Isolation Precautions Guideline Workgroup

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Disclaimer

- The findings and conclusions herein are **draft** and have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

Agenda

- General Overview
- Key Concept Updates
  - Section A: Overview of Transmission of Infectious Agents
  - Section B: Fundamental Elements Needed to Prevent Transmission of Infectious Agents in Healthcare Settings
  - Section C: Precautions to Prevent Transmission of Infectious Agents (*with Evidence Review*)
- Discussion

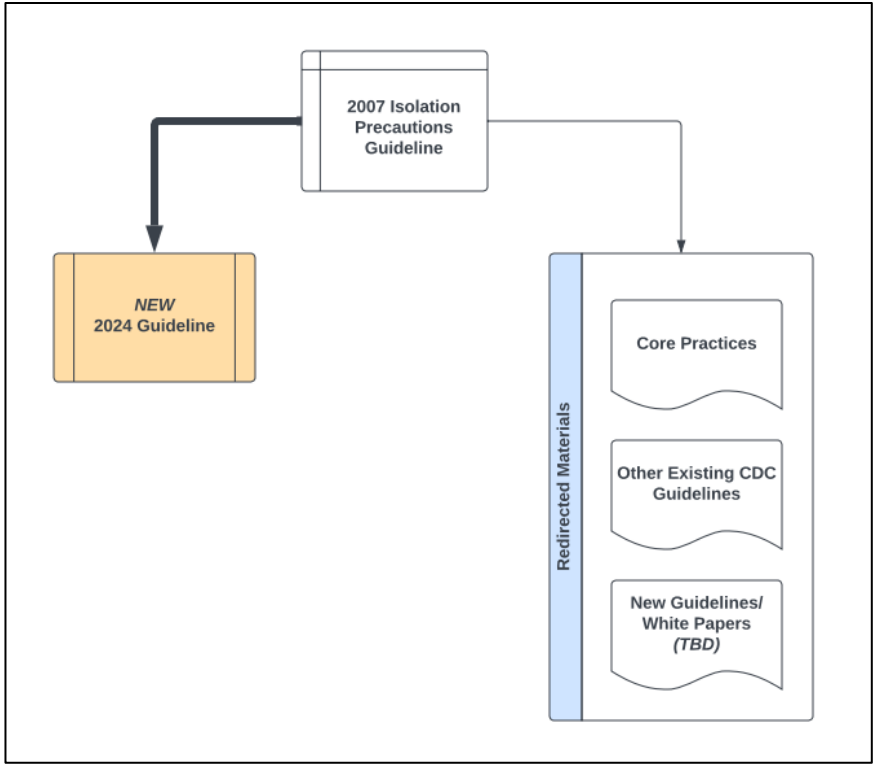
General Overview

Workgroup Goal is Creation of Update to 2007 Isolation Precautions Guideline

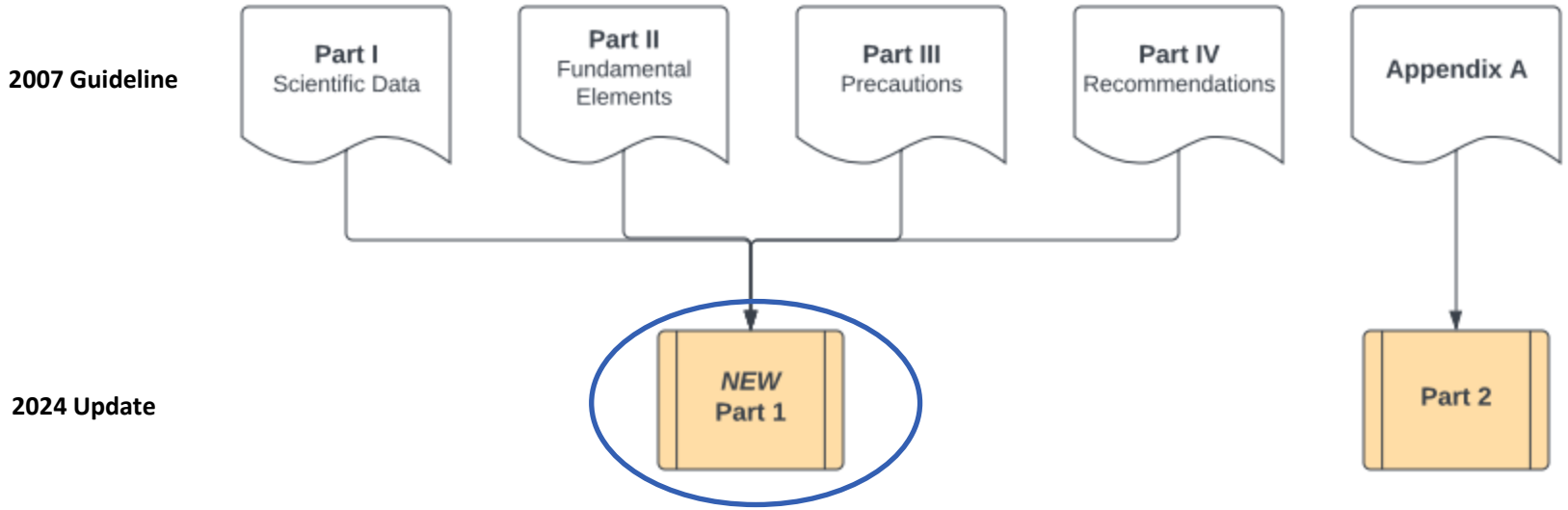
- More concise and suitable for mobile devices
- Provides an updated scientific foundation for how pathogens spread in the healthcare setting
- Recommend new categories of transmission-based precautions
- Intended to be applicable to all healthcare settings

