Subtle Signs and Symptoms of Illness and Injury

Developmental Disabilities Support Division

Resource Packet B

Infection

Dental, UTI, Skin, and Respiratory

Required for:
RN, LPN, SLP, PT, OT, BSC,
and
Optional for RD/LD/LN and Other

NEW MEXICO
Department of Health
Developmental Disabilities Supports Division

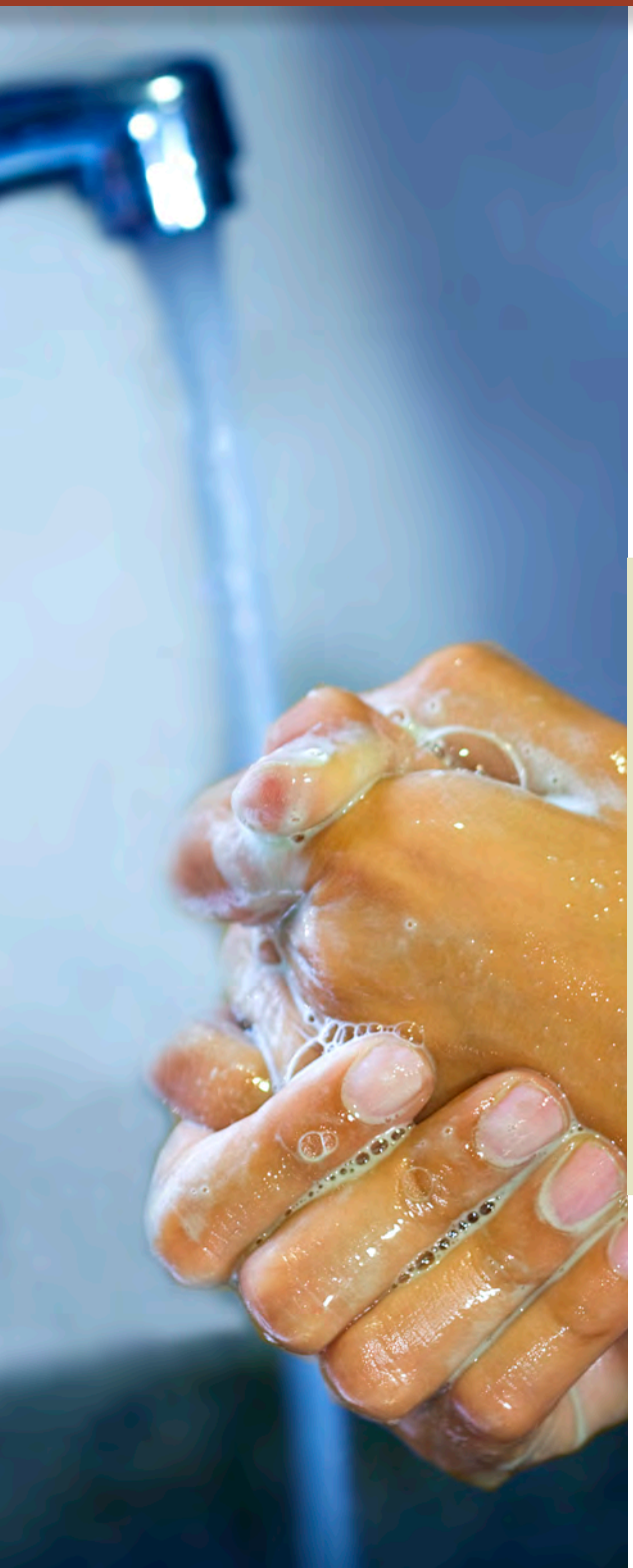
2021

Signs and Symptoms (S&S) of Infection

Signs and Symptoms (S&S) of Infection will depend on the site of the infection. Subtle S&S for infection may include, but are not limited to the following:

- The direct support personnel (DSP) may inform you that the person is just not acting like him/herself or has a change in behavior.
- A change in behavior may include but are not limited to the following:
    - The person is not interested in eating/drinking, or is not eating the usual amount, or develop a new difficulty with eating
    - There may be an increase in self-injurious behavior (SIB) due to pain associated with infection (e.g., poking/squeezing eyes or headbanging bcs of sinus pressure/pain).
- The person may be leaning more to one side than before. Leaning may be a sign of injury, pain, indigestion/GER, skin injury/discomfort in sitting position (if person uses a wheelchair), or difficulty breathing
- They may be lethargic and sleeping more than usual or may be more grumpy, sensitive or agitated
- All other conditions may be exacerbated such as mental health, seizures etc.
- There may be a change in vital signs such as fever, tachycardia, or hypotension
- They may be sweating more than usual even in cool environment
- They may appear pale or flushed
- If the infection cause dyspnea they may have cyanosis
- Increased coughing
- Increased drooling
- Changes in urine output (increased or decreased) could be a sign of UTI.
- May be more sensitive or agitated

Handwashing
at Home, at Play, and Out and About



Germs are everywhere! They can get onto your hands and items you touch throughout the day. Washing hands at key times with soap and water is one of the most important steps you can take to get rid of germs and avoid spreading germs to those around you.

How can washing your hands keep you healthy?

Germs can get into the body through our eyes, nose, and mouth and make us sick. Handwashing with soap removes germs from hands and helps prevent sickness. Studies have shown that handwashing can prevent 1 in 3 diarrhea-related sicknesses and 1 in 5 respiratory infections, such as a cold or the flu.

Handwashing helps prevent infections for these reasons:

People often touch their eyes, nose, and mouth without realizing it, introducing germs into their bodies.

Germs from unwashed hands may get into foods and drinks when people prepare or consume them. Germs can grow in some types of foods or drinks and make people sick.

Germs from unwashed hands can be transferred to other objects, such as door knobs, tables, or toys, and then transferred to another person's hands.

What is the right way to wash your hands?

1. Wet your hands with clean running water (warm or cold) and apply soap.
2. Lather your hands by rubbing them together with the soap.
3. Scrub all surfaces of your hands, including the palms, backs, fingers, between your fingers, and under your nails. Keep scrubbing for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song twice.
4. Rinse your hands under clean, running water.
5. Dry your hands using a clean towel or air dry them.

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

CS 280522A

When should you wash your hands?

Handwashing at any time of the day can help get rid of germs, but there are key times when it's most important to wash your hands.

- Before, during, and after preparing food
- Before eating food
- Before and after caring for someone who is sick
- Before and after treating a cut or wound
- After using the bathroom, changing diapers, or cleaning up a child who has used the bathroom
- After blowing your nose, coughing, or sneezing
- After touching an animal, animal food or treats, animal cages, or animal feces (poop)
- After touching garbage
- If your hands are visibly dirty or greasy

What type of soap should you use?

You can use bar soap or liquid soap to wash your hands. Many public places provide liquid soap because it's easier and cleaner to share with others. Studies have not found any added health benefit from using soaps containing antibacterial ingredients when compared with plain soap. Both are equally effective in getting rid of germs. If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol.

How does handwashing help fight antibiotic resistance?

Antibiotic resistance occurs when bacteria resist the effects of an antibiotic – that is, germs are not killed and they continue to grow. Sicknesses caused by antibiotic-resistant bacteria can be harder to treat. Simply using antibiotics creates resistance, so avoiding infections in the first place reduces the amount of antibiotics that have to be used and reduces the likelihood that resistance will develop during treatment. Handwashing helps prevent many sicknesses, meaning less use of antibiotics.

Studies have shown that handwashing can prevent

1 in 3

diarrhea-related sicknesses and

1 in 5

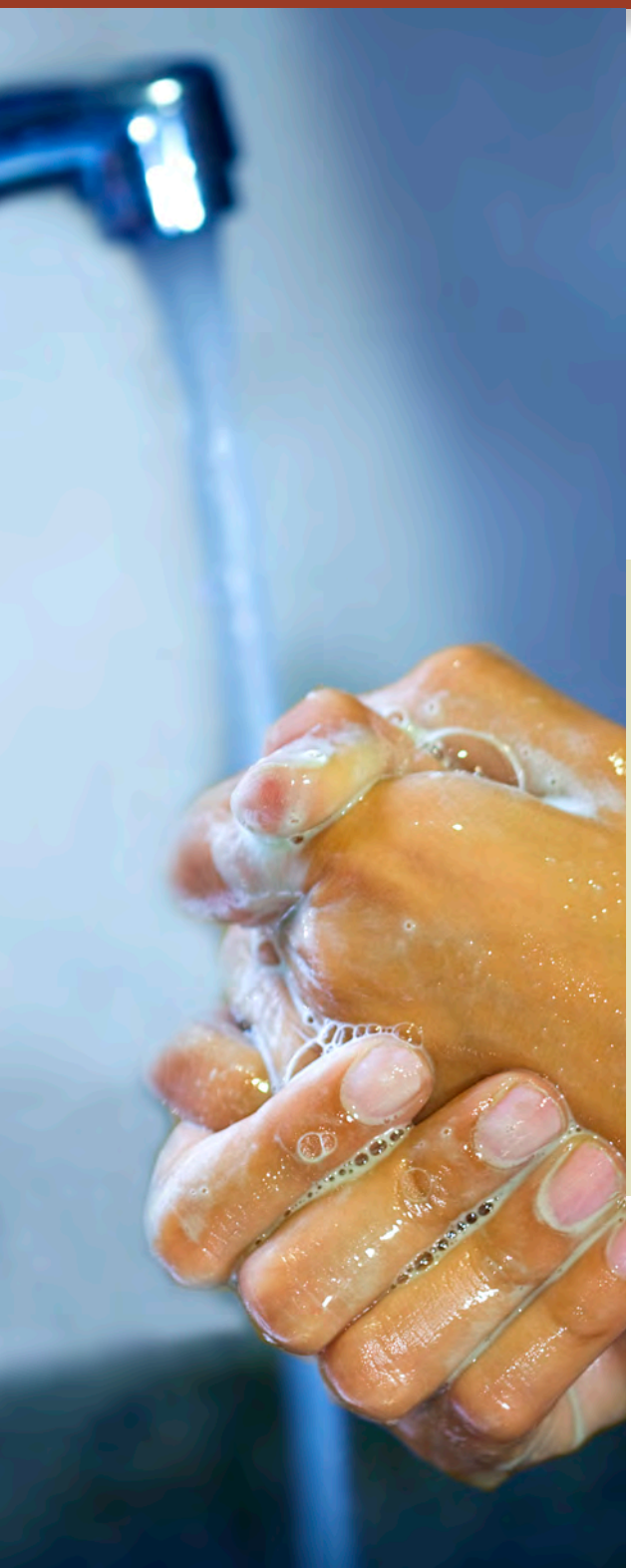
respiratory infections, such as a cold or the flu.

For more information and a video demonstration of how to wash your hands, visit the CDC handwashing website:

www.cdc.gov/handwashing

Lavado de manos

en casa, en donde jugamos y cuando salimos



¡Los microbios están en todas partes! Pueden llegar a sus manos y a los objetos que toca a lo largo de todo el día. Lavarse las manos con agua y jabón en momentos clave es una de las medidas más importantes que puede tomar para librarse de los microbios y evitar transmitirlos a quienes lo rodean.

¿Cómo es que lavarse las manos lo mantiene sano?

Los microbios pueden entrar al cuerpo a través de los ojos, la nariz y la boca, y enfermarnos. Lavarse las manos con jabón elimina los microbios que estén en ellas y ayuda a prevenir las enfermedades. Los estudios han mostrado que lavarse las manos puede prevenir 1 de cada 3 enfermedades diarreicas y 1 de cada 5 infecciones respiratorias, como el resfriado o la influenza (gripe).

Lavarse las manos ayuda a prevenir infecciones por estas razones:

Con frecuencia, las personas se tocan los ojos, la nariz y la boca sin darse cuenta, y de ese modo introducen microbios en el cuerpo.

Los microbios de las manos que no se lavaron pueden llegar a los alimentos y a las bebidas cuando las personas los preparan o los consumen. Los microbios pueden multiplicarse en algunos tipos de alimentos o bebidas y causarles enfermedades a las personas.

Los microbios de las manos sin lavar pueden transferirse a otros objetos, como las manijas de las puertas, las mesas o los juguetes y, luego, transferirse a las manos de otra persona.

¿Cuál es la forma correcta de lavarse las manos?

1. Mójese las manos con agua corriente limpia (tibia o fría) y enjabónelas.
2. Frótese las manos con jabón, formando espuma.
3. Frote todas las superficies, incluidos los dedos, entre los dedos, debajo de las uñas, las palmas y el dorso de las manos. Siga frotándose las manos por al menos 20 segundos. ¿Necesita un reloj? Tararee dos veces la canción “Cumpleaños feliz”.
4. Enjuáguese las manos con agua corriente limpia.
5. Séquese las manos con una toalla limpia o al aire.

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

CS 280522A MLS-283078

¿Cuándo debe lavarse las manos?

Lavarse las manos en cualquier momento del día puede ayudar a librarse de los microbios, pero hay momentos clave cuando es más importante hacerlo.

- Antes, durante y después de preparar alimentos
- Antes de comer
- Antes y después de atender a alguien que esté enfermo
- Antes y después de tratar heridas o cortaduras
- Después de ir al baño, cambiar pañales o limpiar a un niño que haya ido al baño
- Después de sonarse la nariz, toser o estornudar
- Después de tocar un animal, comida o bocadillos para animales, jaulas o heces de animales (caca)
- Después de tocar la basura
- Si tiene las manos visiblemente sucias o engrasadas

¿Qué tipo de jabón debe usar?

Puede usar jabón en barra o líquido para lavarse las manos. Muchos lugares públicos proveen jabón líquido porque es más fácil y más limpio compartirlo con los demás. Los estudios no han encontrado ningún beneficio adicional para la salud cuando se usan jabones antibacterianos en comparación con el jabón común. Ambos son igualmente eficaces para librarse de los microbios. Si no hay agua y jabón disponibles, use un desinfectante de manos a base de alcohol que contenga como mínimo un 60 % de alcohol.

¿Cómo es que lavarse las manos ayuda a combatir la resistencia a los antibióticos?

La resistencia a los antibióticos ocurre cuando las bacterias resisten los efectos de un antibiótico; es decir, los gérmenes no mueren y continúan creciendo. Las enfermedades causadas por bacterias resistentes a los antibióticos pueden ser más difíciles de tratar. El tan solo usar antibióticos crea resistencia; por ese motivo, evitar las infecciones en primer lugar disminuye la cantidad de antibióticos que se tengan que usar y reduce las probabilidades de que la resistencia tenga lugar durante el tratamiento. Lavarse las manos ayuda a prevenir muchas enfermedades, y esto significa un menor uso de antibióticos.

Los estudios han mostrado que lavarse las manos puede prevenir

1 de cada 3

enfermedades diarreicas y

1 de cada 5

infecciones respiratorias, como el resfriado o la influenza (gripe).

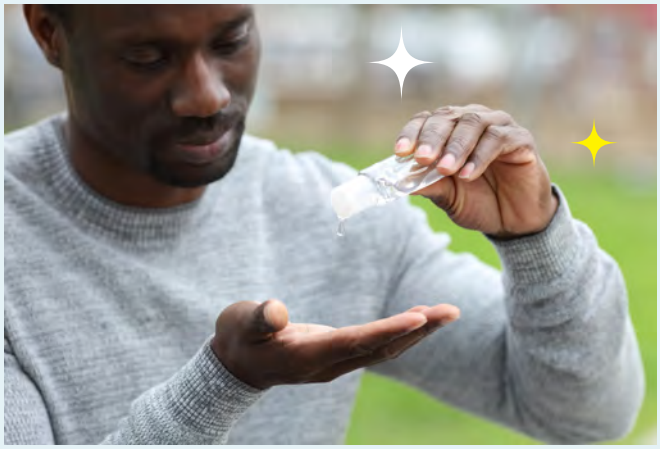
Para obtener más información y ver una demostración en video sobre cómo lavarse las manos, visite el sitio en la web de los CDC sobre el lavado de manos:

https://www.cdc.gov/handwashing/esp/index.html

Hand Sanitizer Use Out and About

Germs are everywhere! They can get onto hands and items we touch during daily activities and make us sick. Cleaning hands at key times with soap and water or hand sanitizer that contains at least 60% alcohol is one of the most important steps you can take to avoid getting sick and spreading germs to those around you.

There are important differences between washing hands with soap and water and using hand sanitizer. Soap and water work to remove all types of germs from hands, while sanitizer acts by killing certain germs on the skin. Although alcohol-based hand sanitizers can quickly reduce the number of germs in many situations, they should be used in the right situations. Soap and water are more effective than hand sanitizers at removing certain kinds of germs like norovirus, *Cryptosporidium*, and *Clostridioides difficile*, as well as chemicals.



