

EVIDENCE SEARCH REPORT

RESEARCH QUESTION: Environmental factors that influence a facility's ability to control or manage an outbreak AND Infection control practices in an ILI outbreak	UNIQUE IDENTIFIER: LTC042201-02 ESR LTC042201-04 ESR
RESOURCES USED:	
<ul style="list-style-type: none"> • CDC database • CINAHL • Embase • Google Scholar • LitCovid • MEDLINE 	<ul style="list-style-type: none"> • medRxiv • PHAC database • PubMed • Reference/Citation Lists • WHO Global Research on COVID-19 • Reference and citation searching
LIMITS/EXCLUSIONS/INCLUSIONS: English	REFERENCE INTERVIEW COMPLETED: April 23, 2020
DATE: April 25, 2020	
LIBRARIAN: Michelle Dalidowicz & Catherine Boden	REQUESTOR: Dr. Brittany Ellis
TEAM: Long-term care	
CITE AS: Dalidowicz, M; Boden, C. What environmental management and built environment factors influence a home's ability to prevent or manage an ILI outbreak? AND What is the evidence for infection control practices (checklist items) for preventing or managing an ILI outbreak? 2020 Apr 25; Document no.: LTC042201-02 ESR. In: COVID-19 Rapid Evidence Reviews [Internet]. SK: SK COVID Evidence Support Team, c2020. 24 p. (CEST evidence search report)	

LIBRARIAN NOTES/COMMENTS

Hello Susan and Heather,

Please find my searches at the end of the document. I tried to pare down the amount of articles selected for this report as much as I could. I did not include articles that discussed the vaccination of healthcare workers/residents. These represented a good chunk of what I waded through in the literature. I realize that you didn't want generic infection control articles, but I have included some in case they have more detailed information in the full-text of the article (I only reviewed the abstracts).

A few of the articles did not have links, but we can order them for you if you would like to read the full-text. I hope some of this information helps.

Thanks,
Michelle

DISCLAIMER

This information is provided as a service by the Saskatchewan Health Authority and University of Saskatchewan Libraries. Professional librarians conduct searches of the literature. Results are subject to the limitations of the databases and the specificity, broadness and appropriateness of the search parameters presented by the requester. The Libraries do not represent in any matter that retrieved citations are complete, accurate or otherwise to be relied upon. The search results are only valid as of the date and time at which the search is conducted. The Libraries do not accept responsibility for any loss or damage arising from the use of, or reliance on, search results.

SEARCH RESULTS

To obtain the full-text articles or to request offsite access, email library@saskhealthauthority.ca.

SUMMARIES, GUIDELINES & OTHER RESOURCES

RNAO, OMA & AdvantAge Ontario. Suggestions and Strategies for Isolating Residents in LTC during COVID [Updated April 2, 2020]

[https://rnao.ca/sites/rnao-ca/files/Considerations for Isolating Residents of LTC Covid 19 FINAL April 1 2020 2.pdf](https://rnao.ca/sites/rnao-ca/files/Considerations_for_Isolating_Residents_of_LTC_Covid_19_FINAL_April_1_2020_2.pdf)

- Recommendations on space, staffing, infection control

Health Canada. Infection Prevention and Control for COVID-19: Interim Guidance for Long Term Care Homes

<https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevent-control-covid-19-long-term-care-homes.html#a5>

- Describes general strategies for infection control and isolating in place

ARTICLES FROM THE LIBRARY DATABASES

Note: References are sorted by year (newest to oldest)

1. Ashurst A. How to maintain a safe care home environment. Nursing and Residential Care. 2020;22(4):1-2. DOI: 10.12968/nrec.2020.22.4.7

ABSTRACT: In the wake of the outbreak of the coronavirus, infection control must be a priority, especially in care environments where older vulnerable people are living. Adrian Ashurst discusses how to ensure residents and staff remain safe and healthy by implementing and maintaining an excellent infection control process

DOI: 10.12968/nrec.2020.22.4.7

2. Dosa D, Jump RLP, LaPlante K, et al. Long-Term Care Facilities and the Coronavirus Epidemic: Practical Guidelines for a Population at Highest Risk. J Am Med Dir Assoc. 2020;21(5):569-71. DOI: 10.1016/j.jamda.2020.03.004

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32179000>

DOI: 10.1016/j.jamda.2020.03.004

3. Gardner W, States D, Bagley N. The Coronavirus and the Risks to the Elderly in Long-Term Care. J Aging Soc Policy. 2020:1-6. DOI: 10.1080/08959420.2020.1750543

ABSTRACT: The elderly in long-term care (LTC) and their caregiving staff are at elevated risk from COVID-19. Outbreaks in LTC facilities can threaten the health care system. COVID-19 suppression should focus on testing and infection control at LTC facilities. Policies should also be developed to ensure that LTC facilities remain adequately staffed and that infection control protocols are closely followed. Family will not be able to visit LTC facilities, increasing isolation and vulnerability to abuse and neglect. To protect residents and staff, supervision of LTC facilities should remain a priority during the pandemic.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32245346>

DOI: 10.1080/08959420.2020.1750543

4. Kimball A, Hatfield KM, Arons M, et al. Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility - King County, Washington, March 2020. MMWR Morb Mortal Wkly Rep. 2020;69(13):377-81. DOI: 10.15585/mmwr.mm6913e1

ABSTRACT: Older adults are susceptible to severe coronavirus disease 2019 (COVID-19) outcomes as a consequence of their age and, in some cases, underlying health conditions (1). A COVID-19 outbreak in a long-term care skilled nursing facility (SNF) in King County, Washington that was first identified on February 28, 2020, highlighted the potential for rapid spread among residents of these types of facilities (2). On March 1, a health care provider at a second long-term care skilled nursing facility (facility A) in King County, Washington, had a positive test result for SARS-CoV-2, the novel coronavirus that causes COVID-19,

after working while symptomatic on February 26 and 28. By March 6, seven residents of this second facility were symptomatic and had positive test results for SARS-CoV-2. On March 13, CDC performed symptom assessments and SARS-CoV-2 testing for 76 (93%) of the 82 facility A residents to evaluate the utility of symptom screening for identification of COVID-19 in SNF residents. Residents were categorized as asymptomatic or symptomatic at the time of testing, based on the absence or presence of fever, cough, shortness of breath, or other symptoms on the day of testing or during the preceding 14 days. Among 23 (30%) residents with positive test results, 10 (43%) had symptoms on the date of testing, and 13 (57%) were asymptomatic. Seven days after testing, 10 of these 13 previously asymptomatic residents had developed symptoms and were recategorized as presymptomatic at the time of testing. The reverse transcription-polymerase chain reaction (RT-PCR) testing cycle threshold (Ct) values indicated large quantities of viral RNA in asymptomatic, presymptomatic, and symptomatic residents, suggesting the potential for transmission regardless of symptoms. Symptom-based screening in SNFs could fail to identify approximately half of residents with COVID-19. Long-term care facilities should take proactive steps to prevent introduction of SARS-CoV-2 (3). Once a confirmed case is identified in an SNF, all residents should be placed on isolation precautions if possible (3), with considerations for extended use or reuse of personal protective equipment (PPE) as needed (4).

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32240128>

DOI: 10.15585/mmwr.mm6913e1

5. Lee MH, Lee GA, Lee SH, et al. A systematic review on the causes of the transmission and control measures of outbreaks in long-term care facilities: Back to basics of infection control. PLoS One. 2020;15(3):e0229911. DOI: 10.1371/journal.pone.0229911

ABSTRACT: BACKGROUND: The unique characteristics of long-term care facilities (LTCFs) including host factors and living conditions contribute to the spread of contagious pathogens. Control measures are essential to interrupt the transmission and to manage outbreaks effectively. AIM: The aim of this systematic review was to verify the causes and problems contributing to transmission and to identify control measures during outbreaks in LTCFs. METHODS: Four electronic databases were searched for articles published from 2007 to 2018. Articles written in English reporting outbreaks in LTCFs were included. The quality of the studies was assessed using the risk-of-bias assessment tool for nonrandomized studies. FINDINGS: A total of 37 studies were included in the qualitative synthesis. The most commonly reported single pathogen was influenza virus, followed by group A streptococcus (GAS). Of the studies that identified the cause, about half of them noted outbreaks transmitted via person-to-person. Suboptimal infection control practice including inadequate decontamination and poor hand hygiene was the most frequently raised issue propagating transmission. Especially, lapses in specific care procedures were linked with outbreaks of GAS and hepatitis B and C viruses. About 60% of the included studies reported affected cases among staff, but only a few studies implemented work restriction during outbreaks. CONCLUSIONS: This review indicates that the violation of basic infection control practice could be a major role in introducing and facilitating the spread of contagious diseases in LTCFs. It shows the need to promote compliance with basic practices of infection control to prevent outbreaks in LTCFs.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32155208>

DOI: 10.1371/journal.pone.0229911

6. McMichael TM, Currie DW, Clark S, et al. Epidemiology of Covid-19 in a Long-Term Care Facility in King County, Washington. N Engl J Med. 2020;27. DOI: 10.1056/NEJMoa2005412

ABSTRACT: BACKGROUND: Long-term care facilities are high-risk settings for severe outcomes from outbreaks of Covid-19, owing to both the advanced age and frequent chronic underlying health conditions of the residents and the movement of health care personnel among facilities in a region. METHODS: After identification on February 28, 2020, of a confirmed case of Covid-19 in a skilled nursing facility in King County, Washington, Public Health-Seattle and King County, aided by the Centers for Disease Control and Prevention, launched a case investigation, contact tracing, quarantine of exposed persons, isolation of confirmed and suspected cases, and on-site enhancement of infection prevention and control. RESULTS: As of March 18, a total of 167 confirmed cases of Covid-19 affecting 101 residents, 50 health care personnel, and 16 visitors were found to be epidemiologically linked to the facility. Most cases among residents included respiratory illness consistent with Covid-19; however, in 7 residents no symptoms were documented. Hospitalization rates for facility residents, visitors, and staff were 54.5%, 50.0%, and 6.0%, respectively. The case fatality rate for residents was 33.7% (34 of 101). As of March 18, a total of 30 long-term care facilities with at least one confirmed case of Covid-19 had been identified in King County. CONCLUSIONS: In the context of rapidly escalating Covid-19 outbreaks, proactive steps by long-term care facilities to identify and exclude potentially infected staff and visitors, actively monitor for potentially infected patients, and implement appropriate infection prevention and control measures are needed to prevent the introduction of Covid-19.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32220208>

DOI: 10.1056/NEJMoa2005412

7. Ouslander JG. Coronavirus Disease19 in Geriatrics and Long-Term Care: An Update. J Am Geriatr Soc. 2020;03:03.

DOI: 10.1111/jgs.16464

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32243567>

DOI: 10.1111/jgs.16464

8. Rios P, Radhakrishnan A, Thomas SM, et al. Guidelines for preventing respiratory illness in older adults aged 60 years and above living in long-term care: A rapid review of clinical practice guidelines. medRxiv. 2020:2020.03.19.20039180. DOI: 10.1101/2020.03.19.20039180

ABSTRACT: Background: The overall objective of this rapid review was to identify infection protection and control recommendations from published clinical practice guidelines (CPGs) for adults aged 60 years and older in long-term care settings. Methods: Comprehensive searches in MEDLINE, EMBASE, the Cochrane Library, and relevant CPG publishers/repositories were carried out in early March 2020. Title/abstract and full-text screening, data abstraction, and quality appraisal (AGREE-II) were carried out by single reviewers. Results: A total of 17 relevant CPGs were identified, published in the USA (n=8), Canada (n=6), Australia (n=2), and the United Kingdom (n=1). All of the CPGs dealt with infection control in long-term care facilities (LTCF) and addressed various types of viral respiratory infections (e.g., influenza, COVID-19, severe acute respiratory syndrome). Ten or more CPGs recommended the following infection control measures in LTCF: hand hygiene (n=13), wearing personal protective equipment (n=13), social distancing or isolation (n=13), disinfecting surfaces (n=12), droplet precautions (n=12), surveillance and evaluation (n=11), and using diagnostic testing to confirm illness (n=10). While only two or more CPGs recommended these infection control measures: policies and procedures for visitors, staff and/or residents (n=9), respiratory hygiene/cough etiquette (n=9), providing supplies (n=9), staff and/or residents education (n=8), increasing communication (n=6), consulting or notifying health professionals (n=6), appropriate ventilation practices (n=2), and cohorting equipment (n=2). Ten CPGs also addressed management of viral respiratory infections in LTCF and recommended antiviral chemoprophylaxis (n=10) and one CPG recommended early mobilization of residents. Conclusion: The recommendations from current guidelines overall seem to support environmental measures for infection prevention and antiviral chemoprophylaxis for infection management as the most appropriate first-line response to viral respiratory illness in long-term care. Competing Interest Statement The authors have declared no competing interest. Funding Statement This work was funded by the Canadian Institutes of Health Research (CIHR) through the Strategy for Patient Oriented Research (SPOR) Evidence Alliance. Author Declarations All relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript. Yes All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived. Yes I understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance). Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable. Yes All datasets supporting the conclusions of this article are included within the article.

