE.

Viral Hemorrhagic Fever Predictor

This screen allows you to enter information about your hospital's characteristics and the types of PPE your hospital personnel most commonly use when managing a patient known or suspected to be infected with a viral hemorrhagic fever (VHF). Consider your hospital's status as you respond to the questions.

- Regional Ebola and Other Special Pathogen Treatment Center (RESPTC)
- State or Jurisdiction Special Pathogen Treatment Center (State Treatment Center)
- Assessment Hospital
- Frontline Hospital

If you do not know your hospital's status, use the recommendations for Frontline Hospitals.



1. **Adjust the slider to the number of days of PPE use for which you are planning.**

    a. The number of days entered should be informed by your hospital role. All hospitals should have a plan to restock for additional days as required.

    b. RESPTCs and State Treatment Centers should plan to care for patients throughout the course of their illness. The suggested minimum number of days of PPE is 7.

    c. Assessment hospitals should plan to initiate care and diagnostic testing. The suggested minimum number of days of PPE is 4 (96 hours) to allow for testing and results.

    d. Frontline hospitals should plan to identify and isolate patients suspected of being infected with a VHF. The suggested minimum number of days of PPE is 2 (48 hours) to allow for transfer delays.

    e. VHF PPE planning assumes that re-supply of PPE is possible and that the risk of many VHF patients presenting at once to a hospital are small.

2. **Enter the number of isolation rooms you plan to staff at one time. PPE usage is dependent on the number of room entries by staff per shift.**

    a. For example, if you plan to manage up to 2 patients concurrently, enter 2 if you plan for each patient to be in a separate room. Enter 1 if you plan to cohort 2 confirmed patients per room. (NOTE: Patients under investigation should not be cohorted.)

    b. The number of patients you plan to manage at one time is informed by your hospital's infrastructure and status.

    c. RESPTCs are expected to have the capability to care for at least 2 VHF patients at the same time. The recommended minimum number of rooms for RESPTCs is 2.

    d. State Treatment Centers are expected to have the capability to care for at least 1 VHF at a time. The recommended minimum number of rooms for State Treatment Centers is 1.

    e. Frontline hospitals are expected to isolate and inform about suspected VHF patients with rapid transfer to a facility to care for the patient for the duration of their illness. Assessment hospitals are expected to isolate, inform, and then assess and initiate treatment for suspected VHF patients before releasing or transferring patients to a facility capable of definitive care. Therefore, frontline and assessment hospitals are unlikely to manage multiple VHF patients in multiple rooms at one time and should generally enter 1 for the number of rooms.

3. **Select whether your hospital primarily uses disposable gowns or coveralls.**

    a. Hospitals may use a mix of disposable gowns and coveralls along with a hood or head cover. Please select the *primary* option your hospital plans to use for VHF patient care.

4. **Select whether your staff will primarily use powered air purifying respirators (PAPRs) *or* N95 respirators when caring for a VHF patient.**

    a. Hospitals may use a mix of respirator types. As a planning tool, this module cannot account for all possible combinations. If your hospital uses both N95 respirators and PAPRs, please select the *primary* type of respirator you plan to use.

b. If you selected PAPRs, you must also account for their various components, which may need to be replaced after a single room entry/exit.

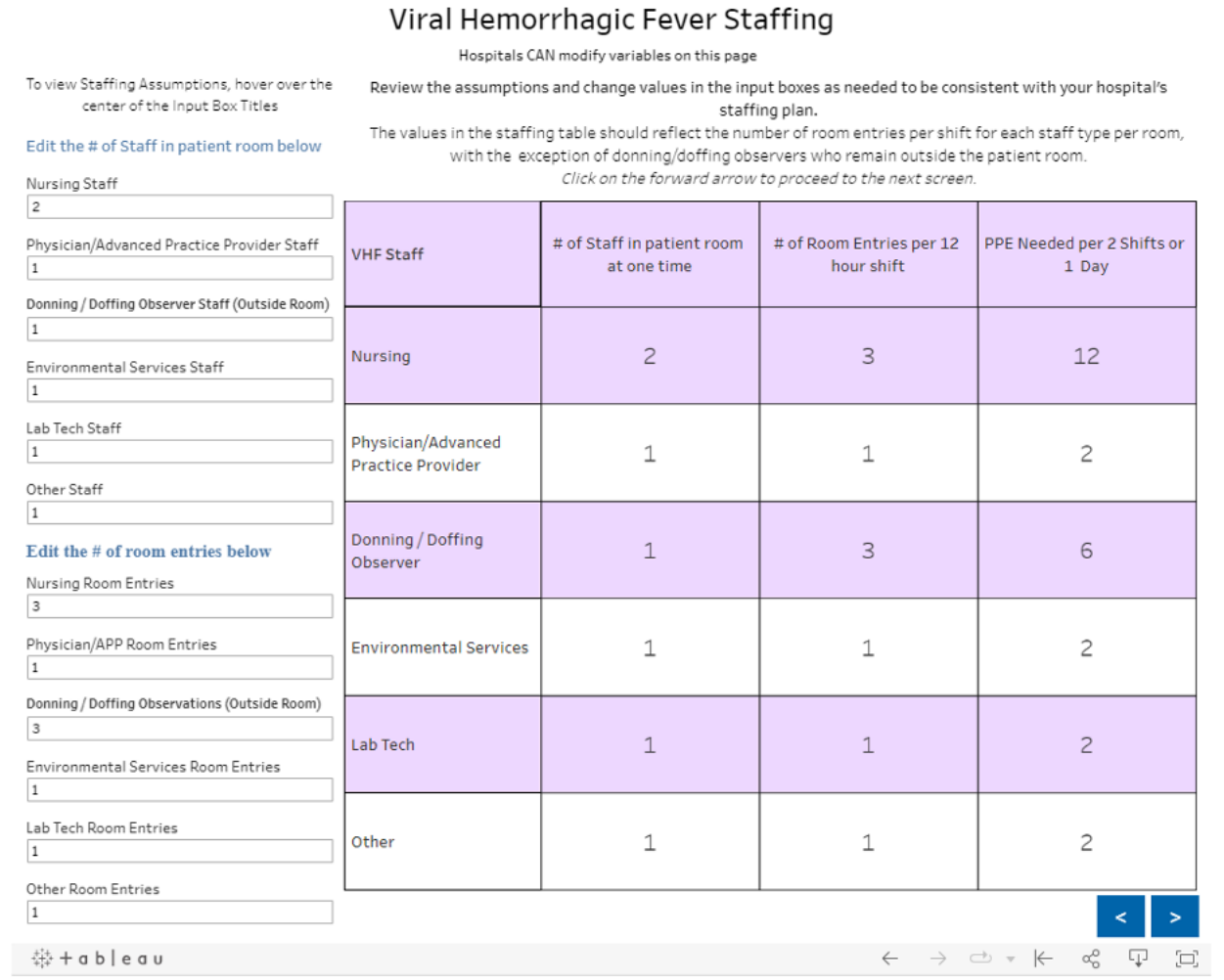
   i. Indicate whether the hoods, tubing, and filters associated with the PAPR model most commonly used by your hospital are intended for single use or are reusable.

   ii. Enter the number of filters for the helmet or external motor of the PAPR model most commonly used by your hospital.

5. **Click on the forward arrow to proceed to the next screen.**

Viral Hemorrhagic Fever Staffing

6. **The staffing table is pre-filled; review the assumptions and change values as needed to be consistent with your hospital's staffing plan.**



a. The values in the staffing table should reflect the number of room entries per 12-hour shift for each staff type per room, with the exception of donning/doffing observers who remain outside the patient room.

b. Consider remote monitoring and other control practices that may reduce the amount of time providers need to remain inside the patient room or the number of times they need to enter. These practices may reduce the amount of PPE needed.

c. Other hospital staff not entering the patient room will also need to don PPE appropriate to their location and role. These additional PPE needs are not included in the PPE Module calculations. For example, consider the additional PPE needs of hospital emergency department (ED) staff who may come in close contact to a patient under investigation, laboratory workers and others at risk through procedures outside the room, and waste management staff.

Staffing Assumptions (NOTE: These assumptions can also be viewed by hovering over the center of input box titles.):

Nursing	• Assumes 2 nurses enter the patient room every 4 hours (or one nurse entering every 2 hours). • Nurses may not be in the room at all times. • Only 1 nurse may be required for a stable patient, with two-person tasks accomplished during a brief overlap period, if needed. • Consider increasing nurse/patient ratios when managing pediatric and/or pregnant patients.
Physician/Advanced Practice Provider	• Assumes 1 room entry per 12 hour shift. • Optimally, room entry/exit should be timed to correspond with nurse entry/exit to minimize PPE use by donning/doffing observer.
Donning/Doffing Observer	• Assumes PPE usage only when observing provider PPE donning and doffing at room entry/exit. • Assumes 1 set of PPE per room entry, which could include 2 staff entering and 1 exiting, for example. Observer PPE consumption rates are tied to nursing room entries.
Environmental Services	• Assumes 2 room entries for cleaning per 24 hours. • Enter 0 environmental services staff if nursing staff performs these duties. • Consider additional PPE needs for terminal cleaning/ decontamination.
Lab Tech	• Assumes 2 room entries for lab draws per 24 hours. • Enter 0 lab techs if nursing staff performs these duties.
Other Personnel	• Includes spiritual care, biomedical, nurse aids, respiratory therapists, autoclave operators, and other personnel specified in your hospital's plan who may enter the patient room. • May also include caregivers of pediatric patients.

