CH Guidelines in Practice: Transmission-Based Precautions

PODCAST

Earn 1.9 Contact Hours

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ABSTRACT

The updated AORN "Guideline for transmission-based precautions" provides perioperative nurses with evidence-based guidance on preparing for emerging and persistent infectious threats and outlines strategies to reduce the risk of transmission in the surgical setting. This article provides an overview of the guideline and discusses recommendations for personal protective equipment; implementing standard, contact, droplet, and airborne precautions; infective airborne particle risk assessment; transporting patients with confirmed or suspected infectious disease; and preparing for emerging infectious diseases. A scenario illustrates the application of these practices during the transport of a patient on airborne precautions. Perioperative nurses should review the guideline in its entirety and apply the recommendations to support infection prevention; protect patients and personnel; and ensure safe, evidence-based care across all surgical settings.

Key words: *transmission-based precautions, standard precautions, contact precautions, droplet precautions, airborne precautions.*

Emerging infectious disease (EID) threats in the perioperative setting continue to evolve, driven by the emergence of novel pathogens and the increasing prevalence of multidrug-resistant organisms.[1] Perioperative personnel function at the intersection of invasive interventions and patient vulnerability, making the prevention of infection transmission essential for patient and staff member safety. The COVID-19 pandemic heightened global awareness of transmission-based precautions, revealing vulnerabilities in preparedness and underscoring the critical role of perioperative personnel in mitigating transmission risks. Lessons learned during the pandemic continue to shape strategies for managing current and future infectious threats in surgical settings.

The revised AORN "Guideline for transmission-based precautions"[1] provides perioperative team members with guidance on preventing infection and controlling infectious disease transmission to help establish a safe environment for both patients and perioperative personnel. The guideline includes information on the following topics:

- standard precautions,
- personal protective equipment (PPE),
- contact precautions,
- droplet precautions,
- airborne precautions,
- infective airborne particle risk assessment,
- EID plan development,
- Occupational Safety and Health Administration bloodborne pathogens standard,
- personnel with infections,
- personnel immunization,
- education, and
- quality.[1]

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The AORN Guideline Development Team assessed the available evidence and included *regulatory requirements* when applicable and made *recommendations* when the benefits of the initiative clearly would exceed the harms; in general, high- to moderate-quality evidence supports recommendations.[2] The AORN Guideline Development Team also made *conditional recommendations* when the benefits of the initiative likely would exceed the harms; any level of evidence supports conditional recommendations under certain conditions.[2] The evidence table for this guideline can be found at *https://www.aorn.org/docs/default-source/guidelines-resources/evidence-rating-and-tables/evidence-table-transmission-based-precautions-011025.pdf*.

This article provides an overview of content from the revised guideline related to PPE; implementing standard, contact, droplet, and airborne precautions; infective airborne particle risk assessment; transporting patients with confirmed or suspected infectious disease; and preparing for EIDs. Table 1 identifies guideline recommendations for some questions that are not discussed in this article. Perioperative nurses should review the revised guideline in its entirety for additional information that may affect their practice.

PERSONAL PROTECTIVE EQUIPMENT

Perioperative personnel must use PPE whenever there is a potential for exposure to blood, body fluids, or other potentially infectious materials.[1,3] Personal protective equipment serves as a critical barrier protecting the wearer's skin, mucous membranes, clothing, and respiratory tract from infectious agents. The selection of PPE should align with the anticipated mode of transmission—contact, droplet, or airborne—as well as the nature of the patient interaction.[4]

Gloves and gowns are standard PPE elements when there is a reasonable risk of contact with mucous membranes; nonintact skin; contaminated surfaces; or blood, body fluids, or other potentially infectious materials.[1] Gloves help prevent contamination of the hands, while gowns protect skin and clothing from splashes or spills of infectious materials (Video 1).[1]

Eye protection is also essential when there is a risk of exposure to splashes or sprays, and includes the use of goggles, face shields, or eyewear with solid side protection.[1] Standard eyeglasses may not adequately shield against splashes or droplets. The importance of proper eye protection was underscored during the COVID-19 pandemic. In a retrospective cohort study of 345 health care personnel (HCP) exposed to patients with COVID-19, researchers found that 8 (2.3%) HCP tested positive during a 14-day quarantine, with 7 (87.5%) of those individuals having failed to wear eye protection during care.[5] The absence of eye protection was linked to a significantly increased risk of infection (relative risk, 10.25; 95% confidence interval [CI], 1.28 to 82.39; P = .009).[5]

Table 1. Questions Related to Transmission-Based Precautions and the Associated Guideline Recommendations[1]