URL: <http://medrxiv.org/content/early/2020/03/27/2020.03.19.20039180.abstract>

DOI: 10.1101/2020.03.19.20039180

9. Rios P, Radhakrishnan A, Thomas SM, et al. Preventing respiratory illness in older adults aged 60 years and above living in long-term care: A rapid overview of reviews. medRxiv. 2020:2020.03.19.20039081. DOI: 10.1101/2020.03.19.20039081

ABSTRACT: Background: The overall objective of this rapid overview of reviews (overview hereafter) was to identify evidence from systematic reviews (SRs) for infection control and prevention practices for adults aged 60 years and older in long-term care settings. Methods: Comprehensive searches in MEDLINE, EMBASE, the Cochrane Library, bioRxiv.org/medRxiv.org, clinicaltrials.gov and the Global Infectious Disease Epidemiology Network (GIDEON) were carried out in early March 2020. Title/abstract and full-text screening, data abstraction, and quality appraisal (AMSTAR 2) were carried out by single reviewers. Results: A total of 6 SRs published between 1999 and 2018 were identified and included in the overview. The SRs included between 1 and 37 primary studies representing between 140 to 908 patients. All of the primary studies included in the SRs were carried out in long-term care facilities (LTCF) and examined pharmacological, non-pharmacological, or combined interventions. One high quality SR found mixed results for the effectiveness of hand hygiene to prevent infection (2 studies statistically significant positive results, 1 study non-statistically significant results). One moderate quality SR with meta-analysis found a moderate non-statistically significant effect for personal protective equipment (PPE) in preventing infection and found no statistically significant results for the effectiveness of social isolation. One moderate quality SR reported statistically significant evidence for the effectiveness of amantadine and amantadine + PPE to prevent infection with respiratory illness in LTCF. Conclusion: The current evidence suggests that with antiviral chemoprophylaxis with adamantane is effective in managing

respiratory illness in residents of long-term care facilities. The rest of the strategies can be used in long-term care facilities, yet have limited evidence supporting their use from systematic reviews. Competing Interest Statement The authors have declared no competing interest. Funding Statement This work was funded by the Canadian Institutes of Health Research (CIHR) through the Strategy for Patient Oriented Research (SPOR) Evidence Alliance Author Declarations All relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript. Yes All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived. Yes I understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance). Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable. Yes All datasets supporting the conclusions of this article are included within the article

URL: <http://medrxiv.org/content/early/2020/03/27/2020.03.19.20039081.abstract>

DOI: 10.1101/2020.03.19.20039081

10. Roxby AC, Greninger AL, Hatfield KM, et al. Detection of SARS-CoV-2 Among Residents and Staff Members of an Independent and Assisted Living Community for Older Adults - Seattle, Washington, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(14):416-8. DOI: 10.15585/mmwr.mm6914e2

ABSTRACT: In the Seattle, Washington metropolitan area, where the first case of novel coronavirus 2019 disease (COVID-19) in the United States was reported (1), a community-level outbreak is ongoing with evidence of rapid spread and high morbidity and mortality among older adults in long-term care skilled nursing facilities (SNFs) (2,3). However, COVID-19 morbidity among residents of senior independent and assisted living communities, in which residents do not live as closely together as do residents in SNFs and do not require skilled nursing services, has not been described. During March 5-9, 2020, two residents of a senior independent and assisted living community in Seattle (facility 1) were hospitalized with confirmed COVID-19 infection; on March 6, social distancing and other preventive measures were implemented in the community. UW Medicine (the health system linked to the University of Washington), Public Health - Seattle & King County, and CDC conducted an investigation at the facility. On March 10, all residents and staff members at facility 1 were tested for SARS-CoV-2, the virus that causes COVID-19, and asked to complete a questionnaire about their symptoms; all residents were tested again 7 days later. Among 142 residents and staff members tested during the initial phase, three of 80 residents (3.8%) and two of 62 staff members (3.2%) had positive test results. The three residents had no symptoms at the time of testing, although one reported an earlier cough that had resolved. A fourth resident, who had negative test results in the initial phase, had positive test results 7 days later. This resident was asymptomatic on both days. Possible explanations for so few cases of COVID-19 in this residential community compared with those in several Seattle SNFs with high morbidity and mortality include more social distancing among residents and less contact with health care providers. In addition, early implementation of stringent isolation and protective measures after identification of two COVID-19 cases might have been effective in minimizing spread of the virus in this type of setting. When investigating a potential outbreak of COVID-19 in senior independent and assisted living communities, symptom screening is unlikely to be sufficient to identify all persons infected with SARS-CoV-2. Adherence to CDC guidance to prevent COVID-19 transmission in senior independent and assisted living communities (4) could be instrumental in preventing a facility outbreak.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32271726>

DOI: 10.15585/mmwr.mm6914e2

11. Yen MY, Schwartz J, King CC, et al. Recommendations for protecting against and mitigating the COVID-19 pandemic in long-term care facilities. J Microbiol Immunol Infect. 2020;10:10. DOI: 10.1016/j.jmii.2020.04.003

ABSTRACT: The COVID-19 outbreak has drawn heightened attention from public health scholars researching ways to limit its spread. Much of the research has been focused on minimizing transmission in hospitals and in the general community. However, a particularly vulnerable community that has received relatively little attention is elders residing in long-term care facilities (LTCFs). In this article we address this relative lack of attention, arguing that enhanced traffic control bundling (eTCB) can and should be adopted and implemented as a means of protecting LTCF residents and staff. Enhanced TCB has been widely applied in hospital settings and has proven effective at limiting droplet and fomite transmissions both within hospitals and between hospitals and the general community. By effectively adapting eTCB to LTCF conditions, particularly by incorporating compartmentalization within zones plus active surveillance, COVID-19 transmission into and throughout LTCFs can be minimized, thereby saving numerous lives among an especially vulnerable population.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/32303480>

DOI: 10.1016/j.jmii.2020.04.003

12. Zerbib S, Vallet L, Muggeo A, et al. Copper for the Prevention of Outbreaks of Health Care-Associated Infections in a Long-term Care Facility for Older Adults. J Am Med Dir Assoc. 2020;21(1):68-71 e1. DOI: 10.1016/j.jamda.2019.02.003

ABSTRACT: OBJECTIVE: We aimed to study the efficacy of copper as an antimicrobial agent by comparing incidence rates during outbreaks in areas equipped vs not equipped with copper surfaces in a long-term facility for dependent older adults (nursing home). DESIGN: Prospective observational pilot study in a nursing home. SETTING AND PARTICIPANT: All persons resident in the nursing home belonging to Reims University Hospital, from February 1, 2015 to June 30, 2016, were included. METHODS: Incidence rates for health care-related infections during outbreaks occurring during the study period were compared between the wing that was equipped and the wing that was not equipped with copper surfaces. Results are expressed as relative risks (RRs) and 95% confidence intervals (95% CIs). RESULTS: During the study period, 556 residents were included; average age was 85.4 +/- 9.2 years, and 76% were women. Four outbreaks occurred during the study period: 1 influenza, 1 keratoconjunctivitis, and 2 gastroenteritis outbreaks. The risk of hand-transmitted health care-associated infection was significantly lower in the area equipped with copper surfaces (RR 0.3, 95% CI 0.1-0.5). CONCLUSIONS AND IMPLICATIONS: In our study, copper was shown to reduce the incidence of hand-transmitted health care-associated infections and could represent a relatively simple measure to help prevent HAIs in nursing homes.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/30954421>

DOI: 10.1016/j.jamda.2019.02.003

13. Huhtinen E, Quinn E, Hess I, et al. Understanding barriers to effective management of influenza outbreaks by residential aged care facilities. Australas J Ageing. 2019;38(1):60-3. DOI: 10.1111/ajag.12595

ABSTRACT: OBJECTIVE: To identify the perceived barriers to the implementation of the Australian national guidelines on influenza outbreak management with Sydney Local Health District (SLHD) residential aged care facility (RACF) staff. METHODS: All SLHD RACFs were invited to participate in a telephone interview. The questionnaire collected information about demographic characteristics and participants' level of agreement with statements regarding perceived barriers to implementing the national guidelines for influenza outbreak management. RESULTS: Twenty-eight of 61 RACFs (46%) participated in the study. The three most common barriers identified were as follows: scepticism towards staff influenza vaccination (n = 13, 46%); the effort required to read the national guidelines (n = 11, 39%); and lack of infrastructure to physically separate residents during an outbreak (n = 10, 36%). CONCLUSIONS: We recommend implementing and evaluating programmes which address misconceptions about influenza vaccination amongst RACF staff. Further, all RACF staff, including care staff, should receive targeted education on the role of infection control in influenza outbreak management.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/30537166>

DOI: 10.1111/ajag.12595

14. Ki HK, Han SK, Son JS, et al. Risk of transmission via medical employees and importance of routine infection-prevention policy in a nosocomial outbreak of Middle East respiratory syndrome (MERS): a descriptive analysis from a tertiary care hospital in South Korea. BMC Pulm Med. 2019;19(1):190. DOI: 10.1186/s12890-019-0940-5

ABSTRACT: BACKGROUND: In 2015, South Korea experienced an outbreak of Middle East respiratory syndrome (MERS), and our hospital experienced a nosocomial MERS infection. We performed a comprehensive analysis to identify the MERS transmission route and the ability of our routine infection-prevention policy to control this outbreak. METHODS: This is a case-cohort study of retrospectively analysed data from medical charts, closed-circuit television, personal interviews and a national database. We analysed data of people at risk of MERS transmission including 228 in the emergency department (ED) and 218 in general wards (GW). Data of personnel location and movement, personal protection equipment and hand hygiene was recorded. Transmission risk was determined as the extent of exposure to the index patient: 1) high risk: staying within 2 m; 2) intermediate risk: staying in the same room at same time; and 3) low risk: only staying in the same department without contact. RESULTS: The index patient was an old patient admitted to our hospital. 11 transmissions from the index patient were identified; 4 were infected in our hospital. Personnel in the ED exhibited higher rates of compliance with routine infection-prevention methods as observed objectively: 93% wore a surgical mask and 95.6% washed their hands. Only 1.8% of personnel were observed to wear a surgical mask in the GW. ED had a higher percentage of high-risk individuals compared with the GW (14.5% vs. 2.8%), but the attack rate was higher in the GW (16.7%; 1/6) than in the ED (3%; 1/33). There were no transmissions in the intermediate- and low-risk groups in the ED. Otherwise 2 patients were infected in the GW among the low-risk group. MERS were transmitted to them indirectly by staff who cared for the index patient. CONCLUSIONS: Our study provide compelling evidence that routine infection-prevention policies can greatly reduce nosocomial transmission of MERS. Conventional isolation is established mainly from contact tracing of patients during a MERS outbreak. But it should be extended to all people treated by any medical employee who has contact with MERS patients. TRIAL REGISTRATION: NCT02605109, date of registration: 11th November 2015.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/31666061>

DOI: 10.1186/s12890-019-0940-5

15. Hand J, Rose EB, Salinas A, et al. Severe Respiratory Illness Outbreak Associated with Human Coronavirus NL63 in a Long-Term Care Facility. Atlanta, Georgia: Centers for Disease Control & Prevention (CDC); 2018. p. 1964-6.

