COVID-19 Living Rapid Review
Transmission Risk & Activities/Settings
Expedited Draft Summary #3

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Question

What is the risk of COVID-19 transmission associated with different activities (e.g., dining, exercising etc.) or settings (e.g., educational, hospitality etc.) and what factors contribute to risk (e.g., type of contact, number of contacts, time within the risk environment)?

How does transmission risk of common activities alter with background population prevalence of SARS-CoV-2 and population vaccine coverage?

Methods

A detailed peer-reviewed search strategy was developed by an information specialist in consultation with the review team. Electronic databases searched include MEDLINE and Embase. The initial search was conducted September 29, 2021 and updated on October 26, 2021. No search update was performed in November due to librarian absence. A search update will be included for Version 4 of the expedited draft summary. The searches will continue to be updated monthly for a limit of six months.

All reviewers independently conducted a training exercise based on 50 articles for title and abstract screening and 10 articles for full-text review before beginning study selection to ensure agreement between reviewers. One reviewer independently screened titles and abstracts and then full-text studies for relevant articles. For data extraction, all reviewers completed a training exercise based on 5 articles before beginning data extraction. One reviewer independently extracted data from included studies with a second reviewer verifying study inclusion and extracted data. Critical appraisals and analyses of the included studies have not been completed and will be available in the final manuscript.

Findings

For transmission risk of settings and activities, we present a visual summary of evidence in Table 1 and detailed individual study information further below.

The initial search retrieved 10,318 references and the October update added an additional 398 references for a total of 10,716 references included in the search. Given no additional search update in November, 10,716 total references remain the total. To date, we have reviewed 7,700 of the 10,716 references with 3,016 titles and abstracts remaining to be screened. We have reviewed 774 full-text articles of which **81 have been included**. **21 new studies** have been added since the previous report (see Version 2, 15 November 2021) and have been used to complete this expedited draft summary. Newly added items are highlighted in green throughout the report.

Table 1: Visual summary of evidence for transmission risk of COVID-19 and different settings and activities

Setting & Activity	References	Risk Level as reported by study author(s)	Preventative Measures	Time Period Studied
Accommodations				
Chalet	Previous[1]	High	NR	February 2020
Shared housing (e.g., dormitories)	Previous[2,3]	Low[2], High[3]	masking, disinfection, accessibility of alcohol pumps	July 2020 – May 2021
Business				
Conference	Previous[4]	High	social distancing	March - April 2020
Education				
Nursery/Kindergarten	**New**[5] Previous[6–14]	Low	**Hand hygiene, mask wearing (adults)**	June 2020 – December 2020
Primary schools	**New**[5] Previous[6,8–24]	Low	face masks; distancing; screening, handwashing, hybrid education, improved ventilation, bubbles	January 2020 – February 2021
Secondary schools	Previous[4,6,8–11,13–15,17–19,21–25]	Low	face masks; distancing; screening, handwashing, hybrid education, improved ventilation, bubbles	January 2020 - February 2021
Events and entertainment				
Social events[a]	**New**[26] Previous[27–34]	High	social distancing	May – June 2020
Weddings	Previous[4,35]	High	social distancing, public awareness of epidemic prevention and control	March - April 2020
Hospitality venues	Previous[4]	High	social distancing	March - April 2020
Shopping	Previous[27,36]	Unclear	social distancing, public awareness of epidemic prevention and control	January 2020 – January 2021
Healthcare				
Community healthcare	Previous[37]	Low	face masks	June 2020