7. **Click on the forward arrow to proceed to the next screen.**

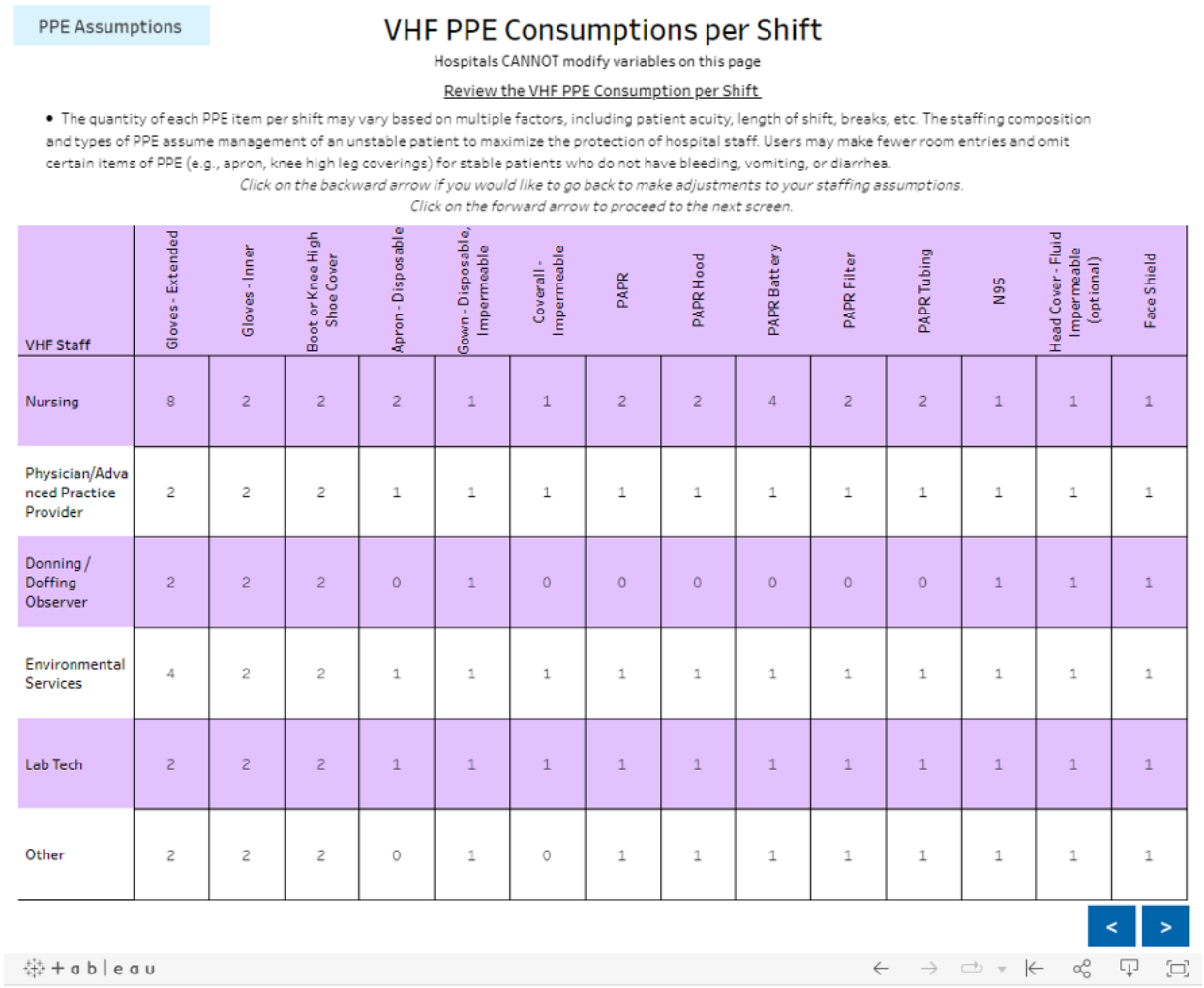
Viral Hemorrhagic Fever PPE Consumption Per Shift

8. **Review the VHF PPE Consumption per Shift.**

   a. The quantity of each PPE item per shift may vary based on factors such as patient acuity, length of shift, breaks, and whether more than one patient is cared for in a room.

   b. The staffing composition and types of PPE assume management of an unstable patient to maximize the protection of hospital staff. Users may make fewer room entries and omit certain items of PPE (e.g., apron, knee high leg coverings) for stable patients who do not have bleeding, vomiting, or diarrhea.

Note: You cannot change the PPE assumptions displayed on this screen.



VHF Staff	Gloves - Extended	Gloves - Inner	Boot or Knee High Shoe Cover	Apron - Disposable	Gown - Disposable, Impermeable	Coverall - Impermeable	PAPR	PAPR Hood	PAPR Battery	PAPR Filter	PAPR Tubing	N95	Head Cover - Fluid Impermeable (optional)	Face Shield
Nursing	8	2	2	2	1	1	2	2	4	2	2	1	1	1
Physician/Advanced Practice Provider	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Donning / Doffing Observer	2	2	2	0	1	0	0	0	0	0	0	1	1	1
Environmental Services	4	2	2	1	1	1	1	1	1	1	1	1	1	1
Lab Tech	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Other	2	2	2	0	1	0	1	1	1	1	1	1	1	1

PPE Consumption Assumptions:

Gloves	• Assumes 3 outer glove changes by nursing staff, 1 outer glove change by environmental services staff, and 0 outer glove changes per room entry by other provider types due to shorter durations in the care environment. • Gloves should have extended cuffs. • Some hospitals plan to don 3 pairs of gloves as part of their ensemble or don a third pair when performing specific tasks such as specimen collection or waste management. This is not included in calculations. • If confirmed patients are cohorted, an increased number of glove changes may be required when moving between patients.
Boot/Shoe Covers	• Disposable boot/shoe covers used with gowns must extend at least to mid-calf and be impermeable. • •Dedicated boots or waterproof booties may be used in conjunction with coveralls. • Booties must be able to tolerate abrasion from the floor. • Reusable boots must have a defined decontamination process.
Apron	• Aprons should be disposable and impermeable.
Gown/Coverall	• Providers should either wear a gown that passes ANSI/AAMI PB70 Level 4 requirements or a coverall that passes ASTM F1671 (13.8 kPa) or ISO 16604 ≥ 14 kPa. • The chosen item should be disposable and impermeable. • For coveralls with a built in hood, the hood should be tucked in and not used.
PAPR/N95	• Hospitals may choose to use N95 respirators or PAPRs (including controlled air purifying respirators [CAPRs]). DASH calculates the type of respiratory protection your hospital *primarily* uses. • If using N95 respirators: » Splash protection is required (e.g., face shield) – one per room entry » Impermeable head covers are also required (e.g., surgical hood) – one per room entry. • If using PAPRs: » PAPR blower units/systems may be reused post decontamination. Therefore, the quantity of PAPRs needed per shift and per day should be based on the number of persons who may be using a PAPR and the time needed to decontaminate and ensure these products are ready for use. Assumptions reflect 2 PAPRs for nurses as they are unable to "hand off" units when leaving/entering the room unless the entire hood/hose assembly is disposable.

- Hospital policy for decontamination of the units should be considered when determining PAPR needs.
- One PAPR will be needed for each staff member per shift who will be in direct contact with the patient. Hospitals should consider having 1.5 to 2 shifts worth of PAPR blower units/systems on hand to account for staff changeover and decontamination time.
- PAPR battery maintenance and ensuring charged batteries are always available is another key consideration. Calculations include additional batteries to allow charging.
- Follow manufacturer guidance to determine the need to replace/dispose of filters. Filters must have a HEPA component. Several manufacturers have added specific instructions for cleaning, disinfection, and decontamination after use with a known or suspected Ebola patient. Calculations assume the filter is being changed only when filtering capacity is reached (i.e., airflow falls below minimums) unless the user indicates that filters are single use.

9. Click on the back arrow if you would like to adjust your staffing assumptions.

10. Click on the forward arrow to proceed to the next screen.

References for Assumptions:

CDC. (2015). For U.S. Healthcare Settings: Donning and Doffing Personal Protective Equipment (PPE) for Evaluating Persons Under Investigation (PUIs) for Ebola Who are Clinically Stable and Do Not Have Bleeding, Vomiting, or Diarrhea. U.S. Department of Health and Human Services.

This document provides guidance to healthcare workers on donning and doffing personal protective equipment while evaluating a clinically stable person under investigation who does not have bleeding, vomiting, or diarrhea.

CDC. (2015). Guidance on Personal Protective Equipment (PPE) to be Used by Healthcare Workers during Management of Patients with Confirmed Ebola or Persons under Investigation (PUIs) for Ebola who are Clinically Unstable or Have Bleeding, Vomiting, or Diarrhea in U.S. Hospitals, Including Procedures for Donning and Doffing PPE. U.S. Department of Health and Human Services.

This webpage includes guidance on the types of personal protective equipment that should be used by those caring for patients with Ebola. It also includes steps for donning and doffing PPE as well as what trained observers should do to ensure these steps are followed.

National Institute for Occupational Safety and Health. (2018). Considerations for Selecting Protective Clothing Used in Healthcare for Protection Against Microorganisms in Blood and Body Fluids. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.

This webpage of the National Personal Protective Technology Laboratory provides background information on understanding different types of worker exposures, discusses the selection of protective clothing, identifies current healthcare protective clothing standards and specifications, and includes links to additional information.

OSHA. (2014). PPE Selection Matrix for Occupational Exposure to Ebola Virus. U.S. Department of Labor.

