

Public Health Emergency Preparedness and Response: Non-Pharmaceutical Interventions to Reduce Transmission of Viral Respiratory Infections in Long-Term Care Communities

Community Preventive Services Task Force Finding and Rationale Statement Ratified June 2024

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CPSTF Finding and Rationale Statement

Context

Long-term care (LTC) communities provide a broad range of health, personal care, and supportive services to residents who may have limited selfcare capabilities due to physical, cognitive, or mental disability. Individuals may receive long-term care services in a variety of settings, including residential care communities or group homes, continuing care retirement or life care communities, assisted living, nursing homes, or skilled nursing facilities. Services offered may include nursing care, 24-hour supervision, three meals a day, and assistance with activities of daily living (Harris-Kojetin 2019, NIH National Institute on Aging 2019).

The COVID-19 pandemic highlighted the vulnerability of residents in LTC communities to viral respiratory infections. LTC community residents make up less than 1% of the U.S. population but accounted for more than 23% of all COVID-19 deaths as of January 2022 (Kaiser Family Foundation 2022).

CDC's guidance to prevent and slow the spread of viral respiratory infections includes vaccination, treatment, and nonpharmaceutical interventions (CDC 2024a). Nonpharmaceutical interventions (NPIs) are actions, apart from getting vaccinated and taking medicine, that people and communities can take to help slow the spread of infections (CDC 2024b, Qualls 2017). A combination of individual, community, and environmental NPIs can be part of the response to respiratory infection outbreaks or pandemics (Qualls 2017).

Individual NPIs (CDC 2024b, 2024c, Qualls 2017) are everyday preventive actions such as:

- Proper hand hygiene: clean hands using an alcohol-based hand sanitizer in healthcare settings when hands are not visibly dirty; or washing with soap and water if hands are visibly dirty.
- Using personal protective equipment (PPE): covering nose and mouth with a mask, staff using gloves, gowns, goggles, face shields when appropriate.
- Staff not coming to work when sick: instructing sick staff not to report to work.

Community NPIs (CDC 2007, 2024b, Qualls 2017) are policies and strategies, such as:

- Testing and screening: identifying affected individuals.
- Physical distancing: creating ways to increase distance between people (e.g., limiting group activities, isolating infected individuals, cohorting or placing people together in the same room)
- Visitor restriction: temporarily restricting visitors' access to the LTC communities. Restriction could range from not allowing any visitors, reducing the number of visitors, or limiting how long visitors can stay or where they can meet the residents.
- Resident admission or transfer restriction: limiting admission of new patients, and transport and movement of patients.

Environmental NPIs (CDC 2007, 2023, 2024b, 2024d, Qualls 2017) include the following:

- Cleaning and disinfecting: cleaning surfaces (e.g., floors, tabletops) on a regular basis, and when visibly soiled (e.g., spills); disinfecting frequently touched surfaces and objects on a regular basis and following the cleaning process when visibly soiled.

- Ventilation: circulating indoor air to dilute viral particles using natural (e.g., open windows to allow air circulation) or mechanical methods (e.g., using high-efficiency particulate filters, installing ultraviolet germicidal irradiation systems)..

Intervention Definition

Long-term care communities for adults with disabilities and older adults can adopt non-pharmaceutical interventions as strategies to prevent, slow, or stop the spread of viral respiratory infections. NPIs may be directed to residents, staff, and visitors and applied at the:

- Individual level (e.g., use personal protective equipment such as gloves, masks, and others, proper hand hygiene, and staff not coming to work when sick),
- Community level (e.g., testing, physical distancing, visitor restriction, and resident admission or transfer restriction), or
- Environmental level (e.g., cleaning and disinfecting, and improving ventilation).

CPSTF Finding (June 2024)

The Community Preventive Services Task Force (CPSTF) recommends non-pharmaceutical interventions in long-term care communities based on sufficient evidence of effectiveness in decreasing viral respiratory infection incidence among LTC community residents and staff.

Evidence shows that during a viral respiratory infection outbreak or pandemic, combinations of NPIs can reduce the risk of infection among LTC community residents and staff.

Evidence is inconsistent for impact of visitor restriction alone or in combination with physical distancing on residents' mental health and quality of life.