Setting & Activity	References	Risk Level as reported by study author(s)	Preventative Measures	Time Period Studied
Hospitals	**New**[26,38–50] Previous[27,36,51–57]	Unclear[26,27,36,40,51,52,54,55,57], Low[43–45,47,49,50,53], High[38,39,41,42,46,48,56]	face masks, hand hygiene, staff training, PPE, restricting visitors, environmental cleansing and disinfection, quarantine, testing, **shorter shifts**	March 2020 – March 2021
Specialty care[b]	**New**[42,58,59]	**Low**[58], **Unclear**[42,59]	face masks, hand hygiene, PPE, environmental cleansing and disinfection, quarantine	February 2020 – June 2020
Primary care	**New**[60]	**High**	**Social distancing, wearing PPE, testing and contact tracing**	**March 2020 – June 2020**
Healthcare workers (transmission to household)	Previous[51,61]	High	hand hygiene, face masks, physical distancing	March 2020 – June 2020
Healthcare workers (transmission to patients)	Previous[53]	Low	face masks and other infection control policies	October 2020 – April 2021
Residential and long-term care	**New**[60,62] Previous[4,30,34,51,53,63]	High	face masks, hand hygiene, restricting visitors, physical distancing, **enhanced cleaning**	January – September 2020; March – April 2020
Hospitality				
Cruise ships	Previous[64]	High	ship based quarantine, enhanced health measures and access to onshore quarantine and isolation facilities	March 2020 – April 2020
Tour guides	Previous[65]	High	NR	January – March 2020

Setting & Activity	References	Risk Level as reported by study author(s)	Preventative Measures	Time Period Studied
Waiter or bartenders	Previous[65]	Low	NR	January – March 2020
Cooks	Previous[65]	Low	NR	January – March 2020
Restaurants	Previous[33,36]	High	contact tracing and quarantine, and early introduction of social distancing measures	January – June 2020
Household				
Family home	Previous[28,36,57,66]	High	public awareness of infection and control, hand hygiene, self-isolation	January 2020 – March 2020
Specialized services				
Dental	Previous[67]	Low	PPE	May – October 2020
Personal care services[c]	Previous[33]	Medium	contact tracing and quarantine, and early introduction of social distancing measures	January – June 2020
Sports and activities				
Golf	Previous[68]	Low	Social distancing, testing	July - December 2020
Sports	**New**[69] Previous[19,70,71]	**Low**[69], High[19,70,71]	quarantine for infected individuals, face masks, physical distancing, **hygiene measures**	**August** 2020 – **March** 2021
Camp[d]	Previous[72,73]	Low	screening, daily temperature checks, masks, hand hygiene, physical distancing, small cohorts, scheduled site cleanings, and staff COVID-19 education and	March – August 2020

Setting & Activity	References	Risk Level as reported by study author(s)	Preventative Measures	Time Period Studied
			workplace training	
Transportation				
Bus or metro	Previous[36]	High	public awareness of epidemic prevention and control	January 2020 – March 2020
Flight travel	Previous[36,57,74–77]	High[36,57,74–76], Low[77]	post-flight quarantine, contact-tracing, distancing	January – March 2020
Car sharing	Previous[57,78]	High	masking	January - April 2020
Modes of transportation	**New**[26] Previous[30]	**Unclear**[26], Low[30]	Masking	January – September 2020
Workplaces				
Construction labour	Previous[27,65,79]	High	NR	January – March 2020
Domestic housekeepers	Previous[65]	High	NR	January – March 2020
Drivers (e.g., car, taxi, van)	Previous[65]	High	NR	January – March 2020
Drivers (e.g., bus, train)	Previous[65]	Low	NR	January – March 2020
Meat and poultry processing plant	Previous[80]	Unclear	masking, testing, ventilation, physical barriers, distancing, disinfection	June-September 2020
Personal care workers	Previous[65]	Low	NR	January – March 2020
Receptionists	Previous[65]	Low	NR	January – March 2020
Salesperson	**New**[81] Previous[65]	High	**Social distancing, masking**	January – **May 2020**
Religious professionals	Previous[65]	High	NR	January – March 2020

[a] Social events are defined by the study authors and may include but is not limited to any social activity with one or more individuals such as dating, getting together with a neighbor or friends, banquet, dinner, karaoke, community gatherings, or birthday parties.

[b]Speciality care includes specific settings outside a general hospital setting (e.g., dialysis unit, physical therapy, outpatient care)

[c] Personal services may include hair salons, beauty parlors, nail salons, spa, etc.