ABSTRACT: We describe an outbreak of severe respiratory illness associated with human coronavirus NL63 in a long-term care facility in Louisiana in November 2017. Six of 20 case-patients were hospitalized with pneumonia, and 3 of 20 died. Clinicians should consider human coronavirus NL63 for patients in similar settings with respiratory disease.

URL:

DOI: 10.3201/eid2410.180862

16. Kariya N, Sakon N, Komano J, et al. Current prevention and control of health care-associated infections in long-term care facilities for the elderly in Japan. J Infect Chemother. 2018;24(5):347-52. DOI: 10.1016/j.jiac.2017.12.004

ABSTRACT: Residents of long-term care facilities for the elderly are vulnerable to health care-associated infections. However, compared to medical institutions, long-term care facilities for the elderly lag behind in health care-associated infection control and prevention. We conducted an epidemiologic study to clarify the current status of infection control in long-term care facilities for the elderly in Japan. A questionnaire survey on the aspects of infection prevention and control was developed according to SHEA/APIC guidelines and was distributed to 617 long-term care facilities for the elderly in the province of Osaka during November 2016 and January 2017. The response rate was 16.9%. The incidence rates of health care-associated infection outbreaks and residents with health care-associated infections were 23.4 per 100 facility-years and 0.18 per 1,000 resident-days, respectively. Influenza and acute gastroenteritis were reported most frequently. Active surveillance to identify the carrier of multiple drug-resistant organisms was not common. The overall compliance with 21 items selected from the SHEA/APIC guidelines was approximately 79.2%. All facilities had infection control manuals and an assigned infection control professional. The economic burdens of infection control were approximately US\$ 182.6 per resident-year during fiscal year 2015. Importantly, these data implied that physicians and nurses were actively contributed to higher SHEA/APIC guideline compliance rates and the advancement of infection control measures in long-term care facilities for the elderly. Key factors are discussed to further improve the infection control in long-term care facilities for the elderly, particularly from economic and social structural standpoints.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/29336918>

DOI: 10.1016/j.jiac.2017.12.004

17. Lansbury LE, Brown CS, Nguyen-Van-Tam JS. Influenza in long-term care facilities. Influenza Other Respir Viruses. 2017;11(5):356-66. DOI: 10.1111/irv.12464

ABSTRACT: Long-term care facility environments and the vulnerability of their residents provide a setting conducive to the rapid spread of influenza virus and other respiratory pathogens. Infections may be introduced by staff, visitors or new or transferred residents, and outbreaks of influenza in such settings can have devastating consequences for individuals, as well as placing extra strain on health services. As the population ages over the coming decades, increased provision of such facilities seems likely. The need for robust infection prevention and control practices will therefore remain of paramount importance if the impact of outbreaks is to be minimised. In this review, we discuss the nature of the problem of influenza in long-term care facilities, and approaches to preventive and control measures, including vaccination of residents and staff, and the use of antiviral drugs for treatment and prophylaxis, based on currently available evidence.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/28691237>

DOI: 10.1111/irv.12464

18. Lee DT, Yu D, Ip M, et al. Evaluation on the implementation of respiratory protection measures in old age homes. Clinical interventions in aging. 2017;12:1429-38. DOI: 10.2147/CIA.S142522

ABSTRACT: PURPOSE: Old age homes (OAHs) represent a vulnerable community for influenza outbreaks. Effective implementation of respiratory protection measures has been identified as an effective prevention measure to reduce mortality and morbidity caused by such outbreaks. Yet, relatively little is known about this aspect in these homes. This study evaluated the implementation of respiratory protection measures among infection control officers (ICOs) and health care workers (HCWs) in these homes in Hong Kong. PATIENTS AND METHODS: A territory-wide, cross-sectional survey was conducted in 87 OAHs. A total of 87 ICOs and 1,763 HCWs (including nurses, health workers, care workers, allied HCWs and assistants) completed the questionnaires that evaluated the implementation at the organizational level and individual level, respectively. Generalized estimating equations with unstructured working correlation matrix were used to analyze the simultaneous influence of organizational and individual factors on the implementation. RESULTS: At the organizational level, all homes had a policy on respiratory protection and implementation of such measures was generally adequate. Basic resources such as paper

towels/hand dryers and equipment disinfectants, however, were rated as most inadequate by HCWs. Training opportunities were also identified as grossly inadequate. Only less than half of the ICOs and HCWs participated in training on infection control either at the initiation of employment or on a regular basis. Twenty-five percent of HCWs even indicated that they had never participated in any infection control training. At the individual level, hand hygiene, among other protection measures, was found to be less well implemented by HCWs. In terms of the association of various organizational and individual characteristics, private homes and health workers rated significantly higher scores in the implementation of various domains in respiratory protection. CONCLUSION: Addressing the unmet training needs and promoting hand hygiene practice are efforts suggested to further enhance the implementation of respiratory protection measures in OAHs.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/28932109>

DOI: 10.2147/CIA.S142522

19. Lee DT, Yu DS, Ip M, et al. Implementation of respiratory protection measures: Visitors of residential care homes for the elderly. *Am J Infect Control*. 2017;45(2):197-9. DOI: 10.1016/j.ajic.2016.07.022

ABSTRACT: To evaluate the implementation of respiratory protection measures for and by visitors of residential care homes for the elderly in Hong Kong, a territory-wide cross-sectional survey was conducted. A total of 87 infection control officers, 1,763 health care workers, and 520 visitors from 87 homes completed the questionnaires. Rules on respiratory protection for visitors were found to vary across residential care homes for the elderly. Uncooperative visitors and inadequate resources were identified as major barriers in the implementation of such measures for visitors.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/27692788>

DOI: 10.1016/j.ajic.2016.07.022

20. Najafi M, Laskowski M, de Boer PT, et al. The Effect of Individual Movements and Interventions on the Spread of Influenza in Long-Term Care Facilities. *Med Decis Making*. 2017;37(8):871-81. DOI: 10.1177/0272989X17708564

ABSTRACT: BACKGROUND: Nosocomial influenza poses a serious risk among residents of long-term care facilities (LTCFs). OBJECTIVE: We sought to evaluate the effect of resident and staff movements and contact patterns on the outcomes of various intervention strategies for influenza control in an LTCF. METHODS: We collected contact frequency data in Canada's largest veterans' LTCF by enrolling residents and staff into a study that tracked their movements through wireless tags and signal receivers. We analyzed and fitted the data to an agent-based simulation model of influenza infection, and performed Monte-Carlo simulations to evaluate the benefit of antiviral prophylaxis and patient isolation added to standard (baseline) infection control practice (i.e., vaccination of residents and staff, plus antiviral treatment of residents with symptomatic infection). RESULTS: We calibrated the model to attack rates of 20%, 40%, and 60% for the baseline scenario. For data-driven movements, we found that the largest reduction in attack rates (12.5% to 27%; ANOVA $P < 0.001$) was achieved when the baseline strategy was combined with antiviral prophylaxis for all residents for the duration of the outbreak. Isolation of residents with symptomatic infection resulted in little or no effect on the attack rates (2.3% to 4.2%; ANOVA $P > 0.2$) among residents. In contrast, parameterizing the model with random movements yielded different results, suggesting that the highest benefit was achieved through patient isolation (69.6% to 79.6%; ANOVA $P < 0.001$) while the additional benefit of prophylaxis was negligible in reducing the cumulative number of infections. CONCLUSIONS: Our study revealed a highly structured contact and movement patterns within the LTCF. Accounting for this structure instead of assuming randomness in decision analytic methods can result in substantially different predictions.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/28538110>

DOI: 10.1177/0272989X17708564

21. O'Neil CA, Kim L, Prill MM, et al. Preventing Respiratory Viral Transmission in Long-Term Care: Knowledge, Attitudes, and Practices of Healthcare Personnel. *Infect Control Hosp Epidemiol*. 2017;38(12):1449-56. DOI: 10.1017/ice.2017.232

ABSTRACT: OBJECTIVE To examine knowledge and attitudes about influenza vaccination and infection prevention practices among healthcare personnel (HCP) in a long-term-care (LTC) setting. DESIGN Knowledge, attitudes, and practices (KAP) survey. SETTING An LTC facility in St Louis, Missouri. PARTICIPANTS All HCP working at the LTC facility were eligible to participate, regardless of department or position. Of 170 full- and part-time HCP working at the facility, 73 completed the survey, a 42.9% response rate. RESULTS Most HCP agreed that respiratory viral infections were serious and that hand hygiene and face mask use were protective. However, only 46% could describe the correct transmission-based precautions for an influenza patient. Correctly answering infection prevention knowledge questions did not vary by years of experience but did vary for HCP with more direct patient contact versus less patient contact. Furthermore, 42% of respondents reported working while sick, and 56% reported that their coworkers did. In addition, 54% reported that facility policies made staying home while ill difficult. Some respondents expressed concerns about the safety (22%) and effectiveness (27%) of the influenza vaccine, and 28% of respondents stated that they would not get the influenza vaccine if it was not required. CONCLUSIONS This survey of staff in

an LTC facility identified several areas for policy improvement, particularly sick leave, as well as potential targets for interventions to improve infection prevention knowledge and to address HCP concerns about influenza vaccination to improve HCP vaccination rates in LTCs. *Infect Control Hosp Epidemiol* 2017;38:1449-1456.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/29173225>

DOI: 10.1017/ice.2017.232

22. Spires SS, Talbot HK, Pope CA, et al. Paramyxovirus Outbreak in a Long-Term Care Facility: The Challenges of Implementing Infection Control Practices in a Congregate Setting. *Infect Control Hosp Epidemiol.* 2017;38(4):399-404.

DOI: 10.1017/ice.2016.316

ABSTRACT: OBJECTIVE We report an outbreak of respiratory syncytial virus (RSV) and human metapneumovirus (HMPV) infections in a dementia care ward containing 2 separately locked units (A and B) to heighten awareness of these pathogens in the older adult population and highlight some of the infection prevention challenges faced during a noninfluenza respiratory viral outbreak in a congregate setting. METHODS Cases were defined by the presence of new signs or symptoms that included (1) a single oral temperature ≥ 37.8 degrees C (100.0 degrees F) and (2) the presence of at least 2 of the following symptoms: cough, dyspnea, rhinorrhea, hoarseness, congestion, fatigue, and malaise. Attempted infection-control measures included cohorting patients and staff, empiric isolation precautions, and cessation of group activities. Available nasopharyngeal swab specimens were sent to the Tennessee Department of Health for identification by rT-PCR testing. RESULTS We identified 30 of the 41 (73%) residents as cases over this 16-day outbreak. Due to high numbers of sick personnel, we were unable to cohort staff to 1 unit. Unit B developed its first case 8 days after infection control measures were implemented. Of the 14 cases with available specimens, 6 patients tested positive for RSV-B, 7 for HMPV and 1 patient test positive for influenza A. Overall, 15 cases (50%) required transfer to acute care facilities; 10 of these patients (34%) had chest x-ray confirmed pulmonary infiltrates; and 5 residents (17%) died. CONCLUSIONS This case report highlights the importance of RSV and HMPV in causing substantial disease in the older adult population and highlights the challenges in preventing transmission of these viruses. *Infect Control Hosp Epidemiol* 2017;38:399-404.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/28065183>

DOI: 10.1017/ice.2016.316

23. Diaz-Decaro J, Launer B, McKinnell JA, et al. Prevalence of respiratory viruses, including influenza, among nursing home residents and high-touch room surfaces. *Open Forum Infectious Diseases Conference: ID Week.* 2016;3(Supplement 1).

