SARS-CoV-2 Infection Prevention and Control:

Environment, Rounding, Aerosol Generating Procedures & Personal Protective Equipment

Maine CDC Healthcare Epidemiology Program

12/2021

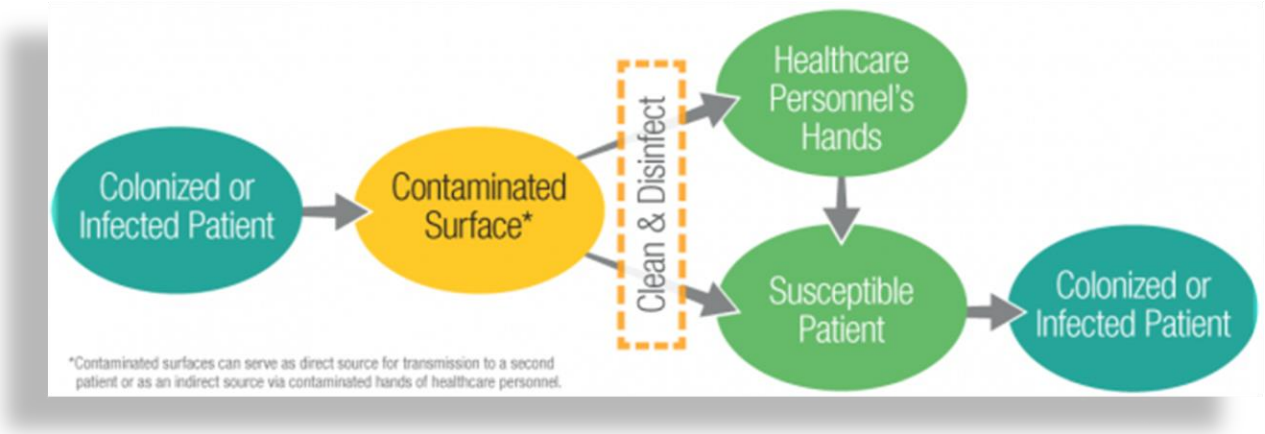
Environment of Care

Why is the environment important?

Throughout healthcare, the physical environment represents an important source of pathogens (germs) that can cause infections and/or may carry antibiotic resistance.

Transmission:

- Sometimes, the healthcare environment is a **primary source** of germs other times it can be an **indirect source**, such as when a healthcare worker fails to wash their hands, after touching a contaminated a piece of equipment or environmental surface.
    - Contamination of surfaces, including high-touch surfaces in the room (*e.g., bedrails, over-bed tables, and call-buttons*) and reusable patient care equipment that is moved between rooms, can lead to:
        (1) transmission to the next patient who occupies the room or uses the same equipment, or
        (2) contamination of the hands or clothing of healthcare personnel with transmission to other patients/residents/clients (P/R/C)



https://www.cdc.gov/hai/prevent/environment/surfaces.html

Environment of Care & IPC Rounding

Rounding: Rounding or auditing is a form of process surveillance to identify if the environment of care is being maintained for safety and staff are implement best practices and policies.

- Collect data and document findings to monitor for trends or
- Provide direct feedback and education to staff
- Important to vary the times/shifts that auditing is performed
- Leadership should participate in rounding

What can be included in rounding? Examples include but are not limited to:

- Is PPE readily available?
- Is PPE donned and doffed appropriately?
- If using extended-use or limited-reuse, is PPE donned/doffed, stored appropriately to prevent contamination?
- Is source control and physical distancing being maintained?
- Is hand hygiene performed?
- How are supplies stored?
- Is commode emptying performed in a way to prevent cross-contamination of the environment?
- Visualization of cleanliness
- Observation of cleaning & disinfection for non-critical equipment as well as daily cleaning of client/patient/resident rooms (*e.g., high touch areas*)
  - Is cleaning of COVID-19 quarantined/isolated person(s) rooms performed daily?
  - Is equipment dedicated and reusable equipment cleaning/disinfected after use prior to storage or use on another person
  - Is the appropriate wet-time adhered to?
  - Are adjunct staff (e.g., nursing & nursing support) assisting in daily cleaning disinfection? Are they trained and following expected process?