[d]Includes indoor/outdoor and summer camps

Descriptive summaries of newly added studies

Education

Nursery/Kindergarten

Meuris et al.[5] conducted a prospective cohort study in Belgium to investigate the possible role of children in the transmission of SARS-CoV-2 in a volunteer sample of 181 children, parents, and school employees. Forty-five individuals (24.9%) tested positive: 13 children (20.6%; 95% CI: 10.6%-30.6%) and 32 adults (27.1%; 95% CI: 19.1%- 35.7%) (P = .34). Children were more often asymptomatic compared with adults (6 [46.2%; 95% CI: 19.1%-73.3%] vs 4 of 31 [12.9%; 95% CI: 1.3%-24.5%]; P = .04). The median duration of symptoms was shorter in children than in adults (0.00 days [IQR, 0.00-1.00 days] vs 15.00 days [IQR, 7.00-22.00 days]). A reconstruction of the outbreak revealed that most transmission events occurred between teachers and between children within the school. Of the observed household transmission events, most seemed to have originated from a child or teacher who acquired the infection at school. The study authors found that a transmission tree reconstruction suggests that most transmission events originated from within the school. Additional measures should be considered to reduce the transmission of SARS-CoV-2 at school, including intensified testing.

Primary schools

For Meuris et al. see Nursery/Kindergarten under Education.

Events and entertainment

Social events

For Lentz et al.[26] see Hospital under Healthcare.

Healthcare

Hospitals

Aranaz-Andrés et al.[38] conducted a cross-sectional study looking to identify factors related to SARS-CoV-2 infection in physicians and internal residents during the pandemic at a tertiary hospital in Spain between February and April 2020. A questionnaire was administered to 323 professionals and 70% of the professionals perceived a shortage of personal protective equipment (PPE), while 40% perceived a shortage of hand sanitizer, although more than 70% said they used it properly. Soap was more available and had a higher percentage of correct use (73.6–79.5%) ($p > 0.05$). In the adjusted model (OR; 95% CI), belonging to a high-risk specialty (4.45; 1.66–11.91) and the use of public transportation (3.27; 1.87–5.73) remained risk factors. Protective factors were changes of uniform (0.53; 0.32–0.90), sanitation of personal objects before the workday (0.55; 0.31–0.97), and the disinfection of shared material (0.34; 0.19–0.58). The study authors concluded that they cannot confirm that a shortage or misuse of PPE is a factor in the spread of SARS-CoV-2, however fears and assessments were similar in both groups.

Wenlock et al.[39] conducted a prospective cohort study to describe the nosocomial spread at a local level as well as identifying factors that will be useful in predicting the severity of outbreaks at UK hospital between October and December 2020. Of the 575 patients exposed, 118 (19.5%) tested positive within 14 days of their exposure, with secondary attack rates (SAR) ranging from 0 to 72%. 68.6% (81/118) of secondary cases had not been in the same bay as the index case. For exposed patients, sharing a bay with the index case and having spent longer on the ward with them were associated with acquiring infection (ORs of 3.8, 95% CI: 1.89- 7.74, and 1.08, 95% CI: 1.01- 1.15 respectively). 71% of secondary cases tested positive while asymptomatic and 94.6% had tested negative earlier in their admission. The authors found that exposure to COVID-19 in hospital commonly leads to transmission that is not confined to the index case's bay. The study confirms that asymptomatic testing is important and suggests that an increased frequency of testing may be beneficial.

Sharma et al.[40] conducted a prospective cohort study to assess the potential risk factors of the coronavirus infection among healthcare workers and to evaluate the effectiveness of infection prevention and control measures among them at a tertiary hospital in India. The study found that the majority (45%) of healthcare workers were nurses, followed by hospital/sanitary/technical attendants (30%) and doctors (24%). Out of a total of 256 healthcare workers, 2% tested positive. Around 80% of healthcare workers had ever attended any IPC training. A statistically significant association was found between posting area of healthcare workers and their exposure to COVID patients (duration of exposure, PPE has worn by healthcare workers, direct contact of healthcare workers with the patient's material) and COVID positivity (P value <.001). The study authors concluded that a well-supervised donning and doffing practice, taking adequate precautions and IPC trainings for healthcare workers in COVID and non-COVID areas can minimize the risk of getting an infection.