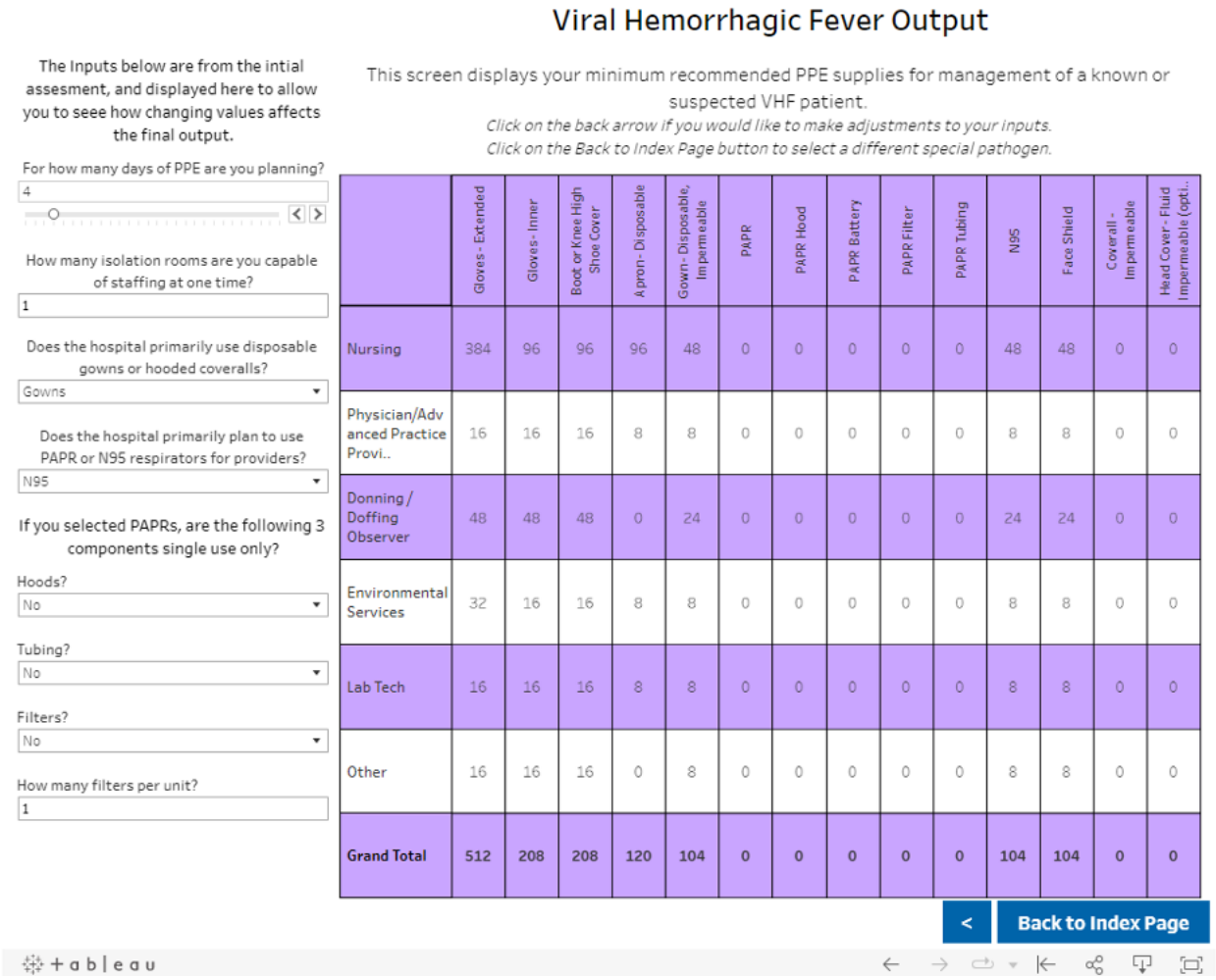
This resource shares information on the type of PPE to be worn in various situations (e.g., normal work activities, casual interaction, providing medical and supportive care, cleaning and disinfecting environments, and dealing with waste).

OSHA. (n.d.). Ebola Control and Prevention. (Accessed 6/1/2022). U.S. Department of Labor.

This webpage includes background information, guidance, and links to resources for specific types of workers who may be exposed to Ebola-contaminated environments.

Viral Hemorrhagic Fever Output

This screen displays your minimum recommended PPE supplies for management of confirmed or suspected VHF patients based on the number of isolation rooms you plan to use at one time.



	Gloves - Extended	Gloves - Inner	Boot or Knee High Shoe Cover	Apron - Disposable	Gown - Disposable, Impermeable	PAPR	PAPR Hood	PAPR Battery	PAPR Filter	PAPR Tubing	N95	Face Shield	Coverall - Impermeable	Head Cover - Fluid Impermeable (opti..
Nursing	384	96	96	96	48	0	0	0	0	0	48	48	0	0
Physician/Advanced Practice Provi..	16	16	16	8	8	0	0	0	0	0	8	8	0	0
Donning / Doffing Observer	48	48	48	0	24	0	0	0	0	0	24	24	0	0
Environmental Services	32	16	16	8	8	0	0	0	0	0	8	8	0	0
Lab Tech	16	16	16	8	8	0	0	0	0	0	8	8	0	0
Other	16	16	16	0	8	0	0	0	0	0	8	8	0	0
Grand Total	**512**	**208**	**208**	**120**	**104**	**0**	**0**	**0**	**0**	**0**	**104**	**104**	**0**	**0**

11. **Change your inputs on the left side of the screen, if desired.**

    a. The inputs displayed are what you entered on the VHF Predictor screen. If you change these inputs, the values on the outputs table adjust automatically.

12. **Click on the download or share icon on the Tableau toolbar at the bottom of the screen to record your work.**

    a. You CANNOT save the values you input or your outputs in the PPE Module itself. We encourage you to save or print your results to PDF using the download option or save the shared link in your browser favorites.

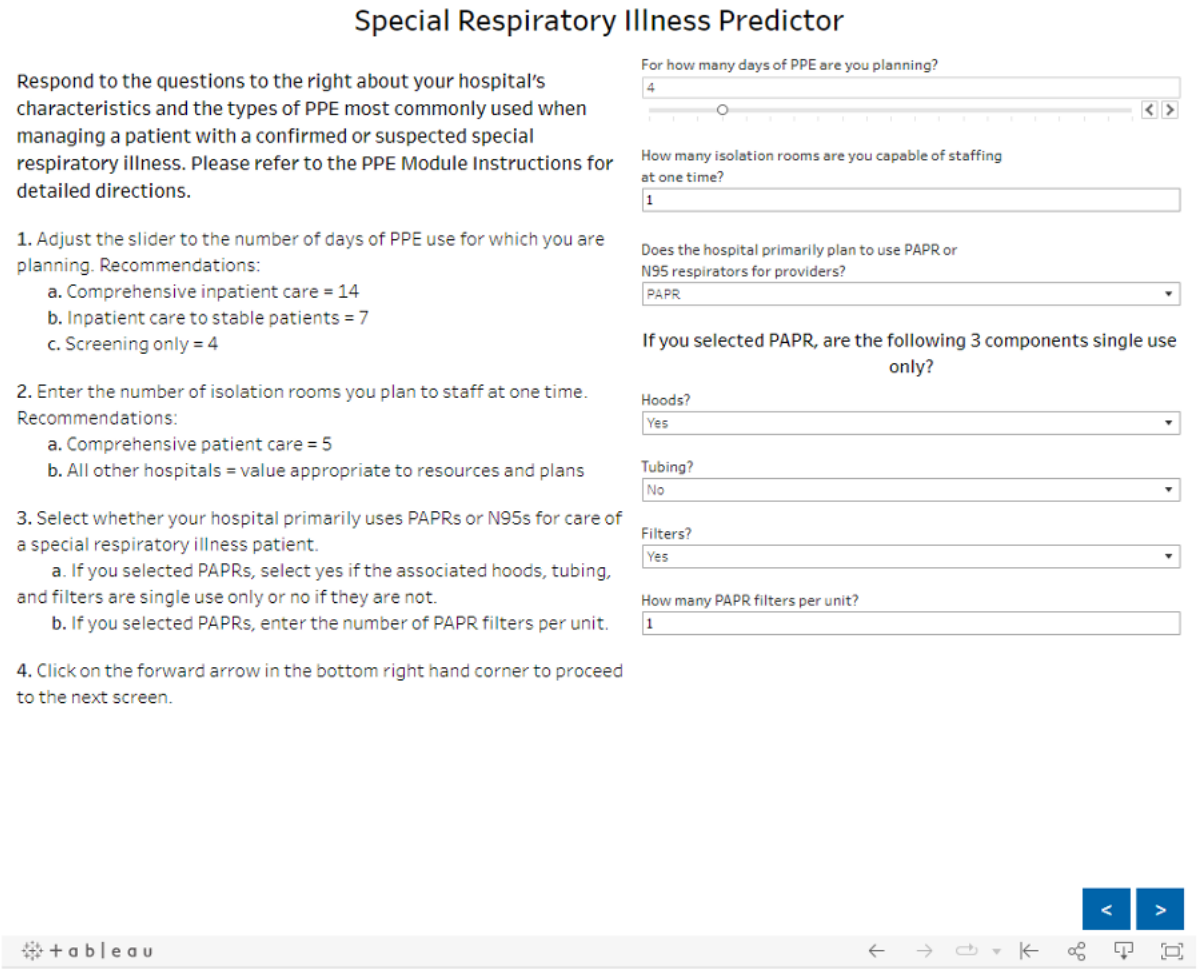
    b. Additional details are available in the How to Save Inputs and Results section. Make sure to download or save your shared link before exiting the PPE Module as all inputs will be reset when you return.