Question	Recommendation
What is the correct sequence for removing a gown and gloves?	2.5.6
Do surgical helmets provide respiratory protection?	2.6.7
Can a staff member with an open cut on their hand work in a perioperative area?	9.1
How can personal protective equipment compliance be improved in the perioperative setting?	12.2

Reference

1. *Guideline for transmission-based precautions. In*: Guidelines for Perioperative Practice. *AORN Inc; 2025*. *https://aornguidelines.org/guidelines/content?sectionid=173727681&view=book*

Video 1. Recommendations for wearing a gown as a part of the personal protective equipment required for transmission-based precautions. AAMI = Association for the Advancement of Medical Instrumentation. The full-text HTML version of this article includes video content. To view this version, please visit *http://doi.org/10.1002/aorn.14411*.

Surgical masks are required when there is a reasonable risk of exposure to fluids that could contaminate the nose or mouth.[1,3] In addition to protecting the wearer, surgical masks serve to prevent the transmission of pathogens from HCP to patients, especially in sterile environments.[1] However, it is important to distinguish between a surgical mask and a respirator. Although masks help block splashes and large droplets, they do not seal tightly to the face and are not designed to filter airborne particles (Figure 1).

Respiratory protection of personnel is an Occupational Safety and Health Administration regulatory requirement as part of an employer's respiratory protection program, which includes the provision and use of respirators, medical clearance of personnel to wear respirators, fit-testing of respirators, education on respirator use, and evaluation of the respiratory protection program.[6] In situations requiring respiratory protection, perioperative personnel should wear a fit-tested, National Institute for Occupational Safety and Health (NIOSH)–approved surgical N95 respirator or higher-level protection as outlined in the facility's respiratory protection plan.[1] These respirators offer filtration of at least 95% of airborne particles and provide fluid resistance, making them suitable for surgical use.[7]

Figure 1. A perioperative team member wearing personal protective equipment.

STANDARD PRECAUTIONS

Standard precautions represent the core set of infection prevention measures applied universally in all health care settings and for all patients, regardless of their infection status.[4] These measures aim to reduce the risk of infectious agents spreading from patients to HCP or between patients by the assumption that all blood, body fluids (except sweat), nonintact skin, and mucous membranes may contain transmissible infectious agents.[4] Key elements include

- hand hygiene,
- appropriate use of PPE (eg, gloves, gowns, eye protection, masks),
- environmental cleaning and disinfection,
- safe injection practices,
- reprocessing of reusable medical equipment (eg, blood pressure cuff), and
- respiratory hygiene and cough etiquette.[8]

Respiratory hygiene and cough etiquette, introduced after the 2003 severe acute respiratory syndrome (SARS) outbreak, is intended to reduce transmission from individuals with respiratory symptoms at the first point of contact.[4] Unlike standard precautions, which are primarily focused on HCP during patient care, practices associated with respiratory hygiene and cough etiquette apply to everyone entering a health care facility—including staff members, patients, and visitors. The practices include masking, covering coughs and sneezes, hand hygiene, signage, education, and maintaining spatial separation when feasible.[4] Respiratory hygiene and cough etiquette can help reduce the spread of respiratory infections in health care facilities by limiting potential exposures.[8]

Source control—a component of standard precautions—refers to the use of a well-fitting face mask, cloth mask, or respirator to cover the mouth and nose and prevent the spread of respiratory secretions during activities such as talking, coughing, or sneezing.[1] This practice reduces the likelihood of transmitting infection by limiting the release of potentially infectious particles into the surrounding environment.[9] During times of increased community respiratory virus transmission, AORN conditionally recommends

that facilities implement broader source control measures—such as requiring all individuals entering the building to wear a mask—to enhance protection and minimize the risk of exposure.[1]

In a retrospective observational study conducted across 13 Swiss acute care hospitals, researchers examined the effect of mask policies on health care–associated SARS-CoV-2 (ie, COVID-19) infections during the BA.4 and BA.5 Omicron wave from June to September 2022.[10] Of 2980 laboratory-confirmed cases, 444 (14.9%) were considered health care–associated. Hospitals that expanded masking requirements to include all patient interactions experienced a 66% reduction in infection risk (rate ratio 0.39, 95% CI, 0.30 to 0.49), while those that maintained more limited policies experienced no significant change.[10]

These findings support the effectiveness of source control strategies, particularly during high-risk periods. When infectious pathogens require more targeted containment than standard precautions, additional transmission-based precautions—contact, droplet, or airborne—should be implemented to further protect patients and HCP.[4]