ABSTRACT: Background. Nursing homes (NH) are a unique environment for the spread of respiratory viruses. Outbreaks due to influenza A have been previously reported, but there are few data on viral etiologies in non-outbreak settings. The advent of rapid molecular multiplex methods now provide the ability to understand more about non-outbreak viral respiratory infections in NH residents and the potential of shedding to high-touch surfaces. Methods. Nursing home residents with acute onset respiratory symptoms were identified from 3 Southern California NHs from June-August 2015. Bilateral nares swabs were obtained and 5 high touch room surfaces were sampled: (1) table/bedrails, (2) call button/remote/phones, (3) light switches, (4) bathroom rail/handles, and (5) door/handles. All samples were processed utilizing the FilmArray Respiratory Panel (RP) (Biofire Diagnostics), an FDA-approved automated multiplex nested PCR system. The FilmArray instrument system tests for a standard panel of viruses (influenza A, A/H1N1, H3, and H1-2009), influenza B, RSV, parainfluenza virus 1-4, adenovirus, coronavirus (229E, HKU1, OC43, NL63), human metapneumovirus, and human rhinovirus/enterovirus). Results. A total of 52 residents and 260 environmental surfaces underwent multiplex testing. Among these residents, 19% (10 of 52) had a detectable viral pathogen: parainfluenza-3 (n = 4), rhinovirus/enterovirus (n = 4), RSV (n = 1), and influenza B (n = 1). Environmental contamination was found in 20% (2 of 10) of total room surface swabs (bedrail n = 1, door n = 1). Viral species from environmental swabs were all concordant with positive patient results. Conclusion. In a non-outbreak setting, we identified viral respiratory pathogens in one-fifth of NH residents during the summer. One fifth of high touch room surfaces were contaminated with the same virus, suggesting some environmental contamination. Our findings confirm that viral infections are common with summer respiratory symptoms in NH residents and subsequent environmental contamination may facilitate further spread. Findings may have implications for care of NH residents with respiratory symptoms and environmental cleaning of their rooms.

URL: <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emexa&AN=627784226>

24. French CE, McKenzie BC, Coope C, et al. Risk of nosocomial respiratory syncytial virus infection and effectiveness of control measures to prevent transmission events: a systematic review. *Influenza Other Respir Viruses.* 2016;10(4):268-90. DOI: 10.1111/irv.12379

ABSTRACT: Respiratory syncytial virus (RSV) causes a significant public health burden, and outbreaks among vulnerable patients in hospital settings are of particular concern. We reviewed published and unpublished literature from hospital settings to assess: (i) nosocomial RSV transmission risk (attack rate) during outbreaks, (ii) effectiveness of infection control measures.

We searched the following databases: MEDLINE, EMBASE, CINAHL, Cochrane Library, together with key websites, journals and grey literature, to end of 2012. Risk of bias was assessed using the Cochrane risk of bias tool or Newcastle -Ottawa scale. A narrative synthesis was conducted. Forty studies were included (19 addressing research question one, 21 addressing question two). RSV transmission risk varied by hospital setting; 6-56% (median: 28.5%) in neonatal/paediatric settings (n = 14), 6-12% (median: 7%) in adult haematology and transplant units (n = 3), and 30-32% in other adult settings (n = 2). For question two, most studies (n = 13) employed multi-component interventions (e.g. cohort nursing, personal protective equipment (PPE), isolation), and these were largely reported to be effective in reducing nosocomial transmission. Four studies examined staff PPE; eye protection appeared more effective than gowns and masks. One study reported on RSV prophylaxis for patients (RSV - Ig/palivizumab); there was no statistical evidence of effectiveness although the sample size was small. Overall, risk of bias for included studies tended to be high. We conclude that RSV transmission risk varies widely during hospital outbreaks. Although multi-component control strategies appear broadly successful, further research is required to disaggregate the effectiveness of individual components including the potential role of palivizumab prophylaxis.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/26901358>

DOI: 10.1111/irv.12379

25. Sassi HP, Sifuentes LY, Koenig DW, et al. Control of the spread of viruses in a long-term care facility using hygiene protocols. *Am J Infect Control.* 2015;43(7):702-6. DOI: 10.1016/j.ajic.2015.03.012

ABSTRACT: BACKGROUND: Approximately 50% of norovirus cases in the United States occur in long-term care facilities; many incidences of rotavirus, sapovirus, and adenovirus also occur. The primary objectives of this study were to demonstrate movement of pathogenic viruses through a long-term care facility and to determine the impact of a hygiene intervention on viral transmission. METHODS: The coliphage MS-2 was seeded onto a staff member's hands, and samples were collected after 4 hours from fomites and hands. After 3 consecutive days of sample collection, a 14-day hygiene intervention was implemented. Hand sanitizers, hand and face wipes, antiviral tissues, and a disinfectant spray were distributed to employees and residents. Seeding and sampling were repeated postintervention. RESULTS: Analysis of the pre- and postintervention data was performed using a Wilcoxon signed-rank test. Significant reductions in the spread of MS-2 on hands (P = .0002) and fomites (P = .04) were observed postintervention, with a >99% average reduction of virus recovered from both hands and fomites. CONCLUSION: Although MS-2 spread readily from hands to fomites and vice versa, the intervention reduced average MS-2 concentrations recovered from hands and fomites by up to 4 logs and also reduced the incidence of MS-2 recovery.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/25944726>

DOI: 10.1016/j.ajic.2015.03.012

26. Lum HD, Mody L, Levy CR, et al. Pandemic influenza plans in residential care facilities. *J Am Geriatr Soc.* 2014;62(7):1310-6. DOI: 10.1111/jgs.12879

ABSTRACT: OBJECTIVES: To identify characteristics of residential care facilities (RCFs) associated with having a pandemic influenza plan. DESIGN: Nationally representative, cross-sectional survey. SETTING: RCFs in the United States. PARTICIPANTS: Participating facilities in the 2010 National Survey of RCFs (N = 2,294), representing 31,030 assisted living facilities and personal care homes. MEASUREMENTS: Facility-level characteristics associated with a pandemic influenza plan, including general organization descriptors, staffing, resident services, and immunization practices. RESULTS: Forty-five percent (95% confidence interval (CI) = 43-47%) had a pandemic plan, 14% (95% CI = 13-16%) had a plan in preparation, and 41% (95% CI = 38-43%) had no plan. In the multivariable model, organization characteristics, staffing, and immunization practices were independently associated with the presence of a pandemic preparedness plan. Organization characteristics were larger size (extra large, OR = 3.27, 95% CI = 1.96-5.46; large, OR = 2.60, 95% CI = 1.81-3.75; medium, OR = 1.66, 95% CI = 1.21-2.27 vs small), not-for-profit status (OR = 1.65, 95% CI = 1.31-2.09 vs for profit), and chain affiliation (OR = 1.65, 95% CI = 1.31-2.09 vs nonaffiliated). Staffing characteristics included number of registered nurse hours (<15 minutes, OR = 1.36, 95% CI = 1.07-1.74 vs no hours), any licensed practical nurse hours (OR = 1.47, 95% CI = 1.08-1.99 vs no hours), and at least 75 hours of required training for aides (OR = 1.34, 95% CI = 1.05-1.71 vs <75 hours). RCFs with high staff influenza vaccination rates (81-100%, OR = 2.12, 95% CI = 1.27-3.53 vs 0% vaccinated) were also more likely to have a pandemic plan. CONCLUSION: A majority of RCFs lacked a pandemic influenza plan. These facilities were smaller, for-profit, non-chain-affiliated RCFs and had lower staff vaccination rates. These characteristics may help target facilities that need to develop plans to handle a pandemic, or other disasters.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/24852422>

DOI: 10.1111/jgs.12879

27. Rainwater-Lovett K, Chun K, Lessler J. Influenza outbreak control practices and the effectiveness of interventions in long-term care facilities: a systematic review. *Influenza Other Respir Viruses.* 2014;8(1):74-82. DOI: 10.1111/irv.12203

ABSTRACT: BACKGROUND: Evaluation of influenza control measures frequently focuses on the efficacy of chemoprophylaxis and vaccination, while the effectiveness of non-pharmaceutical interventions (NPI) receives less emphasis. While influenza control measures are frequently reported for individual outbreaks, there have been few efforts to characterize the real-world effectiveness of these interventions across outbreaks. OBJECTIVES: To characterize influenza case and outbreak definitions and control measures reported by long-term care facilities (LTCFs) of elderly adults and estimate the reduction in influenza-like illness (ILI) attack rates due to chemoprophylaxis and NPI. METHODS: We conducted a literature search in PubMed including English-language studies reporting influenza outbreaks among elderly individuals in LTCFs. A Bayesian hierarchical logistic regression model estimated the effects of control measures on ILI attack rates. RESULTS: Of 654 articles identified in the literature review, 37 articles describing 60 influenza outbreaks met the inclusion criteria. Individuals in facilities where chemoprophylaxis was used were significantly less likely to develop influenza A or B than those in facilities with no interventions [odds ratio (OR) 0.48, 95% CI: 0.28, 0.84]. Considered by drug class, adamantanes significantly reduced infection risk (OR 0.22, 95% CI: 0.12, 0.42), while neuraminidase inhibitors did not show a significant effect. Although NPI showed no significant effect, the results suggest that personal protective equipment may produce modest protective effects. CONCLUSIONS: Our results indicate pharmaceutical control measures have the clearest reported protective effect in LTCFs. Non-pharmaceutical approaches may be useful; however, most data were from observational studies and standardized reporting or well-conducted clinical trials of NPI are needed to more precisely measure these effects.
URL: <https://www.ncbi.nlm.nih.gov/pubmed/24373292>
DOI: 10.1111/irv.12203

28. Sze-To GN, Yang Y, Kwan JK, et al. Effects of surface material, ventilation, and human behavior on indirect contact transmission risk of respiratory infection. Risk Anal. 2014;34(5):818-30. DOI: 10.1111/risa.12144

ABSTRACT: Infectious particles can be deposited on surfaces. Susceptible persons who contacted these contaminated surfaces may transfer the pathogens to their mucous membranes via hands, leading to a risk of respiratory infection. The exposure and infection risk contributed by this transmission route depend on indoor surface material, ventilation, and human behavior. In this study, quantitative infection risk assessments were used to compare the significances of these factors. The risks of three pathogens, influenza A virus, respiratory syncytial virus (RSV), and rhinovirus, in an aircraft cabin and in a hospital ward were assessed. Results showed that reducing the contact rate is relatively more effective than increasing the ventilation rate to lower the infection risk. Nonfabric surface materials were found to be much more favorable in the indirect contact transmission for RSV and rhinovirus than fabric surface materials. In the cases considered in this study, halving the ventilation rate and doubling the hand contact rate to surfaces and the hand contact rate to mucous membranes would increase the risk by 3.7-16.2%, 34.4-94.2%, and 24.1-117.7%, respectively. Contacting contaminated nonfabric surfaces may pose an indirect contact risk up to three orders of magnitude higher than that of contacting contaminated fabric surfaces. These findings provide more consideration for infection control and building environmental design.
URL: <https://www.ncbi.nlm.nih.gov/pubmed/24955468>
DOI: 10.1111/risa.12144

29. Jones RM, Adida E. Selecting nonpharmaceutical interventions for influenza. Risk Anal. 2013;33(8):1473-88. DOI: 10.1111/j.1539-6924.2012.01938.x

ABSTRACT: Models of influenza transmission have focused on the ability of vaccination, antiviral therapy, and social distancing strategies to mitigate epidemics. Influenza transmission, however, may also be interrupted by hygiene interventions such as frequent hand washing and wearing masks or respirators. We apply a model of influenza disease transmission that incorporates hygiene and social distancing interventions. The model describes population mixing as a Poisson process, and the probability of infection upon contact between an infectious and susceptible person is parameterized by p . While social distancing interventions modify contact rates in the population, hygiene interventions modify p . Public health decision making involves tradeoffs, and we introduce an objective function that considers the direct costs of interventions and new infections to determine the optimum intervention type (social distancing versus hygiene intervention) and population compliance for epidemic mitigation. Significant simplifications have been made in these models. However, we demonstrate that the method is feasible, provides plausible results, and is sensitive to the selection of model parameters. Specifically, we show that the optimum combination of nonpharmaceutical interventions depends upon the probability of infection, intervention compliance, and duration of infectiousness. Means by which realism can be increased in the method are discussed.
URL: <https://www.ncbi.nlm.nih.gov/pubmed/23231621>
DOI: 10.1111/j.1539-6924.2012.01938.x