Hand sanitizers also may not remove harmful chemicals, such as pesticides and heavy metals like lead.

Handwashing reduces the amounts of all types of germs, pesticides, and metals on hands. Knowing when to clean your hands and which method to use will give you the best chance of preventing sickness.

When should I use?

Soap and Water

- **Before**, **during**, and **after** preparing food
- **Before** eating food
- **Before** and **after** caring for someone who is sick with vomiting or diarrhea
- **Before** and **after** treating a cut or wound
- **After** using the toilet
- **After** changing diapers, or cleaning up a child who has used the bathroom
- **After** touching an animal, animal feed, or animal waste
- **After** handling pet food or pet treats
- **After** touching garbage
- If your hands are visibly dirty or greasy

Alcohol-based Hand Sanitizer

- **Before** and **after** visiting a friend or loved one in a hospital or nursing home, unless the person is sick with *Clostridioides difficile* (if so, use soap and water to wash hands).
- If soap and water are not readily available, use an alcohol-based hand sanitizer that contains **at least 60% alcohol**, and wash with soap and water as soon as you can.

DO NOT use hand sanitizer if your hands are visibly dirty or greasy–for example, after gardening, playing outdoors, fishing, or camping. If a handwashing station is available, wash your hands with soap and water instead.

After blowing your nose, coughing, or sneezing, you should clean your hands by immediately washing your hands with soap or using alcohol-based hand sanitizer to avoid spreading germs.

How should I use?

Soap and Water

- **Wet** your hands with clean running water (warm or cold), turn off the tap, and apply soap.
- **Lather** your hands by rubbing them together with the soap. Lather the backs of your hands, between your fingers, and under your nails.
- **Scrub** your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song twice.
- **Rinse** your hands under clean, running water.
- **Dry** your hands using a clean towel or air dry them.

Alcohol-Based Hand Sanitizer

Use an alcohol-based hand sanitizer that contains **at least 60% alcohol**. Supervise young children when they use hand sanitizer to prevent swallowing alcohol, especially in schools and childcare facilities.

- **Put** enough sanitizer on your hands to cover all surfaces.
- **Rub** your hands together until they feel dry (this should take around 20 seconds).

Do NOT rinse or wipe off the hand sanitizer before it's dry; it may not work well against germs.

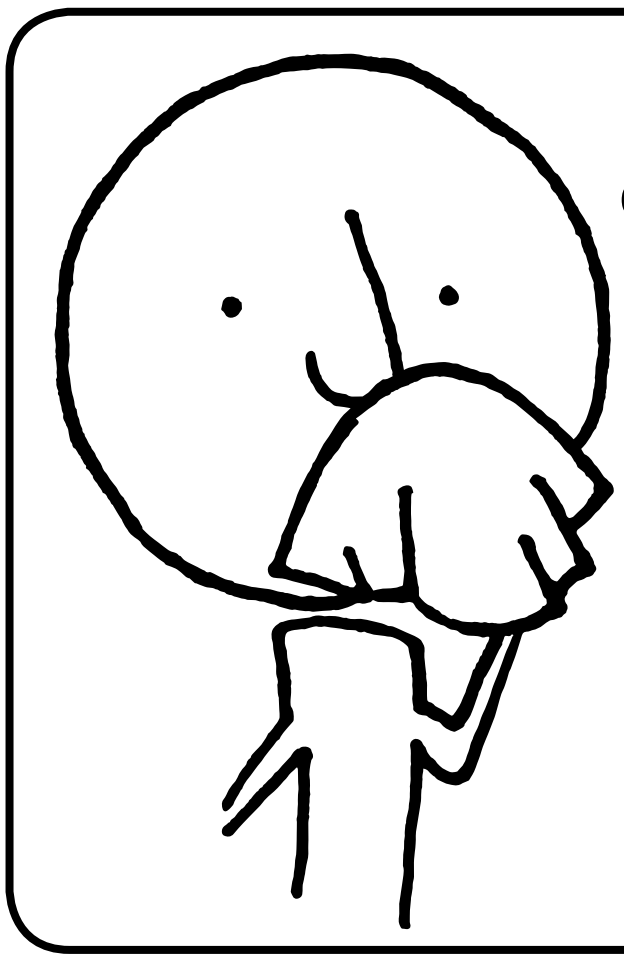
LIFE IS BETTER WITH CLEAN HANDS

www.cdc.gov/handwashing

CS310275-A

Stop the spread of germs that make you and others sick!

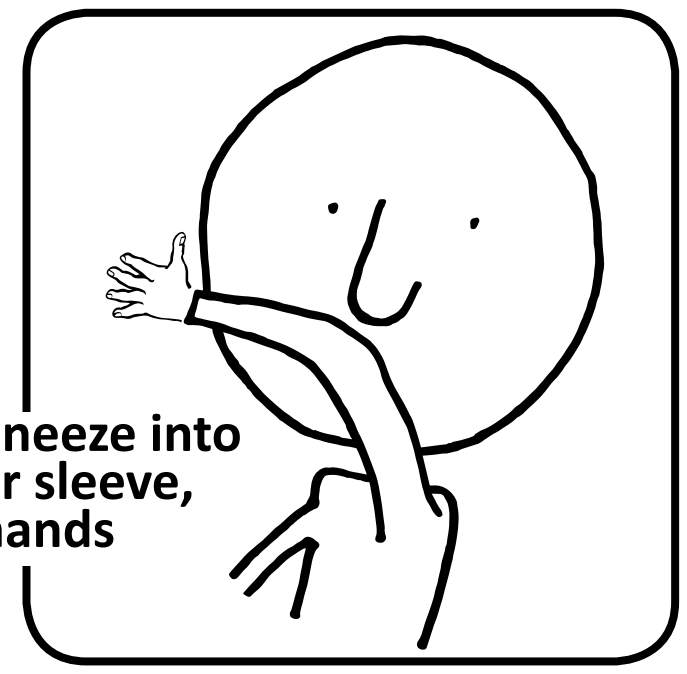
Cover your Cough



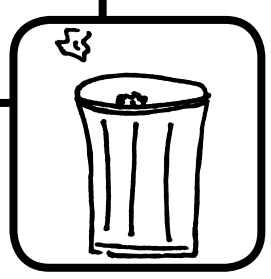
Cover your mouth and nose with a tissue when you cough or sneeze

or

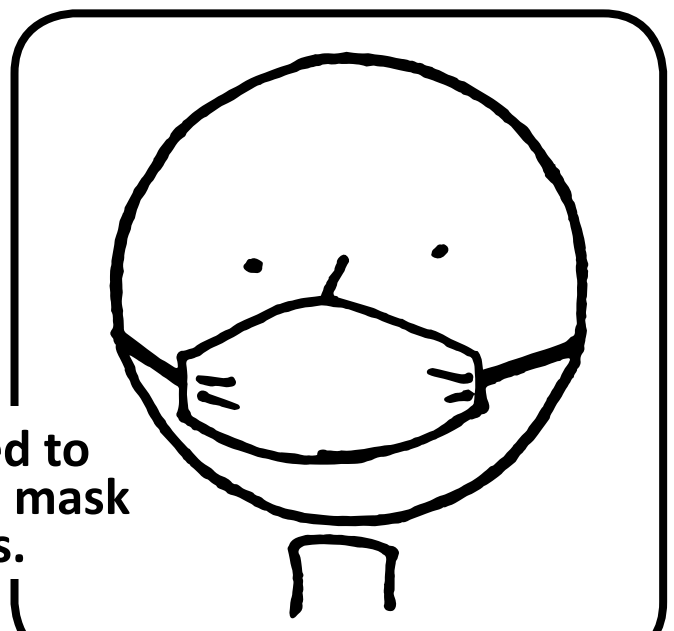
cough or sneeze into your upper sleeve, not your hands



Put your used tissue in the waste basket.

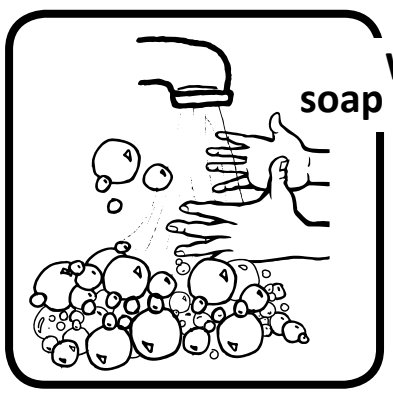


You may be asked to put on a surgical mask to protect others.



Clean your Hands

after coughing or sneezing.



Wash with soap and water

or

clean with alcohol-based hand sanitizer.

DEPARTMENT OF HEALTH

Infectious Disease Epidemiology, Prevention and Control
PO Box 64975, St. Paul, MN 55164
651-201-5414 or 1-877-676-5414
www.health.state.mn.us

APIC
ASSOCIATION FOR PROFESSIONALS IN INFECTION CONTROL AND EPIDEMIOLOGY, INC.

3/2020

Use Personal Protective Equipment (PPE) When Caring for Patients with Confirmed or Suspected COVID-19

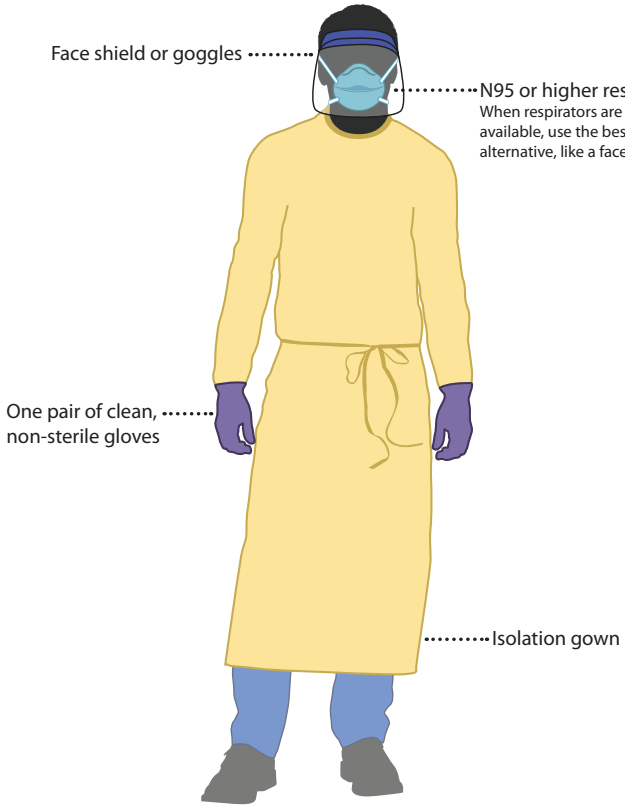
Before caring for patients with confirmed or suspected COVID-19, healthcare personnel (HCP) must:

- **Receive comprehensive training** on when and what PPE is necessary, how to don (put on) and doff (take off) PPE, limitations of PPE, and proper care, maintenance, and disposal of PPE.
- **Demonstrate competency** in performing appropriate infection control practices and procedures.

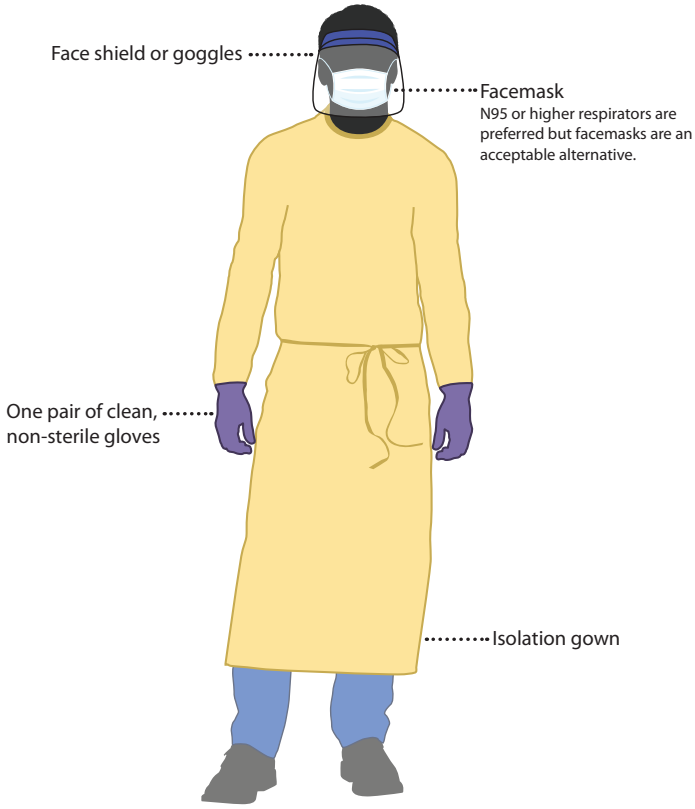
Remember:

- PPE must be donned correctly before entering the patient area (e.g., isolation room, unit if cohorting).
- PPE must remain in place and be worn correctly for the duration of work in potentially contaminated areas. PPE should not be adjusted (e.g., retying gown, adjusting respirator/facemask) during patient care.
- PPE must be removed slowly and deliberately in a sequence that prevents self-contamination. A step-by-step process should be developed and used during training and patient care.

Preferred PPE – Use N95 or Higher Respirator



Acceptable Alternative PPE – Use Facemask



www.cdc.gov/coronavirus

CS 316124-A 06/03/2020

Donning (putting on the gear):

More than one donning method may be acceptable. Training and practice using your healthcare facility's procedure is critical. Below is one example of donning.

1. **Identify and gather the proper PPE to don.** Ensure choice of gown size is correct (based on training).
2. **Perform hand hygiene using hand sanitizer.**
3. **Put on isolation gown.** Tie all of the ties on the gown. Assistance may be needed by another HCP.
4. **Put on NIOSH-approved N95 filtering facepiece respirator or higher (use a facemask if a respirator is not available).** If the respirator has a nosepiece, it should be fitted to the nose with both hands, not bent or tented. Do not pinch the nosepiece with one hand. Respirator/facemask should be extended under chin. Both your mouth and nose should be protected. Do not wear respirator/facemask under your chin or store in scrubs pocket between patients.*
   - » **Respirator:** Respirator straps should be placed on crown of head (top strap) and base of neck (bottom strap). Perform a user seal check each time you put on the respirator.
   - » **Facemask:** Mask ties should be secured on crown of head (top tie) and base of neck (bottom tie). If mask has loops, hook them appropriately around your ears.
5. **Put on face shield or goggles.** When wearing an N95 respirator or half facepiece elastomeric respirator, select the proper eye protection to ensure that the respirator does not interfere with the correct positioning of the eye protection, and the eye protection does not affect the fit or seal of the respirator. Face shields provide full face coverage. Goggles also provide excellent protection for eyes, but fogging is common.
6. **Put on gloves.** Gloves should cover the cuff (wrist) of gown.
7. **HCP may now enter patient room.**

Doffing (taking off the gear):

More than one doffing method may be acceptable. Training and practice using your healthcare facility's procedure is critical. Below is one example of doffing.

1. **Remove gloves.** Ensure glove removal does not cause additional contamination of hands. Gloves can be removed using more than one technique (e.g., glove-in-glove or bird beak).
2. **Remove gown.** Untie all ties (or unsnap all buttons). Some gown ties can be broken rather than untied. Do so in gentle manner, avoiding a forceful movement. Reach up to the shoulders and carefully pull gown down and away from the body. Rolling the gown down is an acceptable approach. Dispose in trash receptacle.*
3. **HCP may now exit patient room.**
4. **Perform hand hygiene.**
5. **Remove face shield or goggles.** Carefully remove face shield or goggles by grabbing the strap and pulling upwards and away from head. Do not touch the front of face shield or goggles.
6. **Remove and discard respirator (or facemask if used instead of respirator).*** Do not touch the front of the respirator or facemask.
   - » **Respirator:** Remove the bottom strap by touching only the strap and bring it carefully over the head. Grasp the top strap and bring it carefully over the head, and then pull the respirator away from the face without touching the front of the respirator.
   - » **Facemask:** Carefully untie (or unhook from the ears) and pull away from face without touching the front.
7. **Perform hand hygiene after removing the respirator/facemask** and before putting it on again if your workplace is practicing reuse.

Facilities implementing reuse or extended use of PPE will need to adjust their donning and doffing procedures to accommodate those practices.

