

NPIAP POSITION STATEMENTS ON PREVENTING INJURY WITH N95 MASKS

Introduction

Pressure injury prevention and treatment through evidence-based practice is the foundation of NPIAP. We applaud the heroes in the health care provider workforce. We are deeply concerned about the facial injuries we are seeing in fellow clinicians as a result of prolonged use of N95 respirator masks while caring for patients with COVID-19.

The NPIAP recently completed an evidence-based guideline in collaboration with our international colleagues from the EPUAP and PPIA.¹ While this guideline provides important evidence-based recommendations for prevention of pressure injuries in patients, any application of those recommendations to the current COVID-19 pandemic comes with an important caveat: *The essential function of a Personal Protective Equipment (PPE) mask (i.e. to prevent COVID-19 transmission from patient to provider) cannot be compromised.*

In order to develop best practice recommendations for clinicians on the front lines of the COVID-19 crisis, we have reviewed and analyzed current evidence on the prevention of pressure injuries as well as current safety standards and research on PPE. This position paper is unique in that it combines current evidence in both pressure injury prevention and PPE science as a basis for recommendations within the context of the COVID-19 crisis. COVID-19 is a novel virus with a relatively high rate of transmission, morbidity and mortality. Where direct evidence was lacking or inconclusive, we placed greater weight on the need to prevent COVID-19 infection. We analyzed the evidence using the Strength of Evidence ratings developed for the 2019 International Pressure Injury Guideline.¹

Background

Pressure Injury Science: The same mechanical forces (i.e. pressure and shear) that cause pressure injuries in our patients are now causing pressure injuries in fellow healthcare providers wearing PPE masks, face shields and goggles for long periods of time. N95 respirator masks have a particularly high risk for injury due to requirements for a tight fit. Skin injury can also occur as a result of friction and the accumulation of moisture under the mask. As with patients, there are three primary factors we can influence to prevent these injuries:

1. Intensity of pressure (and shear)
2. Duration of pressure (and shear)
3. Tissue tolerance of the individual (including the effects of friction and moisture on tissue tolerance).

Infection Prevention Science: Any effort to address the above factors, must be considered within the context of what we know about best evidence-based practices for transmission of COVID-19 to clinicians. We currently know that:

1. Surgical masks help block large-particle droplets, splashes, sprays, or splatter that may contain viruses or bacteria.² However they are not the best option for COVID-19 protection. A randomized controlled trial involving 3591 subjects indicated significantly lower rates of laboratory-confirmed viral infections with continuous N95 mask use when compared to surgical mask use.³
2. Respirator masks such as the N95 are recommended as preferred practice (when available) for clinicians caring for patients with COVID-19.⁴⁻⁶
3. To be effective in preventing COVID-19 infection, respirator masks such as the N95 mask require a tight seal that should be fitted according to Occupational Safety and Health (OSHA) standards, and seal-checked by the user each time the respirator is donned.⁶⁻⁸
4. It is the responsibility of the wearer to ensure their own personal safety through seal checks through the course of wear time/work shift.
5. Anything placed between the skin and mask should not interfere with the function of the mask. Check manufacturer instructions.
6. There is currently no evidence to ensure the wearer's safety from viral penetration when a wound care dressing is placed under a respirator type mask.

NPIAP POSITION STATEMENTS ON PREVENTING INJURY WITH N95 MASKS

NPIAP Position Statements

Goal: Prevent Injury from Friction and Moisture

Statement 1: Application of a liquid skin sealant/protectant on skin surfaces that will be in contact with the mask may help prevent friction injuries without interfering with the fit of the N95 mask. (Good Practice Statement)

Implementation Considerations

- Cautiously apply liquid skin sealants/protectants to avoid contact with eyes and mucous membranes.
- Do not use cyanoacrylates near the eyes.
- Allow to fully dry before applying the mask.
- Liquid skin sealants/protectants will not mitigate the effects of pressure and shear.
- Maintain good skin care practices. Keep the skin clean and appropriately hydrated.¹ Avoid alkaline soaps/cleanser¹ and harsh chemical solutions.
- Examples of liquid skin sealants/protectants can be identified at the [Wound Source](#) website. Follow manufacturer instructions for product use.

Statement 2: The NPIAP does not recommend the use of petroleum jelly, mineral oil or any other compound that could enhance slippage and affect the function of the mask. (Strength of Evidence = C).