Rationale

Basis of Finding

The CPSTF recommendation is based on evidence from a systematic review of 42 studies (search period database inception to January 2024), conducted by a review team (the Team) consisting of specialists in systematic review methods and subject matter experts.

All included studies examined LTC communities that had baseline NPIs in place to comply with standard infection control and prevention protocols. Additional NPIs were implemented in these communities in response to viral respiratory infection outbreaks or pandemics (38 studies) or as part of quality improvement efforts (5 studies).

The Team examined the impact of added NPIs on viral respiratory infection incidence (number of people infected among people at risk), viral infection-related morbidity (e.g., hospitalization or ED visits), and mortality (Table 1). NPIs implemented in LTC communities reduced viral infection in residents and staff. These interventions also decreased hospitalization and mortality due to infection.

The Team also examined the impact of community level NPIs on residents' mental health (Table 2) and quality of life (Table 3) during the COVID-19 pandemic (8 studies). All studies were conducted outside the U.S. and examined the impact of visitor restriction alone, visitor restriction followed by physical distancing, or visitor restriction and physical distancing implemented at the same time. The results were inconsistent across the eight studies, and no conclusion

could be drawn. Four of the eight studies used the interrupted time series study design to account for the impact of COVID pandemic. They found that visitor restriction alone or in combination with physical distancing didn't significantly impact the residents' mental health or quality of life.

LTC communities in the included studies added different combinations of NPIs based on their needs and resources and were generally successful in improving respiratory viral infection-related outcomes. However, it could not be determined which NPI or NPI combination was the most effective. Ten studies with a cross-sectional study design examined the association between individual NPIs and downstream health outcomes, and the results were inconsistent.

Table 1. Impact of NPIs in LTC Communities on Respiratory Infection-Related Outcomes

Outcome	Number of Studies	Summary Effect Estimates	Direction of Effect
Incidence	17	Relative difference or change: Median decrease of -46.0% (IQI: -77.7%, -16.0%) 10 studies with 11 datapoints Absolute difference or change: Median decrease of -1.7 pct pts (IQI: -13.7, -1.3) 5 studies with 5 datapoints 6 studies reported on viral infection incidence: 5 favorable, NS; 1 no change 5 studies reported on the proportion of communities with an outbreak: 4 favorable, sig; 1 no change 1 study reported on environmental contamination and was favorable, NS	Favors the intervention
Hospitalization and ED Visits	5 ^a	Relative difference or change: Median decrease of -56.5% (IQI: -69.3%, -34.1%) 5 studies with 6 datapoints Absolute difference or change: Median decrease of -4.8 pct pts (IQI: -9.3 pct pts, -0.61 pct pts) 4 studies with 4 datapoints 1 study provided narrative result that was favorable, sig	Favors the intervention

Outcome	Number of Studies	Summary Effect Estimates	Direction of Effect
Mortality	6	Relative difference or change: Median decrease of -33.1% Min to max: -77.8% to -23.0% 3 studies with 3 datapoints 3 studies provided narrative results: 1 favorable, sig; 1 favorable, NS; 1 no change	Favors the intervention

Incidence: number of viral respiratory infections/ number of people at risk for viral respiratory infection over time (specified by study authors).

Hospitalization due to infection: number hospitalized due to viral respiratory infection / number of people infected or the number of people at risk for viral respiratory infection.

Mortality due to infection: number of deaths due to viral respiratory infection / number of people infected or at risk for viral respiratory infection.

CI: confidence interval

Min: minimum

Max: maximum

NS: not statistically significant

IQI: interquartile interval

Pct pts: percentage points

Sig: statistically significant

^aStudies reported multiple outcomes.

Table 2. Impact of Visitor Restriction Alone or in Combination with Physical Distancing on LTC Community Residents' Mental Health.

Outcome	Number of Studies ^a	Summary Effect Estimates
Anxiety	2	2 improved anxiety (1 sig, 1 NS). 1 worsened anxiety, NS.
Aggressive behavior	3	1 improved aggressive behavior, NS. 1 worsened aggressive behavior, NS. 1 no change.
Cognition	3	3 worsened cognition, sig. 1 no change.
Delirium	2	1 worsened delirium, NS. 1 no change.