13. **Click on the Back to Index Page button to return to the main DASH PPE Module page and select a different special pathogen.**

Special Respiratory Illness Predictor

This screen allows you to enter information about your hospital's characteristics and the types of PPE your hospital most commonly uses when managing a patient with a confirmed or suspected special respiratory illness. Consider your hospital's role as you respond to the questions:

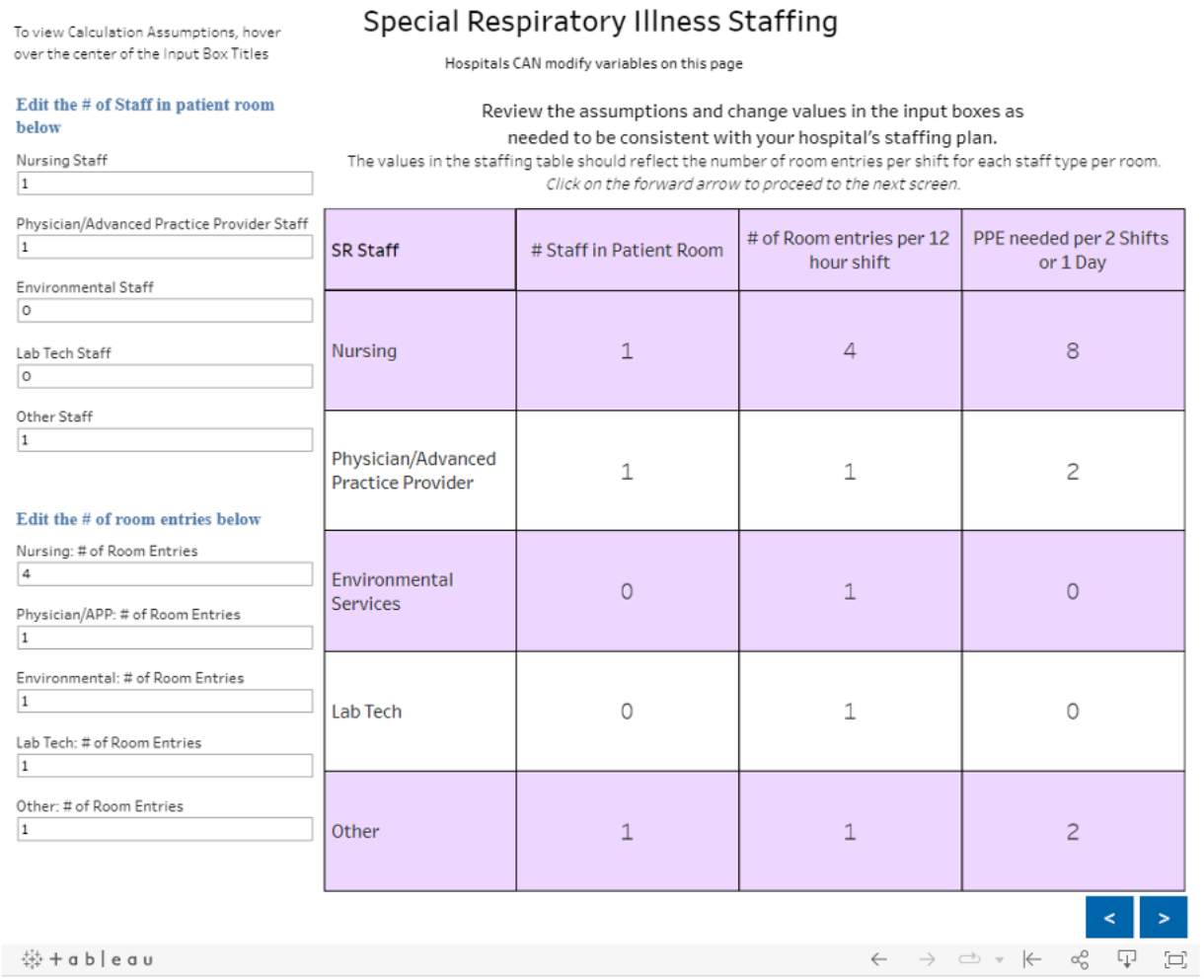
- Screening only (no inpatient special respiratory care)
- Inpatient care for stable patients only
- Comprehensive inpatient care, potential for multiple patients



1. **Adjust the slider to the number of days of PPE use for which you are planning.**
    a. The number of days entered should be informed by your hospital role. All hospitals should have a plan to restock for additional days as required.
    b. The minimum number of days for hospitals providing comprehensive inpatient care is 14.
    c. The minimum number of days for hospitals providing inpatient care to stable patients is 7.
    d. The minimum number of days for hospitals only providing screening is 4. This number accounts for the possibility of consecutive patients rather than a single patient.
    e. These recommendations assume re-supply for special respiratory illness PPE is possible.
2. **Enter the number of isolation rooms you plan to staff at one time as PPE usage is dependent on the number of room entries by staff per shift.**
    a. For example, if you plan to manage up to 6 patients concurrently, enter 6 if you plan for each patient to be in a separate room or 3 if you plan to cohort 2 confirmed patients requiring similar PPE per room. Patients under investigation should not be cohorted.
    b. The number of patients you plan to manage at one time is informed by your hospital's capability.
    c. The minimum number of rooms for hospitals providing comprehensive inpatient care is 5. This number reflects their capacity to simultaneously care for multiple patients at various stages of illness.
    d. Other hospitals are unlikely to manage multiple patients in multiple rooms at one time, but users should enter a value appropriate to their resources and plans.
3. **Select whether your hospital primarily uses PAPRs *or* N95 respirators for providers.**
    a. Hospitals may use a mix of respirator types. As a planning tool, this module cannot account for all possible combinations. If your hospital uses both N95 respirators and PAPRs, please select the *primary* type of respirator you plan to use to care for a known or suspected special respiratory illness patient.
    b. If you selected PAPRs, you must also account for their various components, which may need to be replaced after a single room entry/exit.
        i. Indicate whether the hoods, tubing, and filters associated with the PAPR model most commonly used by your hospital are intended for single use or are reusable.
        ii. Enter the number of filters for the helmet or external motor of the PAPR model most commonly used by your hospital.
4. **Click on the forward arrow to proceed to the next screen.**

Special Respiratory Illness Staffing

The staffing table is pre-filled based on the stated assumptions below.



5. **Review the assumptions and change values in the input boxes as needed to be consistent with your hospital's staffing plan.**

   a. The values in the staffing table should reflect the number of room entries per shift for each staff type per room.

   b. Consider remote monitoring and other control practices that may reduce the amount of time providers need to remain inside the patient room or the number of times they need to enter the room. These practices may reduce the amount of PPE needed.

   c. Other hospital staff will also need to don PPE appropriate to their location and role (e.g., ED staff initially triaging the patient). These PPE needs are not included in the calculations.

Staffing Assumptions (NOTE: These assumptions can also be viewed by hovering over the center of the input box titles.):

Nursing	• Assumes 4 nurse entries into the room per 12-hour shift. • Consider increasing nurse/patient ratio when managing pediatric and/or pregnant patients.
Physician/Advanced Practice Provider	• Assumes 1 room entry per 12-hour shift.
Environmental Services	• Assumes 2 room entries for cleaning per 24 hours. • Enter 0 environmental services staff if nurse performs these duties.
Lab Tech	• Assumes 2 room entries for lab draws per 24 hours. • Enter 0 lab techs if nurse performs these duties.
Other Personnel	• Includes spiritual care, biomedical, trainees, and other personnel specified in your hospital plan. May also include caregivers of pediatric patients.

6. **Click on the forward arrow to proceed to the next screen.**

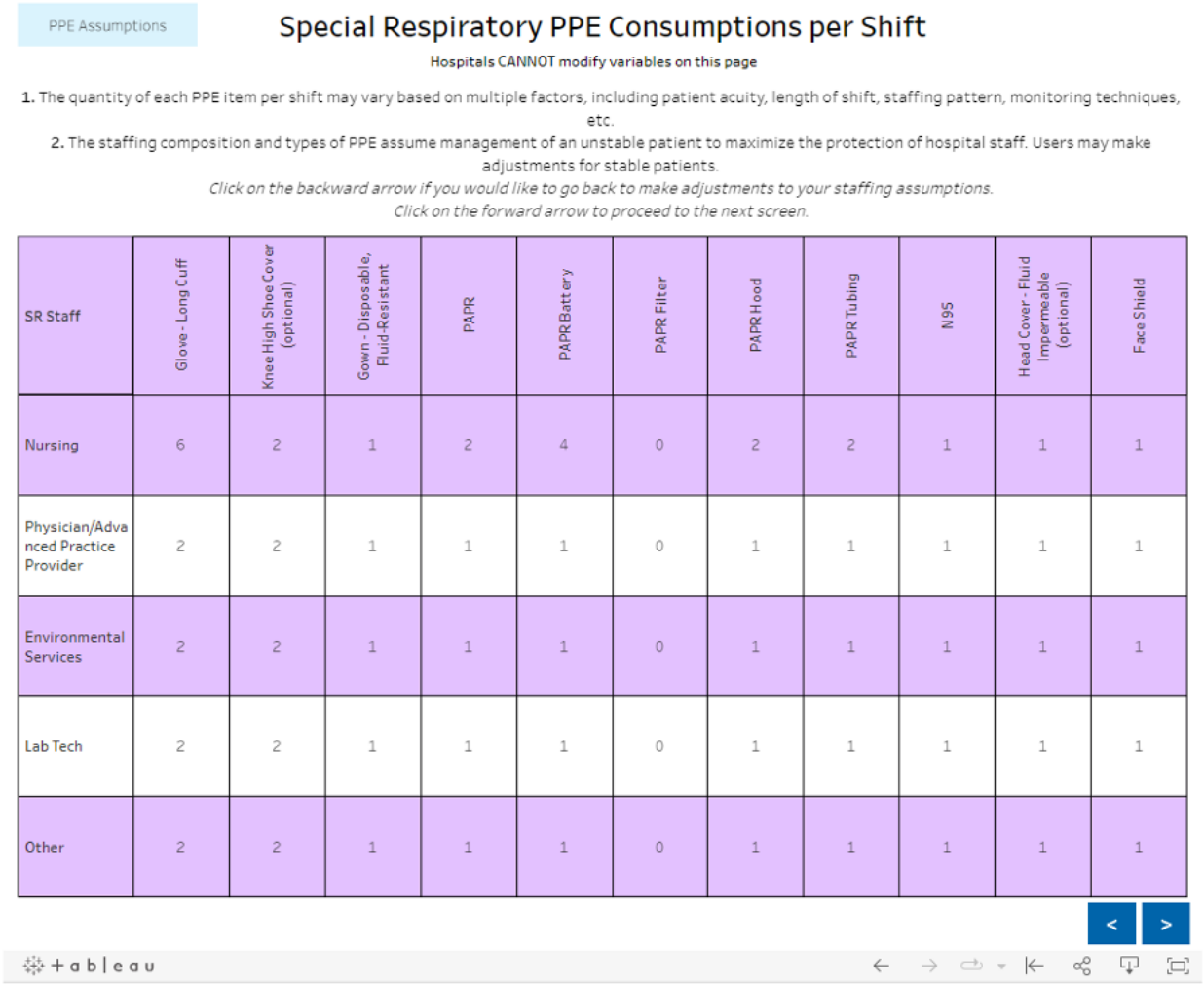
Special Respiratory Illness PPE Consumption Per Shift

7. **Review the Special Respiratory PPE Consumption per Shift.**

   a. The quantity of each PPE item per shift may vary based on multiple factors, including patient acuity, length of shift, staffing pattern, monitoring techniques, and number of patients per room.

   b. The staffing composition and types of PPE assume management of a seriously ill patient to maximize the protection of hospital staff.