Use equipo de protección personal (EPP) cuando atienda a pacientes con COVID-19 confirmado o presunto

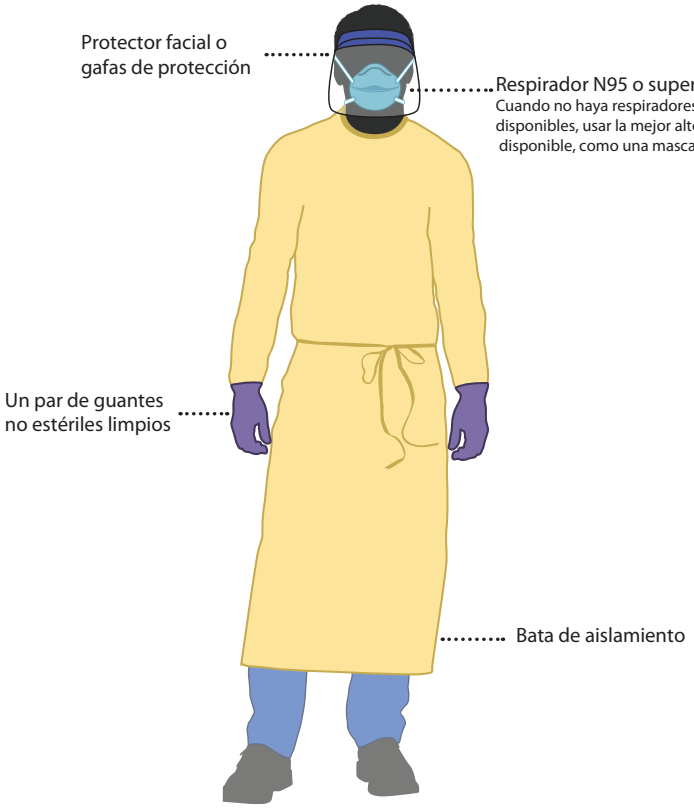
Antes de atender a pacientes con COVID-19 confirmado o presunto, el personal de atención médica debe:

- **Recibir capacitación integral** sobre cuándo se necesita EPP, qué tipo, cómo ponérselo y quitárselo, sus limitaciones y sobre su cuidado, mantenimiento y desecho adecuados.
- **Demostrar competencia** en la ejecución de las prácticas y los procedimientos de control de infecciones adecuados.

Recuerde:

- Se debe tener el EPP correctamente puesto antes de entrar al área de pacientes (p. ej., sala de aislamiento o unidad de aislamiento en caso de cohorte).
- Se debe dejar el EPP puesto y usar de la manera correcta durante todo el tiempo que se esté trabajando en áreas potencialmente contaminadas. No se debe reajustar el EPP durante la atención del paciente (p. ej., volver a atar la bata, ajustar el respirador o mascarilla).
- El EPP se debe quitar lenta y deliberadamente en una secuencia que prevenga la autocontaminación. Se debe crear un proceso paso a paso y practicarse durante la capacitación y atención del paciente.

EPP preferible | **Respirador N95 o superior**



EPP alternativo aceptable | **Mascarilla**

www.cdc.gov/coronavirus-es

CS 316124-A 04/28/2020

Cómo ponerse el EPP:

Podría haber más de un método aceptable para ponerse el EPP. Es crítico que se capacite en el procedimiento que se use en su establecimiento de atención médica y lo practique. A continuación se detalla un ejemplo de cómo ponerse el EPP.

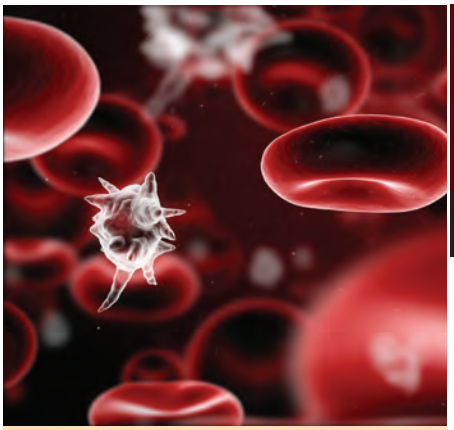
1. **Identificar el EPP adecuado para ponerse y reunir lo necesario.** Revise que el tamaño de la bata sea el correcto (según la capacitación).
2. **Higienizarse las manos con desinfectante de manos.**
3. **Ponerse la bata de aislamiento.** Ate todas las tiras de la bata. Podría necesitar la ayuda de otro miembro del personal.
4. **Ponerse un respirador con mascarilla de filtrado nivel N95 o superior aprobado por NIOSH (usar una mascarilla si no hay un respirador disponible).** Si el respirador tiene una banda de metal, se debe moldear a la forma de la nariz con las dos manos, no se debe arquear ni doblar por el medio. No la pellizque con una mano. El respirador o mascarilla debe llegar hasta la parte de abajo del mentón. Deben quedar protegidas la nariz y la boca. No lleve el respirador o mascarilla por debajo del mentón ni lo guarde en el bolsillo del uniforme entre un paciente y el otro.*
   - » **Respirador:** Las bandas del respirador se deben colocar sobre la corona de la cabeza (la banda superior) y la nuca (la banda inferior). Autoverifique el sellado cada vez que se ponga el respirador.
   - » **Mascarilla facial:** Las bandas de la mascarilla se deben atar sobre la corona de la cabeza (las bandas superiores) y la nuca (las bandas inferiores). Si la mascarilla tiene cintas elásticas, colóqueselas apropiadamente detrás de las orejas.
5. **Ponerse el protector facial o gafas protectoras.** Cuando use un respirador N95 o un respirador elastomérico con mascarilla de media cara, seleccione un protector de ojos adecuado asegurándose de que el ni el respirador interfiera en el posicionamiento correcto del protector de ojos ni el protector de ojos afecte el ajuste o el sellado del respirador. Los protectores faciales proveen cobertura a toda la cara. Las gafas protectoras también proveen una excelente protección de los ojos, pero es común que se empañen.
6. **Ponerse los guantes.** Los guantes deben cubrir los puños de la bata.
7. **Ahora se puede ingresar a la habitación del paciente.**

Cómo quitarse el EPP:

Podría haber más de un método aceptable para quitarse el EPP. Es crítico que se capacite en el procedimiento que se use en su establecimiento de atención médica y lo practique. A continuación se detalla un ejemplo de cómo quitarse el EPP.

1. **Quitarse los guantes.** Asegúrese de no causar contaminación adicional a las manos al quitarse los guantes. Los guantes se pueden quitar usando más de una técnica (p. ej., con la primera mano desenguantada o envuelta en el revés del primer guante).
2. **Quitarse la bata.** Desate todas las tiras (o desabroche todos los broches). Las tiras de algunas batas se deben romper en lugar de desatar. Hágalo suavemente, sin movimientos abruptos. Quítese cuidadosamente la bata desde los hombros hacia abajo y lejos del cuerpo. Enrollarla hacia abajo es un enfoque aceptable. Deséchela en un bote de basura.*
3. **Ahora se puede salir de la habitación del paciente.**
4. **Higienizarse las manos.**
5. **Quitarse el protector facial o gafas protectoras.** Quítese cuidadosamente el protector facial o gafas protectoras tomando la banda y jalándola hacia arriba y lejos de la cabeza. No toque el frente del protector facial o gafas protectoras.
6. **Quitarse y desechar el respirador (o mascarilla, si se usó mascarilla en lugar de respirador).*** No toque el frente del respirador o mascarilla.
   - » **Respirador:** Quítese la banda inferior tocando solo la banda y pasándosela cuidadosamente por encima de la cabeza. Tome la banda superior y pásesela cuidadosamente por encima de la cabeza, y luego retírese el respirador de la cara sin tocar el frente del respirador.
   - » **Mascarilla:** Desate las bandas (o desengáncheselas de las orejas) y retírese la mascarilla de la cara sin tocar el frente.
7. **Higienizarse las manos después de quitarse el respirador o mascarilla y antes de volver a ponérselo si en su lugar de trabajo los están volviendo a usar.**

En los establecimientos donde se esté implementando el uso repetido o extendido de EPP los procedimientos sobre cómo ponerse y quitarse el EPP se deberán adaptar a tales prácticas.



SEPSIS FACT SHEET

A POTENTIALLY DEADLY OUTCOME FROM AN INFECTION

What should I do if I think I have an infection or sepsis?

- Call your doctor or go to the emergency room immediately if you have any signs or symptoms of an infection or sepsis. This is a medical emergency.
- It's important that you say, "I AM CONCERNED ABOUT SEPSIS."
- If you are continuing to feel worse or not getting better in the days after surgery, ask your doctor about sepsis. Sepsis is a common complication of people hospitalized for other reasons.

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

CS257671C

What is sepsis?

Sepsis is the body's overwhelming and life-threatening response to an infection which can lead to tissue damage, organ failure, and death.

When can you get sepsis?

Sepsis can occur to anyone, at any time, from any type of infection, and can affect any part of the body. It can occur even after a minor infection.

What causes sepsis?

Any type of infection that is anywhere in your body can cause sepsis, including infections of the skin, lungs (such as pneumonia), urinary tract, abdomen (such as appendicitis), or other part of the body. An infection occurs when germs enter a person's body and multiply, causing illness and organ and tissue damage.

Who gets sepsis?

Anyone can get sepsis as a bad outcome from an infection, but the risk is higher in:

- people with weakened immune systems
- babies and very young children
- elderly people
- people with chronic illnesses, such as diabetes, AIDS, cancer, and kidney or liver disease
- people suffering from a severe burn or wound

Ask your doctor about your risk for getting sepsis.

What are the symptoms of sepsis?

There is no single sign or symptom of sepsis. It is, rather, a combination of symptoms. Since sepsis is the result of an infection, symptoms can include infection signs (diarrhea, vomiting, sore throat, etc.), as well as ANY of the symptoms below:

S	E	P	S	I	S
Shivering, fever, or very cold	Extreme pain or general discomfort ("worst ever")	Pale or discolored skin	Sleepy, difficult to wake up, confused	"I feel like I might die"	Short of breath

Why should I be concerned about sepsis?

Sepsis can be deadly. It kills more than 258,000 Americans each year and leaves thousands of survivors with life-changing after effects. According to CDC, there are over 1 million cases of sepsis each year, and it is the ninth leading cause of disease-related deaths.

How is sepsis diagnosed?

Doctors diagnose sepsis using a number of physical findings like fever, increased heart rate, and increased breathing rate. They also do lab tests that check for signs of infection.

Many of the symptoms of sepsis, such as fever and difficulty breathing, are the same as in other conditions, making sepsis hard to diagnose in its early stages.

How is sepsis treated?

People with sepsis are usually treated in the hospital. Doctors try to treat the infection, keep the vital organs working, and prevent a drop in blood pressure.

Doctors treat sepsis with antibiotics as soon as possible. Many patients receive oxygen and intravenous (IV) fluids to maintain normal blood oxygen levels and blood pressure.

Other types of treatment, such as assisting breathing with a machine or kidney dialysis, may be necessary. Sometimes surgery is required to remove tissue damaged by the infection.

Are there any long-term effects of sepsis?

Many people who have sepsis recover completely and their lives return to normal. But some people may experience permanent organ damage. For example, in someone who already has kidney problems, sepsis can lead to kidney failure that requires lifelong dialysis.

How can I prevent sepsis?

1 Get **vaccinated**

2 **Prevent infections** that can lead to sepsis by:

- **Cleaning** scrapes and wound
- Practicing good **hygiene** (e.g., hand washing, bathing regularly)

3 If you have an **infection**, **look for signs like**: fever, chills, rapid breathingand heartrate, rash, confusion, and disorientation.

Where can I get more information?

- Centers for Disease Control and Prevention (CDC)—CDC works 24/7 protecting America's health, safety and security. Whether diseases start at home or abroad, are curable or preventable, chronic or acute, stem from human error or deliberate attack, CDC is committed to responding to America's most pressing health challenges. cdc.gov/sepsis cdc.gov/cancer/preventinfections
- Rory Staunton Foundation—The Rory Staunton Foundation supports education and outreach efforts aimed at rapid diagnosis and treatment of sepsis, particularly in children. rorystaunton.com
- Sepsis Alliance®—Created to raise sepsis awareness among both the general public and healthcare professionals. Sepsis Alliance offers information on a variety of sepsis-related topics. Visit sepsis.org/library to view the complete series of titles. sepsis.org

RORY STAUNTON FOUNDATION

SEPSIS ALLIANCE
Suspect Sepsis. Save Lives.

This fact sheet was developed in collaboration with CDC, Sepsis Alliance® and the Rory Staunton Foundation.

SEPSIS FACT SHEET

Sepsis is the body's overwhelming response to infection or injury. It can lead to tissue damage, organ failure, amputations, and death.

WHO GETS SEPSIS?

Sepsis is more likely to affect very young children, older adults, people with chronic illnesses, and those with weakened immune systems. Sepsis is an equal-opportunity killer, affecting people of all ages and levels of health.

WHAT ARE THE SYMPTOMS?

T **Temperature:** Higher or lower than normal

I **Infection:** May have signs and symptoms of an infection

M **Mental Decline:** Confused, sleepy, difficult to rouse

E™ **Extremely Ill:** Severe pain, discomfort, shortness of breath

If you see a combination of these symptoms, especially if there is a recent history of a cut, surgery, invasive procedure, or infection, call 911 or go to a hospital with an advocate and say, ***"I am concerned about sepsis."***

WHAT CAUSES SEPSIS?

Sepsis is caused by an infection. The infection can be viral, bacterial, or fungal, or caused by a parasite. It can be an infection that started in a paper cut or bug bite, or a larger infection, like pneumonia or meningitis. Sometimes, doctors never learn what the infection was.

CAN SEPSIS BE PREVENTED?

You can't always prevent sepsis, but the risk drops when you take steps to prevent or treat infections as quickly as possible. You can do this by staying current with vaccinations, practicing good hygiene, and seeking medical help when you suspect you have an infection.

CRITICAL FACTS ABOUT SEPSIS

- Sepsis is the leading cause of death in hospitals.[1]
- 19% (19 out of 100) of people hospitalized with sepsis are readmitted within 30 days.[2]
- As many as 87% (87 out of 100) of sepsis cases start in the community.[3]
- The risk of dying from sepsis increases by as much as 8% for every hour treatment is delayed.[4]

- Sepsis affects nearly 49 million people worldwide each year and is the most common killer of children, taking more than 3.4 million each year.[5]
- More than 1.7 million people in the U.S. are diagnosed with sepsis each year, that is 1 every 20 seconds.[3]
- 270,000 people die from sepsis each year in the U.S., 1 every 2 minutes; this is more than from prostate cancer, breast cancer, and opioid overdoses combined.[3,6,7]
- More than 75,000 children develop severe sepsis each year in the U.S., and 6,800 die – more than from pediatric cancers.[8,9]
- Sepsis causes at least 261,000 maternal deaths each year world-wide and is a cause of increasing pregnancy-related deaths in the U.S.[10,11]
- In 2012, there were more than 13,700 sepsis-related amputations in the U.S. This works out to an average of 38 amputations per day.[12]
- Up to 50% of sepsis survivors are left with long-term physical and/or psychological effects.[13,14,15]

THERE IS ALSO AN ECONOMIC COST TO SEPSIS

- Sepsis is the #1 cost of hospitalization in the U.S. Costs for acute sepsis hospitalization and skilled nursing are estimated to be $62 billion annually.[16,17]
- The average cost per hospital stay for sepsis is double the average cost per stay across all other conditions.[18]
- Sepsis is the #1 cause for hospital readmissions to the hospital, costing more than $3.5 billion each year.[16,19]
- Despite all this, more than 34% of American adults have NEVER heard of sepsis.[20]

SOURCES

For references, please visit **www.sepsis.org/references.**

SEPSIS IS A MEDICAL EMERGENCY.

IF YOU SUSPECT SEPSIS, CALL 9-1-1 OR GO TO A HOSPITAL RIGHT AWAY.

To learn more about sepsis, or to read tributes and survivor stories, visit us online at Sepsis.org

SEPSIS ALLIANCE

Sepsis Information Guides are supported in part by an educational grant from Merck & Co., Inc.

Recommended Adult Immunization Schedule
for ages 19 years or older

UNITED STATES
2021

How to use the adult immunization schedule

1 Determine recommended vaccinations by age **(Table 1)**

2 Assess need for additional recommended vaccinations by medical condition and other indications **(Table 2)**

3 Review vaccine types, frequencies, and intervals and considerations for special situations **(Notes)**

Recommended by the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/acip) and approved by the Centers for Disease Control and Prevention (www.cdc.gov), American College of Physicians (www.acponline.org), American Academy of Family Physicians (www.aafp.org), American College of Obstetricians and Gynecologists (www.acog.org), American College of Nurse-Midwives (www.midwife.org), and American Academy of Physician Assistants (www.aapa.org).