There's Too Much!

- Risk assess to determine what takes priority
- Vary what you monitor each time you go out

Cleaning & Disinfection

Cleaning and disinfecting environmental surfaces/equipment is fundamental in reducing their potential contribution to the incidence of healthcare-associated infections.

- Equipment minimally should be cleaned & disinfected before use on another patient/resident/client and prior to storage.

▪**Non-Critical Equipment**: comes in contact with intact skin but not mucous membranes. Requires low or intermediate Level disinfection. Examples: blood pressure machines, oximeters, ECG machines, stethoscopes, scales, etc.

- Disinfectants come with a prescribed "wet-time" or "contact time". This is the amount of time the equipment MUST remain visibly wet and CANNOT dry for the product to be effective

Fact: a surface wiped with a disinfectant and left to air dry usually dries within 1 minute dependent upon the temperature and humidity, therefore if the wet-time/contact-time is longer than one minute, you will need to reapply to maintain surface "wetness".

- Review your environment, needs, and awareness of any needs for increased environmental cleaning, i.e. is once a day enough? Think about high-tough areas such as nursing stations and common areas of staff, etc.

Staff performing cleaning & disinfection should be educated and trained on the specific processes and wet-time/contact time of the disinfectants they are going to be using.

Air Exchanges & Room Turnover & SARS-CoV-2

CDC HICPAC Guidelines for Air Exchanges/Hour for Air Clearance

1. Airborne Contaminant Removal

Table B.1. Air changes/hour (ACH) and time required for airborne-contaminant removal by efficiency *

ACH § ¶	Time (mins.) required for removal 99% efficiency	Time (mins.) required for removal 99.9% efficiency
2	138	207
4	69	104
6+	46	69
8	35	52
10+	28	41
12+	23	35
15+	18	28
20	14	21
50	6	8

Amount of time necessary for 99 – 99.9% efficiency for removal of potential contaminants in the air space.

- Delay entry into the room until time has elapsed for enough air changes to remove potentially infectious particles.
- Applicable for all airborne transmission organisms
- Helpful to know the specific ACH for each area/room of your facility
- Must continue to wear appropriate PPE when providing care for P/R/C who are on airborne isolation
- Must continue to wear appropriate PPE (*such as N95 or higher respirator*) when entering the space of an airborne isolation area/room after the P/R/C has been transferred/moved/discharged, if the specific ACH has not yet elapsed
- Terminal cleaning of the room should take place after the appropriate time has elapsed to ensure that any potential air contaminants that may have fallen on to surfaces are appropriately cleaned/disinfected/removed

https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#tableb1
https://www.maine.gov/dhhs/mecdc/infectious-disease/hai/resources.shtml