Precautions Guideline Development Process

- Current guideline content reviewed and compared to existing CDC documents
- Focus on narrowing scope of new guideline and appropriately dispersing other important information



2024 Outline Structure

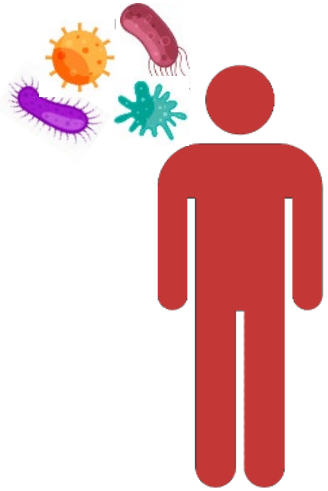


- Defines the new transmission framework and evidence base
- Focuses on modes of transmission of infection and prevention

Section A

Overview of Transmission of Infectious Agents

Whether a Transmission Occurs Is Determined by Pathogen, Environmental, and Host Factors at the Time of Event



- **Pathogen factors**
  - *Viability during transit*
- **Environmental factors**
  - *Air conditions (temperature, humidity, ventilation)*
  - *Surface conditions (material, porosity)*
- **Host factors**
  - *Non-immune defense (intact skin)*
  - *Immunity (prior infection, vaccination)*

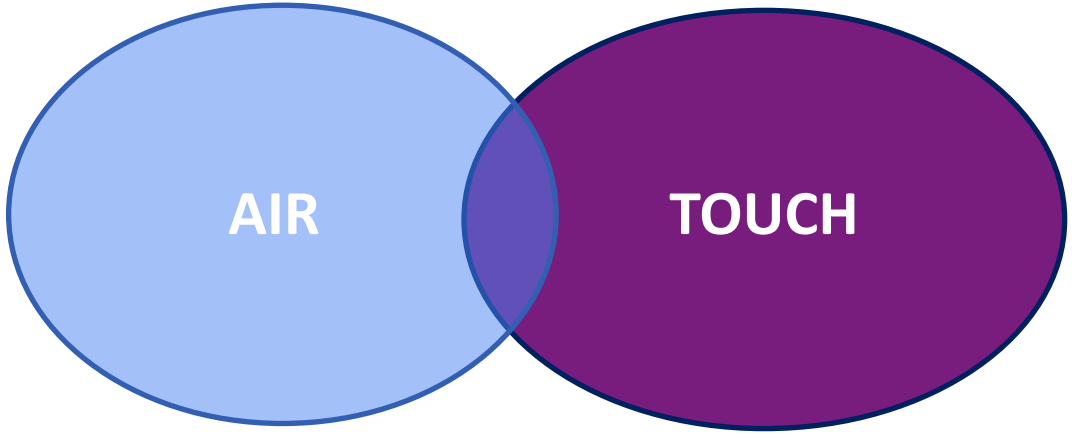
Infected/colonized individual or reservoir

At-risk individual

Significance of Transmission: Infections Are Not Uniform in Severity or Consequence

- On the basis of the health impact an infection may have on an individual and the community, some pathogens are recognized as requiring intensive efforts to prevent morbidity and mortality, while others do not rise to that level
- Less intensive effort might be indicated when outcomes are not usually severe, the population has a high degree of immunity, and effective therapeutics and vaccines are available
- The boundaries describing those categories require risk assessment over time by public health leaders, healthcare epidemiologists, and society at large, and can vary depending on the setting and the exposed population

Transmission Pathways: Air and Touch



- Pathogens generally spread via a major pathway, though minor pathways might contribute to spread
- Pathogen transmission epidemiology is informed by **observing patterns of infection spread**