Vaccines in the Adult Immunization Schedule*

Vaccines	Abbreviations	Trade names
Haemophilus influenzae type b vaccine	Hib	ActHIB® Hiberix® PedvaxHIB®
Hepatitis A vaccine	HepA	Havrix® Vaqta®
Hepatitis A and hepatitis B vaccine	HepA-HepB	Twinrix®
Hepatitis B vaccine	HepB	Engerix-B® Recombivax HB® Heplisav-B®
Human papillomavirus vaccine	HPV	Gardasil 9®
Influenza vaccine (inactivated)	IIV	Many brands
Influenza vaccine (live, attenuated)	LAIV4	FluMist® Quadrivalent
Influenza vaccine (recombinant)	RIV4	Flublok® Quadrivalent
Measles, mumps, and rubella vaccine	MMR	M-M-R II®
Meningococcal serogroups A, C, W, Y vaccine	MenACWY-D MenACWY-CRM MenACWY-TT	Menactra® Menveo® MenQuadfi®
Meningococcal serogroup B vaccine	MenB-4C MenB-FHbp	Bexsero® Trumenba®
Pneumococcal 13-valent conjugate vaccine	PCV13	Prevnar 13®
Pneumococcal 23-valent polysaccharide vaccine	PPSV23	Pneumovax 23®
Tetanus and diphtheria toxoids	Td	Tenivac® Tdvax™
Tetanus and diphtheria toxoids and acellular pertussis vaccine	Tdap	Adacel® Boostrix®
Varicella vaccine	VAR	Varivax®
Zoster vaccine, recombinant	RZV	Shingrix

*Administer recommended vaccines if vaccination history is incomplete or unknown. Do not restart or add doses to vaccine series if there are extended intervals between doses. The use of trade names is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Report

- Suspected cases of reportable vaccine-preventable diseases or outbreaks to the local or state health department
- Clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or 800-822-7967

Injury claims

All vaccines included in the adult immunization schedule except pneumococcal 23-valent polysaccharide (PPSV23) and zoster (RZV) vaccines are covered by the Vaccine Injury Compensation Program. Information on how to file a vaccine injury claim is available at www.hrsa.gov/vaccinecompensation.

Questions or comments

Contact www.cdc.gov/cdc-info or 800-CDC-INFO (800-232-4636), in English or Spanish, 8 a.m.–8 p.m. ET, Monday through Friday, excluding holidays.

Download the CDC Vaccine Schedules app for providers at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html.

Helpful information

- Complete ACIP recommendations: www.cdc.gov/vaccines/hcp/acip-recs/index.html
- *General Best Practice Guidelines for Immunization* (including contraindications and precautions): www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- Vaccine information statements: www.cdc.gov/vaccines/hcp/vis/index.html
- Manual for the Surveillance of Vaccine-Preventable Diseases (including case identification and outbreak response): www.cdc.gov/vaccines/pubs/surv-manual
- Travel vaccine recommendations: www.cdc.gov/travel
- Recommended Child and Adolescent Immunization Schedule, United States, 2021: www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html
- ACIP Shared Clinical Decision-Making Recommendations www.cdc.gov/vaccines/acip/acip-scdm-faqs.html

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2021

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV) or **Influenza recombinant** (RIV4)	1 dose annually			
or		or		
Influenza live, attenuated (LAIV4)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes)			
	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			
Varicella (VAR)	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)			2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal conjugate (PCV13)	1 dose			1 dose
Pneumococcal polysaccharide (PPSV23)	1 or 2 doses depending on indication			1 dose
Hepatitis A (HepA)	2 or 3 doses depending on vaccine			
Hepatitis B (HepB)	2 or 3 doses depending on vaccine			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

Table 2 Recommended Adult Immunization Schedule by Medical Condition and Other Indications, United States, 2021

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4 count		Asplenia, complement deficiencies	End-stage renal disease; or on hemodialysis	Heart or lung disease, alcoholism[1]	Chronic liver disease	Diabetes	Health care personnel[2]	Men who have sex with men
			<200 mm³	≥200 mm³							
IIV or RIV4	1 dose annually										
or										or	
LAIV4	Not Recommended					Precaution				1 dose annually	
Tdap or Td	1 dose Tdap each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 years									
MMR	Not Recommended*	Not Recommended	1 or 2 doses depending on indication								
VAR	Not Recommended*	Not Recommended		2 doses							
RZV			2 doses at age ≥50 years								
HPV	Not Recommended*	3 doses through age 26 years	2 or 3 doses through age 26 years depending on age at initial vaccination or condition								
PCV13		1 dose									
PPSV23		1, 2, or 3 doses depending on age and indication									
HepA			2 or 3 doses depending on vaccine								
HepB			2, 3, or 4 doses depending on vaccine or condition						<60 years ≥60 years		
MenACWY	1 or 2 doses depending on indication, see notes for booster recommendations										
MenB	Precaution	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations									
Hib		3 doses HSCT[3] recipients only	1 dose								

- Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection
- Recommended vaccination for adults with an additional risk factor or another indication
- Precaution—vaccination might be indicated if benefit of protection outweighs risk of adverse reaction
- Recommended vaccination based on shared clinical decision-making
- Not recommended/ contraindicated—vaccine should not be administered.
- No recommendation/ Not applicable

*Vaccinate after pregnancy.

1. Precaution for LAIV4 does not apply to alcoholism. **2.** See notes for influenza; hepatitis B; measles, mumps, and rubella; and varicella vaccinations. **3.** Hematopoietic stem cell transplant.

Notes

Recommended Adult Immunization Schedule for ages 19 years or older, United States, 2021

For vaccine recommendations for persons 18 years of age or younger, see the Recommended Child/Adolescent Immunization Schedule.

Additional Information

COVID-19 Vaccination

ACIP recommends use of COVID-19 vaccines within the scope of the Emergency Use Authorization or Biologics License Application for the particular vaccine. Interim ACIP recommendations for the use of COVID-19 vaccines can be found at www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/covid-19.html

Haemophilus influenzae type b vaccination

Special situations

- **Anatomical or functional asplenia (including sickle cell disease):** 1 dose if previously did not receive Hib; if elective splenectomy, 1 dose, preferably at least 14 days before splenectomy
- **Hematopoietic stem cell transplant (HSCT):** 3-dose series 4 weeks apart starting 6–12 months after successful transplant, regardless of Hib vaccination history

Hepatitis A vaccination

Routine vaccination

- **Not at risk but want protection from hepatitis A** (identification of risk factor not required): 2-dose series HepA (Havrix 6–12 months apart or Vaqta 6–18 months apart [minimum interval: 6 months]) or 3-dose series HepA-HepB (Twinrix at 0, 1, 6 months [minimum intervals: dose 1 to dose 2: 4 weeks / dose 2 to dose 3: 5 months])

Special situations

- **At risk for hepatitis A virus infection:** 2-dose series HepA or 3-dose series HepA-HepB as above
  - **Chronic liver disease** (e.g., persons with hepatitis B, hepatitis C, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice the upper limit of normal)
  - **HIV infection**
  - **Men who have sex with men**
  - **Injection or noninjection drug use**
  - **Persons experiencing homelessness**
  - **Work with hepatitis A virus** in research laboratory or with nonhuman primates with hepatitis A virus infection
  - **Travel in countries with high or intermediate endemic hepatitis A** (HepA-HepB [Twinrix] may be administered on an accelerated schedule of 3 doses at 0, 7, and 21–30 days, followed by a booster dose at 12 months)
  - **Close, personal contact with international adoptee** (e.g., household or regular babysitting) in first 60 days after arrival from country with high or intermediate endemic hepatitis A (administer dose 1 as soon as adoption is planned, at least 2 weeks before adoptee's arrival)
  - **Pregnancy** if at risk for infection or severe outcome from infection during pregnancy
  - **Settings for exposure, including** health care settings targeting services to injection or noninjection drug users or group homes and nonresidential day care facilities for developmentally disabled persons (individual risk factor screening not required)

Hepatitis B vaccination

Routine vaccination

- **Not at risk but want protection from hepatitis B** (identification of risk factor not required): 2- or 3-dose series (2-dose series Heplisav-B at least 4 weeks apart [2-dose series HepB only applies when 2 doses of Heplisav-B are used at least 4 weeks apart] or 3-dose series Engerix-B or Recombivax HB at 0, 1, 6 months [minimum intervals: dose 1 to dose 2: 4 weeks / dose 2 to dose 3: 8 weeks / dose 1 to dose 3: 16 weeks]) or 3-dose series HepA-HepB (Twinrix at 0, 1, 6 months [minimum intervals: dose 1 to dose 2: 4 weeks / dose 2 to dose 3: 5 months])

Special situations

- **At risk for hepatitis B virus infection:** 2-dose (Heplisav-B) or 3-dose (Engerix-B, Recombivax HB) series or 3-dose series HepA-HepB (Twinrix) as above
  - **Chronic liver disease** (e.g., persons with hepatitis C, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice upper limit of normal)
  - **HIV infection**
  - **Sexual exposure risk** (e.g., sex partners of hepatitis B surface antigen [HBsAg]-positive persons; sexually active persons not in mutually monogamous relationships; persons seeking evaluation or treatment for a sexually transmitted infection; men who have sex with men)
  - **Current or recent injection drug use**
  - **Percutaneous or mucosal risk for exposure to blood** (e.g., household contacts of HBsAg-positive persons; residents and staff of facilities for developmentally disabled persons; health care and public safety personnel with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids; hemodialysis, peritoneal dialysis, home dialysis, and predialysis patients; persons with diabetes mellitus age younger than 60 years, shared clinical decision-making for persons age 60 years or older)
  - **Incarcerated persons**
  - **Travel in countries with high or intermediate endemic hepatitis B**
  - **Pregnancy** if at risk for infection or severe outcome from infection during pregnancy (Heplisav-B not currently recommended due to lack of safety data in pregnant women)

Human papillomavirus vaccination

Routine vaccination

- **HPV vaccination recommended for all persons through age 26 years:** 2- or 3-dose series depending on age at initial vaccination or condition:
  - **Age 15 years or older at initial vaccination:** 3-dose series at 0, 1–2 months, 6 months (minimum intervals: dose 1 to dose 2: 4 weeks / dose 2 to dose 3: 12 weeks / dose 1 to dose 3: 5 months; repeat dose if administered too soon)
  - **Age 9–14 years at initial vaccination and received 1 dose or 2 doses less than 5 months apart:** 1 additional dose
  - **Age 9–14 years at initial vaccination and received 2 doses at least 5 months apart:** HPV vaccination series complete, no additional dose needed
- **Interrupted schedules:** If vaccination schedule is interrupted, the series does not need to be restarted
- **No additional dose recommended after completing series with recommended dosing intervals using any HPV vaccine**

Shared clinical decision-making

- **Some adults age 27–45 years: Based on shared clinical decision-making,** 2- or 3-dose series as above

Special situations

- **Age ranges recommended above for routine and catch-up vaccination or shared clinical decision-making also apply in special situations**

- **Immunocompromising conditions, including HIV infection**: 3-dose series as above, regardless of age at initial vaccination
- **Pregnancy**: HPV vaccination not recommended until after pregnancy; no intervention needed if vaccinated while pregnant; pregnancy testing not needed before vaccination

Influenza vaccination

Routine vaccination

- **Persons age 6 months or older:** 1 dose any influenza vaccine appropriate for age and health status annually
- For additional guidance, see www.cdc.gov/flu/professionals/index.htm

Special situations

- **Egg allergy, hives only:** 1 dose any influenza vaccine appropriate for age and health status annually
- **Egg allergy–any symptom other than hives** (e.g., angioedema, respiratory distress): 1 dose any influenza vaccine appropriate for age and health status annually. If using an influenza vaccine other than RIV4 or ccIIV4, administer in medical setting under supervision of health care provider who can recognize and manage severe allergic reactions.
- Severe allergic reactions to any vaccine can occur even in the absence of a history of previous allergic reaction. Therefore, all vaccine providers should be familiar with the office emergency plan and certified in cardiopulmonary resuscitation.
- A previous severe allergic reaction to any influenza vaccine is a contraindication to future receipt of the vaccine.
- **LAIV4 should not be used** in persons with the following conditions or situations:
  - History of severe allergic reaction to any vaccine component (excluding egg) or to a previous dose of any influenza vaccine
  - Immunocompromised due to any cause (including medications and HIV infection)
  - Anatomic or functional asplenia
  - Close contacts or caregivers of severely immunosuppressed persons who require a protected environment
  - Pregnancy
  - Cranial CSF/oropharyngeal communications
  - Cochlear implant
  - Received influenza antiviral medications oseltamivir or zanamivir within the previous 48 hours, peramivir within the previous 5 days, or baloxavir within the previous 17 days
  - Adults 50 years or older
- **History of Guillain-Barré syndrome within 6 weeks after previous dose of influenza vaccine:** Generally, should not be vaccinated unless vaccination benefits outweigh risks for those at higher risk for severe complications from influenza

Measles, mumps, and rubella vaccination

Routine vaccination

- **No evidence of immunity to measles, mumps, or rubella:** 1 dose
  - **Evidence of immunity:** Born before 1957 (health care personnel, see below), documentation of receipt of MMR vaccine, laboratory evidence of immunity or disease (diagnosis of disease without laboratory confirmation is not evidence of immunity)

Special situations

- **Pregnancy with no evidence of immunity to rubella:** MMR contraindicated during pregnancy; after pregnancy (before discharge from health care facility), 1 dose
- **Nonpregnant women of childbearing age with no evidence of immunity to rubella:** 1 dose
- **HIV infection with CD4 count ≥200 cells/mm^3 for at least 6 months and no evidence of immunity to measles, mumps, or rubella:** 2-dose series at least 4 weeks apart; MMR contraindicated for HIV infection with CD4 count <200 cells/mm^3
- **Severe immunocompromising conditions:** MMR contraindicated
- **Students in postsecondary educational institutions, international travelers, and household or close, personal contacts of immunocompromised persons with no evidence of immunity to measles, mumps, or rubella:** 2-dose series at least 4 weeks apart if previously did not receive any doses of MMR or 1 dose if previously received 1 dose MMR
- **Health care personnel:**
  - **Born in 1957 or later with no evidence of immunity to measles, mumps, or rubella:** 2-dose series at least 4 weeks apart for measles or mumps or at least 1 dose for rubella
  - **Born before 1957 with no evidence of immunity to measles, mumps, or rubella:** Consider 2-dose series at least 4 weeks apart for measles or mumps or 1 dose for rubella

Meningococcal vaccination

Special situations for MenACWY

- **Anatomical or functional asplenia (including sickle cell disease), HIV infection, persistent complement component deficiency, complement inhibitor (e.g., eculizumab, ravulizumab) use:** 2-dose series MenACWY-D (Menactra, Menveo or MenQuadfi) at least 8 weeks apart and revaccinate every 5 years if risk remains
- **Travel in countries with hyperendemic or epidemic meningococcal disease, microbiologists routinely exposed to *Neisseria meningitidis*:** 1 dose MenACWY (Menactra, Menveo or MenQuadfi) and revaccinate every 5 years if risk remains
- **First-year college students who live in residential housing (if not previously vaccinated at age 16 years or older) and military recruits:** 1 dose MenACWY (Menactra, Menveo or MenQuadfi)
- For MenACWY **booster dose recommendations** for groups listed under "Special situations" and in an outbreak setting (e.g., in community or organizational settings and among men who have sex with men) and additional meningococcal vaccination information, see www.cdc.gov/mmwr/volumes/69/rr/rr6909a1.htm

Shared clinical decision-making for MenB

- **Adolescents and young adults age 16–23 years (age 16–18 years preferred) not at increased risk for meningococcal disease:** Based on shared clinical decision-making, 2-dose series MenB-4C (Bexsero) at least 1 month apart or 2-dose series MenB-FHbp (Trumenba) at 0, 6 months (if dose 2 was administered less than 6 months after dose 1, administer dose 3 at least 4 months after dose 2); MenB-4C and MenB-FHbp are not interchangeable (use same product for all doses in series)

Special situations for MenB

- **Anatomical or functional asplenia (including sickle cell disease), persistent complement component deficiency, complement inhibitor (e.g., eculizumab, ravulizumab) use, microbiologists routinely exposed to *Neisseria meningitidis*:** 2-dose primary series MenB-4C (Bexsero) at least one month apart or

Notes

Recommended Adult Immunization Schedule, United States, 2021

- MenB-4C (Bexsero) at least 1 month apart or 3-dose primary series MenB-FHbp (Trumenba) at 0, 1–2, 6 months (if dose 2 was administered at least 6 months after dose 1, dose 3 not needed); MenB-4C and MenB-FHbp are not interchangeable (use same product for all doses in series); 1 dose MenB booster 1 year after primary series and revaccinate every 2–3 years if risk remains
- **Pregnancy:** Delay MenB until after pregnancy unless at increased risk and vaccination benefits outweigh potential risks
- For MenB **booster dose recommendations** for groups listed under "Special situations" and in an outbreak setting (e.g., in community or organizational settings and among men who have sex with men) and additional meningococcal vaccination information, see www.cdc.gov/mmwr/volumes/69/rr/rr6909a1.htm