CONTACT PRECAUTIONS

Contact precautions are infection control measures intended to minimize the risk of transmitting pathogenic microorganisms through direct physical contact with a patient with an infection (eg, multidrug-resistant organisms, *Clostridioides difficile*) or indirect contact with contaminated surfaces or equipment.[1,4] After consultation with an infection preventionist, contact precautions may include using appropriate PPE (eg, gloves, gowns), implementing transport protocols to limit exposure, selecting patient placement to reduce contact with others, and performing enhanced environmental cleaning.[4]

Although a minimum distance of 3 ft has traditionally been recommended for patients on contact precautions, evidence shows that some pathogens—like norovirus—can spread farther. Results of a study after an outbreak in a hotel showed that norovirus can potentially spread up to 5 ft through aerosolized particles from vomit or feces.[11] Patients who require contact precautions therefore should be physically separated from others, and physical distancing should be maximized whenever possible to reduce the risk of transmission.[1]

DROPLET PRECAUTIONS

Droplet precautions are recommended in addition to standard precautions when caring for patients known or suspected to be infected with pathogens transmitted via respiratory droplets (eg, *Neisseria meningitidis*, influenza, group A *Streptococcus*, *Bordetella pertussis*).[1] These precautions include wearing appropriate PPE, ensuring the patient wears a mask during transport, and selecting a room or location that helps limit exposure to others.[4] To prevent infectious particles from reaching their nasal and oral mucosa, perioperative personnel should wear a mask when entering the space of a patient on droplet precautions.[4] For aerosol-generating procedures performed on patients under droplet precautions with suspected or confirmed airborne-transmissible infections, the Centers for Disease Control and Prevention recommends use of a fit-tested, NIOSH-approved N95 respirator or higher-level protection.[4]

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Traditional guidance recommends maintaining a 3-ft distance between patients; however, evidence of transmission occurring beyond this range suggests extending this distance to 6 to 10 ft when possible.[4,12] In shared spaces, such as preoperative areas, it is recommended to close curtains or doors to further limit contact.[1]

AIRBORNE PRECAUTIONS

Airborne precautions are recommended in addition to standard precautions when caring for patients with known or suspected infections transmitted via the airborne route (eg, *Mycobacterium tuberculosis*, measles, varicella-zoster, disseminated herpes zoster).[1] These measures include appropriate PPE (eg, respiratory protection), source control for patients during transport, and the use of environmental and administrative controls to reduce transmission risk.[1] Before entering the room of a patient requiring

airborne precautions, HCP should put on a fit-tested, NIOSH-approved, surgical N95 or higher-level respirator as outlined in the facility's respiratory protection program (Figure 2).[1]

To help contain airborne pathogens like *M tuberculosis*, patients requiring airborne precautions should remain in an airborne infection isolation room (AIIR) throughout their care—including during surgery and recovery—whenever feasible.[4,13] When an AIIR is not available, it is recommended that infection preventionists assess whether supplemental air-cleaning technologies, such as portable high-efficiency particulate air filtration or ultraviolet germicidal irradiation, are needed.[1]

After care is complete for a patient requiring airborne precautions, the room should remain vacant until airborne contaminants are reduced by at least 99%—a process that typically takes approximately 28 minutes with a ventilation rate of 15 air exchanges per hour.[1] This clearance period is especially important after procedures that may trigger coughing and aerosolize infectious particles. Because air exchange efficiency can vary by room, the length of the clearance period may differ. If HCP must enter before the room is cleared, they should wear respiratory protection consistent with facility policy.[1]

Figure 2. A perioperative team member wearing a fit-tested, National Institute for Occupational Safety and Health–approved surgical N95 respirator.

INFECTIVE AIRBORNE PARTICLE RISK ASSESSMENT

An *infective airborne particle risk assessment* is a structured interdisciplinary process used to evaluate transmission risk from airborne particles during procedures and guide appropriate respiratory protection.[1] AORN recommends forming an interdisciplinary team to develop this framework as part of the facility's respiratory protection program.[1] This recommendation reflects a growing understanding that the risk of infection transmission is not solely tied to the classification of certain procedures as aerosol-generating, but rather to the clinical context in which those procedures are performed.