Transmission Via Air

- Pathogens can transmit via air over short distances through direct splash or spray of the pathogen onto a part of the body, or variably across ranges of distance and time via suspended infectious particles
- Historically, the infection prevention community has categorized transmission of respiratory pathogens as ‘droplet’ or ‘airborne’
  - While these epidemiologic terms reflect observed patterns of short versus long distance transmission respectively, the terms do not explicitly describe a continuum of respiratory pathogen transmission through in the air
- All pathogens that spread via the air preferentially transmit over short distances, due to greater concentrations of infectious particles in the air near an infectious person
- However, each pathogen has a signature pattern of observed transmission that extends variably across short-to-long distances and over time, reflecting unique characteristics of pathogen durability while suspended in the air and the required dose for causing an infection in a susceptible host

Transmission Via Touch

- Transmission via touch occurs through physical contact with the pathogen
- Transmission in healthcare settings can occur via intact skin, via non-intact skin (including percutaneous routes such as needlestick injury), or via contact with mucous membranes of the face and gastrointestinal tract
- Transmission by touch can involve intermediary reservoirs such as people, surfaces, or equipment that facilitate spread

Approach to Transmission-Based Precaution Recommendations

- Recommendations for Transmission-Based Precautions utilize multiple layers of intervention (i.e., hierarchy of engineering and administrative controls, and personal protective equipment) that exist in healthcare settings to reduce transmission risk

Section B

Fundamental Elements Needed to Prevent Transmission of Infectious Agents in Healthcare Settings

Masks and Respirators: Key Concepts

- PPE worn over the nose and mouth has three primary functions
  - Block direct splashes to the mucous membranes of nose and mouth
  - Contain exhaled respiratory secretions (source control)
  - Provide filtration of inhaled air
- Different devices have different abilities to perform these functions
- Factors influencing selection include, but not limited to
  - Pathogen-associated morbidity and mortality from infection
  - Amount of aerosols of infectious respiratory particles anticipated to be present
  - Lack of effective treatment or vaccine
  - Transmissibility of the pathogen

Masks and Respirators: Importance of Fit

- Well-fitted masks
  - Fit closely against the face, especially along edges of mask, to minimize the ability of air to bypass the material of the mask

    (e.g., medical/surgical mask that fits well alone or with knotted ear loops or mask fitters, facemasks conforming to ASTM F3502-21)
- Respirators
  - Importance of limiting amount of inhaled air coming from leaks around respirator since that air is unfiltered

    (e.g., disposable filtering face pieces [N95], elastomeric respirators, powered air purifying respirators [PAPRs])

Source Control: Masks and Respirators

- Individuals breathing, speaking, coughing generate aerosols of respiratory secretions that can contain infectious organisms
- A mask or respirator reduces the amount of secretions released into the environment by the wearer, reducing exposure of people in a shared space to respiratory pathogens
  - *Previous focus*: Symptomatic source patients only
  - *New*:
    - Includes patients, HCP and visitors who may be infectious and not yet symptomatic
    - Consider use during periods of high local prevalence of acute respiratory viral infections for all individuals entering a healthcare facility or a part of a facility where patients at risk for more severe outcomes are housed

Eye Protection

- Consideration for addition of eye protection when:
  - Caring for patients who might not be able to effectively contain their coughs wearing a mask (*e.g.,* children)
  - To reduce the risk of inadvertent self-inoculation (*e.g.,* providing a barrier to prevent the wearer from rubbing their face with a soiled hand)
- Selection of device or combination of devices for eye and face protection depends on the extent and nature of coverage needed

Gowns and Gloves

- Function of gowns and gloves remains unchanged from 2007 Isolation Precautions guideline
- The indications for use of gowns and gloves in skilled nursing facilities have evolved since the 2007 guideline, and will be discussed in Section C

Section C

Precautions to Prevent Transmission of Infectious Agents

Standard Precautions: Key Points

- Components of Standard Precautions (as further described in CDC's Core Practices) include:
  - Hand hygiene
  - Environmental cleaning and disinfection
  - Injection and medication safety
  - Risk assessment with use of appropriate personal protective equipment (e.g., gloves, gowns, face masks) based on activities being performed
  - Minimizing Potential Exposures (e.g.,. wearing a mask when respiratory symptoms are present)
  - Reprocessing of reusable medical equipment between each patient or when soiled
- Standard Precautions have **multi-directional benefits** — protect HCP from acquiring infection from patients and prevent HCP or the healthcare environment from transmitting pathogens to patients

Performing a Risk Assessment is Central to Standard Precautions

- HCP assess their risk of exposure to potentially infectious materials for each activity being performed and implement practices and PPE to prevent possible exposure

- HCP might not anticipate all potential opportunities for exposure
  - Facilities may choose to systematically apply elements of Standard Precautions to situations likely to present a risk of pathogen transmission (*e.g.,* PPE ensembles for specific procedures or encounters)

Transmission-Based Precautions: Key Principles

- Used when the route(s) of transmission are not completely interrupted using Standard Precautions alone
- Employ multiple types of precautions for pathogens that have multiple routes of transmission (*e.g.,* disseminated varicella zoster infection)
- Are a foundational component of patient and HCP safety when applied promptly and early (including empiric application)
- May change as understanding of transmission and immunity to infection evolve over time
- Take advantage of multiple layers of interventions (*e.g.,* PPE, rooming, ventilation, disinfection) to reduce the risk of transmission

Evidence Review

Presenter: Erin Stone, MPH

Evidence Review: Three Targeted Questions

1. For healthcare personnel caring for patients with respiratory infections, what is the effectiveness of **medical/surgical masks compared with N95 respirators** in preventing infection?