30. Chami K, Gavazzi G, Bar-Hen A, et al. A short-term, multicomponent infection control program in nursing homes: a cluster randomized controlled trial. J Am Med Dir Assoc. 2012;13(6):569 e9-17. DOI: 10.1016/j.jamda.2012.04.008

ABSTRACT: OBJECTIVES: To assess the impact of a hygiene-encouragement program on reducing infection rates (primary end point) by 5%. DESIGN: A cluster randomized study was carried out over a 5-month period. SETTINGS AND PARTICIPANTS: Fifty nursing homes (NHs) with 4345 beds in France were randomly assigned by stratified-block randomization to either a multicomponent intervention (25 NHs) or an assessment only (25 NHs). INTERVENTION: The multicomponent intervention was targeted to caregivers and consisted of implementing a bundle of infection prevention consensual measures. Interactive educational meetings using a slideshow were organized at the intervention NHs. The NHs were also provided with color posters emphasizing hand hygiene and a kit that included hygienic products such as alcoholic-based hand sanitizers. Knowledge surveys were performed periodically and served as reminders. MEASUREMENTS: The primary end point was the total infection rate (urinary, respiratory, and gastrointestinal infections) in those infection cases classified either as definite or probable. Analyses corresponded to the underlying design and were performed according to the intention-to-treat principle. This study was registered (#NCT01069497). RESULTS: Forty-seven NHs (4515 residents) were included and followed. The incidence rate of the first episode of infection was 2.11 per 1000 resident-days in the interventional group and 2.15 per 1000 resident-days in the control group; however, the difference between the groups did not reach statistical significance in either the unadjusted (Hazard Ratio [HR] = 1.00 [95% confidence interval (CI) 0.89-1.13]; P = .93) or the adjusted (HR = 0.99 [95% CI 0.87-1.12]; P = .86) analysis. CONCLUSION: Disentangling the impact of this type of intervention involving behavioral change in routine practice in caregivers from the prevailing environmental and contextual determinants is often complicated and confusing to interpret the results.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/22682697>

DOI: 10.1016/j.jamda.2012.04.008

31. Chan TC, Hung IF, Luk JK, et al. Prevention of mortality and pneumonia among nursing home older adults by dual pneumococcal and seasonal influenza vaccination during a pandemic caused by novel pandemic influenza A (H1N1). J Am Med Dir Assoc. 2012;13(8):698-703. DOI: 10.1016/j.jamda.2012.05.009

ABSTRACT: OBJECTIVE: To evaluate the efficacy of dual vaccination of seasonal influenza and pneumococcus in nursing home older adults during a novel pandemic of influenza A (H1N1). SETTING: Nine nursing homes in Hong Kong. PARTICIPANTS: A total of 532 nursing home older adults were included in the study. MEASUREMENTS: Efficacy of dual vaccination of seasonal influenza and pneumococcus in nursing home older adults during a novel pandemic influenza A (H1N1). DESIGN: A prospective 12-month cohort study was conducted on older residents from December 2009 to November 2010. Participants were divided into 3 groups according to their choice of vaccination: received both seasonal influenza and 23-valent pneumococcal polysaccharide vaccine (PPV-TIV group), received seasonal influenza vaccine alone (TIV group), and those who refused both vaccinations (unvaccinated group). Those who had received vaccination for influenza A (H1N1) were excluded. Outcome measures included mortality from all causes, pneumonia, and vascular causes. RESULTS: There were 246 in the PPV-TIV group, 211 in the TIV group, and 75 in the unvaccinated group. Baseline characteristics were similar among the groups. The 12-month mortality rates of the PPV-TIV, TIV alone group, and unvaccinated group were 17.1%, 27.0%, and 37.3% respectively (P < .001). Multivariate analysis demonstrated that, compared with vaccination of seasonal influenza alone, dual vaccination significantly reduced all-cause mortality (hazard ratio [HR] 0.54; 95% confidence interval [CI]: 0.35-0.84; P < .01), mortality from pneumonia (HR 0.60; 95% CI: 0.35-0.99; P < .05), and mortality from vascular causes (HR 0.24; 95% CI: 0.09-0.64; P < .01). CONCLUSIONS: During an influenza pandemic or when the circulating influenza strain was not matched by the trivalent seasonal influenza vaccine, dual vaccination of influenza and pneumococcus provided additional protection to nursing home older adults in reducing mortality.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/22722051>

DOI: 10.1016/j.jamda.2012.05.009

32. Hutt E, Ruscini JM, Linnebur SA, et al. A multifaceted intervention to implement guidelines did not affect hospitalization rates for nursing home-acquired pneumonia. J Am Med Dir Assoc. 2011;12(7):499-507. DOI: 10.1016/j.jamda.2010.03.011

ABSTRACT: OBJECTIVE: Determine whether a comprehensive approach to implementing national consensus guidelines for nursing home-acquired pneumonia (NHAP) affected hospitalization rates. DESIGN: Quasi-experimental, mixed-methods, multifaceted, unblinded intervention trial. SETTING: Sixteen nursing homes (NHs) from 1 corporation: 8 in metropolitan Denver, CO; 8 in Kansas and Missouri during 3 influenza seasons, October to April 2004 to 2007. PARTICIPANTS: Residents with 2 or more signs and symptoms of systemic lower respiratory tract infection (LRTI); NH staff and physicians were eligible. INTERVENTION: Multifaceted, including academic detailing to clinicians, within-facility nurse change agent, financial incentives, and nursing education. MEASUREMENTS: Subjects' NH medical records were reviewed for resident characteristics, disease severity, and care processes. Bivariate analysis compared hospitalization rates for subjects with stable and unstable vital signs between intervention and control NHs and time periods. Qualitative interviews were analyzed using content coding. RESULTS: Hospitalization rates for stable residents in both NH groups remained low throughout the study. Few critically ill subjects in the

intervention NHs were hospitalized in either the baseline or intervention period. In control NHs, 8.7% of subjects with unstable vital signs were hospitalized during the baseline and 33% in intervention year 2, but the difference was not statistically significant ($P = .10$). Interviews with nursing staff and leadership confirmed there were significant pressures for, and enablers of, avoiding hospitalization for treatment of acute infections. CONCLUSIONS: Secular pressures to avoid hospitalization and the challenges of reaching NH physicians via academic detailing are likely responsible for the lack of intervention effect on hospitalization rates for critically ill NH residents.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/21450174>

DOI: 10.1016/j.jamda.2010.03.011

33. Khandaker G, Doyle B, Dwyer DE, et al. Managing outbreaks of viral respiratory infection in aged care facilities - challenges and difficulties during the first pandemic wave. Med J Aust. 2010;192(12):722.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/20565356>

34. Schandel JM, Thomas KS. Project: Clean sweep reducing healthcare-associated infections, employee absenteeism, healthcare cost and hospital readmissions in a long term care facility. American Journal of Infection Control. 2010;38(5):E71-E2.

ABSTRACT: Issue: The reemergence of the H1N1 virus, and the continued concern of a seasonal influenza on the high risk resident population, prompted a close review of the current practices focusing on hand hygiene and environmental cleaning/disinfection in our long term care facility. The facility has 137 beds with a variety of acuity levels. Two thirds of the beds are dedicated for skilled and sub acute nursing services. The resident services offered include acute and chronic ventilator management, advanced wound care, post surgical care, as well as comprehensive rehabilitation. Project: An interdisciplinary team was formed to identify opportunities for improvement in the areas of education, product accessibility, and staff, resident and public involvement. A lack of convenient accessibility for both surface and hand germicidal products was identified. Surface and hand hygiene wipes were trialed for 2 months. Education on the products was provided by the vendor to all staff. Public and resident education was provided by facility educators. Surface and hand hygiene wipes were installed throughout the facility in floor stands and wall brackets. They were strategically placed on medication, treatment, and housekeeping carts, as well as in nursing stations, dining, therapy and activity areas, and all public lounge areas. Standard protocols for the use of both surface and hand hygiene wipes were implemented. The initial goal of the project was to decrease the risk of transmission of Influenza, and to reduce the risk of an outbreak that would impact the quality of life for our residents. Pilot results demonstrated an even greater impact than anticipated, which led to the program being permanently adopted in August 2009. Result(s): The implementation of this program has contributed to reductions in healthcare associated infections, hospital admissions due to an infectious process, the costs associated with antibiotic use and employee absenteeism. (Table presented) Lessons Learned: Breaking the chain of transmission continues to be the foundation our infection control program. Product quality, as well as accessibility and user education, are the key components responsible for the success of our Clean Sweep Program.

URL: <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed11&AN=70169190>

35. Utsumi M, Makimoto K, Quroshi N, et al. Types of infectious outbreaks and their impact in elderly care facilities: a review of the literature. Age Ageing. 2010;39(3):299-305. DOI: 10.1093/ageing/afq029

ABSTRACT: BACKGROUND: infectious outbreaks in long-term care facilities (LTCFs) tend to have a significant impact on infection rates and mortality rates of the residents. OBJECTIVES: this review aimed to update the information on pathogens identified in such outbreaks and to try to explore indicators that reflect the impact of outbreaks among residents and health care workers (HCWs). METHODS: MEDLINE (1966-2008) was used to identify outbreaks using the following thesaurus terms: 'Cross-Infection', 'Disease Outbreaks', 'Urinary-Tract Infections' and 'Blood-Borne Pathogens'. Elderly care facilities were identified with the following thesaurus terms: 'Long-Term Care', 'Assisted-Living Facilities', 'Homes for the Aged' and 'Nursing Homes'. Age category was limited using 'Aged'. RESULTS: thirty-seven pathogens were associated with 206 outbreaks. The largest number of reported outbreaks by a single pathogen involved the influenza virus, followed by noroviruses. Among residents, the highest median attack rate for respiratory infection outbreaks was caused by Chlamydia pneumoniae (46%), followed by respiratory syncytial virus (40%). In gastrointestinal tract infection outbreaks, high median attack rates were caused by Clostridium perfringens (48%) and noroviruses (45%). Outbreaks with high median case fatality rates were caused by Group A Streptococci (50%) and Streptococcus pneumoniae (44%). High median attack rates for HCWs were caused by C. pneumoniae (41%), noroviruses (42%) and scabies (36%). CONCLUSION: a variety of infectious agents were identified as the cause of outbreaks in the elderly and HCWs in LTCFs. Attack rates and case fatality rates are useful indicators for setting priorities for education and prevention of the outbreaks.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/20332371>

DOI: 10.1093/ageing/afq029

36. Pierce Jr JR, Kellie SM, West TA, et al. Top ten list of long-term care facility preparations for the upcoming influenza seasons. Journal of the American Geriatrics Society. 2009;57(12):2318-23.

ABSTRACT: A novel influenza A partly of virus of swine origin (2009 H1N1) emerged this spring, resulting in an influenza pandemic. This pandemic is anticipated to continue into the next influenza season. Given that the 2009 H1N1 and seasonal influenza A appear to be somewhat different in the human populations affected and that two influenza vaccines will be recommended this fall, those who manage long-term care facilities and treat patients in them will be faced with many uncertainties as they approach the 2009/10 influenza season. Ten specific suggestions are offered to those responsible for the care of patients in long-term care facilities regarding the upcoming influenza season. These practical suggestions are the clinical opinions of the authors and do not represent official recommendations of the American Geriatrics Society or any agency. © 2009, The American Geriatrics Society.