NOTE: You cannot change the PPE assumptions displayed on this screen.



SR Staff	Glove - Long Cuff	Knee High Shoe Cover (optional)	Gown - Disposable, Fluid-Resistant	PAPR	PAPR Battery	PAPR Filter	PAPR Hood	PAPR Tubing	N95	Head Cover - Fluid Impermeable (optional)	Face Shield
Nursing	6	2	1	2	4	0	2	2	1	1	1
Physician/Advanced Practice Provider	2	2	1	1	1	0	1	1	1	1	1
Environmental Services	2	2	1	1	1	0	1	1	1	1	1
Lab Tech	2	2	1	1	1	0	1	1	1	1	1
Other	2	2	1	1	1	0	1	1	1	1	1

PPE Consumption Assumptions:

Gloves	• Assumes 2 glove changes by nursing staff for each room entry and 0 glove changes per room entry by other provider types due to shorter durations in the care environment. • If confirmed patients are cohorted, account for an increased number of glove changes when moving between patients.

Shoe covers	• Shoe covers are not included in CDC or WHO guidance but OSHA guidance for MERS recommends shoe or boot covers that extend high enough to cover the lower leg.
Gowns	• CDC specifies “disposable” for MERS, “standard isolation” for SARS, and “clean” gown for avian influenza. OSHA states “fluid-resistant” gown. • Because agents and recommendations are mixed, hospitals should decide on an appropriate level of isolation gown in conjunction with infection prevention practitioners. For simplicity, a disposable, fluid-resistant gown is likely preferred. • For many special respiratory pathogens, hospitals may opt to use fluid-resistant reusable/launderable gowns.
PAPR/N95	• Hospitals may choose to use N95 respirators or PAPRs (including CAPRs). DASH calculates the type of respiratory protection your hospital *primarily* uses. • If using N95 respirators: » Disposal of the N95 at exit from the room is assumed. » Splash protection for the eyes is also needed (e.g., face shield). » Head covers are not included in CDC or WHO guidance but included in OSHA guidance (e.g., surgical hood). These must be disposed after each room exit. • If using PAPRs: » PAPR blower units/systems may be reused post decontamination. Therefore, the quantity of PAPRs needed per shift and per day should be based on the number of persons who may be using a PAPR and the time needed to decontaminate and ensure these products are ready for use. Assumptions reflect 2 PAPRs for nurses as they are unable to “hand off” units when leaving/entering the room unless the entire hood/hose assembly is disposable. » Hospital policy for decontamination of the units should be considered when determining PAPR needs. » One PAPR will be needed for each staff member per shift who will be in direct contact with the patient. Hospitals should consider having 1.5 to 2 shifts’ worth of PAPR blower units/systems on hand to account for staff changeover and decontamination time. » PAPR battery maintenance and ensuring charged batteries are always available is another key consideration. Calculations include additional batteries to allow charging. » Follow manufacturer guidance to determine the need to replace/dispose of filters. Filters must have a HEPA component. Several manufacturers have added specific instructions for cleaning, disinfection, and decontamination. Calculations assume the filter is being changed only when filtering capacity is reached (i.e., airflow falls below minimums) unless the user indicates that filters are single use.

8. **Click on the back arrow if you would like to adjust your staffing assumptions.**
9. **Click on the forward arrow to proceed to the next screen.**

References for Assumptions:

CDC. (2015). Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus (MERS-CoV). U.S. Department of Health and Human Services.

This webpage provides recommendations for preventing transmission of MERS-CoV in healthcare settings.

CDC. (2005). Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS): Supplement I: Infection Control in Healthcare, Home, and Community Settings. U.S. Department of Health and Human Services.

This webpage contains links to guidance on SARS infection control in various settings.

CDC. (2022). Interim Guidance for Infection Control Within Healthcare Settings When Caring for Confirmed Cases, Probable Cases, and Cases Under Investigation for Infection with Novel Influenza A Viruses Associated with Severe Disease. U.S. Department of Health and Human Services.

This webpage provides guidance on infection control when caring for patients confirmed or suspected to be infected with a novel influenza A virus.

OSHA. (n.d.). Avian Influenza. (Accessed 6/1/2022). U.S. Department of Labor.

This webpage provides background, hazard recognition, medical, standards, and control and prevention information and links to additional resources related to avian influenza.

OSHA. (n.d.). MERS. (Accessed 6/1/2022). U.S. Department of Labor.

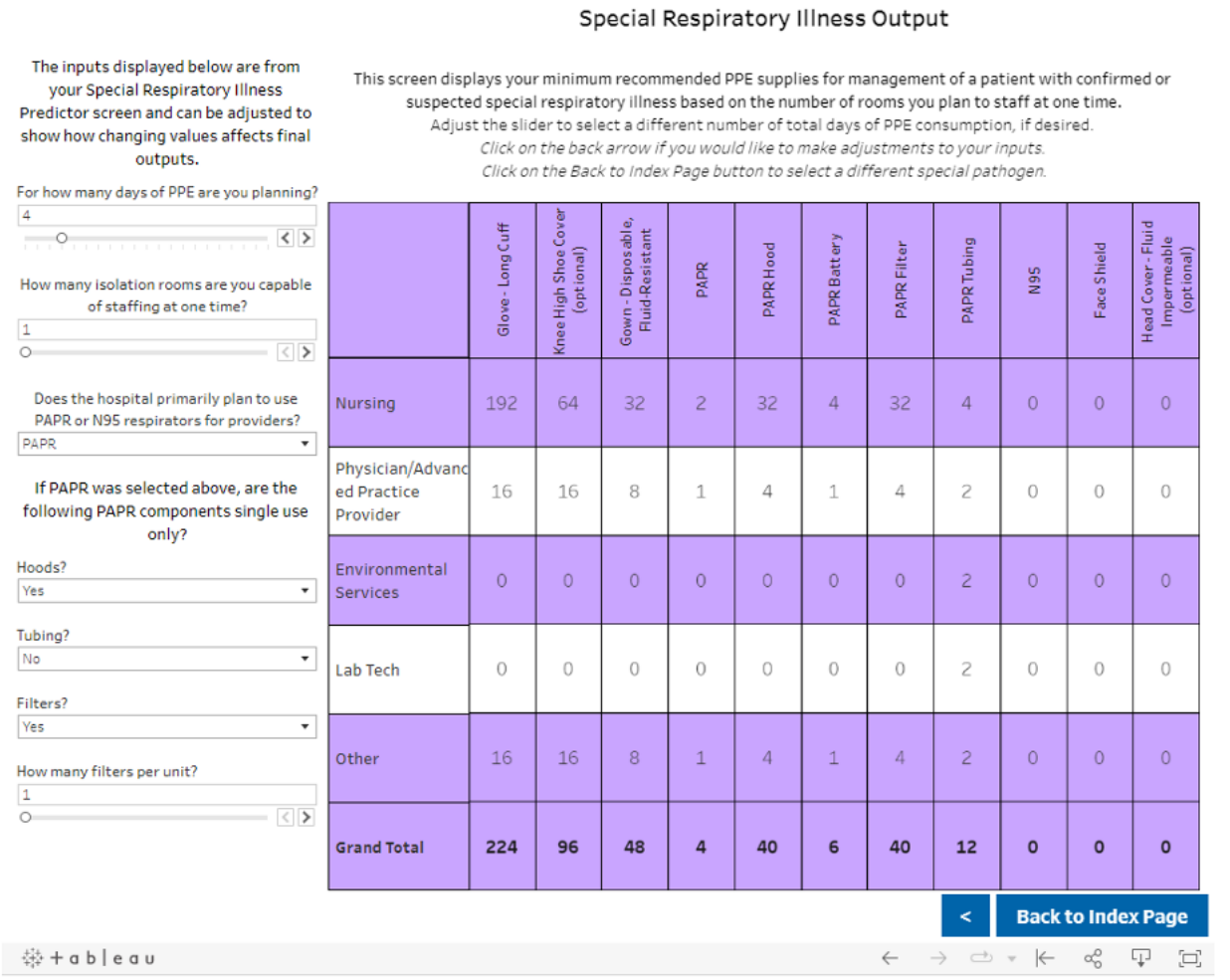
This webpage includes background information, guidance, and links to resources for specific types of workers who may be exposed to MERS-contaminated environments.

World Health Organization. (2019). Infection Prevention and Control During Health Care for Probable or Confirmed Cases of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Infection.

This guidance document provides principles of infection prevention and control strategies and precautions for healthcare workers managing patients with confirmed or probable MERS-CoV infection.

Special Respiratory Illness Output

This screen displays your minimum recommended PPE supplies for management of a patient with confirmed or suspected special respiratory illness.



10. **Change your inputs on the left side of the screen, if desired.**

    a. The inputs displayed are what you entered on the Special Respiratory Illness Predictor screen. If you change these inputs, the values on the outputs table adjust automatically.

2. **Click on the download or share icon on the Tableau toolbar at the bottom of the screen to record your work.**

    a. You CANNOT save the values you input or your outputs in the PPE Module itself. We encourage you to save or print your results using the download to PDF option or save the shared link in your browser favorites.

    b. Additional details are available in the How to Save Inputs and Results section. Make sure to download or save your shared link before exiting the PPE Module as all inputs will be reset when you return.