Recent research conducted in OR environments with varied ventilation systems found that particle generation during procedures like supraglottic airway insertion[14] and extubation[15] was minimal—often lower than levels produced by tidal breathing or voluntary coughing. Results of one environmental monitoring study involving 18 bronchoscopies revealed that airborne particle concentrations remained stable during procedures, even when coughing and suctioning occurred.[16] However, the study also highlighted that HCP frequently contacted room furnishings with their body and PPE (averaging 31.2 and 17.3 touches, respectively), suggesting that contact transmission posed a greater occupational risk than inhalation of airborne particles. These findings emphasize that, when combined with environmental factors and procedural complexity, patient factors such as symptom severity, immunocompromised status, and viral load are more reliable indicators of transmission risk than procedure type alone.[16] As a result, AORN recommends moving beyond fixed procedure labels and implementing individualized, evidence-informed infectious airborne risk assessments to guide mitigation strategies.[1]

The Effect of COVID-19

The COVID-19 pandemic prompted a reevaluation of longstanding assumptions about how respiratory pathogens are transmitted, particularly regarding droplet and airborne spread. Traditionally, droplet precautions have been used for pathogens thought to spread via respiratory droplets larger than 5 µm, which were believed to travel only short distances, typically less than 3 ft, and deposit on mucosal surfaces during close contact (eg, influenza, group A *Streptococcus*, *B pertussis*).[4] These

precautions include placing a mask on the patient, wearing a surgical mask during care, and minimizing patient contact with others.[1]

However, emerging evidence during the pandemic revealed that infectious airborne particles like SARS-CoV-2 can spread in ways that do not align with the traditional size-and-distance model. Although initially categorized as a droplet-spread virus, SARS-CoV-2 demonstrated patterns of transmission that aligned more closely with airborne pathogens—highlighting the need to reevaluate previous definitions.[17] In response, the World Health Organization (WHO) convened a global technical consultation group to propose new terminology and a more nuanced framework for understanding airborne pathogen transmission.

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The WHO's review emphasized that particle size alone is not an adequate predictor of transmission risk. Instead, respiratory particles exist on a size continuum and behave differently depending on environmental factors, such as airflow, humidity, and temperature.[17] This prompted the introduction of the broader term "through the air" to categorize respiratory transmission into two modes: "airborne transmission/inhalation" and "direct deposition." Airborne transmission/inhalation occurs when infectious particles are inhaled after traveling any distance, while direct deposition refers to particles that are expelled at close range and land directly on the mucous membranes of another individual.[17]

Although the WHO report emphasized the need for additional research, it acknowledged that current Centers for Disease Control and Prevention droplet precautions remain appropriate for preventing direct deposition. However, HCP may still be at risk if the pathogen is also capable of airborne transmission.[17] In these cases, the facility's infective airborne particle risk assessment can help determine if additional respiratory protection, such as an N95 respirator, may be needed.[1]

PATIENT TRANSPORT

When transporting patients who require transmission-based precautions—whether airborne, droplet, or contact—HCP should implement strategies that reduce the risk of pathogen transmission and environmental contamination.[1] These precautions begin with communication before transport: the receiving team should be notified of the patient's impending arrival and informed of the required precautions so that personnel can put on appropriate PPE and prepare the environment.[1,4]

Regardless of the type of transmission-based precaution, several transport practices are recommended for HCP. These include performing hand hygiene before and after patient contact, wearing appropriate PPE, and securely covering any infected or colonized areas of the patient's body.[1,4] Personnel should avoid contacting environmental surfaces, such as door handles or elevator buttons, while wearing contaminated PPE.[1]

Depending on the anticipated level of exposure, HCP may require additional protection. For contact precautions, HCP should wear clean gloves to disinfect bed rails and controls that personnel may touch before transporting the patient.[1] For droplet precautions, HCP may wear a surgical mask depending on the risk of exposure (eg, when transporting a patient who is unable to wear mask).[1] For airborne precautions, AORN conditionally recommends that the transporter wear an N95 respirator or higher-level protection depending on the expected interaction and exposure risk, especially when close contact or respiratory interventions are expected.[1] When feasible, it is recommended that patients requiring airborne precautions be transported directly between AIIRs, such as from the inpatient unit to the preoperative holding area, and to a designated AIIR in the postanesthesia care unit (PACU) after the procedure.[1]

EID PLAN

As a regulatory requirement set by the Centers for Medicare & Medicaid Services, health care organizations must include EIDs in their emergency preparedness programs as part of an all-hazards approach.[18] The COVID-19

pandemic brought widespread attention to the importance of proactive planning for infectious disease threats, highlighting how quickly novel pathogens can overwhelm health care systems; as a result, EID preparedness is critical for safeguarding patients, staff members, and visitors while ensuring the continuity of perioperative services.