URL: <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed11&AN=355759214>

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ABSTRACT: Standard and Droplet Precautions are considered adequate to control the transmission of influenza in most health care situations. Vaccination of health care staff, carers and vulnerable patients against seasonal and, eventually, pandemic influenza strains is an essential protective strategy. Management principles include: performance of hand hygiene before and after every patient contact or contact with the patient environment, in accord with the national 5 Moments for Hand Hygiene Standard; disinfection of the patient environment; early identification and isolation of patients with suspected or proven influenza; adoption of a greater minimum distance of patient separation (2 metres) than previously recommended; use of a surgical mask and eye protection for personal protection on entry to infectious areas or within 2 metres of an infectious patient; contact tracing for patient and health care staff and restriction of prophylactic antivirals mainly to those at high risk of severe disease; in high aerosol-risk settings, use of particulate mask, eye protection, impervious long-sleeved gown, and gloves donned in that sequence and removed in reverse sequence, avoiding self-contamination; exclusion of symptomatic staff from the workplace until criteria for non-infectious status are met; reserving negative-pressure ventilation rooms (if available) for intensive care patients, especially those receiving non-invasive ventilation; ensuring that infectious postpartum women wear surgical masks when caring for their newborn infants and practise strict hand hygiene; and implementation of special arrangements for potentially infected newborns who require nursery or intensive care.

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ABSTRACT: BACKGROUND: Residents in long-term care facilities (LTCFs) are at considerable risk for developing infections. This is the first comprehensive examination of infection control programs in Canadian LTCFs in almost 20 years. METHODS: A survey designed to assess resident and LTCF characteristics; personnel, laboratory, computer, and reference resources; and surveillance and control activities of infection prevention and control programs was sent in 2005 to all eligible LTCFs across Canada. RESULTS: One third of LTCFs (34%, 488/1458) responded. Eighty-seven percent of LTCFs had infection control committees. Most LTCFs (91%) had 24-hour care by registered nurses, and 84% had on-site infection control staff. The mean number of full-time equivalent infection control professionals (ICPs) per 250 beds was 0.6 (standard deviation [SD], 1.0). Only 8% of ICPs were certified by the Certification Board of Infection Control and Epidemiology. Only one fifth of LTCFs had physicians or doctoral level professionals providing service to the infection control program. The median surveillance index score was 63 out of a possible 100, and the median control index score was 79 of 100. Influenza vaccinations were received by 93.0% (SD, 11.3) of residents in 2004. CONCLUSION: To bring infection control programs in Canadian LTCFs up to expert suggested resource and intensity levels will necessitate considerable investment. More and better trained ICPs are essential to providing effective infection prevention and control programs in LTCFs and protecting vulnerable residents from preventable infections.

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ABSTRACT: Influenza outbreaks occasionally occur in nursing homes (NHs) despite vaccination, but occurrence during summer is a rare event. We describe an influenza outbreak during a heatwave in 2005, and discuss the usefulness of rapid diagnosis in facilitating early intervention as well as appropriate infection control measures. An outbreak was observed in a single NH with 81 residents (mean age 88 years) and 48 healthcare workers (HCWs) and lasted seven days. Fever, cough and wheezing were reported as the main symptoms in 32 affected residents (39.5%) and 6 (12.5%) HCWs. Influenza was suspected and provisionally confirmed by a rapid diagnostic test performed on specimens from four patients. The outbreak was further confirmed by culture and reverse transcriptase-polymerase chain reaction in seven out of 10 residents. The strain was similar to the winter epidemic strain of the 2004-2005 season: H3N2A/New York/55/2004. As soon as the outbreak was confirmed, a crisis management team was set up with representatives of the local health authority and NH staff. A package of measures was implemented to control the outbreak, including patient isolation and the wearing of surgical masks by all residents and staff. A therapeutic course of oseltamivir was prescribed to 19/32 symptomatic patients and to 5/6 HCWs, and 47 residents and 42 remaining HCWs received a prophylactic post-exposure regimen. The outbreak ended within 48 h. Case fatality rate was 15.6% among residents. Pre-outbreak influenza vaccine coverage among the residents was 93.5% and 41.7% in HCWs. The rapid diagnostic test enabled prompt action to be taken, which facilitated infection control measures.

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ABSTRACT: BACKGROUND: Nursing home (NH)-acquired pneumonia (NHAP) causes excessive mortality, hospitalization, and functional decline, partly because many NH residents do not receive appropriate care. Care structures like nurse/resident staffing ratios can impede or abet quality care. This study examines the relationship between nurse/resident staffing ratios, turnover, and adherence to evidence-based guidelines for treating NHAP. METHODS: A prospective, chart-review study was conducted among residents of 16 NHs in three states with ≥ 2 signs and symptoms of NHAP during the 2004--2005 influenza season. NH medical records were reviewed concurrently for functional status, comorbidity, NHAP severity, and guideline adherence. Ratio of licensed nurse and Certified Nursing Assistant (CNA) hours per resident per day (hrpd) and ratio of newly hired nursing staff/year to current nursing staff were provided by Directors of Nursing. Associations among guideline adherence, nurse and CNA hrpd, and turnover were assessed using multiple regression to adjust for case mix, facility characteristics, and clustering of residents in facilities. RESULTS: Mid (1.7-2.0) and high (> 2.0) CNA hrpd were significantly associated with better pneumococcal and influenza vaccination rates. More than 1.2 licensed nurse hrpd was significantly associated with appropriate hospitalization (odds ratio [OR] 12.4; 95% confidence interval [CI], 3.5-43.8) and guideline-recommended antibiotics (OR 3.8; 95% CI, 1.7-8.7). A $> 70\%$ turnover was inversely related to timely physician notification (OR 0.4; 95% CI, 0.2-0.7) and appropriate hospitalization (OR 0.09; 95% CI, 0.05-0.26). CONCLUSIONS: NHAP treatment guideline adherence is associated with nurse and CNA hrpd and stability. An NH's ability to implement evidence-based care may depend on adequate staffing ratios and stability.

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ABSTRACT: It is widely believed that protecting health care facilities against outbreaks of pandemic influenza requires pharmaceutical resources such as antivirals and vaccines. However, early in a pandemic, vaccines will not likely be available and antivirals will probably be of limited supply. The containment of pandemic influenza within acute-care hospitals anywhere is problematic because of open connections with communities. However, other health care institutions, especially those providing care for the disabled, can potentially control community access. We modeled a residential care facility by using a stochastic compartmental model to address the question of whether conditions exist under which nonpharmaceutical interventions (NPIs) alone might prevent the introduction of a pandemic virus. The model projected that with currently recommended staff-visitor interactions and social distancing practices, virus introductions are inevitable in all pandemics, accompanied by rapid internal propagation. The model identified staff reentry as the critical pathway of contagion, and provided estimates of the reduction in risk required to minimize the probability of a virus introduction. By using information on latency for historical and candidate pandemic viruses, we developed NPIs that simulated notions of protective isolation for staff away from the facility that reduced the probability of bringing the pandemic infection back to the facility to levels providing protection over a large range of projected pandemic severities. The proposed form of protective isolation was evaluated for

social plausibility by collaborators who operate residential facilities. It appears unavoidable that NPI combinations effective against pandemics more severe than mild imply social disruption that increases with severity.

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ABSTRACT: This report outlines practical lessons learnt from an influenza-like outbreak in an aged-care facility in NSW, which affected 26 residents, resulted in 14 hospital admissions and was associated with six deaths. No common causative agent was identified. Key recommendations include: encouraging aged-care facilities to establish mechanisms that improve the early identification of outbreaks and timely implementation of outbreak control strategies; identifying strategies to inform general practitioners of outbreaks if they have patients residing in aged-care facilities; and improving the vaccination coverage of the aged-care workforce.

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ABSTRACT: BACKGROUND: An epidemic outbreak of keratoconjunctivitis occurred in a nursing home in Madrid from August to December 2005. OBJECTIVE: This article reports the outbreak, the infection control measures taken, and risk factors for keratoconjunctivitis. METHODS: A cohort study was conducted on the nursing home staff and residents. Specific attack rates and relative risks with their 95% confidence intervals were estimated. A multivariate analysis (logistic regression) was performed proving odds ratios (OR) of becoming ill. Conjunctival swab samples were taken and tested for viral infection. More stringent infection control measures were implemented following the occurrence of the initial cases. RESULTS: For ty-six cases were identified in the nursing home (infection rates of 30.5% in residents and 8.3% in workers). Total duration of the outbreak was 120 days. Corneal ulcer occurred in 3 cases. The factors appearing as independent risk factors were age (OR = 5.7 in people aged \geq 90 years compared to those aged < 80 years), cognitive impairment (OR = 2.64) and nursing home floor (OR = 2.74 for the first floor, where the outbreak started). Adenoviral DNA was amplified in 10 samples, and 8 of them could be typed as adenovirus serotype 8. CONCLUSIONS: Early adoption of adequate hygiene measures is essential to control these outbreaks. In nursing homes with a high number of people with cognitive impairment, an additional effort should be made when the first cases occur to provide such people an increased and improved care and monitoring.

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ABSTRACT: Influenza outbreaks in aged care facilities (ACFs) can be associated with high morbidity and mortality. National guidance includes the use of antiviral medication for residents and staff and other measures to prevent serious health outcomes. An outbreak of influenza in an ACF was reported to the Brisbane Southside Population Health Unit (BSPHU) on 10 August 2007. The BSPHU assisted the ACF and local general practitioners in the provision of oseltamivir to staff and residents on 11 August 2007. The onset of illness in the last case was 13 August 2007. Antiviral prophylaxis was ceased and the outbreak declared over on 22 August 2007. This paper describes some of the practical issues encountered in the public health response in this setting. Vaccination of ACF residents and staff remains the key preventive strategy for the future.

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ABSTRACT: In early 2003, the global infection control community faced a great challenge, sudden acute respiratory syndrome (SARS). The rapid spread of SARS, its capacity to infect health care workers, and its many unknown features in the early days of the outbreak meant that health care workers were unsure of the most effective methods of infection control to prevent disease transmission. These conditions made designing appropriate, effective and standard infection control responses difficult. Innovation was necessary. This article provides a brief overview of global challenges in infection control and SARS. The author reports field observations and describes five selected examples of highly innovative, SARS-related infection control practices observed in three affected countries during the height of the 2003 outbreak. These examples relate to risk assessment, patient segregation, strategies to limit access to clinical areas, health care worker protection, and efforts to promote public confidence. Many of these strategies could be considered for use in the post-2003 SARS era, especially in preparation for an influenza or Avian influenza pandemic.

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ABSTRACT: **BACKGROUND:** In Norway, around 20 % of the elderly live in long-term care facilities. The risk of acquiring a nosocomial infection increases by age and the consequences of infections become more severe. This article describes the epidemiology of nosocomial infections and the use of antibiotics in long-term care facilities. Infection control measures are recommended. **MATERIAL AND METHODS:** We used data from the national prevalence surveys of nosocomial infections and from the national surveillance system for communicable diseases. In addition we reviewed current literature. **RESULTS:** The prevalence of nosocomial infection is similar in hospitals and long-term care facilities in Norway, between 5 % and 10 %. Legal regulations require all health institutions in Norway to have an infection control programme, but little attention has been given to prevention of nosocomial infections in long-term care facilities. Less than 50 % of them have implemented the mandatory infection control programme. The vaccination coverage for influenza is only about 30 %. The coverage of pneumococcal vaccination is even lower. **INTERPRETATION:** The following actions are recommended for all long-term care facilities: improved hand hygiene by introducing hand disinfection, implementation of infection control programmes, and improved coverage of pneumococcal and influenza vaccination. Employing more health care personnel, nurses as well as doctors, should be a goal.

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ABSTRACT: **BACKGROUND:** Studies on adherence to infection control policies in nursing homes (NHs) are limited. This pilot study explores the use of various infection control practices and the role of infection control practitioners in southeast Michigan NHs. **METHODS:** A 43-item self-administered questionnaire and explanatory cover letter were mailed to 105 licensed NHs in southeast Michigan. A second mailing was sent to the nonresponders 4 weeks later. **RESULTS:** Significant variability existed in adoption of various infection control measures with respect to time spent in infection control activities (50% of facilities having a full-time infection control practitioner), definitions used in monitoring infections, and immunization rates (influenza: range, 0%-100%; mean, 73.2%; pneumococcal: range, 0%-100%; mean, 38.5%). **CONCLUSION:** Although strides have been made in infection control research in NHs, significant variations exist in implementation of infection control methods and guidelines. Future research should focus on identifying barriers to infection control in NHs.