3. **Click on the Back to Index Page button to return to the main DASH PPE Module page and select a different special pathogen.**

Pandemic Predictor

This screen allows you to enter information about your hospital's characteristics and the types of PPE your hospital would use during a pandemic. The calculations are based on your daily maximum staffing.

Pandemic Crisis and Contingency Care Considerations

1. The calculations for pandemic assume that facilities will be implementing conservation techniques for PPE as outlined by the CDC for contingency or crisis situations. This includes the extended wear or limited reuse of N95 respirators and other types of PPE.
    a. While unconventional, it is understood these optimization strategies may be necessary.
    b. Calculations assume that supply conditions will require staff to wear a respirator for their entire shift and change gowns and gloves according to their work location.
    c. Additional PPE conservation and reuse strategies may be needed to address shortages.
    d. Hospitals will need to identify policies and processes for the safe handling, cleaning/disinfection, and storage of reusable PPE items.
2. Rather than focus only on quantities, planners should consider the risk profile of the facility under scenarios when conservation strategies may be needed.
    a. This includes identifying which areas of the facility, care environments, and staff require a higher level of protection and recognizing that masks (e.g., "simple," "surgical," and other three-ply medical grade masks) afford significant protection for healthcare workers, particularly those not directly engaged in patient care.
    b. Manufacturer and CDC guidance on optimization strategies should be sought and utilized when available.
    c. The data on safe reuse of N95 disposable respirators is poor, though hospitals commonly reused these respirators during the COVID-19 pandemic according to CDC crisis standards of care recommendations. Some data suggest that degradation of performance is more common after four shifts, though constant versus intermittent wear likely has significant impact on duration of safe performance due to the frequency of stretching the elastic bands with intermittent use.
3. Disinfection techniques can damage the filter or mask material. Some techniques such as ultraviolet germicidal irradiation (UVGI) and hydrogen peroxide mist can be effective depending on the type of respirator and technique. Always verify any intended disinfection techniques with the manufacturer.
4. Though the filter media of N95 respirators does not substantially degrade, the flocking and elastic components can. Careful planning should be done with suppliers and hospital administration to determine how large a cache is needed for the facility (knowing that disposable respirators are not a durable asset). These same determinations should be made for other types of PPE.
    a. After listed "use by" dates, the manufacturer cannot guarantee that the product will perform as a newly produced item.
    b. Outdated PPE must be kept separate from daily stock and clearly labeled "for emergency use" if they are kept in caches for pandemics or epidemics.

c. Rotation of stock is an excellent goal, though generally not possible at the facility level in the quantity needed to be prepared for a pandemic. Agreements with suppliers may allow rotation at a regional level.

d. Cached supplies should be stored within manufacturers' recommended storage conditions and checked at least yearly to ensure they are appropriate for use.

e. Supplies should be used in the following order: first use PPE within the manufacturer's "use by" dates, but the oldest first, then use recently expired supplies, then those that expired a longer time ago.

f. While all PPE must be inspected before use, expired PPE should have heightened inspection and testing. In particular, the N95 respirator seal should be assessed as the elastic band tension tends to degrade over time.

g. Prior to using expired PPE, facilities should contact the manufacturer to discuss the conditions in which the supplies have been maintained and potential issues.

5. A few facilities in the United States use elastomeric respirators with appropriate HEPA filters (usually P100 are included as these respirators are commonly used for industrial and painting applications).

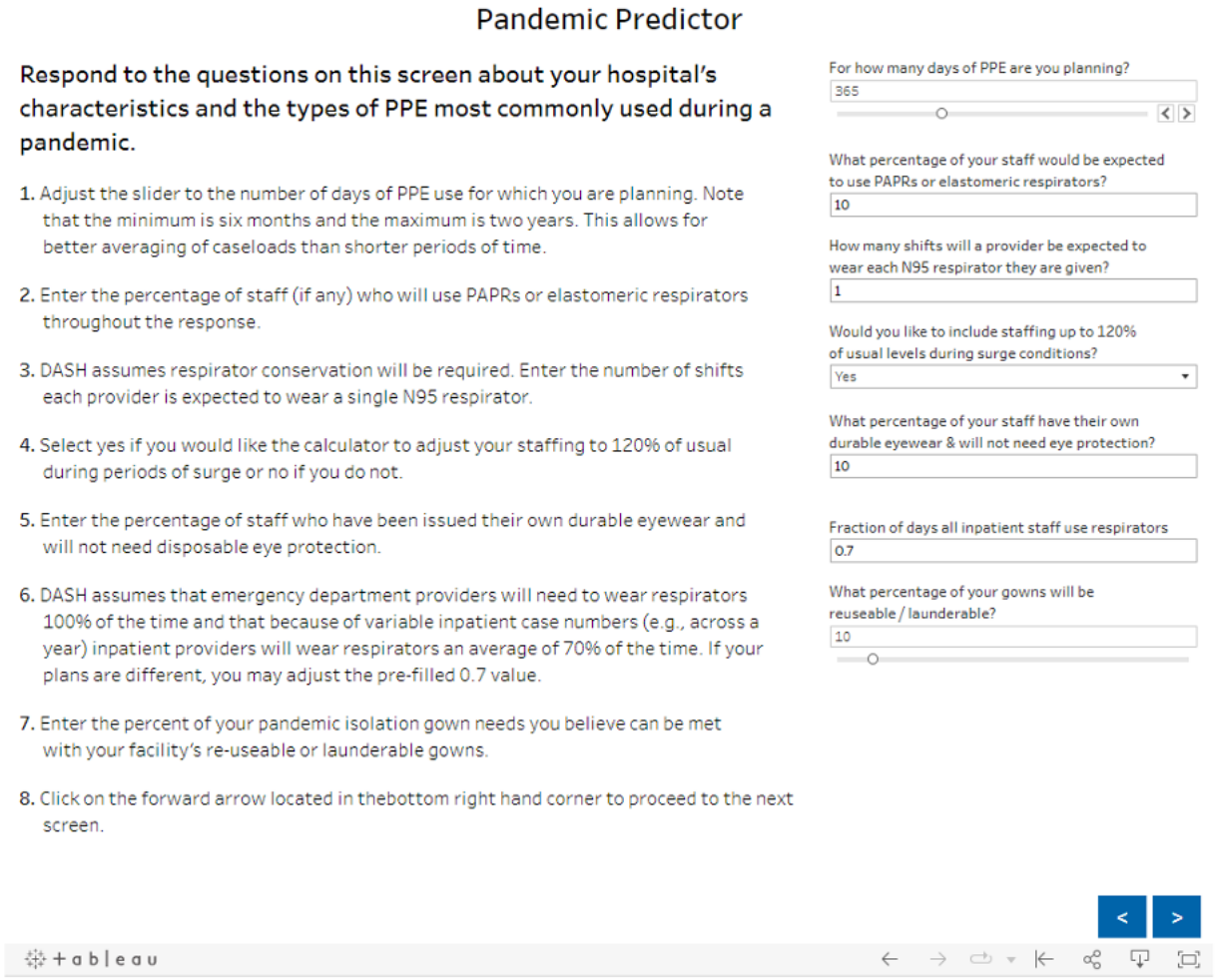
   a. Though information about the use of these devices in the healthcare setting is limited, they are an attractive potential option and during a pandemic would rapidly provide return on investment and reduce the quantity of disposable respirators needed.

   b. Elastomeric respirators must be decontaminated after every use. These respirators should be inspected, maintained, and stored as per manufacturer recommendations.

   c. Some users may find the elastomeric respirators to be more irritating to the skin than N95 respirators though others may feel more comfortable with the seal provided.

   d. Elastomeric (and other) respirators with expiration valves should not be used in most situations or should be modified with an additional filter layer.

   e. Because the elastomeric respirators are not in common healthcare use, their appearance will be unfamiliar and perhaps intimidating to patients and their loved ones. Communication can also be more limited with elastomeric respirators in comparison to disposable respirators. These respirators may have the most applicability in intensive care and similar environments.



1. **Adjust the slider to the number of days of PPE use for which you are planning.**
   a. All hospitals should plan to implement pandemic precautions over an extended time period. The suggested number of days is 365.
   b. The minimum you can enter is 6 months (180 days) and the maximum is just over 2 years (730 days). A minimum of six months allows for better averaging of caseloads/waves than shorter periods of time.
2. **Enter the percentage of staff (if any) expected to wear PAPRs or elastomeric respirators at one time (e.g., 10% of staff will use PAPRs and 10% will use elastomeric respirators per shift = 20%).**
   a. Hospitals that use PAPRs or elastomeric respirators may reduce their predicted N95 respirator usage according to percentage of caregivers equipped. This input is intended to show the effect of non-disposable respirator options on the estimated respirator needs.
   b. Providers should generally be issued their own elastomeric respirator. Hospitals using PAPRs or elastomeric respirators must ensure appropriate donning, doffing, cleaning, and handling protocols as per OSHA respiratory protection standards, including safe storage between shifts. Hospitals should also have replacement particulate filter cartridges available in the event of contamination, splash exposure, etc.

c. Hospitals planning to use PAPRs or elastomeric respirators also need to ensure an adequate supply of their associated components, including hoods, tubing, filters, and batteries. Note that PAPRs cannot be "handed off" from shift to shift due to the need for decontamination and battery charging and an appropriate additional number of units and batteries must be included accordingly.

3. **Enter the average number of shifts each provider is expected to wear each N95 respirator they are issued before discarding.**

   a. Reuse of N95 respirators is not optimal but is included in the CDC's crisis standards of care guidance for respirator shortages and was typical for most hospitals during the COVID-19 pandemic.

   b. Respirators must be disposed of if they become contaminated, damaged, moist, or are worn during procedures likely to generate significant aerosols. The calculator does not account for these losses.

   c. The intent of this input is to show how different conservation strategies may affect N95 respirator needs.