2. For healthcare personnel caring for patients with respiratory infections, what is the effectiveness of adding **eye protection, compared to no eye protection**, in preventing infection?

3. What is the effectiveness of ***risk-based*** **application of gown/glove,** or gloves alone, in preventing transmission of pathogens?

Evidence Review Methods

- Followed standard PRISMA protocol
- Assessed internal validity of individual studies using scales developed by DHQP
- Aggregated results for each key question into narrative summaries, evidence snapshot tables, and qualitative summary of findings tables
  - Evaluated strength, direction, consistency, directness, and overall confidence for each outcome

Example of an Evidence Snapshot Table

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Outcome Type	Brief summary of findings	Number of studies (N =)					Confidence in findings

Evidence Review: Masks

- For healthcare personnel caring for patients with respiratory infections, what is the effectiveness of medical/surgical masks compared with N95 respirators in preventing infection?
  - Outcomes:
    1. Laboratory-confirmed viral respiratory infections (VRIs, pandemic and seasonal)
    2. Sub-groups
       a) Pandemic laboratory-confirmed VRIs (SARS-CoV-2, SARS-CoV-1, H1N1 influenza)
       b) Seasonal laboratory-confirmed VRIs (adenoviruses; human metapneumovirus; coronavirus 229E/NL63; parainfluenza viruses 1, 2 and 3; influenza viruses A and B; respiratory syncytial virus A and B; rhinovirus A/B; coronavirus OC43/HKU1)

Evidence Review: Masks (2)

Evidence Snapshot of the effectiveness of N95 respirators compared to surgical masks

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Laboratory-confirmed viral respiratory infections (VRIs)	Suggests no difference between N95s and surgical masks OR: 0.91 (95%CI: 0.71 – 1.18); I^2 = 85%	13 Studies (Ang 2010, Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, MacIntyre 2011, MacIntyre 2013, Piapan 2020, Radonovich 2019, Wilson 2022) (N = 14,859)	 [a]	 [b]	 [c]		 [d]

[a] All 13 studies by eye protection use, 10 studies (Ang 2010, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, MacIntyre 2011, MacIntyre 2013, Piapan 2020, Radonovich 2019) by coworker exposures, nine studies (Ang 2010, Belan 2022, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020, Wilson 2022) by community exposures, and six studies (Ang 2010, Khurana 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020) by healthcare tasks. Additionally, seven studies (Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, Piapan 2020, Wilson 2022) are retrospective and at risk of recall bias impacting results and two studies (Khurana 2021, Loeb 2004) have small sample sizes. Ten studies (Ang 2010, Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, MacIntyre 2004, MacIntyre 2011, MacIntyre 2013, Piapan 2020, Wilson 2022) either did not report on compliance or did not report compliance measured objectively.

[b] Ten studies report confidence intervals (Belan 2022, Haller 2022, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, MacIntyre 2011, Piapan 2020, Radonovich 2019, Wilson 2022), seven include the null (Belan 2022, Haller 2022, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Radonovich 2019), and eight are wide (Belan 2022, Haller 2022, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, MacIntyre 2011, Piapan 2020).

[c] Results are inconsistent for viral respiratory infections; however, the majority of studies suggest no difference.

[d] Recall bias and confounding affect the confidence in these findings; however, it is not expected that the addition of new evidence will alter these findings.

Evidence Review: Masks (cont.)

Evidence Snapshot of the effectiveness of N95 respirators compared to surgical masks for pandemic and seasonal VRIs

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Pandemic laboratory-confirmed VRIs	Suggests no difference between N95s and surgical masks OR: 0.97 (95%CI: 0.70 – 1.33); I^2 = 87%	10 studies (Ang 2010, Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020, Wilson 2022) (N = 10,100)	 [h]	 [i]	 [c]		 [d]
Seasonal laboratory-confirmed VRIs	Suggests no difference between N95s and surgical masks OR: 0.97 (95%CI: 0.70 – 1.33); I^2 = 54%	4 studies (Loeb 2009, MacIntyre 2011, MacIntyre 2013, Radonovich 2019) (N = 5,927)	 [j]	 [k]	 [c]		 [l]

[h] All ten studies (Ang 2010, Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020, Wilson 2022) are at risk of confounding by patient mask use, nine studies (Ang 2010, Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020) by eye protection use, eight (Ang 2010, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020) by coworker exposures, nine studies (Ang 2010, Belan 2022, Khurana 2021, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020, Wilson 2022) by community exposures, and six studies (Ang 2010, Khurana 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020) by healthcare tasks. Additionally, seven studies (Belan 2022, Haller 2022, Khurana 2021, Li 2021, Loeb 2004, Piapan 2020, Wilson 2022) are retrospective and at risk of recall bias impacting result, and two studies (Khurana 2021, Loeb 2004) have a small sample size.