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ABSTRACT: BACKGROUND: Many US hospitals lack the capacity to house safely a surge of potentially infectious patients, increasing the risk of secondary transmission. Respiratory protection and negative -pressure rooms are needed to prevent transmission of airborne-spread diseases, but US hospitals lack available and/or properly functioning negative -pressure rooms. Creating new rooms or retrofitting existing facilities is time-consuming and expensive. METHODS: Safe methods of managing patients with airborne-spread diseases and establishing temporary negative -pressure and/or protective environments were determined by a literature review. Relevant data were analyzed and synthesized to generate a response algorithm. RESULTS: Ideal patient management and placement guidelines, including instructions for choosing respiratory protection and creating temporary negative -pressure or other protective environments, were delineated. Findings were summarized in a treatment algorithm. CONCLUSION: The threat of bioterrorism and emerging infections increases health care's need for negative -pressure and/or protective environments. The algorithm outlines appropriate response steps to decrease transmission risk until an ideal protective environment can be utilized. Using this algorithm will prepare infection control professionals to respond more effectively during a surge of potentially infectious patients following a bioterrorism attack or emerging infectious disease outbreak.

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ABSTRACT: BACKGROUND: Hong Kong went through a battle with a new respiratory disease, severe acute respiratory syndrome (SARS), from March to June 2003. All clinical settings, including rehabilitative and infirmary setting, have actively involved in fighting against the infection. The intent of this paper was to reflect on the SARS precautionary measures that had been taken in a severe intellectual disabilities hospital in Hong Kong. METHODS: A review on six SARS precautionary measures were conducted. They were assessment of risk, formulation of operational guidelines, implementation of infection control measures, education and training of staff, conducting audits and carrying out environmental improvement work. RESULTS: Patients were at risk of getting infected from carers, visitors, volunteers, and staff and patients of general hospitals. A SARS Quarantine Unit, isolation ward, was opened to isolate patients who might have had close contact with SARS patients during a stay in a general hospital or when they returned from home leave. Undoubtedly, both staff and relatives participated in preventing the patients from being infected. No day leave and home leave was reported and the number of hospitalization in general hospital was decreased during the critical period. Three infection control audits were conducted and improvement work was carried out subsequently. CONCLUSION: The practice of grouping within a standard isolation room is recommended to continue in the future. Moreover, intensive infection control training for all staff is of highest importance to safeguard the health of both staff and patient.

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ABSTRACT: OBJECTIVE: To characterize care of nursing home residents who became ill with nursing home-acquired pneumonia (NHAP) in a group-model, nonprofit HMO, and to pilot-test a strategy to implement evidence-based NHAP care guidelines. STUDY DESIGN: Medical record review and intervention pilot test. METHODS: Nursing home medical records of 78 patients who developed NHAP in 6 homes where the HMO contracts for Medicare services were reviewed for demographics, functional status, comorbidity, NHAP severity, care processes, and guideline compliance. The intervention, combining organizational change (facilitating immunization and providing appropriate emergency antibiotics) and education (quarterly in-services for nursing and aide staff), was pilot-tested for 7 months in 1 facility. Measures of baseline and intervention guideline

adherence at that facility were compared with Fisher's exact test. RESULTS: Among the patients with NHAP, 83% had a response from their physician in less than 8 hours, 82% were treated with an antibiotic that met spectrum recommendations, and 74% were able to swallow were treated with oral antibiotics. However, few patients had documentation of influenza and pneumococcal vaccination; less than half the direct care staff had been vaccinated; and nursing assessments were incomplete for 23%. At the pilot-test facility, improvement was seen in influenza vaccination (14% to 52%, $P = .01$) and use of the most appropriate antibiotics (47% to 85%; $P = .03$). The guideline adherence score improved from 52% to 63% ($P = .04$). CONCLUSION: Use of a multidisciplinary, multifaceted intervention resulted in improvement in quality of care for nursing home residents who become ill with pneumonia.

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ABSTRACT: BACKGROUND: Influenza outbreaks continue to occur in nursing homes despite high vaccination coverage among residents. Recommendations for outbreak control in institutions such as nursing homes advise use of antiviral drugs to reduce influenza transmission. METHODS: Influenza surveillance was performed among elderly residents of nursing homes in Michigan during 2 influenza seasons. The antiviral drug oseltamivir was used for outbreak control at the discretion of nursing home staff once influenza transmission was confirmed by virus isolation or rapid antigen detection. RESULTS: During 2000-2001, influenza was not confirmed in any of the 28 participating homes, despite transmission of types A (H1N1) and B in the community. During 2001-2002, influenza type A (H3N2) transmission was confirmed in 8 (26%) of 31 participating homes; influenza vaccine coverage among residents was 57%-98% in outbreak-associated homes. Oseltamivir was used in all homes with influenza transmission; outbreak control varied according to the rapidity of outbreak recognition and the extent of antiviral use. Reported adverse events were primarily gastrointestinal reactions and rashes. Analysis of the usefulness of rapid antigen detection tests for outbreak recognition indicated a sensitivity of only 77% (specificity, 92%). CONCLUSIONS: Oseltamivir was reasonably well tolerated, and its use, along with continued promotion of vaccination coverage among nursing home residents and staff, should be a valuable addition to institutional outbreak-control strategies.

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ABSTRACT: PURPOSE OF REVIEW: In November 2003, a new, life-threatening, respiratory illness named severe acute respiratory syndrome (SARS) arose from Guangdong Province in China. The illness spread across the globe, caused many major outbreaks, and had an overall mortality rate of 11%. The purpose of this review is primarily to review the clinical features, diagnosis, and management of SARS, but also to comment briefly on the epidemiology and pathogen. RECENT FINDINGS: SARS is caused by a novel coronavirus that primarily affects the lower respiratory tract. It starts with an influenza-like illness characterized by nonspecific, systemic symptoms. This is followed by the rapid development of a non-specific bronchopneumonia associated with lower tract respiratory symptoms, or gastrointestinal symptoms. Most patients recover after a week or 2, but some go on to develop acute respiratory distress syndrome. There is no proven treatment, although cocktails of broad-spectrum antibiotics, antiviral, and immunomodulatory therapy have been tried. Secondary spread can be prevented and outbreaks brought under control provided that staff wear personal protective equipment and pay close attention to good personal hygiene, and patients are isolated. The most urgent needs at present are to develop a vaccine, to develop rapid, inexpensive, accurate diagnostic tests that can give results early in the illness and within a few hours of sampling. Other needs are to investigate which therapies have the lowest adverse event/efficacy ratios. SUMMARY: Up-to-date knowledge of SARS should help in early detection, isolation of high-risk patients, to reduce mortality and morbidity, and to prevent a new global epidemic arising.

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ABSTRACT: This work describes and analyses an outbreak of epidemic keratoconjunctivitis which occurred in 2001 and 2002 in a nursing home for the elderly in Leganes (an area of Madrid). This is the first such published case in Spain with these characteristics and this serotype identification. Sociodemographic characteristics, epidemic curve and attack rates are described. Comparisons of the data were carried out using a chi² test for qualitative variable and t-test for quantitative. Factors associated with the illness are explored by means of contingency tables and logistic regression models. One hundred and two cases were detected, with an attack rate of 36.4% for residents, and 12.9% for workers, not considering spatial or professional

differences. The epidemic curve showed an interpersonal transmission pattern. Multivariate analysis identified the following risk factors in the residents: able to wander freely through the building, urinary incontinence and use of shared bathroom. In 34.6% of the conjunctival samples, adenovirus serotype 8 was detected with identical genomic sequence. Establishment of hygienic sanitary guidance adapted for the cleaning of such establishments and contact with residents as well as early diagnosis and good coordination of human and material resources are key factors in the prevention and control of these outbreaks in closed communities.

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ABSTRACT: Influenza A was cultured in 62 double rooms. The roommate was infected in 12 (19.4%). During 3,294 resident-seasons, influenza was cultured in 208 single rooms (6.3%). Those who lived in double rooms with a culture-positive roommate had a 3.07 relative risk (CI95, 1.61-5.78) of acquiring influenza.

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ABSTRACT: BACKGROUND: Low rates of staff influenza vaccine coverage occur in many health care facilities. Many programs do not offer vaccination to physicians or to volunteers, and some programs do not measure coverage or do so only for a subset of staff. The use of theory in planning and evaluation may prevent these problems and lead to more effective programs. METHOD: We discuss the use of theory in the planning and evaluation of health programs and demonstrate how it can be used for the evaluation and planning of a hospital or nursing home influenza control program. RESULTS: The application of theory required explicit statement of the goals of the program and examination of the assumptions underlying potential program activities. This indicated that staff should probably be considered as employees, volunteers, physicians, and contractors of the facility. It also directed attention to evidence-based strategies for increasing vaccination rates.

CONCLUSION: The application of a program planning model to a problem of institutional influenza prevention may prevent planners from excluding important target populations and failing to monitor the important indicators of program success.

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ABSTRACT: Severe acute respiratory syndrome (SARS) has affected many areas of the world recently and is becoming a global problem. Hong Kong and China have been most severely affected by this new infectious disease. The elderly population is highly vulnerable, and mortality in those older than 65 years is more than 50%. In our study, 27 health care workers and 40 elderly residents in a nursing home were interviewed to investigate their level of knowledge of SARS and its prevention. Most of the elderly residents knew little regarding SARS and prevention strategies, despite access to outside news by TV, radio, and visitors. Also, the worry and fear of an outbreak of SARS among staff working in the nursing home was considered to be high. Tailored education programs to promote awareness and prevention of SARS for the elderly are needed. Also, more in-service training, support, and counseling are strongly indicated for staff to promote disease prevention and improve quality of care.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/14571239>

DOI: 10.1016/s0197-4572(03)00251-9

66. Macartney KK, Gorelick MH, Manning ML, et al. Nosocomial respiratory syncytial virus infections: the cost-effectiveness and cost-benefit of infection control. *Pediatrics.* 2000;106(3):520-6. DOI: 10.1542/peds.106.3.520

ABSTRACT: OBJECTIVE: To determine the cost-effectiveness and cost-benefit of an infection control program to reduce nosocomial respiratory syncytial virus (RSV) transmission in a large pediatric hospital. DESIGN: RSV nosocomial infection (NI) was studied for 8 years, before and after intervention with a targeted infection control program. The cost-effectiveness of the intervention was calculated, and cost-benefit was estimated by a case-control comparison. SETTING: Children's Hospital of

Philadelphia, a 304-bed pediatric hospital. PATIENTS: All inpatients with RSV infection, both community- and hospital-acquired. INTERVENTION: Consisted of early recognition of patients with respiratory symptoms, confirmation of RSV infection by laboratory testing, establishing cohorts of patients and nursing staff, gown and glove barrier precautions, and monitoring and education of staff. OUTCOME MEASURES: The incidence density of RSV NI before and after the intervention was calculated as the rate per 1000 patient days-at-risk for infection. Intervention costs included laboratory testing, isolation, and administration of the program. The cost of RSV NI was estimated by comparing hospital charges for 30 cases and matched uninfected controls. RESULTS: A total of 148 patients acquired NI (88 before and 60 after the intervention). The Mantel-Haenszel stratified relative risk for NI in the period before the infection control program, compared with the postintervention period, was .61 (95% confidence interval: .53-.69). By applying the preintervention stratum-specific rates of infection to the days-at-risk in the postintervention period, an estimated 100 NIs would have been expected, which in comparison to the 60 NIs observed, yielded an estimated program effectiveness of 10 RSV NIs prevented per season. The total cost of the program per season was \$15 627 or \$1,563/NI prevented. In comparison, the mean cost to the hospital was \$9,419/case of RSV NI, resulting in a cost-benefit ratio of 1:6. CONCLUSIONS: A targeted infection control intervention was cost-effective in reducing the rate of RSV NI. For every dollar spent on the program, approximately \$6 was saved.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/10969097>

DOI: 10.1542/peds.106.3.520

SEARCH STRATEGIES

Database: Ovid MEDLINE(R) ALL <1946 to April 24, 2020>

Search Strategy:

- 1 nursing home/ (8533)
- 2 long term care/ (25715)
- 3 ((nursing or long-term or residential or congregate) adj2 (facilit* or home* or setting* or living)).tw. (49478)
- 4 1 or 2 or 3 (77574)
- 5 virus pneumonia/ or severe acute respiratory syndrome/ or middle east respiratory syndrome/ (10057)
- 6 exp influenza/ (48509)
- 7 pneumovirus/ or exp human respiratory syncytial virus/ or murine pneumonia virus/ (2733)
- 8 (virus pneumonia or SARS or severe acute respiratory syndrome* or influenz* or parainfluenz* or respiratory syncytial virus* or Adenovir* or ichtadenovirus* or pneumovirus* or metapneumovirus* or turkey rhinotracheitis virus* or parainfluenza or paramyxoviridae infection* or middle east respiratory syndrome or MERS).tw. (191336)
- 9 coronavirus infection/ (5781)
- 10 (coronavirus* or corona-virus or COVID* or 2019-nCoV or nCoV).tw. (18352)
- 11 or/5-10 (212199)
- 12 exp "construction work and architectural phenomena"/ (0)
- 13 ((building or facilit* or home) adj2 (layout or lay out or design or set-up or configuration* or standard?)).tw. (5877)
- 14 ("per room" or "per patient" or "per resident" or (number* adj3 (bed* or staff* or room*))).tw. (42701)
- 15 (cohorted or cohorting).tw. (456)
- 16 (movement or contact pattern? or social contact? or contact timing or distancing or traffic).tw. (276475)
- 17 (meal service or dining facilit* or dining environment? or ((dining or feeding) adj2 (room? or area?))).tw. (998)
- 18 or/12-17 (326065)
- 19 4 and 11 and 18 (35)
- 20 infection control/ or patient isolation/ or quarantine/ (28688)
- 21 (outbreak control or ((isolat* or quarantin*) adj2 (elder* or aged or patient? or senior? or resident?))).tw. (30137)
- 22 exp disinfection/ (14473)

- 23 disinfectant agent/ (0)
- 24 cross infection/ (56053)
- 25 (steriliz* or disinfect* or biocide* or clean* or decontaminat*).tw. (152102)
- 26 (cross infection or cross contaminat*).tw. (6371)
- 27 or/20-26 (257139)
- 28 4 and 11 and 27 (204)
- 29 19 or 28 (228)
- 30 limit 29 to yr="2003 -Current" (152)

Database: Embase <1974 to 2020 April 23>

Search Strategy:

-
- 1 nursing home/ (51086)
 - 2 long term care/ (126843)
 - 3 ((nursing or long-term or residential or congregate) adj2 (facilit* or home* or setting* or living)).tw. (63854)
 - 4 1 or 2 or 3 (198038)
 - 5 virus pneumonia/ or severe acute respiratory syndrome/ or middle east respiratory syndrome/ (15827)
 - 6 exp influenza/ (84428)
 - 7 pneumovirus/ or exp human respiratory syncytial virus/ or murine pneumonia virus/ (4687)
 - 8 (virus pneumonia or SARS or severe acute respiratory syndrome* or influenz* or parainfluenz* or respiratory syncytial virus* or Adenovir* or ichtadenovirus* or pneumovirus* or metapneumovirus* or turkey rhinotracheitis virus* or parainfluenza or paramyxoviridae infection* or middle east respiratory syndrome or MERS).tw. (217946)
 - 9 coronavirus infection/ (2859)
 - 10 (coronavirus* or corona-virus or COVID* or 2019-nCoV or nCoV).tw. (19861)
 - 11 or/5-10 (260245)
 - 12 exp "construction work and architectural phenomena"/ (65088)
 - 13 ((building or facilit* or home) adj2 (layout or lay out or design or set-up or configuration* or standard?)).tw. (8302)
 - 14 ("per room" or "per patient" or "per resident" or (number* adj3 (bed* or staff* or room*))).tw. (76392)
 - 15 (cohorted or cohorting).tw. (741)
 - 16 (movement or contact pattern? or social contact? or contact timing or distancing or traffic).tw. (345602)
 - 17 (meal service or dining facilit* or dining environment? or ((dining or feeding) adj2 (room? or area?))).tw. (1177)
 - 18 or/12-17 (493896)
 - 19 4 and 11 and 18 (76)
 - 20 infection control/ or patient isolation/ or quarantine/ (84088)
 - 21 (outbreak control or ((isolat* or quarantin*) adj2 (elder* or aged or patient? or senior? or resident?))).tw. (42219)
 - 22 exp disinfection/ (25788)
 - 23 disinfectant agent/ (12232)
 - 24 cross infection/ (19178)
 - 25 (steriliz* or disinfect* or biocide* or clean* or decontaminat*).tw. (186521)
 - 26 (cross infection or cross contaminat*).tw. (7309)
 - 27 or/20-26 (332518)
 - 28 4 and 11 and 27 (270)
 - 29 19 or 28 (332)
 - 30 limit 29 to yr="2003 -Current" (246)

31 from 30 keep 7,9-10,35,101,147,151,157-158,168,183,185,232 (13)

CINAHL

#	Query	Results
S1	((MH "Coronavirus+" OR MH "Coronavirus Infections+") OR (TI coronavirus* OR corona-virus) OR (AB coronavirus* OR corona-virus)) AND ((TI wuhan or beijing or shanghai or Italy or South-Korea or China or Chinese or 2019-nCoV or nCoV or COVID-19 or Covid19 or SARS-CoV*) OR (AB wuhan or beijing or shanghai or Italy or South-Korea or China or Chinese or 2019-nCoV or nCoV or COVID-19 or Covid19 or SARS-CoV*))	1,273
S2	(TI coronavirus* OR corona-virus OR covid19 OR "covid 19" or SARS-Cov*) OR (((TI (novel OR new OR nouveau OR "2019") N2 (coronavirus* or corona virus*)) OR (AB (novel OR new OR nouveau OR "2019") N2 (coronavirus* or corona virus*)) AND ((MH "China+" OR (TI china OR Chinese) OR (AB chi na OR chinese) OR MH "Italy" OR (TI Italy OR AB Italy) OR MH "Korea" OR MH "South Korea" OR (TI korea OR AB korea)) OR ((MH "Pneumonia+" OR (TI pneumonia OR AB pneumonia)) AND (TI Wuhan OR AB Wuhan))	1,120
S3	((TI "COVID-19" OR "2019-nCoV" OR "SARS-CoV*" OR 2019-nCov OR 2019 coronavirus* OR 2019 corona virus* OR covid19) OR (AB "COVID-19" OR "2019-nCoV" OR "SARS-CoV*" OR 2019-nCov OR 2019 coronavirus* OR 2019 corona virus* OR covid19)) OR MH "Coronavirus+" OR MH "Coronavirus Infections+" OR (TI ((novel or new or nouveau or "2019") N2 (coronavirus* or corona virus* or pandemi*)) OR AB ((novel or new or nouveau or "2019") N2 (coronavirus* or corona virus* or pandemi*)))	4,305
S4	((TI "2019-nCov" OR "COVID-19" OR covid 19 OR "SARS-CoV-2" OR covid19) OR (AB "2019-nCov" OR "COVID-19" OR covid 19 OR "SARS-CoV-2" OR covid19)) OR ((TI (coronavirus* OR corona-virus*) AND (wuhan OR shanghai OR Beijing OR Italy OR south-korea OR china OR chinese)) OR (AB (coronavirus* OR corona-virus*) AND (wuhan OR shanghai OR Beijing OR Italy OR south-korea OR china OR chinese))	1,386
S5	(TI (novel OR new OR nouveau OR "2019") N2 (coronavirus* or corona virus*)) OR (AB (novel OR new OR nouveau OR "2019") N2 (coronavirus* or corona virus*))	537
S6	S1 OR S2 OR S3 OR S4 OR S5	4,591
S7	((MH "Long Term Care") OR (MH "Nursing Home Patients")) OR (MH "Nursing Homes") OR (MH "Skilled Nursing Facilities")	58,819
S8	TI ((nursing or long-term or residential or congregate) N2 (facilit* or home* or setting* or living)) OR AB ((nursing or long-term or residential or congregate) N2 (facilit* or home* or setting* or living))	44,644
S9	S7 OR S8	78,719
S10	(MH "Facility Design and Construction+") OR (MH "Health Facility Planning")	16,913
S11	TI (((building or facilit* or home) N2 (layout or lay out or design or set-up or configuration* or standard?))) OR AB (((building or facilit* or home) N2 (layout or lay out or design or set-up or configuration* or standard?)))	4,037
S12	TI (("per room" or "per patient" or "per resident" or (number* N3 (bed* or staff* or room*)))) OR AB (("per room" or "per patient" or "per resident" or (number* N3 (bed* or staff* or room*))))	14,476
S13	TI ((cohorted or cohorting)) OR AB ((cohorted or cohorting))	251
S14	TI ((movement or contact pattern? or social contact? or contact timing or distancing or traffic)) OR AB ((movement or contact pattern? or social contact? or contact timing or distancing or traffic))	75,160
S15	TI ((meal service or dining facilit* or dining environment? or ((dining or feeding) N2 (room? or area?)))) OR AB ((meal service or dining facilit* or dining environment? or ((dining or feeding) N2 (room? or area?))))	444

S16	S10 OR S11 OR S12 OR S13 OR S14 OR S15	110,281
S17	S6 AND S9 AND S16	3
S18	(MH "Infection Control") OR (MH "Handwashing+") OR (MH "Patient Isolation") OR (MH "Quarantine") OR (MH "Sterilization and Disinfection+") OR (MH "Universal Precautions")	47,127
S19	TI ((infection control or outbreak control or ((isolat* or quarantin*) N2 (elder* or aged or patient? or senior? or resident?)))) OR AB ((infection control or outbreak control or ((isolat* or quarantin*) N2 (elder* or aged or patient? or senior? or resident?))))	19,635
S20	(MH "Disinfectants") OR (MH "Equipment Contamination")	6,937
S21	(MH "Cross Infection+") OR (MH "Environmental Pollution+")	109,849
S22	TI ((steriliz* or disinfect* or biocide* or clean* or decontaminat* or contaminat*)) OR AB ((steriliz* or disinfect* or biocide* or clean* or decontaminat* or contaminat*))	42,739
S23	TI ((cross infection or environmental pollut* or cross pollut*)) OR AB ((cross infection or environmental pollut* or cross pollut*))	1,360
S24	S18 OR S19 OR S20 OR S21 OR S22 OR S23	177,920
S25	S6 AND S9 AND S24	17
S26	S17 OR S25	20
S27	S6 AND S9	48

Pubmed

Search (((((wuhan[tw] AND (coronavirus[tw] OR corona virus[tw])) OR coronavirus*[ti] OR COVID*[tw] OR nCov[tw] OR 2019 ncov[tw] OR novel coronavirus[tw] OR novel corona virus[tw] OR covid-19[tw] OR SARS-COV-2[tw] OR Severe Acute Respiratory Syndrome Coronavirus 2[tw] OR coronavirus disease 2019[tw] OR corona virus disease 2019[tw] OR new coronavirus[tw] OR new corona virus[tw] OR new coronaviruses[all] OR novel coronaviruses[all] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[nm] OR 2019 ncov[tw] OR nCov 2019[tw] OR SARS Coronavirus 2[all]))) AND (((nursing home*[Title/Abstract] OR nursing facilit*[Title/Abstract])) OR (senior* home[Title/Abstract] OR senior* facilit*[Title/Abstract] OR elder* home[Title/Abstract] OR elder* facilit*[Title/Abstract] OR geriatric home*[Title/Abstract] OR geriatric facilit*[Title/Abstract])) OR (long term care home*[Title/Abstract] OR long term care facilit*[Title/Abstract])) OR congregate living)

Search terms for other resources used in various combinations:

- long term care or nursing home or congregate living or nursing facility or geriatric facility or elderly home
- environment or facility standards or facility design
- cleaning protocols or disinfecting protocols
- private rooms or "per room"
- cohorted or cohorting
- COVID-19 OR SARS-CoV