4. **Select "yes" if you would like the calculator to adjust your staffing to 120% during peak surges of patients or "no" if you would like it to remain at your daily maximum staffing.**

5. **Enter the percentage of staff who have been issued their own durable eyewear and will not need disposable eye protection.**

6. **Adjust the pre-filled value of 0.7 based on your hospital's assumptions. DASH assumes that ED providers will need to wear respirators 100% of the time and that because of variable inpatient case numbers (e.g., across a year) inpatient providers will wear respirators an average of 70% of the time. If your plans are different, adjust the prefilled 0.7 value.**

   a. The 70% inpatient assumption is based on surge conditions requiring 100% use by inpatient providers approximately half of the year and 30-50% use during non-surge periods when a lower proportion of inpatients test positive.

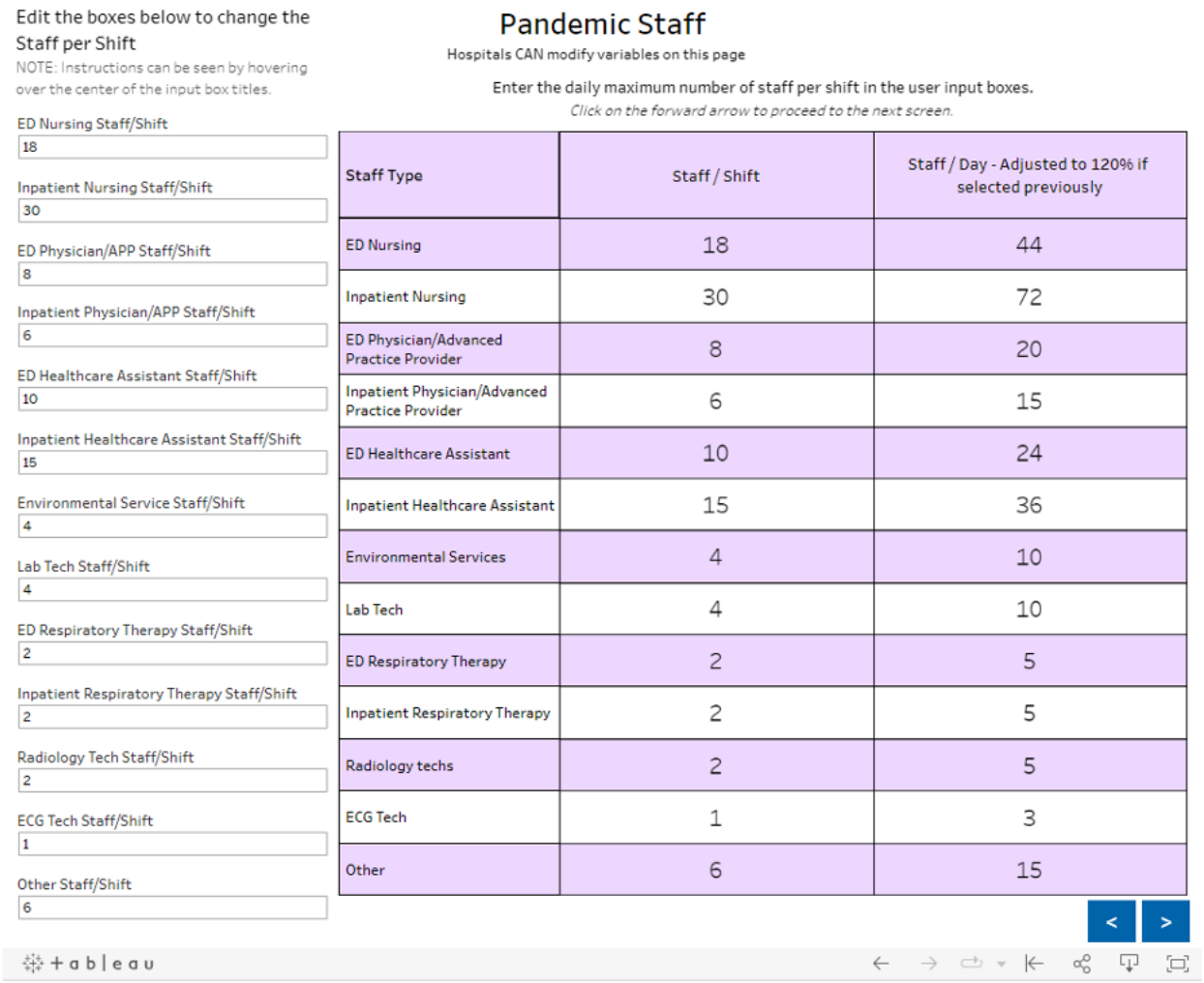
7. **Enter the percent of your pandemic isolation gown needs you believe can be met with your facility's re-usable or launderable gowns.**

   a. If using launderable gowns, it is important to understand how many gowns you have on hand versus those in the laundering process as well as the predicted replacement needs.

8. **Click on the forward arrow to proceed to the next screen.**

Pandemic Staffing

9. **Enter the daily maximum number of staff per shift in the user input boxes. (NOTE: Instructions can also be viewed by hovering over the center of input box titles.)**



Staffing Assumptions:

ED Nursing	• Enter the number of nurses required to staff the ED as well as urgent care and any acute care clinics at your daily maximum staffing.
Inpatient Nursing	• Enter the number of nurses required to staff all intensive care unit, floor, monitored, and stepdown beds at usual staffing ratios.
ED Physicians/Advanced Practice Providers	• Enter the number of physicians, advanced practice providers, and trainees required to staff the ED as well as urgent care and any acute care clinics at your daily maximum staffing.

Inpatient Physician/ Advanced Practice Providers	• Enter the number of inpatient admitting physicians, consultants, and trainees/residents according to daily staffing.
ED Healthcare Assistants	• Enter the number of ED healthcare assistants per shift. Do not include clerical or other non-clinical assistants.
Inpatient Healthcare Assistants	• Enter the number of inpatient healthcare assistants per shift. Do not include clerical or other non-clinical assistants.
Environmental Services	• Enter the total number of environmental services staff per shift.
Lab Tech	• Enter the total number of lab personnel per shift collecting patient samples in the ED, clinics, or inpatient units.
ED Respiratory Therapy	• Enter the total number of respiratory therapy personnel per shift in the ED.
Inpatient Respiratory Therapy	• Enter the total number of respiratory therapy personnel per shift in inpatient units.
Radiology	• Enter the total number of radiology techs working on an average day shift.
ECG Tech	• Enter the total number of ECG techs working on an average day shift.
Other	• Enter the total number of spiritual care, biomedical, physical/occupational therapy, trainees not included above, and other medical/surgical personnel who have bedside responsibilities per shift, as required. • Some additional personnel (e.g., outpatient pharmacy, specialty clinic) may need to wear at least some PPE for specific duties. Consider including those staff that would need to wear respirators daily.

10. **Click on the forward arrow to proceed to the next screen.**

Pandemic PPE Consumption Per Shift

11. Review the Pandemic PPE Consumption per Shift table.

a. The PPE consumption table shows estimated PPE needed by role for a 12 hour shift.

b. The quantity of each PPE item per shift may vary based on multiple factors, including the hospital's implementation of PPE reuse strategies under contingency or crisis care.

Note: You cannot change the PPE assumptions displayed on this screen.

PPE Assumptions

Pandemic PPE Consumptions per Shift

Hospitals CANNOT modify variables on this page

The PPE consumption table shows estimated PPE needed by role for a 12 hour shift. The quantity of each PPE item per shift may vary based on multiple factors, including the hospital's implementation of PPE reuse strategies under contingency or crisis care.

Click on the forward arrow to proceed to the next screen.

Staff Type	Gloves	Gown - Launderable or Disposable, Fluid-Resistant	N95	Face Shield
ED Nursing	72	12	1	0.1
Inpatient Nursing	16	4	1	0.1
ED Physician/Advanced Practice Provider	72	12	1	0.1
Inpatient Physician/Advanced Practice Provider	16	4	1	0.1
ED Healthcare Assistant	48	12	1	0.1
Inpatient Healthcare Assistant	16	4	1	0.1
Environmental Services	24	12	1	0.1
Lab Tech	48	4	1	0.1
ED Respiratory Therapy	48	4	1	0.1
Inpatient Respiratory Therapy	48	4	1	0.1
Radiology techs	48	4	1	0.1
ECG Tech	48	4	1	0.1
Other	16	4	1	0.1

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PPE Consumption Assumptions:

Gloves

- Numbers displayed are total gloves; divide number shown by 2 for pairs of gloves.
- Assumes ED nursing and ED physicians/APPs change gloves 36 times per 12 hour shift.
- Assumes ED healthcare assistants, lab techs, ED respiratory therapists, inpatient respiratory therapists, radiology techs, ECG techs change gloves 24 times per 12 hour shift.