[i] Eight studies (Belan 2022, Haller 2022, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020, Wilson 2022) report confidence intervals, seven (Belan 2022, Haller 2022, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022, Piapan 2020) include the null, and six (Belan 2022, Haller 2022, Li 2021, Loeb 2004, Loeb 2009, Loeb 2022) are wide.

[j] All four studies (Loeb 2009, MacIntyre 2011, MacIntyre 2013, Radonovich 2019) are at risk of confounding by eye protection use, patient mask use, and coworker exposures, and one study (Loeb 2009) is also at risk of confounding by community exposures, and healthcare tasks Two studies (MacIntyre 2011, MacIntyre 2013) do not report compliance measured objectively.

[k] Three studies (Loeb 2009, MacIntyre 2011, Radonovich 2019) report confidence intervals, two (Loeb 2009, Radonovich 2019) include the null, and two (Loeb 2009, MacIntyre 2011) are wide.

[l] Confounding affects the confidence of these findings and it is that the addition of new evidence may alter these findings.

Evidence Review: Mask Adverse Events

Evidence Snapshot for Physical Adverse Events From N95s or Medical/ Surgical Masks

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Vital signs (including pCO_2, SpO_2, and heart rate)	The evidence indicates no difference in SpO_2 and heart rate (vitals are within normal range) and is inconclusive for pCO_2.	4 Studies (Ipek, Manerkar, Su, Nwosu) (N = 306)	[m]	[n]	[o]	[p]	[q]
Headaches, difficulty breathing, and dizziness	The evidence indicates difficulty breathing, headaches, and dizziness are more frequent among N95 users than surgical mask users.	14 studies (Aloweni 2022, Cigiloglu 2021, Gelardi 2020, Hajjij 2020, Ipek 2021, KoseogluToksoy 2021, Liu 2022, Loeb 2022, Manerkar 2021, Nwosu 2021, Peres 2022, Ramirez-Moreno 2020, Rapisarda 2021, Su 2021) (N = 7,014)	[r]	[n]			[s]
Nausea	The evidence suggests no difference.	3 Studies (Gelardi, Ipek, Radonovich) (N = 177)	[t]	[u]			[s]
Skin issues	The evidence indicates pain, pressure injuries, skin damage, acne, and perspiration are more frequent in N95 users, and no difference in dermatitis and itching.	14 Studies (Abdi 2022, Aloweni 2022, Altun 2022, Ansari 2022, Atay 2020, Burns 2021, Gelardi 2020, Ipek 2021, Liu 2022, Park 2021, RadonovichJr 2009, Tang 2020, Wan, Zaib 2020) (N = 6,937)	[v]	[w]			

[m] One study (Ipek 2021) did not measure compliance to face masks, two studies (Ipek 2021, Su) were subject to sampling and recall bias, one study (Su 2021) was subject to confounding by work site, and three studies (Manerkar 2021, Su, Nwosu) were subject to confounding by task, gender, age, baseline fitness, and duration of mask use.

[n] Two studies reported small sample sizes (Su 2021, Ipek 2021).

[o] The evidence is inconsistent for the outcome of pCO_2.

[p] One study (Manerkar) was conducted in a healthcare facility with high heat and humidity due to no air conditioning during monsoon season.

[q] Small sample sizes and confounding affect the confidence in these findings; however, it is not expected that the addition of new evidence will alter these findings.

[r] Nine studies (Hajij, Ipek 2021, KoseogluToksoy Liu, Manerkar, Nwosu, Peres, Ramirez-Moren, Su) were subject to sampling bias and recall Bias. Nine studies (Gelardi, Hajij, KoseogluToksoy,Liu, Manerkar, Nwosu, Peres, Ramirez-Moreno, Su 2021) were subject to confounding by work site, and eight studies (Gelardi, KoseogluToksoy, Liu, Manerkar 2021, Peres, Ramirez-Moreno, Su, Nwosu) were subject to confounding by task, gender, age, baseline fitness, and duration of mask use.

[s] The addition of new evidence is not expected to alter these findings.

[t] Two studies (Ipek 2021, Su) were subject to sampling and recall bias, and confounding by work site, task, gender, age, and duration of mask use.