Aerosol Generating Procedures & SARS-CoV-2

Aerosol Generating Procedure Prevention Measures During SARS-CoV-2						
Scenario	**N95 or higher level respirator**	**Routine AGP practices + source control** *(surgical mask with fluid barrier protection preferred)*	**AGP Signage**	**Room Turn Over**	**Cleaning & Disinfection**	**Other**
Caring for a P/R/C who is on isolation or quarantine for SARS-CoV-2 regardless of community transmission status	Yes, HCW should wear ***N95 or higher respirator*** *(gowns, gloves, eye protection still apply per transmission-based precautions)* while in the space and during performance of and after completion until specified time has elapsed	/	Yes, while conducting the AGP keep door closed and place signage outside the space to notify AGP is ongoing & display what time the room is cleared for entry without the necessary PPE	Yes, should be "shut-down" prior to cleaning/disinfection and use by another patient based on the ACH of the room.	Yes, Clean and disinfect surfaces utilizing a disinfectant effective against SARS-CoV-2 after room shut-down	*Note: procedures that could generate infectious aerosoles should be performed cautiously and avoided if appropriate alternatives exist* •AGPs should take place in an airborne infection isolation room (AIIR), if possible. •The number of HCW present during the procedure should be limited to only those essential for P/R/C care and procedure support. •Visitors should not be present for the procedure.
Community Transmission: Substantial - High	Yes, HCW should minimally wear a N95 or higher level respirator while in the space & during performance of AND after completion UNTIL specified time has elapsed for **ANY AGP performed**	/	Yes, while conducting the AGP keep door closed and place signage outside the space to notify AGP is ongoing & display what time the room is cleared for entry without the necessary PPE (*if the P/R/C is NOT on SARS-CoV-2 precautions*).	Yes, should be "shut-down" prior to cleaning/disinfection and use by another patient based on the ACH of the room.	Yes, Clean and disinfect surfaces utilizing a disinfectant effective against SARS-CoV-2 after room shut-down	•AGPs should take place in an airborne infection isolation room (AIIR), if possible. •The number of HCPW present during the procedure should be limited to only those essential for P/R/C care and procedure support, if possible. •Visitors should not be present for the procedure, if possible
Community transmission is low-moderate *AND* Providing care to P/R/C who are NOT in isolation or quarantine for SARS-CoV-2 *or other transmission-based precautions that would require higher level precautions*	Not required	Yes, regardless of vaccination status. *Note: Federal CDC doesn't put any restrictions upon roommate status and AGPs. Noting, that there will be assuming of some risk in this situation.*	Not required	/	Follow routine cleaning & disinfection best practices	/

Definitions:

ACH: air exchanges/hour
AGP: aerosol generating procedures
HCW: healthcare worker
P/R/C: patient, resident, or client
PPE: personal protective equipment

MeCDC Healthcare Epidemiology - updated 10/27/2021

Re
htt
htt

Key Points:

- Level of PPE needed based on clinical situation or level of community transmission
- Placement / Room "shut-down or Clearance"
- Signage / Notification
- Cleaning /Disinfection

See website for full details: https://www.maine.gov/dhhs/mecdc/infectious-disease/hai/resources.shtml