Outcome	Number of Studies ^a	Summary Effect Estimates
Depression	5	1 improved depression, sig. 1 improved depression, NS. 1 worsened depression, sig. 1 worsened depression, NS. 3 no change.
Loneliness	2	2 no change.
Withdrawal	1	No change

Sig: statistically significant

NS: not statistically significant

^aStudies reported multiple mental health outcomes.

Table 3. Impact of Visitor Restriction Alone or in Combination with Physical Distancing on LTC Community Residents' Quality of Life.

Outcome	Number of Studies ^a	Summary Effect Estimates
Emotional well being	1	2 worsened emotional well-being, NS.
Functional status	1	No change
Self-determination	1	1 improved self-determination, NS. 1 worsened self-determination, NS.
Social interactions	2	2 improved interpersonal relationship and social inclusion, NS. 1 worsened social inclusion, NS. 2 no change.

NS: not statistically significant

^aStudies reported multiple quality of life outcomes.

Applicability and Generalizability Issues

Intervention Settings

The CPSTF finding is applicable to LTC communities across the United States. The finding is mostly based on responses to SARS-CoV-2, the virus that causes COVID-19, but can be applied to infections caused by other respiratory viruses.

The included studies evaluated interventions implemented in the United States (14 studies), the Netherlands (5 studies), the United Kingdom (4 studies), Canada (3 studies), France (3 studies), Spain (3 studies), Germany (2 studies), Italy (2 studies), Australia (1 study), Belgium (1 study), Cyprus (1 study), Hong Kong, China (1 study), Israel (1 study), Sweden (1 study), and Taiwan (1 study). U.S. studies were implemented in the Northeast (6 studies), South (4 studies), and Midwest

(2 studies) regions as defined by the [U.S. Census Bureau](https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf) [https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf]. Two U.S. studies were implemented in multiple regions. While a few of the 43 studies exclusively evaluated NPIs in LTC communities located in rural (2 studies) or urban settings (2 studies), most were in a mix of urban, suburban, and rural settings (24 studies). Many studies did not report on urbanicity (15 studies).

Studies included all types of LTC communities (21 studies), nursing homes or skilled nursing facilities only (17 studies), or residential LTC communities only (2 studies). Three studies did not specify the type of LTC community examined. Most studies examined NPIs implemented in response to SARS-CoV-2 (38 studies), with the rest examining respiratory illnesses caused by flu or other viruses that produced flu-like illnesses (2 studies), upper respiratory illnesses (2 studies), or pneumonia (3 studies).

Population Characteristics

The CPSTF finding is applicable to adults residing in LTC communities.

Few studies reported on population characteristics and those that did only provided demographic information for residents.

Twelve of the included studies reported residents' age, with a median average age of 83 years. Three studies reported age groups with a median 62% of residents aged 80 years or more; small proportions of the residents were below 60 years (8%) or 65 years of age (7%). Included studies examined LTC communities serving older adults (31 studies), older adults and people with dementia (5 studies), adults with disabilities (3 studies), older adults and adults with disabilities (2 studies), or older adults, people with dementia, and adults with disabilities (2 studies).

Only 15 studies reported residents' gender, with a median of 65% being females. Eleven of the included studies reported residents' underlying conditions, including dementia (4 studies), intellectual disability (2 studies), mobility issues (4 studies), and chronic conditions such as cardiovascular disease or chronic respiratory disease (2 studies).

Four studies conducted in the United States reported residents' race and ethnicity. Three studies evaluated LTC communities with predominantly White resident populations (median of 85% White) residents. The fourth study served a population that was 65% White, 32% Black or African American, and 1% Hispanic. One of the four studies performed a stratified analysis and reported NPIs were effective across LTC communities with different proportions of non-White residents.

Intervention Characteristics

The CPSTF finding is likely applicable across different numbers, types, and levels of NPIs implemented.

Thirty-three of the included studies evaluated the impact of adding NPIs at the individual (2 studies), community (21 studies), environmental (2 studies), or a mix of the different levels (8 studies). Some of the studies examined a single NPI, including individual level NPIs such as improving access to alcohol-based hand sanitizer and staff adherence to proper hand hygiene (2 studies); community level NPIs such as testing (12 studies), physical distancing (1 study), visitor restriction (2 studies), or relaxing of visitor restriction (1 study); and environmental level NPIs such as cleaning and disinfecting using ultraviolet light (1 study) or installation of ultraviolet air purification in ventilation system (1 study).