Pneumococcal vaccination

Routine vaccination

- **Age 65 years or older** (immunocompetent—see www.cdc.gov/mmwr/volumes/68/wr/mm6846a5.htm?s_cid=mm6846a5_w): 1 dose PPSV23
  - If PPSV23 was administered prior to age 65 years, administer 1 dose PPSV23 at least 5 years after previous dose

Shared clinical decision-making

- **Age 65 years or older** (immunocompetent): 1 dose PCV13 based on **shared clinical decision-making** if previously not administered.
  - PCV13 and PPSV23 should not be administered during the same visit
  - If both PCV13 and PPSV23 are to be administered, PCV13 should be administered first
  - PCV13 and PPSV23 should be administered at least 1 year apart

Special situations

(www.cdc.gov/mmwr/preview/mmwrhtml/mm6140a4.htm)

- **Age 19–64 years with chronic medical conditions (chronic heart [excluding hypertension], lung, or liver disease, diabetes), alcoholism, or cigarette smoking:** 1 dose PPSV23
- **Age 19 years or older with immunocompromising conditions (congenital or acquired immunodeficiency [including B- and T-lymphocyte deficiency, complement deficiencies, phagocytic disorders, HIV infection], chronic renal failure, nephrotic syndrome, leukemia, lymphoma, Hodgkin disease, generalized malignancy, iatrogenic immunosuppression [e.g., drug or radiation therapy], solid organ transplant, multiple myeloma) or anatomical or functional asplenia (including sickle cell disease and other hemoglobinopathies):** 1 dose PCV13 followed by 1 dose PPSV23 at least 8 weeks later, then another dose PPSV23 at least 5 years after previous PPSV23; at age 65 years or older, administer 1 dose PPSV23 at least 5 years after most recent PPSV23 (note: only 1 dose PPSV23 recommended at age 65 years or older)
- **Age 19 years or older with cerebrospinal fluid leak or cochlear implant:** 1 dose PCV13 followed by 1 dose PPSV23 at least 8 weeks later; at age 65 years or older, administer another dose PPSV23 at least 5 years after PPSV23 (note: only 1 dose PPSV23 recommended at age 65 years or older)

Tetanus, diphtheria, and pertussis vaccination

Routine vaccination

- **Previously did not receive Tdap at or after age 11 years:** 1 dose Tdap, then Td or Tdap every 10 years

Special situations

- **Previously did not receive primary vaccination series for tetanus, diphtheria, or pertussis:** At least 1 dose Tdap followed by 1 dose Td or Tdap at least 4 weeks after Tdap and another dose Td or Tdap 6–12 months after last Td or Tdap (Tdap can be substituted for any Td dose, but preferred as first dose), Td or Tdap every 10 years thereafter
- **Pregnancy:** 1 dose Tdap during each pregnancy, preferably in early part of gestational weeks 27–36
- **Wound management:** Persons with 3 or more doses of tetanus-toxoid-containing vaccine: For clean and minor wounds, administer Tdap or Td if more than 10 years since last dose of tetanus-toxoid-containing vaccine; for all other wounds, administer Tdap or Td if more than 5 years since last dose of tetanus-toxoid-containing vaccine. Tdap is preferred for persons who have not previously received Tdap or whose Tdap history is unknown. If a tetanus-toxoid-containing vaccine is indicated for a pregnant woman, use Tdap. For detailed information, see www.cdc.gov/mmwr/volumes/69/wr/mm6903a5.htm

Varicella vaccination

Routine vaccination

- **No evidence of immunity to varicella:** 2-dose series 4–8 weeks apart if previously did not receive varicella-containing vaccine (VAR or MMRV [measles-mumps-rubella-varicella vaccine] for children); if previously received 1 dose varicella-containing vaccine, 1 dose at least 4 weeks after first dose
  - Evidence of immunity: U.S.-born before 1980 (except for pregnant women and health care personnel [see below]), documentation of 2 doses varicella-containing vaccine at least 4 weeks apart, diagnosis or verification of history of varicella or herpes zoster by a health care provider, laboratory evidence of immunity or disease

Special situations

- **Pregnancy with no evidence of immunity to varicella:** VAR contraindicated during pregnancy; after pregnancy (before discharge from health care facility), 1 dose if previously received 1 dose varicella-containing vaccine or dose 1 of 2-dose series (dose 2: 4–8 weeks later) if previously did not receive any varicella-containing vaccine, regardless of whether U.S.-born before 1980
- **Health care personnel with no evidence of immunity to varicella:** 1 dose if previously received 1 dose varicella-containing vaccine; 2-dose series 4–8 weeks apart if previously did not receive any varicella-containing vaccine, regardless of whether U.S.-born before 1980
- **HIV infection with CD4 count ≥200 cells/mm^3 with no evidence of immunity:** Vaccination may be considered (2 doses 3 months apart); VAR contraindicated for HIV infection with CD4 count <200 cells/mm^3
- **Severe immunocompromising conditions:** VAR contraindicated

Zoster vaccination

Routine vaccination

- **Age 50 years or older:** 2-dose series RZV (Shingrix) 2–6 months apart (minimum interval: 4 weeks; repeat dose if administered too soon), regardless of previous herpes zoster or history of zoster vaccine live (ZVL, Zostavax) vaccination (administer RZV at least 2 months after ZVL)

Special situations

- **Pregnancy:** Consider delaying RZV until after pregnancy if RZV is otherwise indicated.
- **Severe immunocompromising conditions (including HIV infection with CD4 count <200 cells/mm^3):** Recommended use of RZV under review

BMJ Open Quality

Reducing urinary tract infections in care homes by improving hydration

Katie Lean,[1] Rasanat Fatima Nawaz,[1,2] Sundus Jawad,[3] Charles Vincent[2]

To cite: Lean K, Nawaz RF, Jawad S, *et al*. Reducing urinary tract infections in care homes by improving hydration. *BMJ Open Quality* 2019;**8**:e000563. doi:10.1136/bmjoq-2018-000563

Received 25 October 2018
Revised 21 May 2019
Accepted 24 June 2019

[1]Patient Safety, Oxford Patient Safety Collaborative, Oxford, UK
[2]Department of Experimental Psychology, University of Oxford, Oxford, UK
[3]Medicines Optimisation Team, NHS East Berkshire Clinical Commissioning Group, Windsor, UK

Correspondence to
Katie Lean;
katie.lean@oxfordahsn.org

ABSTRACT

Dehydration may increase the risk of urinary tract infections (UTIs), which can lead to confusion, falls, acute kidney injury and hospital admission. We aimed to reduce the number of UTIs in care home residents which require admission to hospital. The principal intervention was the introduction of seven structured drink rounds every day accompanied by staff training and raising awareness. UTIs requiring antibiotics reduced by 58% and UTIs requiring hospital admissions reduced by 36%, when averaged across the four care homes. Care home residents benefited from greater fluid intake, which in turn may have reduced infection. Structured drink rounds were a low-cost intervention for preventing UTIs and implemented easily by care staff.

PROBLEM

Urinary tract infection (UTI) was the condition with the highest rate of emergency admissions to hospital in 2012/2013.[1] Dehydration has been highlighted as a common cause of admission to hospital in nursing home residents,[2] and there is evidence that many older residents living in care homes do not receive enough fluids. In this context, a care home is a residential environment for older adults providing them with onsite care services where required.

The regional acute kidney injury programme at the Oxford Patient Safety Collaborative was established to improve the recognition and response to acute kidney injury. East Berkshire Clinical Commissioning Group (CCG) highlighted that UTI was the most common reason for hospital admission from their care home population in 2015/2016. A quality improvement project was designed to address the aim of improving hydration and reducing UTIs.

East Berkshire CCG has over 75 care homes within their region. We identified four care homes with the highest incidence of UTI admissions to hospital and approached them to collaborate and co-design the project. These three residential homes and one nursing home had a combined total of 150 residents, majority over 75 years old and more than half living with dementia. Most of the employees are care assistants who work 12-hour shifts and in one home there was a high turnover of staff. All homes remained in the project from conception to completion.

The SMART aim of this quality improvement project was to reduce the incidence of UTIs by improving hydration with the ultimate aim of reducing UTI admissions to hospital by 5% from the previous year.

BACKGROUND

Promoting good hydration and nutrition in older adults leads to increased well-being and improved quality of life.[3] Older adults often forget to drink[4] and over half of nursing home residents do not have a safe swallowing mechanism making them susceptible to decreased fluid intake.[5] These factors increase the risk of dehydration and UTIs in older adults, which can in turn lead to confusion, falls, acute kidney injury and hospital admission.[6] Inadequate staffing, including high turnover and understaffed care homes, increases the risk of dehydration in residents.[7 8]

Dysphagia (difficulty in swallowing) is also known to contribute to dehydration in older adults. Over half of care home residents are highlighted as having issues swallowing.[5 9] Older adults with dysphagia will require more encouragement to drink as fluids become less palatable and require thickeners. There is also an increased fear of choking, drooling and aspirating in residents.[10] Residents with dementia may require 1:1 care as they are at a higher risk of dehydration and require careful support and management with their drinking and eating.[11]

Residents with a safe swallow have an increased risk of dehydration due to the decline of the sense of thirst in older adults.[12] Many nursing home residents drink less than 1.5 litres a day and leave drinks unfinished.[12 13] Older adults capable of drinking without assistance may also limit fluid intake due to concerns surrounding incontinence as well as the fear of falling when needing to go to the toilet.[14]

Monitoring fluid intake of patients and residents is common in hospital and care

environments.[4] Fluid balance charts are used to record fluid intake and output. Drinks intake charts are used to exclusively record intake of drinks. Ensuring accurate documentation has been a challenge when using these methods. Numerous studies have identified inaccuracies across the use of these charts, particularly in the residential care setting.[15–17] In one study,[15] a third of residents were at risk of dehydration but not identified as such through their fluid intake charts. Accurate fluid charts are critical to improving hydration, but their design and use may need to be adapted to suit the care home environment.

In a small study, drinks diaries were completed by patients to track fluid intake over a 24-hour period.[18] Residents were typically asked to record the name of the drink, type of mug, cup or glass used, and tick the appropriate picture indicating how much they drank (a little, half, a lot or all). Due to cognitive or physical disabilities, many residents were unable to keep their own drinks diaries. However, the intervention led to increased fluid intake for those residents who had the ability and capacity to write.[18]

A small number of studies have attempted to improve hydration in nursing homes. For example, a 5-week hydration programme was carried out in the USA, with a sample of 51 nursing home residents aiming to increase daily fluid intake by 16 ounces.[19] The intervention involved increasing the presentation of drinks using a more attractive format, for example, decorated drinks carts. Over half the residents achieved the target additional 16 fluid ounces. The study did not find a statistically significant improvement in UTI reduction; however, other researchers have cited poorer physical health and UTI as one of the conditions that older adults are susceptible to when they do not receive adequate hydration.[20]

In summary, there is evidence that improving hydration has a variety of health benefits for older residents living in care homes, but there are few validated interventions. Structured drink rounds appear to be the most promising approach, but there is little guidance on how best to implement these. The intervention should allow for care home staff to receive relevant training in the importance of hydration, while offering and monitoring fluids in a flexible manner that suits each care home.

MEASUREMENT

The project started in May 2016 when formal baseline data were collected for the number of UTIs requiring antibiotics. Hospital admissions data were accessed from May 2015 and monitored throughout the project. The underlying population is the same in the study as the data were collected from four care homes and the same overall number of residents. Naturally, there is some change over time in the residents in each home.

Baseline data for UTI admission to hospital were provided by Secondary Uses Service accessed by East Berkshire CCG. The data measured all residents who were admitted to hospital with a UTI as the primary diagnosis. Baseline data were collected from May 2015 to June 2016, across the four care homes and collected monthly through the CCG from July 2016 to March 2018.

Baseline data for the number of UTIs requiring antibiotic treatment each month were collected using Safety Crosses, between May 2016 and June 2016. A safety cross is a visual tool containing 31 boxes (each box counts as a day in the month) used to collect data for improvement. A nominated champion within the care home was responsible for completing these daily. A red sticker indicated if a resident had a UTI requiring admission to hospital, an orange sticker indicated a resident requiring an antibiotic prescription for a UTI and a green sticker was an incident-free day. A sticker was placed on the date the UTI occurred, and if multiple residents had a UTI on the same day, multiple stickers would be used. During the project, the antibiotics data were collected monthly from July 2016 to March 2018.

Structured drink rounds were implemented seven times a day as the principal intervention and recorded on a designated sheet by the carer undertaking each round. The project champion would then tally the daily totals to give a weekly percentage of completed drink rounds. These data were then entered into a run chart by the project lead to note variation, sustainability of the process and offer support when required. Staff collated this information at the end of each month, allowing them to highlight successes and also identify areas for improvement.

DESIGN

The SMART aim of this quality improvement project was to reduce the incidence of UTIs by improving hydration with the ultimate aim of reducing admissions to hospital by 5% from the previous year.

All aspects of the project and intervention were designed and implemented in close collaboration with the care homes. A multidisciplinary team was formed to oversee the project which included a patient safety manager, pharmacist, dietitian, local general practitioner (GP), care home staff including managers, nurses, carers, activity co-ordinators and chefs. Throughout the project, care home residents were approached for their thoughts on the drink rounds.

Training of staff on the signs and symptoms of UTIs was identified as the first priority. This ensured SIGN 88 guidance[21] was used to identify clinical signs and symptoms of a UTI rather than the use of routine dipstick testing of residents. Hydration champions were identified to cascade the information and posters designed as this was more feasible than training busy staff individually.

The principal intervention was the implementation of a structured drink round to ensure that residents were offered a wide selection of hot and cold drinks at least seven times a day.

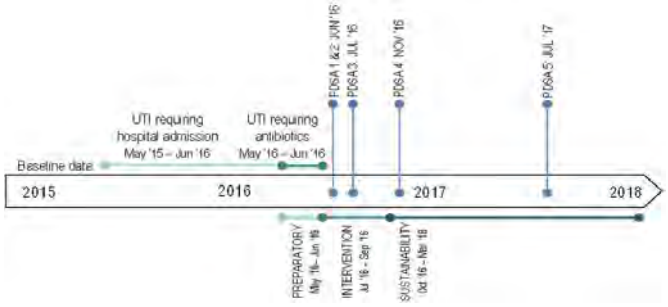


Figure 1 Timeline of the project illustrating when baseline data were collected, implementation of Plan, Do, Study, Act (PDSA) cycles and different phases of the project; preparatory, intervention and sustainability. UTI = urinary tract infection.

STRATEGY

The principal intervention was the introduction of seven structured drink rounds. This was supported by staff training, awareness and campaigns, drinks diaries for residents at risk of dehydration and guidance for sustaining changes in the long term (see figure 1). Plan, Do, Study, Act (PDSA) cycles were used to trial the components of the improvement intervention implemented to achieve these aims.

Preparatory phase

PDSA cycle 1: A poster was designed to raise awareness of the signs and symptoms of a UTI. The poster displayed information on the definition and diagnosis of a UTI as per SIGN 88 guidance.[21]

PDSA cycle 2: A 2-hour training session was attended by care home managers, nurses, support workers, activities co-ordinators and chefs. The training was open to all staff within the care home to ensure the importance of hydration was understood across all teams. The sessions covered the anatomy and physiology of the urinary system, signs and symptoms of dehydration, causes of dehydration, methods to improve hydration, effects of certain medication on kidneys and signs and symptoms of a UTI. At the end of the training sessions staff discussed the importance of structured drink rounds and ideas and thoughts on how to adapt these to suit their care home.

Intervention phase

PDSA cycle 3: The seven daily structured drink rounds were designed by the care homes to encourage hydration at regular intervals throughout the day for all residents. Seven drink rounds were chosen due to it being manageable for care home staff and supporting the daily recommendation of 6–8 glasses of water to keep residents hydrated.[22] The care homes decided what times they were going to undertake the drink rounds.

The drink round included theming and decorating the trolleys, ensuring they were bright and appealing for residents and to attract the attention of those with dementia. The theme was changed regularly to stimulate residents and keep up with key events, for example, festivals or sporting events. A wide variety of hot and cold drinks were presented using colourful juices, colourful cups and mugs. Ice lollies and milkshakes were included to offer alternative methods of increasing fluid intake. Residents were consulted throughout the process and selected cocktails of the month and taste tested various drinks to decide what they preferred.

Staff recorded drink rounds on a designated sheet and were required to circle 'yes' or 'no' depending on whether the drink round was carried out or not. They were encouraged to be honest about whether the drink round was undertaken. If any rounds were not taking place, then this allowed staff to review the times at which the drinks were being offered or other confounding issues.