Mostafa et al.[41] conducted a cross-sectional study at 12 hospitals and medical centres in Cairo, Egypt to evaluate the proportion of healthcare workers and the associated epidemiological and clinical risk factors. The study found that of infected healthcare workers, 78 (45.9%) reported contact with a suspected case and 47 (27.6%) reported face-to-face contact within 2 m with a confirmed case. The proportion of infection among symptomatic healthcare workers (n= 54/616) was 8.8% (95% CI: 6.7-11.3); 6/54 (11.1%) had fever 38C and 7/54 (13.0%) reported severe symptoms. Most infected healthcare workers were asymptomatic (116/170, 68.2%). The proportion of infection among asymptomatic healthcare workers (n = 116/3424) was 3.4% (95% CI: 2.8-4.0). Overall, the high rate of asymptomatic infections among healthcare workers reinforces the need for expanding universal regular testing. The infection rate among symptomatic healthcare workers in this study is comparable with the national rate detected through symptom-based testing. This suggests that infections among healthcare workers may reflect community rather than nosocomial transmission during the early phase of the COVID-19 epidemic in Egypt.

Lidstrom et al.[42] conducted a cross-sectional study of healthcare workers and support staff in Uppsala, Stockholm to investigate the rate of infection and investigate professional and demographic factors associated with transmission. Overall, 577 (6.6%) were classified as seropositive, with no statistically significant differences between healthcare workers and support staff. Among healthcare workers, age (OR 0.987 per year, 95% CI: 0.980–0.995), time to sampling (OR 1.019 per day, 95% CI: 1.004–1.035), and employment at an outpatient care unit (OR 0.620, 95% CI: 0.487–0.788) were statistically significantly associated with risk of infection. COVID-19 specific units were not at particular risk, compared to other units with comparable characteristics and staff demography. Study authors concluded that the findings indicate that SARS-CoV-2

transmission is related to inpatient healthcare work and illustrate the need for a high standard of basic hygiene routines in all inpatient care settings.

Ng et al.[43] conducted a retrospective cohort study to describe the clinical and epidemiological characteristics of children with COVID-19 in the state of Negeri Sembilan, Malaysia in the setting of mandatory hospital isolation and quarantine for all confirmed cases. In total, 261 children (48.7% males, 51.3% females) were included in this study. One hundred and fifty-one children (57.9%) were asymptomatic on presentation. Among the symptomatic cases, fever was the most common presenting symptom. Two hundred and forty-one (92.3%) cases were close contacts of infected household or extended family members. One (2.1%) of the uninfected guardians accompanying a child in quarantine tested positive for severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) upon discharge. Overall, the study concluded that COVID-19 in children was associated with mild symptoms and a good prognosis and familial clustering was an important epidemiologic feature in the outbreak in Negeri Sembilan. The risk of transmission of SARS-CoV-2 from children to guardians in hospital isolation was minimal despite close proximity.

Landoas et al.[44] conducted a prospective cohort study to describe COVID-19 nosocomial cases during the first pandemic wave among patients in a French University hospital and compliance with hygiene measures. Among 259 patients included, 14 (5.4%) were considered as nosocomial COVID-19. Median time before symptom onset was 25 days (interquartile range: 12–42). Eleven patients (79%) had risk factors for severe COVID-19. Five died (36%) including 4 deaths attributable to COVID-19. Two clusters were identified. The first cluster had 5 cases including 3 nosocomial acquisitions and no tested healthcare workers were positive. The second cluster had 3 cases including 2 nosocomial cases and four healthcare workers were positive. Surgical mask wearing and hand hygiene compliance were adequate for 95% and 61% of healthcare workers, respectively. Overall, the number of nosocomial COVID-19 cases in the hospital was low. Compliance regarding mask wearing, hand hygiene and lockdown measures drastically reduced transmission of the virus.