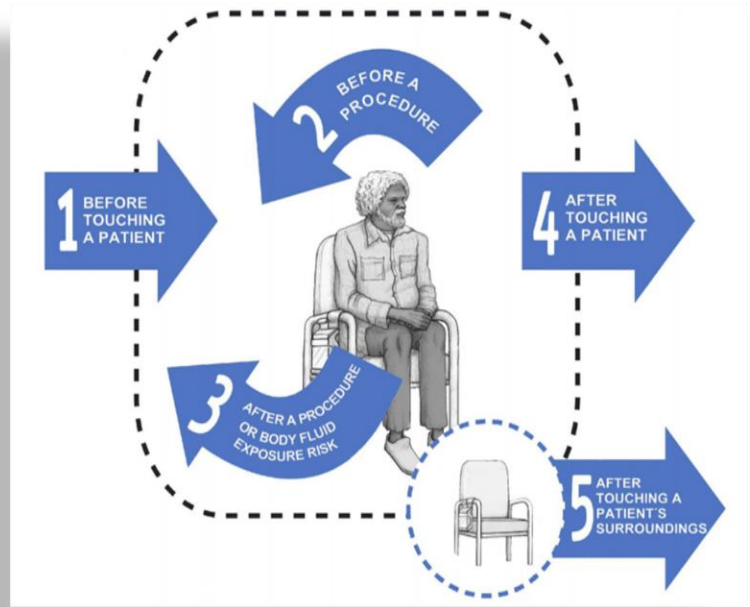
Hand Hygiene

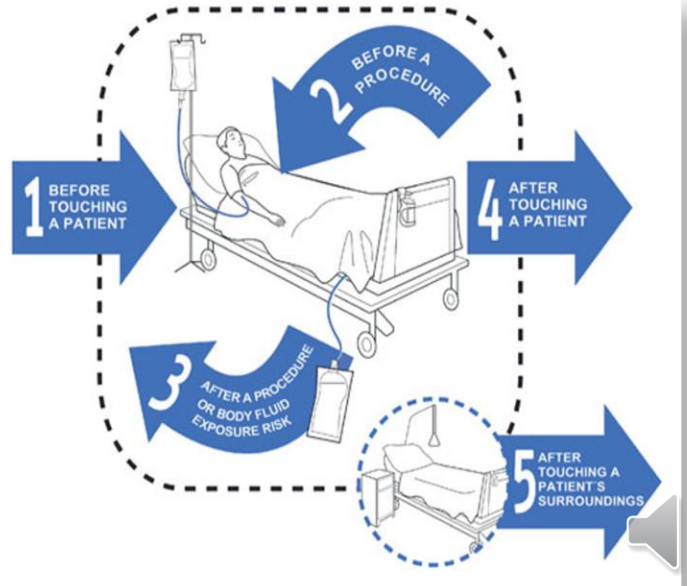
Hand Hygiene: Process of cleaning hands by using hand washing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis. Hand hygiene stops direct and indirect pathogen transfer.

Healthcare personnel should use an alcohol-based hand rub or wash with soap and water for the following clinical indications:

- Immediately before touching a patient (includes before donning gloves)
- Before performing an aseptic task (e.g., placing an indwelling device) or handling invasive medical devices
- Before moving from work on a soiled body site to a clean body site on the same patient
- After touching a patient or the patient's immediate environment
- After contact with blood, body fluids, or contaminated surfaces
- Immediately after glove removal

WHO 5 Moments of Hand Hygiene



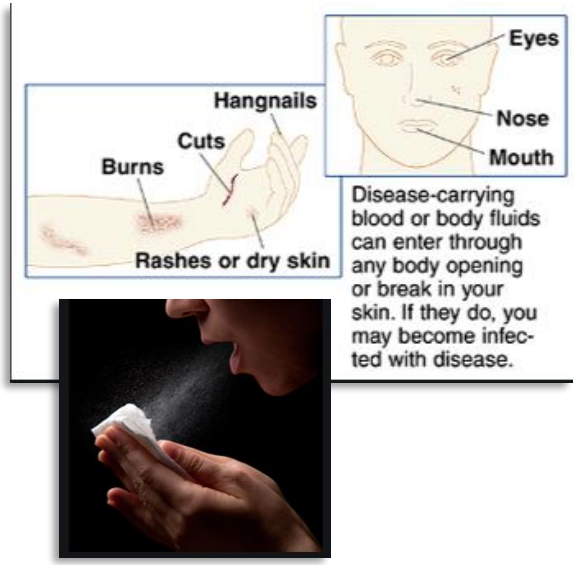


Resources:
CDC Hand Hygiene: https://www.cdc.gov/handhygiene/index.html
WHO Hand Hygiene: https://www.who.int/publications/i/item/9789241597906

Personal Protective Equipment - PPE

Is designed to protect the wearer's skin, eyes, mucous membranes, airways, and clothing from coming into contact with infectious agents.

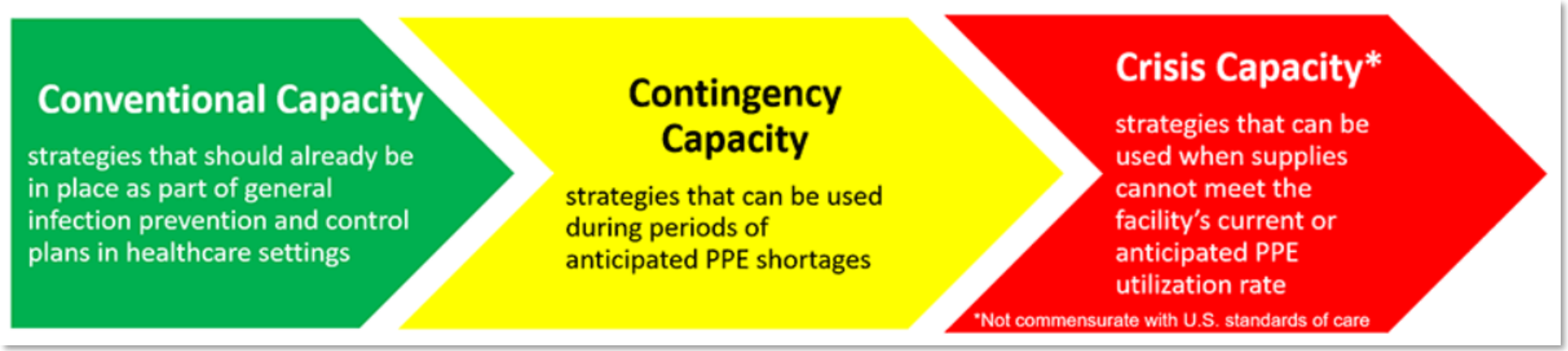
- Protects a person from respiratory droplets that may contain infectious organisms (*SARS-CoV-2/Influenza, etc*.)
- Protects a person from becoming contaminated with material or microorganisms (*MRSA, CRE, Candida auris*) that could be carried to other patients/residents/clients or the environment, that could cause infection in others.
- Includes gloves, face masks, respirators, eyewear, face shields, and gowns.