Sustainability phase

PDSA cycle 4: Supplementary drinks diaries were introduced in the nursing home for all residents, and in the remaining three residential homes, they were introduced on an ad hoc basis whenever there were concerns about a risk of dehydration. Residents with capacity completed these themselves, but most of the time staff completed them. The diaries were designed, trialled and adjusted to suit the needs of the residents, staff and home. They documented the drinking behaviour of each resident, measured the type of drink and recorded the quantity consumed.

PDSA cycle 5: Good Practice Guidance (GPG) was written to encourage care home staff to understand clinical signs and symptoms of a UTI as per SIGN 88 guidance,[21] as well as promoting good hydration. A form to communicate UTI signs and symptoms was developed for care staff to use when communicating with GPs but also serves as a UTI management care plan.

GPG encouraged GPs to move away from routinely requesting a urine dipstick test in residents over 65 years old as a confirmation for diagnosis and recommended local formulary antibiotic prescribing information and guidance. The guidance was approved by East Berkshire Clinical Commissioning Group Effective Prescribing Performance Committee and introduced to assist care home staff and GPs to work collaboratively in effectively identifying UTIs and optimising treatment and management.

RESULTS

UTIs requiring antibiotics

The average number of UTIs requiring antibiotics across the four care homes at baseline was 1.8, and this reduced to 0.75 UTIs during the intervention and sustainability phase (see figure 2). This resulted in a 58% reduction of UTIs requiring antibiotics post intervention (Mann-Whitney U = 6.00, p = 0.10).

During the baseline period, the average number of days between UTIs was 9 days. As the intervention was put in place, this increased to 44 days. After 12 months of the intervention, the days between UTIs increased to 121 and

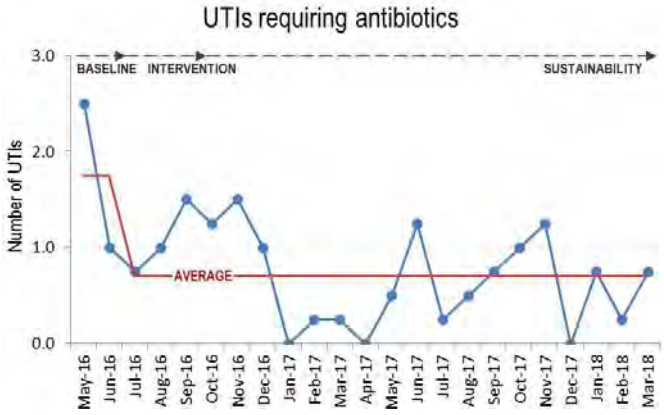


Figure 2 Average monthly numbers of urinary tract infections (UTIs) requiring antibiotics during the baseline, intervention and sustainability phase.

at 18 months this was 80 days without UTIs across all four care homes.

Hospital admissions

Across the four care homes, the average number of UTIs requiring hospital admission at baseline was 1.4 and reduced to 0.9 UTIs during the intervention and sustainability phase (see figure 3). This resulted in a 36% reduction of UTIs requiring hospital admission (Mann-Whitney U = 83.00, p = 0.09).

Sustainability

Across the four care homes, staff maintained a monthly drink rounds compliance of more than 97%. Compliance increased from 97% during the intervention phase to consistently over 99% in the sustainability phase.

One care home noted that they were always missing a drinks round at 13:30 and felt that it was too close to lunch time for their staff to achieve, and residents also reported being too full. This round was changed and another time slot was allocated which allowed the care home to reach 100% compliance with their seven structured drink rounds.

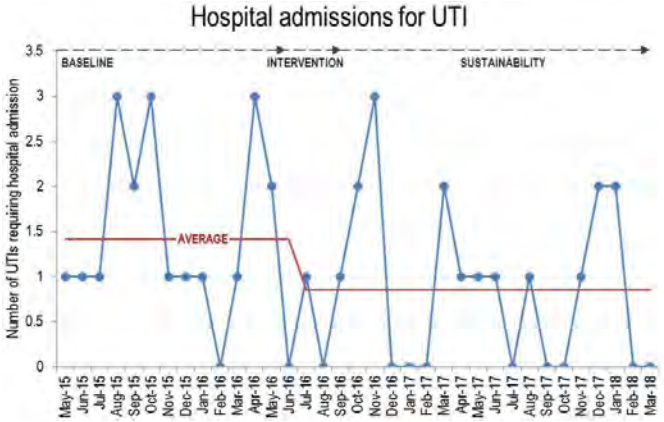


Figure 3 Average number of hospital admissions for urinary tract infections (UTIs) during the baseline, intervention and sustainability phase.

The nursing home had high staff turnover which impacted the consistency of the drink rounds. They were encouraged to re-inforce the message of hydration through safety huddles at the beginning of each shift. This worked well and staff reached 100% drink rounds compliance.

Lessons and limitations

All quality improvement programmes require review of existing research, support from leadership, engaging service users and staff. However, in this context of running a project within the care home setting, particular importance was placed on support, data and responding to a changing environment.

External support within the care home environment is limited and one of the key success factors to this project was the commitment of a team member from the East Berkshire CCG. They were trusted by the care homes and provided consistency, guidance and encouragement especially in the first 6 months of the project. It was imperative to involve staff in the design of the principle intervention to ensure that it was practical and sustainable.

Understanding data within the care home environment varies widely between staff. Having collected the baseline data, it proved invaluable for all the team to understand on average how many UTIs were occurring in their home and that they could make a difference. Moving forward, the care home managers reviewed the data with staff at regular intervals to demonstrate improvement which gave them the impetus to keep going. While data on UTI admissions to hospital and UTIs requiring antibiotics were collected, it would have been valuable to look at other projects that were occurring at the same time in the care home, for example, reduction in falls, to note if these had any influence on the outcome.

Throughout the project, UTIs were counted if the GP diagnosed it as so. In hindsight, it would have been beneficial to have clarified what constituted a confirmed diagnosis of a UTI, as practice varies between GPs.

The care home environment poses specific challenges, as at times there can be a high turnover of staff including management staff which occurred within one of the homes. Further training sessions were held, but this still did not fully address the situation. Following discussions with care home staff on what would help with training new staff, a set of small cartoon clips were designed which staff can access on YouTube. Huddles at the beginning of each shift were introduced within this care home as a means to incorporate the importance of hydration. On reflection, this might have been appropriate to introduce into each care home so that the hydration needs of all residents was a priority at the beginning of the day including residents who required particular support.

CONCLUSION

Residents of care homes are at high risk of dehydration which increases the risk of UTIs and other problems.

This project has highlighted that a combination of optimising hydration, education for staff and clinical guidance reduces the need for antibiotics which may in turn reduce hospital admissions for UTIs. These changes have been sustained for 2 years in the four care homes engaged in the project.

Reducing admissions associated with UTIs is important because every avoided uncomplicated admission has a potential minimum saving of £1331.00 per day in the NHS.[23] Reducing the use of antibiotics is cost-effective and links closely with the global ambition of antimicrobial stewardship. Care homes throughout the Thames Valley region and beyond are now adopting the principles for improvement with the aid of all the project details included in a toolkit on the Oxford Patient Safety Collaborative website. Train-the-trainer days have also been designed to support the organisations undertaking the improvement project. Six short clips incorporating the training have been designed and uploaded to YouTube which can be used by care homes to train new staff.

The success of the hydration project was down to care home staff co-designing it, so that seven structured drink rounds a day could be carried out flexibly in each care setting to marry with the existing daily routine. It is low cost to implement, easy to measure and has far surpassed the aim of reducing UTI admissions to hospital by 5% each year.

Acknowledgements We would like to thank the care home staff who co-designed, developed and implemented this intervention. Their dedication and hard work improves the lives of the older people in their care. We would like to thank the Acute Kidney Injury Workstream based at the Oxford Patient Safety Collaborative where this project was conceived.

Contributors KL and SJ co-designed the project, delivered the training and aggregated the data. RFN analysed the data and took the lead in writing the manuscript. CV critically reviewed the manuscript and all authors contributed to the final version.

Funding This project was not funded by a specific grant as care homes were using existing resources. Health Education England have subsequently funded video clips to support the training for this initiative (https://www.youtube.com/watch?v=oY8m3bv2JDU).

Competing interests None declared.

Patient consent for publication Consent was gained from the care home managers for the use of anonymous data. Residents involvement was part of routine daily care.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

1. NHS England. Emergency admissions for ambulatory care sensitive conditions, 2014. Available: https://www.england.nhs.uk/wp-content/uploads/2014/03/red-acsc-em-admissions-2.pdf [Accessed 24 Oct 2018].
2. Schols JMGA, De Groot CPGM, van der Cammen TJM, *et al*. Preventing and treating dehydration in the elderly during periods of illness and warm weather. *J Nutr Health Aging* 2009;13:150–7.
3. Courtney M, O'Reilly M, Edwards H, *et al*. The relationship between clinical outcomes and quality of life for residents of aged care facilities. *Aust J Adv Nurs* 2009;26:49–57.
4. Hooper L, Bunn D. Detecting dehydration in older people: useful tests. *Nurs Times* 2015;111:12–16.
5. Campbell N. Innovations to support hydration care across health and social care. *Br J Community Nurs* 2016;21:S24–S29.
6. Bunn D, Jimoh F, Wilsher SH, *et al*. Increasing fluid intake and reducing dehydration risk in older people living in long-term care: a systematic review. *J Am Med Dir Assoc* 2015;16:101–13.
7. Shipman D, Hooten J. Are nursing homes adequately staffed? The silent epidemic of malnutrition and dehydration in nursing home residents. Until mandatory staffing standards are created and enforced, residents are at risk. *J Gerontol Nurs* 2007;33:15–18.
8. Care Quality Commission. Dignity and nutrition for older people: review of compliance. CQC, London, 2011. Available: https://www.cqc.org.uk/publications/themed-inspection/dignity-and-nutrition-older-people [Accessed 24 Oct 2018].
9. Royal College of Speech and Language Therapists. RCSLT resource manual for commissioning and planning services for SLCN: dysphagia, 2009. Available: https://www.rcslt.org/speech_and_language_therapy/commissioning/dysphagia_manual_072014 [Accessed 24 Oct 2018].
10. Sura L, Madhavan A, Carnaby G, *et al*. Dysphagia in the elderly: management and nutritional considerations. *Clin Interv Aging* 2012;7:287–98.
11. Ullrich S, McCutcheon H. Nursing practice and oral fluid intake of older people with dementia. *J Clin Nurs* 2008;17:2910–9.
12. Mentes JC. The complexities of hydration issues in the elderly. *Nutr Today* 2013;48:S10–S12.
13. Hooper L, Abdelhamid A, Attreed NJ, *et al*. Clinical symptoms, signs and tests for identification of impending and current water-loss dehydration in older people. *Cochrane Database Syst Rev* 2015;4:1–212.
14. Mentes JC*et al*. Managing oral hydration. In: Boltz M, Capezuti E, Fulmer T, *et al*, eds. *Evidence-based geriatric nursing protocols for best practice*. 5th edition. New York: Springer Publishing Company, 2016: 111–24.
15. Kayser-Jones J, Schell ES, Porter C, *et al*. Factors contributing to dehydration in nursing homes: inadequate staffing and lack of professional supervision. *J Am Geriatr Soc* 1999;47:1187–94.
16. Forsyth DM, Lapid MI, Ellenbecker SM, *et al*. Hydration status of geriatric patients in a psychiatric hospital. *Issues Ment Health Nurs* 2008;29:853–62.
17. Pokrywka HS, Koffler KH, Remsburg R, *et al*. Accuracy of patient care staff in estimating and documenting meal intake of nursing home residents. *J Am Geriatr Soc* 1997;45:1223–7.
18. Jimoh FO, Bunn D, Hooper L. Assessment of a self-reported drinks diary for the estimation of drinks intake by care home residents: fluid intake study in the elderly (FISE). *J Nutr Health Aging* 2015;19:491–6.
19. Robinson SB, Rosher RB. Can a beverage CART help improve hydration? *Geriatr Nurs* 2002;23:208–11.
20. Davis C. 10 ways to reduce UTIs: long term management care. iAdv SR care. *Spring* 2017;66:32–4.
21. Sign.ac.uk. Management of suspected bacterial urinary tract infection in adults, 2012. Available: https://www.sign.ac.uk/sign-88-management-of-suspected-bacterial-urinary-tract-infection-in-adults.html [Accessed 24 Oct 2018].
22. Gleick PH. Basic water requirements for human activities: meeting basic needs. *Water Int* 1996;21:83–92.
23. NHS Improvement. National tariff payment system 2017/18 and 2018/19, 2016. Available: https://improvement.nhs.uk/resources/national-tariff-1719/ [Accessed 24 Oct 2018].

Role of SLP in UTI Prevention:

- Consumption of liquids is essential for minimizing UTIs. Persons who receive hydration by feeding tube do not need assistance with swallowing liquids. However, persons who must swallow liquids may be challenged with meeting hydration requirements due to dysphagia, or a swallowing disorder. An SLP has expertise in assessing, diagnosing and treating dysphagia.
- Dysphagia may make it difficult to safely swallow thin liquids and increases the risk for aspiration.
    - Thickening liquids with commercially available thickeners may be recommended by an SLP for safe swallowing. Liquids should NEVER be thickened without consulting with a swallowing specialist, as this may increase risk for aspiration in some individuals. When thickened liquids are recommended, support staff and families should NOT use Metamucil or other additives. This is dangerous! Any liquid may be thickened to a honey, nectar or pudding consistency based upon the recommendations of an SLP. Many people who are recommended to drink thickened liquids communicate that they do not enjoy thickened beverages. The taste is not changed, but the sensory aspects of liquid refreshment are altered. As a result, persons may drink less when their liquids are thickened. It is important to assure that they continue to meet their daily hydration requirements whether liquids are thickened or not. Consider consulting with the Registered Dietitian to increase offerings of foods that are high in fluid to supplement thickened liquids.
    - Free Water is the presentation of non-thickened or thin liquids to individuals that may aspirate small amounts of thin liquid. This option for increasing hydration is often not appropriate for persons with IDD. Free Water is ONLY considered when an individual has excellent or very good oral hygiene to minimize risk of bacteria entering the respiratory tract if aspirated. It is presented only after oral hygiene. It is NEVER given with a meal or snack—NEVER with food. Free Water allows an individual to continue to drink thin water when they are known to aspirate thin liquids in small amounts. This helps to satisfy their thirst with less risk of introducing bacteria to the lungs. Liquids presented in combination with foods continue to need thickening.
        - Presentation of Free Water may not be a good idea in a house where support staff or family need to follow two types of liquid recommendations. This decision needs to be made by the swallowing specialist in collaboration with those who are responsible for supervision of all oral intake.
    - When liquids are presented at room temperature, for some people they are less satisfying, or they may be swallowed less safely. COLD or VERY WARM liquids provide increased sensory information that assists in safer swallowing. When an individual feels a temperature that is very different from the temperature of their mouth, it assists in stimulating a more immediate swallow. This minimizes the risk for aspiration of fluid. It also provides increased sensory enjoyment or refreshment for some people.
    - There are many types of cups available to support individuals who have drinking challenges. The SLP is competent to provide an assessment, trial and recommendation for the best type of cup to support safe drinking. Some cups work better with thin

liquids and some are designed for thickened liquids. Some limit the amount of liquid per sip and some encourage the safest head position for swallowing. Some cups even minimize tipping over with independent drinking.

- Other individuals may need to have liquids presented by teaspoon. There are many options for type of teaspoon. Straws also come in a variety of sizes and with ways to control the amount of liquid delivered per sip.
- When people are not able to suck liquids from a cup or straw, SLPs are knowledgeable regarding techniques to help them learn to suck. It is always safer for someone to control the amount and rate of liquid presentation independently, than to have support staff or family pour liquid into their mouth. This is why the use of a syringe to deliver liquid into someone's mouth is discouraged as being a very risky and unsafe way to present liquids.
- It requires a lot of effort for some people to drink. For this reason, it is recommended that presentation of liquids is done in small volumes, for example offering 4 oz. at a time, rather than 8 oz.. When swallowing muscles fatigue, the risk for aspiration increases.
- It is important to offer a variety of tastes when encouraging increased hydration. Consider carbonated beverages, if there are no issues with GERD or swallowing carbonation. Consider a variety of flavors and offer the individual a choice of flavors. Most persons with IDD need more opportunities for choice in their lives.