[u] Two studies reported small sample sizes (Ipek 2021, Radonovich).

[v] Fifteen studies (Abdi 2022, Aloweni 2022, Altun 2022, Ansari 2022, Atay 2020, Burns 2021, Gelardi, Ipek 2021, Liu, Manerkar, Nwosu, Park 2021, RadonovichJr 2009, Tang 2020, Wan) were subject to sampling bias and recall Bias. Thirteen studies (Abdi 2022, Aloweni 2022,Altun 2022, Ansari 2022, Atay 2020, Gelardi, ,Liu, Manerkar, Nwosu, Park 2021, RadonovichJr 2009, Tang 2020, Wan) were subject to confounding by work site, and fourteen studies (Abdi 2022, Aloweni 2022,Altun 2022, Ansari 2022, Atay 2020, Burns 2021 Gelardi, Krajewski, Liu, Nwosu, Park 2021, RadonovichJr 2009, Tang 2020, Wan) were subject to confounding by task, gender, age, baseline fitness, and duration of mask use.

[w] Three studies reported small sample sizes (Nwosu, Radonovich, Ipek 2021).

Evidence Review: Mask Adverse Events (cont.)

Evidence Snapshot for Psychological Adverse Events From N95s or Medical/ Surgical Masks

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Fatigue	The evidence suggests fatigue is more frequent in N95 users than in surgical mask users.	3 Studies (Ipek 2021, Cigiloglu 2021, Su 2021) (N = 413)	 [x]	 [n]			 [q]

[x] Two studies (Ipek 2021, Cigiloglu 2021) did not measure compliance to face masks, one study (Su 2021) was subject to confounding by work site, two studies (Ipek 2021, Cigiloglu 2021) were subject to confounding by task, by the pandemic, and work duration.

Evidence Review: Mask Adverse Events *(2)*

Evidence Snapshot for Occupational Adverse Events From N95s or Medical/ Surgical Masks

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Difficulty talking	The evidence suggests difficulty talking is more frequent in N95 users than surgical mask users.	7 Studies (Aliabadi 2022, Hamdan 2022, Nwosu 2021, Peres 2022, Pietrzyk 2022, Radonovich 2009, Su 2021) (N = 3,243)	[y]	[z]	[aa]		[bb]
Work interference	The evidence suggests work interference is more frequent in N95 users than surgical mask users.	4 Studies (Gelardi 2020, Maniaci 2021, Peres 2022, Radonovich 2009) (N = 3,472)	[cc]	[dd]			[ee]
Difficulty concentrating	The evidence is inconsistent and inconclusive.	4 Studies (Gelardi 2020, Ipek 2021, Maniaci 2021, Radonovich 2009) (N = 454)	[ff]	[gg]	[hh]		[ii]

[y] Six studies (Hamdan 2022, Nwosu 2021, Peres 2022, Pietrzyk 2022, Radonovich 2009, Su 2021) were subject to sampling bias. Two studies (Hamdan 2022, Peres 2022) were subject to recall bias and one study (Nwosu 2021) was subject to reporting bias. The studies were subject to confounding by gender (Aliabadi 2022, Nwosu 2021), age (Nwosu 2021), gender (Nwosu 2021), role (Nwosu 2021), task (Nwosu 2021), user errors (Peres 2022), and duty of work (Su 2021).

[z] Five studies (Pietrzyk 2022, Nwosu 2021, Radonovich 2009, Su 2021, Aliabadi 2022) reported a small sample size, and two studies (Radonovich 2009, Su 2021) reported little to no events.

[aa] The evidence is inconsistent for the outcome of difficulty talking.

[bb] Small sample sizes and confounding affect the confidence in these findings; however, it is not expected that additional publications will alter these findings.

[cc] All studies were subject to sampling bias, and three studies were subject to recall bias (Gelardi 2020, Maniaci 2021, Peres 2022). The studies were subject to confounding by user errors (Peres 2022), smoking (Maniaci 2021), allergies (Maniaci 2021), sleep disorders (Maniaci 2021), age (Maniaci 2021, Gelardi 2020), gender (Maniaci 2021, Gelardi 2020), role (Maniaci 2021), baseline fitness (Maniaci 2021), prior mental health (Gelardi 2020), duration of use (Maniaci 2021, Gelardi 2020), and tasks (Maniaci 2021, Gelardi 2020).

[dd] One study (Radonovich 2009) reported a small sample size and reported no events.

[ee] Small sample sizes and confounding affect the confidence in these findings, and the addition of new evidence may alter these findings.