When selecting PPE:

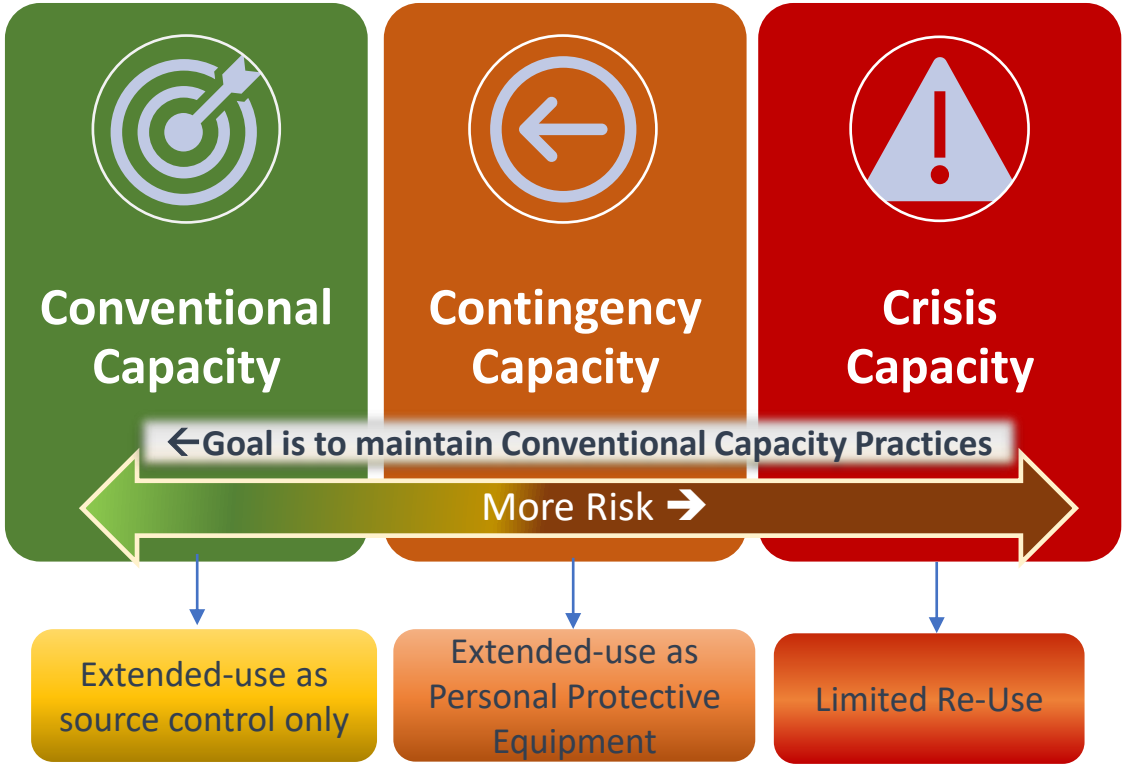
- Review situation for the type of anticipated exposure
- Ensure a good fit
- Ensure PPE is the correct durability for the situation (*e.g., fluid resistant gown, fluid proof, or neither*).