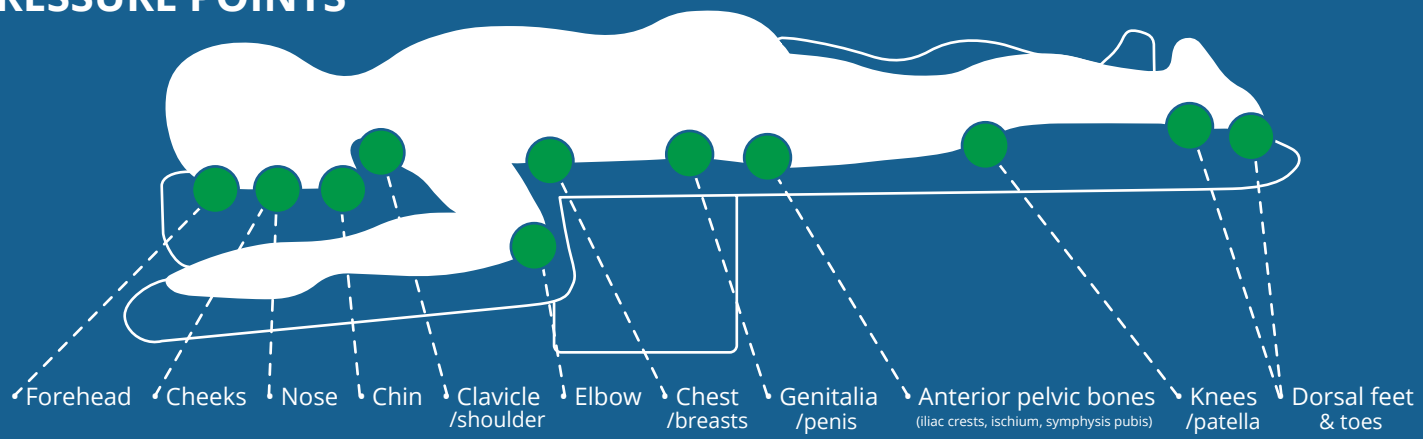
NPIAP
NATIONAL PRESSURE INJURY ADVISORY PANEL

PRESSURE INJURY PREVENTION
PIP Tips for Prone Positioning

GENERAL TIPS

- Use a **pressure redistribution surface** (for those not on a bed specifically designed for proning)
- Follow manufacturer instructions when using beds, positioning devices, prophylactic dressings and other products.
- **Positioning devices**/pillows are needed to offload pressure points.
- Involve enough trained staff to avoid friction-shear when repositioning. May reposition into swimmer position.
- Microshifts and small position changes should be performed while proned, especially in non-rotating beds.
- Assess all **pressure points** :
  - Prior to proning (anterior surfaces). Prior to returning to supine position (posterior surfaces).
  - When alternating arm position in swimming arm position, assess integrity of skin of arm/head/face.
  - Document all skin assessments and preventive measures.

PRESSURE POINTS



• Under/around medical devices

PAY SPECIAL ATTENTION TO THE FOLLOWING AREAS

HEAD

- Apply soft silicone multi-layered foam **prophylactic dressings** to pressure points on face.
- **Manage moisture**: Suction oral secretions. Use liquid skin protectants/sealants on face. Change foam dressing prn. Apply hydrofiber/calcium alginate dressing to manage excess moisture.
- Apply **thin foam dressings under medical devices**. Avoid multiple layers of dressings that increase pressure.
- **Offload head** with offloading device(s): Consider the density of foam, height of the cushion, angle of the face, and endotracheal tube (ETT) positioning when selecting an appropriate device.
- With manual proning, **shift patient's head** q 2 hours; re-position head q 4 hours. May adjust timing to patient needs.
- Note: commercially available ETT securement devices may contribute to increased skin breakdown in proned patients. Assess skin carefully. Consider tape to secure ETT during proning.
- Maintain **eye care** to prevent corneal abrasions. Apply ophthalmic lubricant. Tape eyelids shut horizontally.
- Ensure tongue is inside patient's mouth. A small soft bite block may help. Assess tongue for injury.

TORSO

- Place EKG leads on back while proning.
- Apply prophylactic foam dressings to pressure points.
- Ensure central lines, arterial lines and cannulas are secured (e.g., sutured).
- Empty ileostomy/colostomy pouches and pad around stoma site.
- If receiving enteral feedings, turn off feeding 1 hour before prone position turn. Resume once in prone position as ordered.
- Secure all tubes and devices away from skin; protect surrounding skin with prophylactic dressings and bridge areas with positioning devices.
- Create channels for tubes with positioning aids.Ensure that there are no unsecured devices under the torso.

LEGS

- Apply prophylactic foam dressings to pressure points (e.g., patella and pretibial area).
- Remove securement devices and align urinary catheter/fecal management device toward foot of bed.
- Ensure that there are no unsecured devices under legs. Offload feet.

BREASTS & GENITALIA

- are particularly sensitive tissues that should be offloaded and protected

NPIAP
NATIONAL PRESSURE INJURY ADVISORY PANEL

PRESSURE INJURY PREVENTION
PIP Tips for Prone Positioning

SPECIAL CONSIDERATIONS:

ACUTE RESPIRATORY DISTRESS SYNDROME AND PRONING (INCLUDING WITH COVID-19)

Rationale for Proning in ARDS

- Eight RCTs have demonstrated improved oxygenation and reduced mortality with prone positioning in moderate and severe ARDS.[2,3]
- Prone positioning in ARDS enhances oxygenation by improving alveolar recruitment and ventilation-perfusion ratios while decreasing strain on lung tissue and the risk of ventilator injury.[4,5]

Special considerations with ARDS

- Consider the potential impact of oxygenation deficits on the risk of pressure injuries. (Recommendation1.9)[1]
- Episodes of prone positioning usually last for 12 or more hours.[3]
- Make small shifts in body position and reposition head every 2-4 hours or as required by patient.
- Major complications of proning in ARDS include displacement of ET tube, pressure injuries and loss of venous access.[2]
- If proning in combination with ECMO, carefully secure and offload the ECMO cannula.

BEDS AND POSITIONING DEVICES DESIGNED TO SUPPORT PRONE POSITIONING

Beds

- Proning can be done manually on a specialty support surface with high quality pressure redistribution and shear reduction features.
- Beds specifically designed for prone positioning combine prone positioning features and the ability to rotate the bed 40 to 62 degrees. The rotation feature facilitates drainage of pulmonary secretions and enhances ventilation-perfusion matching.
- Follow manufacturer instructions and training when using beds designed for proning.[7] The rotation feature should not be used with unstable fractures, cervical or skeletal traction and uncontrolled intracranial pressure.

Positioning Devices

- Several devices are commercially available to support prone positioning. They are made of various materials designed to redistribute pressure and reduce shear stress and strain. Devices include those specifically designed for the head and torso, as well as, cushions that can be molded to conform to the body.
- Follow manufacturer instructions and training recommendations when using positioning devices designed for prone positioning.

2019 INTERNATIONAL PRESSURE INJURY GUIDELINE RECOMMENDATIONS

(Refer to full guideline for supporting evidence)

Repositioning Principles

- Determine repositioning frequency with consideration to the individual's level of activity, ability to independently reposition and tissue tolerance. (5.2)
- Reposition the individual to relieve or redistribute pressure using manual handling techniques and equipment that reduce friction and shear. (5.6)
- Reposition individual in such a way that optimal offloading of all bony prominences and maximum redistribution of pressure is achieved. (5.5)
- Once positioned check for uneven distribution of pressure and positioning of medical devices if possible.
- Consider using continuous bedside pressure mapping as a visual cue to guide positioning. (5.7)
- Use a soft silicone multi-layered foam dressing to protect the skin for individuals at risk of pressure injuries. (3.5)
- Do not use ring or donut-shaped positioning devices.
- Avoid extended use of prone positioning unless required for management of the individual's medical condition. (5.10)
- Reposition unstable critically ill individuals who can be repositioned using slow, gradual turns to allow time for stabilization of hemodynamic and oxygenation status. (5.17)
- Initiate frequent small shifts in body position for unstable critically ill individuals who are too unstable to maintain a regular repositioning schedule and to supplement regular repositioning. (5.18)

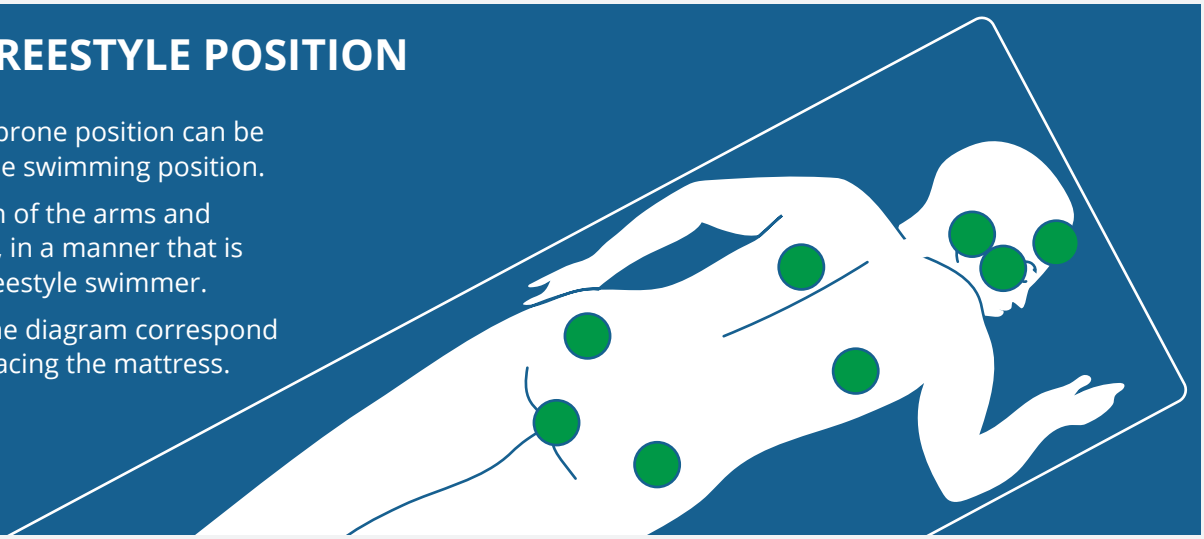
Medical Devices

- Regularly monitor the tension of medical device securements. (8.2)
- Assess the skin under and around medical devices. (8.3)
- Use a thin prophylactic dressing beneath a medical device. (8.5)
- Avoid multiple layers of dressings that increase pressure.
- Regularly rotate or reposition the device if possible. (8.4)
- Avoid positioning the individual directly onto medical devices.

PRESSURE INJURY PREVENTION
PIP Tips for Prone Positioning

SWIMMING/FREESTYLE POSITION

- Patients in standard prone position can be repositioned using the swimming position.
- Alternate the position of the arms and direction of the head, in a manner that is similar to that of a freestyle swimmer.
- Pressure points on the diagram correspond to the body surface facing the mattress.



Cited References

1. European Pressure Ulcer Advisory Panel, National Pressure Injury AdvisoryPanel, and Pan Pacific Pressure Injury Advisory Panel, Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. Third ed. 2019: EPUAP-NPIAP-PPPIA. Available from: **https://guidelinesales.com/**
2. Griffiths, M.J.D., et al., Guidelines on the management of acute respiratory distress syndrome. BMJ Open Respir Res, 2019. 6(1): p. e000420. Available from: **https://spiral.imperial.ac.uk:8443/bitstream/10044/1/74593/2/Guidelines%20on%20the%20management%20of%20acute%20respiratory%20distress%20syndrome.pdf**
3. Papazian, L., et al., Formal guidelines: management of acute respiratory distress syndrome. Ann Intensive Care, 2019. 9(1): p. 69.Available from: **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6565761/pdf/13613_2019_Article_540.pdf**
4. Vollman, K.M. and S.P. Dickinson. Why Prone, Why Now? Improving Outcomes for ARDS Patients. AACN Critical Care Webinar Series 2017 [cited 2020 March 27, 2020]; Available from: **https://www.aacn.org/education/webinar-series/wb0042/why-prone-why-now-improving-outcomes-for-ards-patients**
5. Gordon, A., et al., Prone Positioning in ARDS. Crit Care Nurs Q, 2019. 42(4): p. 371-375.
6. Why Prone? Why Now? Improving Outcomes for ARDS Patients. Crit Care Nurse, 2019. 39(5): p. 84.
7. Jackson, M.E., et al., Skin preparation process for the prevention of skin breakdown in patients who are intubated and treated with RotoProne. Respir Care, 2012. 57(2): p. 311-4. Available from: **http://rc.rcjournal.com/content/57/2/311**
8. American Association of Critical Care Nurses. **https://www.aacn.org/education/webinar-series/wb0042/why-prone-why-now-improving-outcomes-for-ards-patients**

Additional References and Resources

- An excellent educational program on prone positioning for ARDS can be found in the AACN Webinar Series.4,6
- American Association of Critical Care Nurses. **https://www.aacn.org/education/webinar-series/wb0042/why-prone-why-now-improving-outcomesfor-ards-patients**
- See this publication for a picture of facial prophylactic dressing placement techniques.7
- Pan, C., et al., Lung Recruitability in SARS-CoV-2 Associated Acute Respiratory Distress Syndrome: A Single-center, Observational Study. Am J Respir Crit Care Med, 2020.
- Albert, R.K., Prone Ventilation for Patients with Mild or Moderate Acute Respiratory Distress Syndrome. Ann Am Thorac Soc, 2020. 17(1): p. 24-29.
- Valesky, W. and L. Chow, Prone Positioning for Acute Respiratory Distress Syndrome in Adults. Acad Emerg Med, 2020.
- Bajwa, A.A., et al., Automated prone positioning and axial rotation in critically ill, nontrauma patients with acute respiratory distress syndrome (ARDS). J Intensive Care Med, 2010. 25(2): p. 121-5.

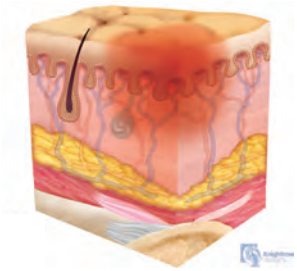
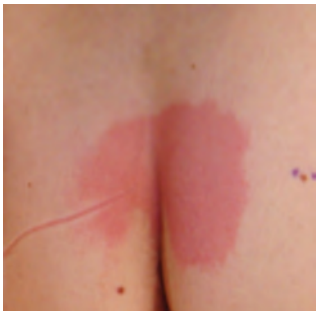
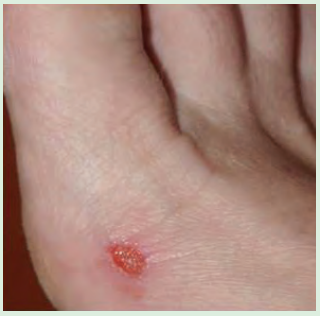
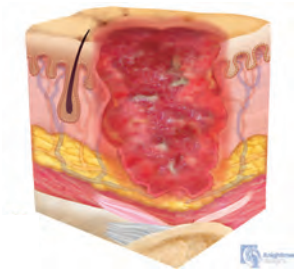
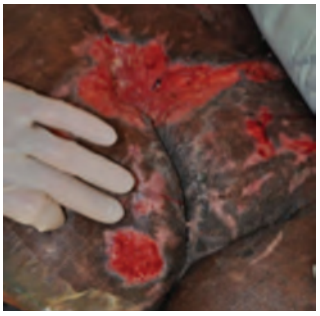
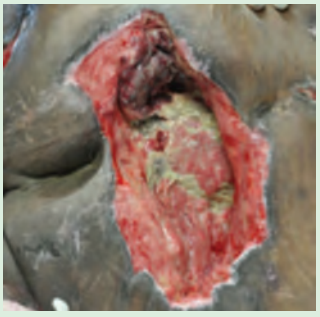
Acknowledgments: The NPIAP gratefully acknowledges the contributions of the following individuals

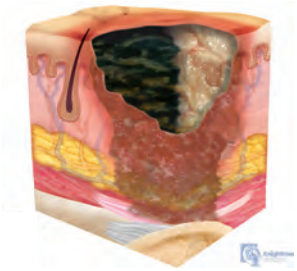
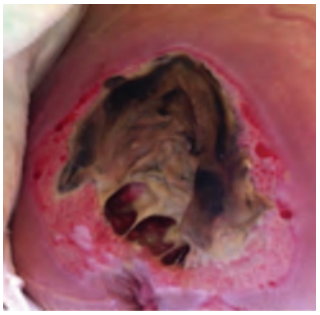
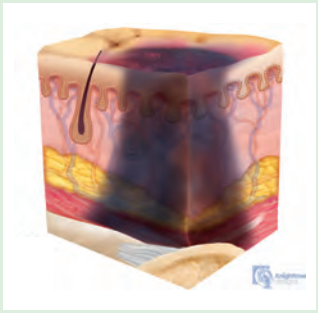
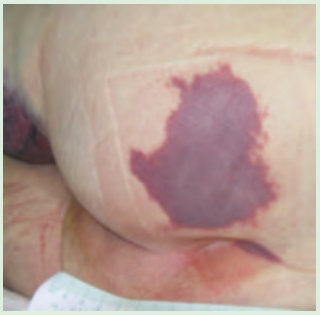
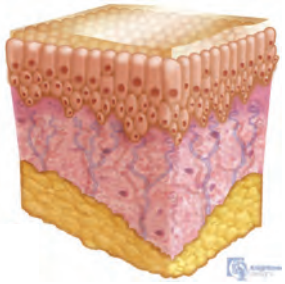
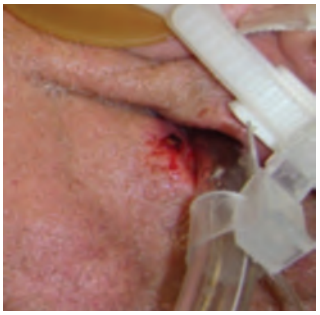
Authors: Dr. VIrginia Capasso, Massachusetts General Hospital; Dr. Jill Cox, Rutgers University; Dr. Janet Cuddigan, University of Nebraska Medical Center; Dr. Barbara Delmore, NYU Langone Health; Dr. Ann Tescher, Mayo Clinic; and Susan Solmos, University of Chicago Medicine.