[ff] Three studies (Gelardi 2020, Maniaci 2021, Radonovich 2009) were subject to sampling bias, and two studies were subject to recall bias (Gelardi 2020, Maniaci 2021). The studies were subject to confounding by sleep disorders (Maniaci 2021), age (Maniaci 2021, Gelardi 2020), gender (Maniaci 2021, Gelardi 2020), role (Maniaci 2021), baseline fitness (Maniaci 2021), prior mental health (Gelardi 2020), duration of use (Maniaci 2021, Gelardi 2020), and tasks (Maniaci 2021, Gelardi 2020, Ipek 2021).

[gg] Two studies (Radonovich 2009, Ipek 2021) reported a small sample size.

[hh] The evidence is inconsistent for the outcome of difficulty concentrating.

[ii] Small sample sizes and confounding affect the confidence in these findings and the addition of new evidence may alter these findings.

Evidence Review: Eye Protection

- For healthcare personnel caring for patients with respiratory infections, what is the effectiveness of adding eye protection, compared to no eye protection, in preventing infection?
  - Outcomes:
    1. Laboratory-confirmed pandemic viral respiratory infections
    2. Sub-groups
       a) Laboratory-confirmed SARS-CoV-1
       b) Laboratory-confirmed SARS-CoV-2

No studies available for seasonal viral respiratory viruses

Evidence Review: Eye Protection (2)

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Laboratory-confirmed pandemic viral respiratory illness	Suggests a benefit to the addition of eye protection for pandemic pathogens OR: 0.41 (95%CI: 0.21 – 0.82); I^2 = 83%	11 Studies (N = 13,436)	1	2			
Laboratory-confirmed SARS-CoV-1	Suggests no difference from the addition of eye protection OR: 0.51 (95%CI: 0.20 – 1.26); I^2 = 0%	3 Studies (N = 1,345)	1	3			
Laboratory confirmed SARS-CoV-2	Suggests no difference with the addition of eye protection OR: 0.43 (95%CI: 0.14 – 1.34); I^2 = 90%	7 Studies (N = 11,808)	1	4			

[1] – All eleven studies are at risk of confounding by mask use, N95 use, improper mask use, community interventions, healthcare tasks, or IPC training (AlMohajer 2021, Alraddadi 2016, Belan 2022, Bhaskar 2020, Burke 2020, Chatterjee 2020, Chen 2009, Khalil 2020, Kumar 2020, Liu 2009, Park 2004). Additionally, nine studies are retrospective and at risk of recall bias impacting results (Alraddadi 2016, Belan 2022, Burke 2020, Chatterjee 2020, Chen 2009, Khalil 2020, Kumar 2020, Liu 2009, Park 2004).

[2] – Five studies reported confidence intervals (Alraddadi 2016, Belan 2022, Chatterjee 2020, Chen 2009, Khalil 2020), three included the null (Alraddadi 2016, Chatterjee 2020, Chen 2009), and one was wide (Chen 2009). Two studies reported zero events in either group (Burke 2020, Park 2004).

[3] – One study a reported confidence interval (Chen 2009), which was wide and included the null. One study reported zero events in either group (Park 2004).

[4] – Three studies reported confidence intervals (Belan 2022, Chatterjee 2020, Khalil 2020), and one included the null (Chatterjee 2020). One study reported zero events in either group (Burke 2020).

Evidence Review: Eye Protection Adverse Events

Evidence Snapshot for Adverse Events and Eye Protection

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Job performance related adverse events	The addition of eye protection results in an increase in fogging, poor visibility, and convenience that may interfere with job performance.	13 Studies (N = 3,120)	 [e]	 [g]			
Physical adverse events	The addition of eye protection results in an increase in headaches and skin reactions with longer duration of use >4 hours.	14 studies (N = 3,909)	 [e]	 [g]			
Psychological and emotional adverse events	The evidence is inconclusive.	2 Studies (N = 565)	 [f]	 [h]			

[e] – All cross-sectional studies were subject to selection bias, recall bias, and were subject to confounding by type of eye-protection, age, gender, occupation or task. Two studies were underpowered to detect a result (Ergerin, Hajiji).

[f] – All cross-sectional studies were subject to selection bias, recall bias, and were subject to confounding by type of eye-protection, age, gender, occupation or task. One study was underpowered to detect a result using a tool that has not been validated to the local cultural context (Ergerin)

[g] – One study reported wide confidence intervals and small sample size (AriciParlak)

[h] – One study reported wide confidence intervals

Evidence Review: Risk-Based Gown/Glove

- What is the effectiveness of risk-based application of gown/glove or gloves alone in preventing transmission of pathogens?
  - Risk-based application can mean patient risk (e.g., target certain patient-level factors other than MDRO status, such as presence of wound or device) or task risk (e.g., target tasks involving direct patient contact versus indirect/no patient contact)
  - Outcomes:
    1. Pathogen colonization acquisition (*Staphylococcus aureus*)
    2. HCP self-contamination of gown/glove: a surrogate marker (Methicillin-resistant *Staphylococcus aureus*, resistant gram negative bacteria)