Preparation is key, and perioperative teams should be involved in both the development and implementation of these plans.[1] AORN recommends that EID preparedness strategies include

- early recognition systems (eg, symptom screening, testing),
- clear patient management protocols for suspected or confirmed infections,
- infection prevention measures (eg, PPE), and
- environmental and engineering controls (eg, ventilation, physical distancing).[1]

Facilities should also prepare for supply shortages and a potential influx of surgical patients by forecasting resource needs and modifying staffing models.[1]

Team members should be familiar with the organization's EID policies, emergency roles, and regulatory considerations during declared public health emergencies.[1] Routine review of and updates to the EID plan—at least every two years—are required and should reflect lessons learned and evolving threats.[18]

SCENARIO

Kevin, an experienced RN circulator, is assigned to an emergent procedure involving Olivia, an 18-year-old patient requiring airborne precautions. She is currently located in a designated AIIR according to facility protocols and will be transported directly to the OR from the AIIR.

Before going to Olivia's room to perform the preoperative assessment and transport her to the OR, Kevin consults the facility's airborne transmission protocols to ensure compliance with the latest infection prevention measures. He also collaborates with a preoperative RN to verify the patient's infection status and ensure that all recommended precautions are in place. He coordinates with the surgical team and anesthesia professional to minimize room traffic and conserve PPE. Kevin also consults with the facility's infection preventionist to determine if any additional environmental measures are needed based on Olivia's airborne-transmissible infection. After gathering the necessary information, he notifies the other members of the OR team and the PACU personnel of the situation. He arranges for bed assignment in the PACU AIIR and confirms that both teams have adequate time to prepare with appropriate measures (eg, PPE, signage).

After all preparations are verified, Kevin goes to the designated nursing unit where Olivia is located; performs hand hygiene; puts on a fit-tested, NIOSH-approved surgical N95 respirator; and enters the AIIR. Kevin does not anticipate direct contact with Olivia during transport. He completes the preoperative interview, confirms that the route to the OR is clear, and notifies the OR charge nurse that he will be arriving in a few minutes so that HCP exposure in the perioperative hallways can be limited. Before leaving the AIIR, he instructs Olivia on respiratory hygiene, cough etiquette, and how to wear a surgical mask for source control. He then pushes Olivia's bed into the corridor, closes the AIIR door, removes his surgical N95 respirator, and performs hand hygiene.

Upon arrival at the OR door, Kevin performs hand hygiene and puts on a clean surgical N95 respirator and eye protection before entering the OR. During the procedure, Kevin works closely with the other surgical team members to ensure strict adherence to airborne precautions. Communication is purposeful and coordinated, with all team members aware of their roles and the importance of limiting OR

Resources for Implementation

AORN publishes a variety of resources (eg, competency verification tools, sample policies and procedures, gap analysis tools) to assist perioperative nurses and leaders implement guidelines. These implementation tools are available to AORN members through the Guideline *Essentials*. Members and nonmembers may have access to the same guideline implementation tools through a subscription to AORN eGuidelines+.

Guideline *Essentials*: Transmission-Based Precautions. AORN. Accessed April 23, 2025. *https://www.aorn.org/guidelines-resources/guidelines-for-perioperative-practice/guideline-essentials/transmission-based-precautions*

traffic. As the procedure nears completion, Kevin notifies the PACU of Olivia's estimated arrival time to allow for adequate preparation. He again confirms that the transport route is clear, and Olivia is transported directly to a designated AIIR in the PACU via the shortest and most isolated path.

Kevin remains vigilant when transporting Olivia to the PACU; he wears an N95 respirator and maintains physical distancing when possible. After transferring care to the PACU team and stepping outside the PACU AIIR, he carefully removes his N95 respirator to avoid contamination, performs hand hygiene, and documents the patient's status along with all infection prevention measures used. He also ensures that the OR remains vacant until airborne contaminants are reduced by at least 99% through a ventilation rate of 15 air exchanges per hour for 28 minutes, and he confirms that enhanced environmental cleaning protocols are initiated before the room is returned to service.

CONCLUSION

Transmission-based precautions are a critical, multifaceted component of infection prevention in the perioperative setting, requiring careful attention to detail and consistent application to protect both patients and personnel. The updated AORN "Guideline for transmission-based precautions" offers comprehensive, evidence-based recommendations for implementing standard and transmission-based precautions across surgical care environments. By adhering to these guidelines, perioperative nurses and health care teams can reduce the risk of infectious disease transmission, respond more effectively to emerging threats, and maintain safe conditions for surgical procedures.

Earn Contact Hours

Contact hours are available for this activity. Earn the contact hours by reading this article, reviewing the outcome and objectives, and completing the Learner Evaluation at *https://aorn.us/oct25-cea*.

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