Reviewers: The NPIAP Directors and Council Liaisons. We are particularly grateful for the feedback provided by the following Corporate Advisory Council representatives to ensure the appropriate use of products that support safe prone positioning practices: Michelle Deppisch, Molnlycke®; Carroll Gillepsie, Arjo, Inc; Julia Rian, ConvaTec, Inc; and Kristen Thurman, Wellsense.

PRESSURE INJURY AND STAGES

A pressure injury is localized damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense pressure, prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities and condition of the soft tissue.

DEFINITION	SCHEMATIC DRAWING	EXAMPLE
STAGE 1 PRESSURE INJURY **Non-blanchable erythema of intact skin** Intact skin with a localized area of non-blanchable erythema, which may appear differently in darkly pigmented skin. Presence of blanchable erythema or changes in sensation, temperature, or firmness may precede visual changes. Color changes do not include purple or maroon discoloration; these may indicate deep tissue pressure injury.		
STAGE 2 PRESSURE INJURY **Partial-thickness skin loss with exposed dermis** Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister. Adipose (fat) is not visible and deeper tissues are not visible. Granulation tissue, slough and eschar are not present. These injuries commonly result from adverse microclimate and shear in the skin over the pelvis and shear in the heel. This stage should not be used to describe moisture associated skin damage (MASD) including incontinence associated dermatitis (IAD), intertriginous dermatitis (ITD), medical adhesive related skin injury (MARSI), or traumatic wounds (skin tears, burns, abrasions).		
STAGE 3 PRESSURE INJURY **Full-thickness skin loss** Full-thickness loss of skin, in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) are often present. Slough and/or eschar may be visible. The depth of tissue damage varies by anatomical location; areas of significant adiposity can develop deep wounds. Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage or bone are not exposed. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.		
STAGE 4 PRESSURE INJURY **Full-thickness loss of skin and tissue** Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining and/or tunneling often occur. Depth varies by anatomical location. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.		

DEFINITION	SCHEMATIC DRAWING	EXAMPLE
UNSTAGEABLE PRESSURE INJURY **Obscured full-thickness skin and tissue loss** Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a Stage 3 or Stage 4 pressure injury will be revealed. Stable escr (i.e. dry, adherent, intact without erythema or fluctuance) on an ischemic limb or the heel(s) should not be softened or removed.		
DEEP TISSUE PRESSURE INJURY **Persistent non-blanchable deep red, maroon or purple discoloration** Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood filled blister. Pain and temperature change often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. The wound may evolve rapidly to reveal the actual extent of tissue injury, or may resolve without tissue loss. If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle or other underlying structures are visible, this indicates a full thickness pressure injury (Unstageable, Stage 3 or Stage 4). Do not use DTPI to describe vascular, traumatic, neuropathic, or dermatologic conditions.		
MUCOSAL MEMBRANE PRESSURE INJURY Mucosal membrane pressure injury is found on mucous membranes with a history of a medical device in use at the location of the injury. These ulcers cannot be staged .		

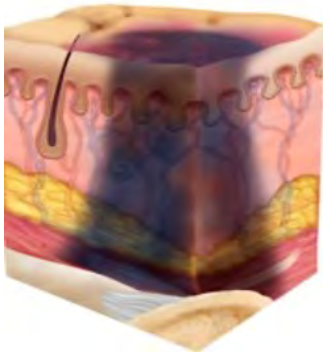
NPIAP®
NATIONAL PRESSURE INJURY ADVISORY PANEL
Improving Patient Outcomes Through Education, Research and Public Policy

WOUNDVISION
woundvision.com/npiap-imposter

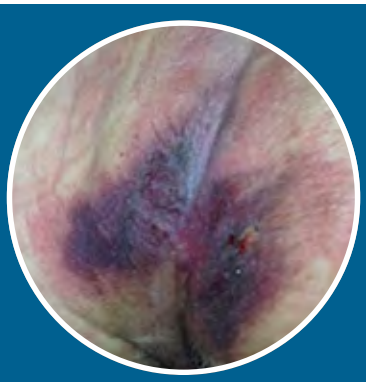
DEEP TISSUE PRESSURE INJURY OR AN IMPOSTER?

Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood-filled blister. Pain and temperature change often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface.

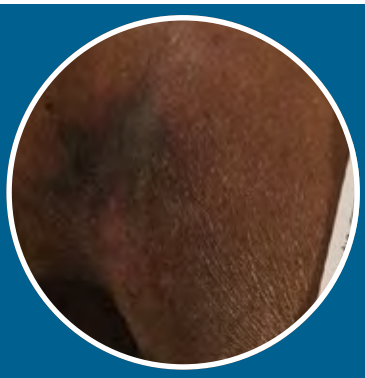
The wound may evolve rapidly to reveal the actual extent of tissue injury or may resolve without tissue loss. If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle or other underlying structures are visible, this indicates a full thickness pressure injury (Unstageable, Stage 3 or Stage 4).



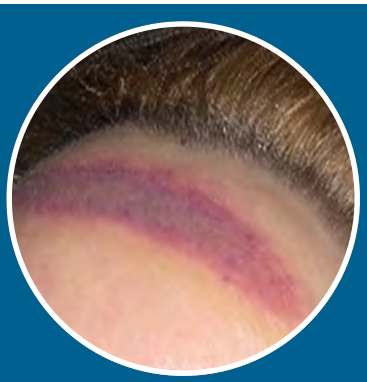
Initial DTPI
Initially intact purple or maroon skin or blood blister



Sacral DTPI after cardiac surgery in supine position 48 hours ago

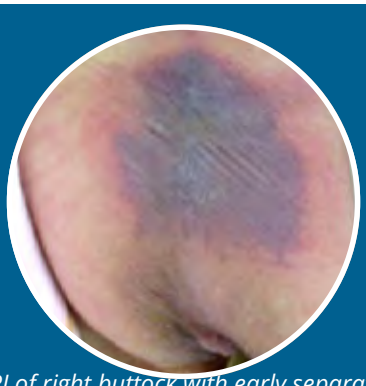


Low sacral-coccygeal DTPI in a patient sitting in High-Fowler's position

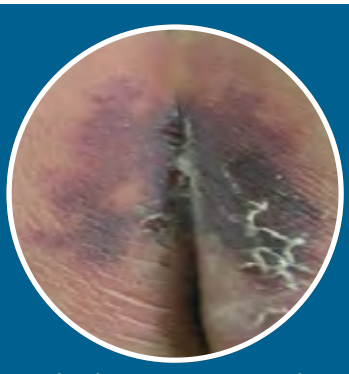


Forehead DTPI after surgery in prone position 24 hours ago

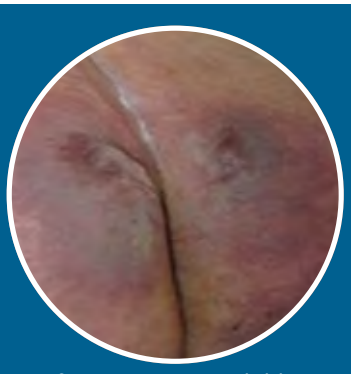
Evolving DTPI
Blistered appearance as epidermis sloughs



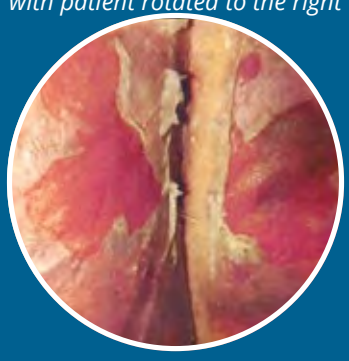
DTPI of right buttock with early separation of the dermis, 72 hours after surgery done with patient rotated to the right



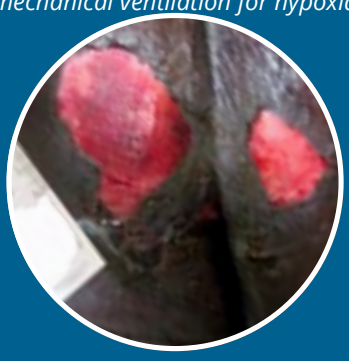
DTPI of right para-sacrum with early separation of the dermis, 72 hours after mechanical ventilation for hypoxia



DTPI of para-sacrum with blistering, 72 hours after cardiac surgery in supine position



DTPI of para-sacrum with blistering, 72 hours after cardiac surgery in supine position



DTPI of buttocks with blistering, 72 hours after mechanical ventilation for hypoxia

Blood blister - Tissue may be hard to the touch or boggy

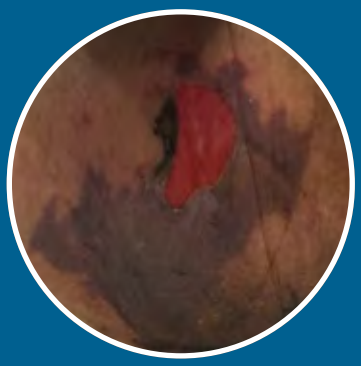
NPIAP®
NATIONAL PRESSURE INJURY ADVISORY PANEL
Improving Patient Outcomes Through Education, Research and Public Policy

WOUNDVISION
woundvision.com/npiap-imposter

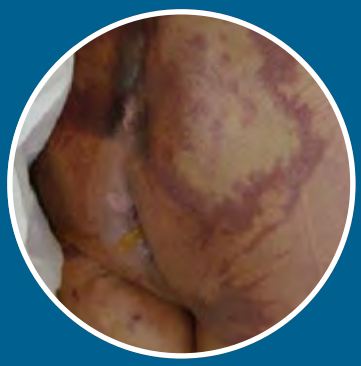
DEEP TISSUE PRESSURE INJURY OR AN IMPOSTER?

Many conditions can lead to purple or ecchymotic skin and rapidly developing eschar. Some of the most common differential diagnoses are shown below.

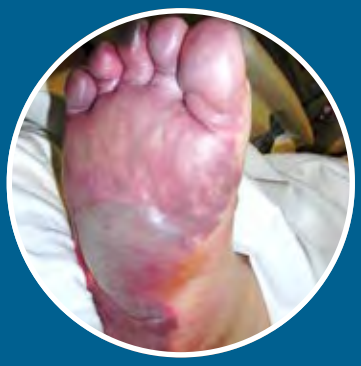
Ischemia



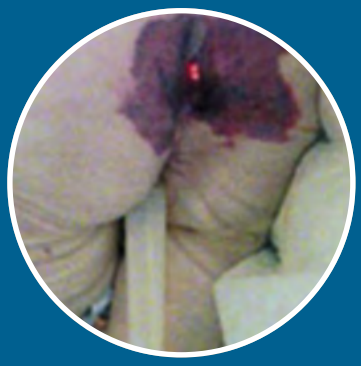
COVID-19
COVID-19 accelerates clotting in small vessels Skin color change is not always on pressure bearing tissues



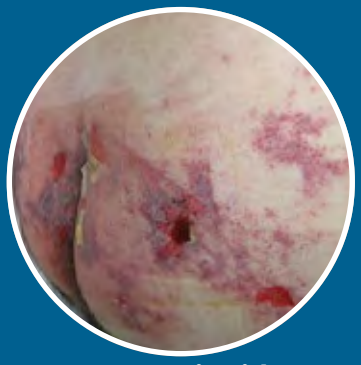
Embolic Disease
Marked disease of internal iliacs or postoperative aorto-iliac bypass with emboli



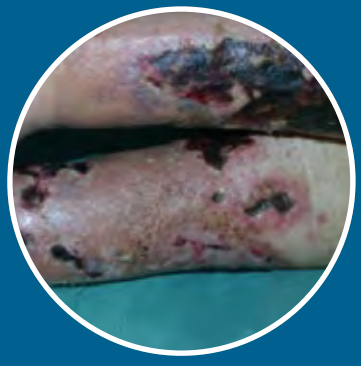
Vasopressor induced peripheral ischemia
Levophed in use - Ischemia of ears, nose, fingers also common



Ischemia from hypotension
Sudden purpura near end of life, no pressure events had occurred. Patient died 4 days later

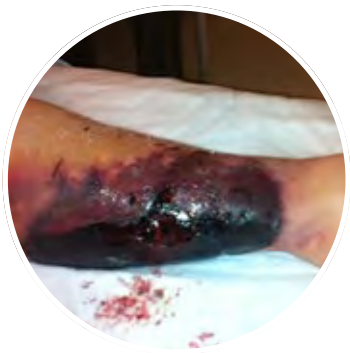


DIC/sepsis with microvascular emboli
Reticular presentation Spontaneous onset, rapidly necrotic

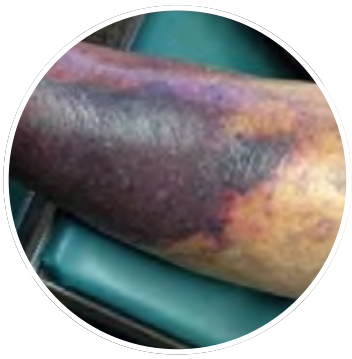


Calciphylaxis (AKA calcific uremic arteriopathy)
Seen in patients in dialysis dependent renal failure due to hyper-parathyroidism, hypercalcemia and hyper-phosphatemia

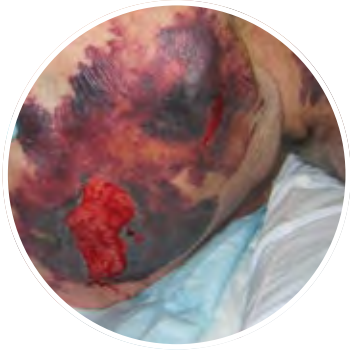
Trauma



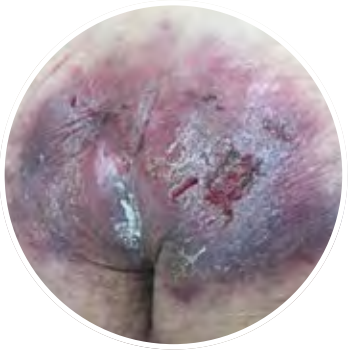
Warfarin induced skin necrorsis
Erythematous flushing then progressing within 24 hours to full thickness hemorrhagic bullae several days after high loading doses of Warfarin.



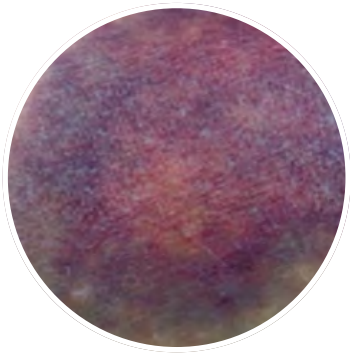
Hematoma
History of trauma to area, often anticoagulated - Area is palpable and often tender



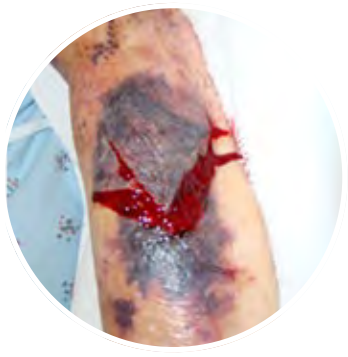
Blunt trauma
History of traumatic injury Irregular shape Painful to touch. Morel Lavallée Lesions are possible



Chronic Friction Injury
Immobile or chairbound patient who uses a slide board Skin thick and irregular lesions



Bruise
History of trauma in the area Color changes to yellow and green in a few days



Skin Tear
Patient fell attempting to ambulate. Usually, profuse bleeding.