Evidence Review: Gown and Gloves

Table. Evidence Snapshot of the Effectiveness of a Multi-component Strategy Including Targeted Gown and Glove Use to Prevent Resident Acquisition

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
Staphylococcus aureus (MRSA+MSSA) Colonization/ acquisition	Evidence is insufficient to determine an association between a multi-component strategy for the implementation of targeted gown and glove use and a reduction in *S. aureus* colonization acquisition among residents.	1 study (N = 221 residents and their HCP) (Lydecker 2020)					

Table. Evidence Snapshot of the Association between Routine Care Activities and Contamination of Gowns and Gloves

Outcome	Summary	Studies	Strength	Precision	Consistency	Directness	Confidence
MRSA contamination of HCP PPE	Evidence suggests an association between MRSA contamination of gowns and gloves while dressing and providing hygiene (e.g. brushing teeth, combing hair) to a resident.	2 studies (Pineles 2017, Roghmann 2016) (N = 601 residents and their HCP)					
Resistant gram negative bacteria (RGNB) contamination of HCP PPE	Evidence is inconsistent on which activities are associated with RGNB contamination of gowns and gloves during routine resident care.	2 studies (Blanco 2018, Blanco 2017) (N = 584 residents and their HCP)					

[1] All five studies (Lydecker 2020, Pineles 2017, Roghmann 2016, Blanco 2018, Blanco 2017)) are at risk of confounding by delivery of concurrent healthcare tasks, healthcare personnel training, patient characteristics, and location of contamination on gowns. Four studies (Pineles 2017, Roghmann 2016, Blanco 2018, Blanco 2017) did not report power calculations and it was unclear whether they were adequately powered to detect a result.

[2] All measures of association are reported with wide confidence intervals, or the precision is unclear because confidence intervals were not reported.

[3] Inconsistency cannot be assessed with only one study or results are inconsistent.

[4] Populations (HCP and patient), and settings are direct.

[5] It is likely that these results may change.

[6] Results are consistent.

Transmission-Based Precautions

DRAFT: Transmission-Based Precautions to Prevent Transmission by Air

Category	Facemask or Respiratory Protection	Eye Protection	Airborne Infection Isolation Room (AIIR)	Example Pathogens
Routine Air Precautions	Medical/Surgical Facemask	Per Standard Precautions	Not routinely recommended	Seasonal coronavirus, Seasonal influenza
Novel Air Precautions	N95 respirator	Yes	Not routinely recommended	MERS, SARS-CoV-1, Pandemic-phase respiratory viruses (*e.g.*, influenza, SARS-CoV-2)
Extended Air Precautions	N95 respirator	Per Standard Precautions	Yes	Tuberculosis, measles, varicella

Standard Precautions applies to all situations regardless of Transmission-Based Precautions used

DRAFT: Transmission-Based Precautions to Prevent Transmission by Touch for Healthcare Facilities *(Except Skilled Nursing Facilities)*

Label	PPE	Situation	Dedicated Medical Equipment	Single Occupancy	Example Pathogens
Contact Precautions	Gown/Glove *for all activities*	Any room entry	Yes	Preferred; if not available, consider cohorting patients with the same pathogen	Norovirus, *C. difficile*, *C. auris*, scabies

Standard Precautions applies to all situations regardless of Transmission-Based Precautions used

DRAFT: Transmission-Based Precautions to Prevent Transmission by Touch *for Skilled Nursing Facilities*

Label	PPE	Situation	Dedicated Medical Equipment	Single Occupancy	Example Pathogens
Contact Precautions	Gown/Glove for all activities	Any room entry	Yes	Preferred; if not available, then cohort	Norovirus, *C. difficile,* scabies. During MDRO outbreaks (time-limited)
Enhanced Barrier Precautions	Gown/glove during high contact patient care activities	May be indicated (when Contact Precautions do not otherwise apply) for: • Pathogen-based: Residents with infection or colonization with an MDRO • Risk-based: Residents with wounds or indwelling medical devices regardless of MDRO colonization status May be considered for other congregate settings in healthcare facilities.	Not required. Clean and disinfect equipment between residents (per Standard Precautions)	Not required	MDROs targeted by CDC (*e.g.*, CRE, CRPA, CRAB, *C. auris*)

Standard Precautions applies to all situations regardless of Transmission-Based Precautions used

Next Steps

- Goal is to have Precautions Guideline for HICPAC review and vote by August 2023

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Isolation Precautions Guideline Workgroup Members: Michael Lin (Co-Chair), Sharon Wright (Co-Chair), Hilary Babcock, Elaine Dekker, Judith Guzman-Cottrill, Anurag Malani, JoAnne Reifsnyder, Mark Russi, Connie Steed, Julie Trivedi, Deborah Yokoe

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Discussion

Appendix

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