Evidence Discussion: Petroleum jelly is potentially flammable, especially in the presence of oxygen. OSHA approved N95 masks have at least 95% filtration efficiency against solid and liquid aerosols that do not contain oil.

Goal: Minimize Intensity of Pressure

Statement 3: The NPIAP is not making a recommendation on the use of thin prophylactic dressings under N95 respirator masks at this time due to critical uncertainties regarding whether this practice will increase the risk of COVID-19 infection. (No Recommendation)

Evidence Discussion:

1. There is evidence to show that thin prophylactic dressings placed under medical devices in patient populations reduces the risk of pressure injuries (Recommendation 8.5).¹ This provides indirect evidence for implementing this practice in clinicians wearing N95 respirator masks.
2. There are no comparable studies in clinicians wearing N95 respirator masks.
3. There is currently no evidence that can ensure the wearer's safety from viral penetration when a dressing is placed under a respiratory type mask. This could be particularly problematic in the case of dressings with a porous outer surface.
4. Although more research is needed, there are preliminary clinical reports of:
 - a. Successful refitting of N95 masks to NIOSH specifications with thin prophylactic dressings in place.⁹ Refitting N95 masks for all staff may not be feasible in the current environment.⁵
 - b. Successful use of thin hydrocolloids dressings without aerosolization upon dressing removal.¹⁰

NPIAP POSITION STATEMENTS ON PREVENTING INJURY WITH N95 MASKS

Statement 4: If clinicians (after weighing risks and benefits and consulting institutional policies) use thin prophylactic dressings to prevent pressure injury or protect already injured areas, the following precautions should be taken to reduce the risk of COVID-19 infection. (Good Practice Statement)

Implementation Considerations

Application of dressings

1. Thin prophylactic dressings can be cut into strips for the nasal bridge, cheek bones and behind ears if in contact with mask or straps.¹¹
2. A dressing on the bridge of the nose may be sufficient.
3. Do not stack multiple dressings. This may increase pressure.
4. If using a foam dressing, ensure the outer layer is non-permeable. Porous dressings may allow transfer of fluids or microorganisms to the skin.¹⁰

Protection against COVID-19 transmission

1. Follow infection control precautions at your facility.
2. If possible, have your N95 mask refit with thin prophylactic dressing in place using OSHA standards for fit testing.¹²
3. After applying dressings, confirm the seal of your N95 mask by blowing out and checking for leaks. Do this before beginning patient contact.¹³
4. If decontaminating and reusing masks under the FDA Emergency Use Authorization, individual clinicians should “seal check” the decontaminated N95 mask before beginning patient contact.¹⁴
5. Assume dressings are contaminated and exercise caution with removal.
We recommend that you close your eyes and hold your breath in exhalation during dressing removal to avoid transmission of aerosolized COVID-19.

Goal: Reduce Duration of Pressure

Statement 5: Remove the mask from your face for 15 minutes every 2 hours outside of areas of patient contact. If this time frame is not practical, attempt to lift the mask by the sides for 5 minutes every 2 hours. Any pressure relief will be helpful. Wash hands before and after touching mask. (Good Practice Statement)

Statement 6: Pressure injuries have also been reported with regular surgical masks and other PPE. Prophylactic dressings can be used with these devices as long as the function of the device is not impaired. (Good Practice Statement)

Goal: Treating Facial Injuries from Masks

Statement 7 (Partial thickness): Treat abrasions with topical moisturizers, liquid skin protectants/sealants or cyanoacrylates. Thin occlusive dressings may be used to protect open wounds if they do not interfere with the mask seal.¹ (Strength of Evidence = C)

NPIAP POSITION STATEMENTS ON PREVENTING INJURY WITH N95 MASKS

Statement 8: (Full-thickness): Deep tissue pressure injury (DTPI), Stage 3, Stage 4 and Unstageable Pressure Injuries should be referred for professional wound care. (Good Practice Statement)

Disclaimers:

This document is intended for educational and informational purposes only. It does not constitute medical advice. Follow institutional policies, manufacturer recommendations and principles of sound clinical judgment.

It is the responsibility of each healthcare professional to verify with their institutional infection control team that any measures taken to prevent or manage PPE-related skin injuries do not interfere with the efficacy of the PPE nor are in conflict with any workplace policy.

Individuals may require a repeat mask fit testing to ensure prevention and management efforts do not interfere with PPE efficacy. Clinicians should seal check N95 respirator masks before beginning patient care.

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NPIAP POSITION STATEMENTS ON PREVENTING INJURY WITH N95 MASKS

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