	• Assumes environmental services changes gloves 12 times per 12 hour shift. • Assumes inpatient nursing, inpatient physicians/APPs, inpatient healthcare assistants, and other personnel change gloves 8 times per shift. • Providers may need to adapt to limiting glove use to situations in which body fluid exposure is likely if glove shortages occur. Ensuring adequate availability of hand hygiene products is critical. • Stockpiling gloves for years is not possible due to sticking and tearing after prolonged storage. However, facility or system rotation prior to expiration dates is possible and can help maintain augmented supplies.
Gowns	• Assumes ED nursing, ED physicians/APPs, ED healthcare assistants, and environmental services change gowns 12 times per shift and all other staff types 4 times per shift. This assumes conservation strategies are in place and gowns are used for higher-risk patients and procedures. • If laundered gowns are used, the hospital needs to account for laundry turn-around (i.e., 2 times the number of gowns needed per 24 hours if the laundry time is 24 hours). • If disposable gowns are used, the CDC specifies “clean” gowns. The hospital should determine what type of gown will be used, including isolation gowns versus disposable fluid-resistant gowns. • Cohorting of patients will substantially reduce the volume of gowns needed compared to a mixed patient unit.
N95 Respirators	• Assumes 1 N95 respirator per provider per shift. • PAPRs or elastomeric respirators will decrease disposable N95 respirator use. • A face shield or surgical mask may be worn over the N95 to reduce surface contamination. • Cohorting of patients can reduce N95 respirator use compared to a mixed patient unit.
Face Shields	• Eye protection (e.g., face shields) are reusable and estimated at 1 face shield per 10 shifts per provider (i.e., displayed in the Pandemic PPE Consumption table as 0.1 face shield per 1 shift) • Policies and education for appropriate cleaning of face shields and goggles are critical to prevent them from acting as fomites. • Some facilities may consider stocking safety glasses, googles, trauma glasses, or masks with eye shields as alternatives or additions to face shields. • If a percentage of staff own or are issued durable eyewear, this will be deducted from the total eye protection. Note that it is likely that even durable eyewear will require replacement at least a few times during a pandemic.

References for Assumptions:

CDC. (2022). Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 (COVID-19) Pandemic. U.S. Department of Health and Human Services.

This webpage provides guidance on infection prevention in healthcare settings during the COVID-19 pandemic.

CDC. (2020). Optimizing Personal Protective Equipment (PPE) Supplies. U.S. Department of Health and Human Services.

This webpage offers information on how to optimize PPE supplies according to conventional, contingency, and crisis capacity.

Check, R., Kelly, B., McMahon, K., et al. (2021). Failure Rates During Reuse of Disposable N95 Masks in Clinical Practice in the Emergency Department. Western Journal of Emergency Medicine. 22(3): 547-551.

The authors of this article describe the results of their prospective cohort study to determine the failure rate of reused N95 respirators.

Lowe, J., Paladino, K., Farke, J., et al. (2020). N95 Filtering Facepiece Respirator Ultraviolet Germicidal Irradiation (UVGI) Process for Decontamination and Reuse. Nebraska Medicine.

This document describes the Nebraska Medicine process for decontamination through UVGI and reuse of N95 respirators.

NETEC. (2020). N95 UVGI Process for Decontamination and Reuse.

Presenters on this recorded webinar describe a process for N95 respirator decontamination and reuse.

OSHA. (2009). Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers. U.S. Department of Labor.

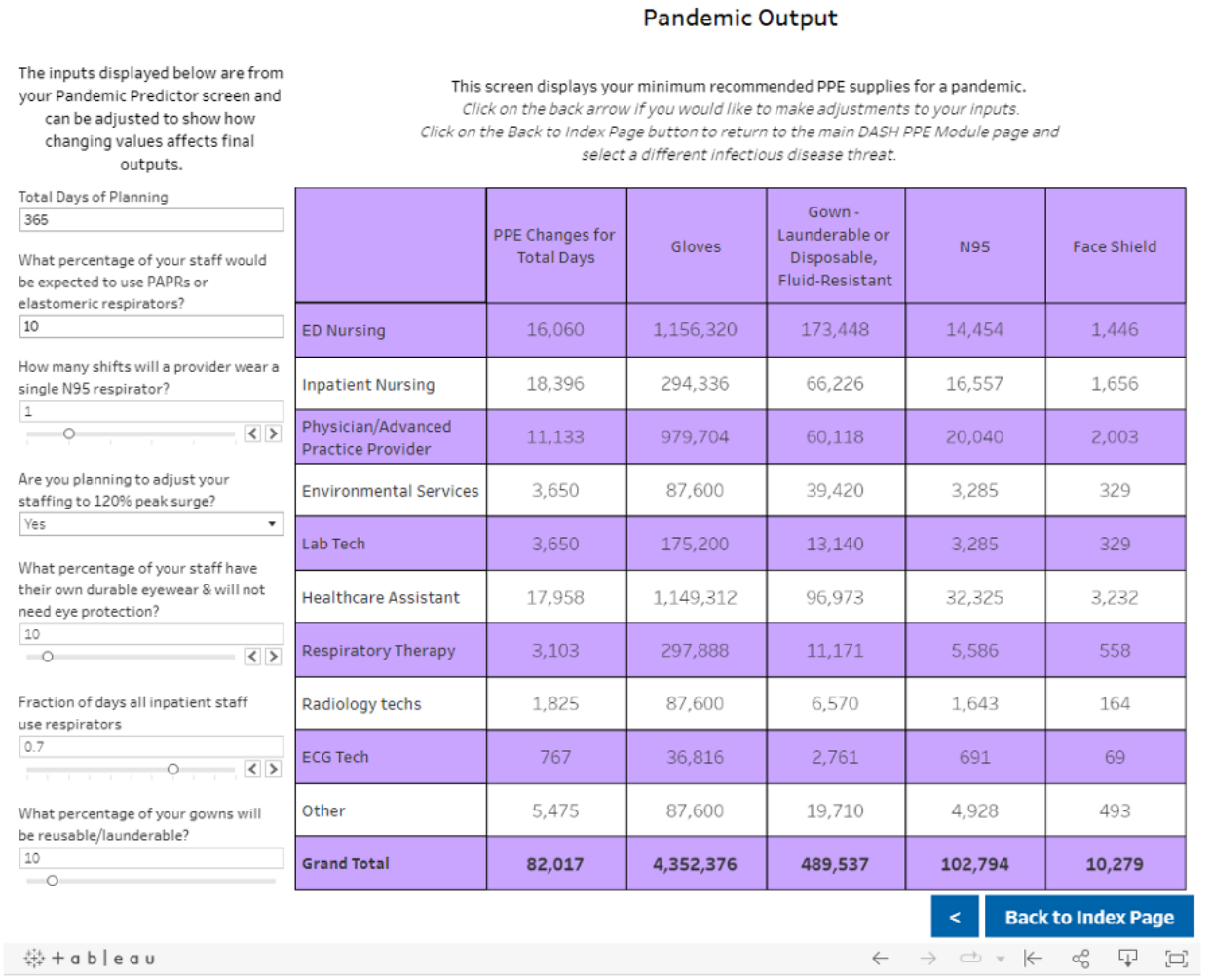
This document provides an overview of infection control and other standards appropriate for pandemic influenza.

The National Academies of Sciences, Engineering, and Medicine. (2019). Reusable Elastomeric Respirators in Health Care: Considerations for Routine and Surge Use.

This report examines strategies for and pros and cons related to stockpiling and reusing elastomeric respirators during an influenza pandemic or other large aerosol-transmissible outbreak.

Pandemic Output

This screen displays your hospital's minimum recommended PPE supplies for a pandemic.



12. Change your inputs on the left side of the screen, if desired.

- **a.** The inputs displayed are what you entered on the Pandemic Predictor screen. If you change these inputs, the outputs table adjusts automatically.

13. Click on the download or share icon on the Tableau toolbar at the bottom of the screen to record your work.

- **a.** You CANNOT save the values you input or your outputs in the PPE Module itself. We encourage you to save or print your results using the download to PDF option or save the shared link in your browser favorites.
- **b.** Additional details are available in the How to Save Inputs and Results section. Make sure to download or save your shared link before exiting the PPE Module as all inputs will be reset when you return.

14. Click on the Back to Index Page button to return to the main DASH PPE Module page and select a different special pathogen.

How to Save Inputs and Results

User inputs and calculated outputs CANNOT be saved within the module. However, you have two options for saving your inputs and results. Once you have completed your session or if you have concerns about the module timing out, you should download or share to record your work.

Downloading

- Click the download icon in the Tableau toolbar at the bottom of any screen. Once selected, a pop-up box will allow you to select what content to download:
  - The "Image" option allows you to download a view of the current screen in .png format.
  - The "PDF" and "PowerPoint" options offer three additional choices:
    - "This View" will download a mirror image of the current screen.
    - "Specific sheets from this dashboard" allows the user to click on specific portions of the current view to be selected for downloading. A "Select All" option is also available.
    - "Specific sheets from this workbook" allows the user to click on miniature versions of any screen from the module to be selected for downloading. A "Select All" option is also available.
    - Most users will prefer to choose "Specific sheets from this workbook" to download some or all sheets.
- The download option will be preferable for users who want to have a copy of their results for future reference and do not expect to return to the module to make frequent changes.

Sharing

- Click the share icon on the Tableau toolbar at the bottom of any screen. Once selected, a pop-up box will appear:
  - Select "Current View" to capture your inputs and results.
  - Copy (CTRL + C) the URL in the box under "Link" and save it as a favorite in your browser or another location.
  - Paste (CTRL + V) the URL into a browser address line to return to the module at the point where you left it.
- If you make additional changes to your inputs, you must repeat this process to capture your current view. You must copy and save the most recent URL to ensure you return to your most current data.
- The share option may allow for collaboration among members of your hospital's planning team as long as the same URL is used by one person at a time. For example, the hospital emergency manager may complete the PPE Module then share the current view URL with the hospital infection preventionist for review. The infection preventionist could adjust the inputs then repeat the share process and send the new URL to the hospital emergency manager to view the updated information.
- Note the additional three sharing icons: 
  - The email icon can be used to share the URL via Outlook. You may want to email the URL to yourself for easy access at a later time. You may also want to email the URL to other members of your team to collaboratively work through the PPE Module.

» While you can share the URL via social media, we do NOT recommend sharing facility-specific information.

NOTE: Each time the share icon is used it generates a different URL. If the hospital emergency manager shares the URL with the hospital infection preventionist and the procurement manager and each of them makes entries and shares their current view with the emergency manager, there will be three different versions of the results. To avoid confusion, only one user at a time should work in the PPE Module.

- The share option will be preferable for users who partially complete the module and plan to return to edit previous entries or complete additional portions of the module, but users must generate a new URL through the share option to capture those changes.

NOTE: Your browser settings may force the module to reset after a period of inactivity; we encourage you to use the download or share option to save your work after completing each scenario.