Each facility should know their PPE capacity:



Once PPE availability returns to normal, promptly resume conventional practices

Personal Protective Equipment - PPE



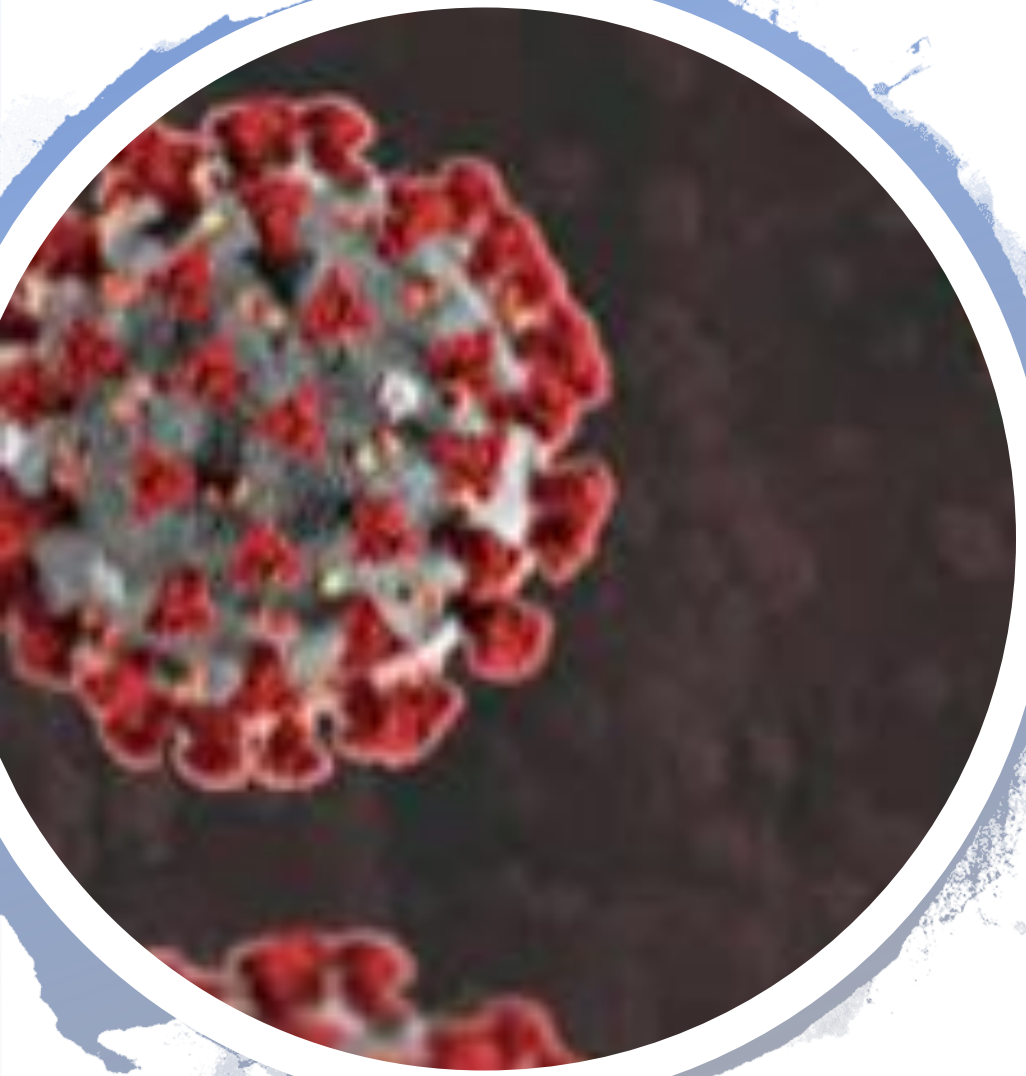
Each capacity's supply strategy comes with specific details for implementation. Please see this website for full details:
https://www.maine.gov/dhhs/mecdc/infectious-disease/hai/index.shtml

See this link for more details!