The remaining studies evaluated different combinations of NPIs, five of which examined NPIs from all three levels. There was reduction in infection across different numbers, types, and levels of NPIs implemented.

NPIs evaluated in the included studies were implemented based on decisions made within the LTC communities (13 studies), at the local or state level (9 studies), or at the national level (11 studies). Such decisions followed guidance produced by the LTC community (1 study); local or state (3 studies), national (13 studies), or global (1 study) institutions or organizations; or a combination of guidelines (10 studies). Five studies did not report on the guidelines used to inform LTC communities' decisions.

NPIs that were implemented in response to outbreaks or pandemics lasted fewer than three months (14 studies), between three and six months (6 studies), or between six and nine months (4 studies). Three studies examined NPI implementation as part of quality improvement efforts and lasted more than one year. Five studies did not report on intervention duration.

Ten of the included studies accessed national (3 studies) or regional (7 studies) databases for LTC communities and examined the association between individual NPIs and health outcomes. The NPIs examined include proper hand hygiene (2 studies), use of PPE (5 studies), physical distancing (8 studies), testing (1 study), resident admission or transfer restriction (1 study), and cleaning and disinfecting (2 studies). The results were inconsistent.

Data Quality

Study designs included group randomized trials (4 studies), group non-randomized trial (1 study), before-after with concurrent comparison groups (6 studies), simple time series with concurrent comparison groups (2 studies), interrupted time series (6 studies), retrospective cohort (1 study), single group before-after (10 studies), simple time series (3 studies), and cross-sectional (10 studies).

The most common study limitations include lack of description of study population or unclear description of intervention; unclear description of sampling frame; and confounders that were not discussed or addressed.

Eight studies examined impact of visitor restrictions with or without physical distancing on residents' mental health during the COVID-19 pandemic. Studies evaluating mental health outcomes would ideally have concurrent comparison groups to account for the generalized impact of the COVID pandemic. No study had a concurrent comparison group, but four studies used an interrupted time series design to account for the changes in mental health due to the pandemic. Compared with studies that used single group before-after or simple time series study design, these four studies were more likely to report that NPIs didn't change or even slightly improved residents' mental health. Studies used a wide array of questionnaires to examine multiple mental health outcomes, making it difficult to summarize results.

Other Benefits and Harms

CPSTF considered potential additional benefits and harms associated with implementing NPIs in LTC communities.

Postulated potential benefits, identified from the included studies:

- Early testing of LTC staff could help identify new variants of SARS-CoV-2 (Sagerman 2021) and contribute to the lower mortality in the LTC communities' surrounding areas (Geeraedts 2022).
- Reduction in non-respiratory infections (Kovach 2017, Yeung 2011, Jutkowitz 2022, Makris 2000), all-cause hospitalizations (Kovach 2017), and all-cause mortality (Yeung 2011).
- Increased overall compliance with health care protocols (Schuengel 2020).

Postulated potential harms, identified from the included studies and the broader literature:

Family caregivers

- Increased feelings of anger, frustration, and sadness, and heightened levels of depressive symptoms and anxiety while not being able to see their loved ones in LTC communities during visitor restrictions (Hugelius 2021, Nash 2021, Schneider 2023).
- Lower quality of life associated with negative perceptions of support received from nursing home staff (Schneider 2023).
- Concern about how social isolation was affecting their loved ones (Nash 2021, Schneider 2023).

Healthcare workers

- Burnout associated with intensive NPI implementation and job demands (Hugelius 2021, Jones 2022, Oliveira 2023, Tulloch 2021, White 2021), increased workload caused by staff shortages when required to stay-at-home when sick (Backhaus 2021), and stress associated with protocol breaches (Scheffler 2022).
- Degradation of workplace community and social isolation associated with physical distancing (Fisher 2021, Scheffler 2022).
- Physical discomfort associated with PPE usage (Brainard 2023).
- Challenges associated with hearing and understanding when residents were wearing PPE (Kaelen 2021, Scheffler 2022).

Considerations for Implementation

The following considerations for implementation are drawn from studies included in the existing evidence review, the broader literature, and expert opinion.