***Note**: recommended the person responsible for respiratory protection at the facility/facilities, review the above Federal CDC guidance on PPE capacity and extended-use limited-reuse to determine if they can safely implement. Although extended use and reuse of respirators have the potential benefit of conserving limited supplies of disposable N95 respirators, it comes with potential risk. The most significant risk is of contact transmission from touching the surface of the contaminated. Note, some devices have not been FDA-cleared for reuse. Some manufacturers' product user instructions recommend discard after each use (i.e., "for single use only"), while others allow reuse if permitted by infection control policy of the facility.*

Personal Protective Equipment (PPE) Routine Guidance

PPE Type	Purpose	When to Wear	Additional Information	Examples
Gloves	**Protects hands and reduces the risk of contamination with blood and other body fluids or potentially infectious material.**	When there is anticipation of touching the mucous membranes or non-intact skin, blood, body fluids, non-intact skin, or other potentially infectious material.	**-Does not replace hand hygiene.** -Hand hygiene must be performed before donning and after doffing gloves. -Gloves should be changed and hand hygiene performed when moving from a dirty to clean task. -Gloves needs to be changed and hygiene performed between patients/residents/clients -Limit touch contamination – touching face, glasses, environment with "dirty" gloves	-Non-sterile: disposable medical gloves usually appropriate -Sterile gloves required for sterile procedures
Gowns	**Protects skin and/or clothing from contamination.**	When participating in patient/resident/client care or procedures in which exposed skin or clothing are likely to be exposed to blood, body fluids, secretions, or excretions.	-Gowns should fully cover the torso, fit comfortably over the body, and have long sleeves that fit snuggly at the wrist. -If fluid penetration is likely, a fluid resistant gown should be used. -Clean gowns are generally used for isolation. -Sterile gowns for performing invasive procedures, such as inserting a central line. As sterile gowns protect patient and healthcare worker.	-Reusable or disposable -Fluid or non-fluid resistant -Clean or sterile
Eye Protection (Goggles / Face shields)	**Protects the eyes and/or face from sprays of potentially infectious material.**	When anticipating activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions.	-Personal eye glasses or contact lenses do not provide adequate protection. **-Goggles: should fit snuggly over and around eyes** **-Face shield: should cover the forehead, extend below the chin, and wrap around the side of the face**	-Goggles, Face shields -Safety glasses: do not provide the same level of splash or droplet protection as goggles and generally should not be used for infection control purposes.
Face mask	**Protects nose and mouth**	When anticipating sprays of blood or body fluids, such as respiratory secretions.	-Also used for source control to limit the spread of potentially infectious respiratory secretions. -Should fully cover nose and mouth	
Surgical Mask	**Protects nose and mouth from large-particle droplets, sprays, or splatter**	During sterile procedures	-Regulated by the FDA and are evaluated for their ability to protect the wearer from contact with liquids. -Can be used for source control -Should fully cover nose and mouth	
Respirators	**Protects the respiratory tract from inhalation of infectious aerosols**	Worn when entering a room/space of a person suspected of having a organism that can produce infectious aerosols.	-Requires medical clearance and fit-testing -Fit-check needs to be performed to ensure tight seal against wearer's face when donning.	-Particulate Respirators N95, N99, N100 -Powered Air-Purifying Respirator (PAPR) -Half or full-face elastomeric respirators



References

- https://www.cdc.gov/hai/prevent/environment/surfaces.html
- CDC Hand Hygiene: https://www.cdc.gov/handhygiene/index.html
- WHO Hand Hygiene: https://www.who.int/publications/i/item/9789241597906
- https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/strategies-optimize-ppe-shortages.html
- https://www.cdc.gov/hai/pdfs/ppe/ppeslides6-29-04.pdf
- https://www.who.int/gpsc/5may/Glove_Use_Information_Leaflet.pdf
- https://blogs.cdc.gov/niosh-science-blog/2020/09/08/source-control/
- https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/strategies-optimize-ppe-shortages.html
- APIC Text of Infection Control and Epidemiology, online, January 7th, 2021
- http://maineinfectionpreventionforum.org/

Questions? E-mail MECDC.HAI@maine.gov