Some strategies to alleviate potential harms associated with NPI implementation in LTC communities include:

- Digital technology (e.g., video chats with family and friends) may help reduce social isolation of residents when visitor restriction or physical distancing were implemented (Colas 2022).
- Small group activities may improve residents' health, with physical activity to reduce their functional decline, and arts activities and other group programming may help enhance residents' social engagement (Bethell 2021, Resnick 2021).
- Regular updates to family caregivers may help mitigate anxiety. Keeping family members and caregivers informed about their loved ones as well as the need for and use of NPIs may help reduce their anxiety (Gallant 2022).

Timely and clear communication between LTC communities and public health agencies.

- Effective and regular communication between LTC communities and public health agencies may help to reduce viral transmission and enhance emergency preparedness and outbreak response (Dawson 2021, Jones 2022, Oldfield 2021).
- Virtual or "just-in-time" education programs for LTC staff may provide rapid and real-time dissemination of NPI best practices (Lingum 2021).

Strategies to support LTC community workforce.

- Foster supportive community among LTC community workforce to build morale (Navarro-Prados 2022).

- Provide evidence-based mental health support for staff members (Fisher 2021, Hugelius 2021).
- Consider having a contingency staffing plan to better manage workloads during any emergency response, especially with the need to incorporate additional NPIs into already busy daily routine (Dawson 2021).
- Recognize the challenges facing the LTC workforce that's racially diverse and primarily female. Develop strategies to address issues such as lower pay, the need to hold multiple jobs, and lack of jobs offering paid sick leave, creating barriers to staying home when sick and increasing the risk of infection for themselves and the LTC residents (Dawson 2021, High 2007, Kobayashi 2016, Van Houtven 2020)

Implementation Resources

The following publicly available resources provide guidance on implementing NPIs in LTC communities:

[CDC: Viral Respiratory Pathogens Toolkit for Nursing Homes](https://www.cdc.gov/long-term-care-facilities/hcp/respiratory-virus-toolkit/) [https://www.cdc.gov/long-term-care-facilities/hcp/respiratory-virus-toolkit/]

- Provides strategies to help prepare for and respond to nursing home residents or healthcare personnel who develop signs or symptoms of a respiratory viral infection.
- Links out to other resources for more information on specific respiratory viruses and outbreak resources.

[AHRQ: A Unit Guide to Infection Prevention for Long-Term Care Staff](https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/quality-resources/tools/cauti-ltc/modules/resources/guides/guide-infection-prevention.pdf)

[https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/quality-resources/tools/cauti-ltc/modules/resources/guides/guide-infection-prevention.pdf]

- Provides an overview of infections and infection prevention in LTC communities, a review of standard precautions and ways to implement transmission-based precautions, with a focus on influenza.

[American Health Care Association and National Center for Assisted Living: Long-term Care Quick Start Guide: Preparing for Respiratory Virus Season](https://www.ahcancal.org/Quality/Documents/GetVaccinated/CDC%20Resources/Long-term%20Care%20Quick%20Start%20Guide%20for%20Respiratory%20Virus%20Season.pdf) [https://www.ahcancal.org/Quality/Documents/GetVaccinated/CDC Resources/Long-term Care Quick Start Guide for Respiratory Virus Season.pdf]

- Links out to guidance and recommendations for prevention and management, including the CDC Toolkit.
- Includes posters for masking and hand hygiene that can be posted in LTC communities as quick aids.

Evidence Gaps

CPSTF identified several areas that have limited information. Additional research and evaluation could help answer the following questions and fill remaining gaps in the evidence base.

CPSTF identified the following questions as priorities for research and evaluation:

- What is the impact of these interventions on residents' mental health and quality of life, considering the need for comparative study designs, having U.S.-based studies, and using standardized mental health outcomes?
- How effective are NPIs in the following settings:
 - Rural LTC communities?
 - LTC communities with high proportion of residents from historically disadvantaged racial and ethnic populations?
 - Residential LTC communities?
 - LTC communities for people with disabilities?

- Which individual or combinations of NPIs work the best?

Remaining questions for research and evaluation identified in this review include:

- Does intervention effectiveness vary with the following factors?
 - Compliance with NPI.
 - Population characteristics such as gender, vaccination status.
 - Community characteristics such as size of community, room sharing, staff to resident ratio, staff working in multiple communities.
 - Provision of education or support services to allow better implementation of NPIs.

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