Rasmussen et al.[45] conducted a prospective cohort study to monitor SARS-CoV-2 incidence, transmission, and antibody development among healthcare workers to identify high risk procedures, pathways, and work areas at a tertiary referral center in Copenhagen, Denmark. 347/361 (96%) healthcare workers participated. Seven (1.9%) were positive on swab tests and none had symptoms. Fifteen (4.2%) developed antibodies. Only one case of potential transmission between healthcare workers was identified. Infection rates were low and no procedures or areas within the department were identified as exposing healthcare workers to a higher risk. The study authors concluded that adherence to the surveillance program was high among healthcare workers. The incidence among healthcare workers at a high-volume ear, nose, throat department was low and may reflect effective local transmission and infection control precautions, as well as a low infectious burden in the Danish society.

Celebi et al.[46] conducted a case-control study to investigate the risk factors for novel coronavirus transmission among healthcare workers in a tertiary care university hospital in Turkey. Of 703 healthcare workers screened between March 20 and May 20, 2020, 50 (7.1%) were found to be positive for SARS-CoV-2. The positivity rates for SARS-CoV-2 among physicians, nurses, cleaning personnel, and the other occupations were 6.3%, 8.0%, 9.1%, and 2.6%, respectively. The infection rate was 8.3% among healthcare workers who worked in COVID-19 units and 3.4% among those who did not work in coronavirus disease 2019 (COVID-19) units (RR = 2.449, CI: 1.062-5.649, P = .027). The presence of a SARS-CoV-2 positive person in the household (P = .016), inappropriate use of personnel protective equipment while caring for patients with COVID-19 infection (P = .003), staying in the same personnel break room as a healthcare worker without a medical mask for

more than 15 minutes (P = .000), consuming food within 1 m of an healthcare worker (P = .003), and failure to keep a safe social distance from an HCW (P = .003) were statistically significant risk factors for infection. Overall, healthcare workers face a high risk of SARS-CoV-2 transmission while providing care for suspected or confirmed COVID-19 patients. However, transmission may also occur in non-medical areas while speaking or eating in the hospital. The proper use of PPE and the implementation of basic infection control precautions are essential. Periodic screening of healthcare workers for SARS-CoV-2 may enable early detection and isolation of infected healthcare workers.

Lentz et al.[26] conducted a case-control study to characterize associations between exposures within and outside the medical workplace with healthcare personnel SARS-CoV-2 infection, including the effect of various forms of respiratory problems. In total, 1,130 healthcare personnel from 67 countries not meeting prespecified exclusion (i.e., healthy but not working, missing workplace exposure data, COVID symptoms without lab confirmation) were included in this study. Healthcare personnel infection was associated with non–aerosol-generating contact with COVID-19 patients (adjusted OR, 1.4; 95% CI: 1.04–1.9; P = .03) and extra-occupational exposures including gatherings of ≥10 people, patronizing restaurants or bars, and public transportation (adjusted OR range, 3.1–16.2). Respirator use during aerosol-generating procedures (AGPs) was associated with lower odds of healthcare personnel infection (adjusted OR, 0.4; 95% CI: 0.2–0.8, P = .005), as was exposure to intensive care and dedicated COVID units, negative pressure rooms, and personal protective equipment (PPE) observers (adjusted OR range, 0.4–0.7). Study authors concluded that COVID-19 transmission to healthcare personnel was associated with medical exposures currently considered lower-risk and multiple extra-occupational exposures, and exposures associated with proper use of appropriate PPE were protective.

Cattelan et al.[47] conducted a prospective cohort study to investigate the occurrence of SARS-CoV-2 infection among healthcare workers involved in the first management of infected patients and to describe the measures adopted to prevent the transmission in a hospital in Italy. 7595 patients were evaluated in the Advanced Triage area: 5.2% resulted positive and 72.4% was symptomatic. The healthcare worker team was composed of 60 members. A total of 361 nasopharyngeal swabs were performed on healthcare workers. All the swabs resulted in negative tests and none of the healthcare workers reached the primary or the secondary endpoint. The study authors concluded that an integrated hospital infection control strategy, consisting of dedicated areas for infected patients, strict measures for PPE use and mass surveillance, is successful to prevent infection among healthcare workers.

Maltezou et al.[48] conducted a cross-sectional study to estimate the risk of infection among healthcare workers based on hospital characteristics in a hospital in Greece. Study authors found that factors associated with an increased risk for SARS-CoV-2 infection were working in a non-referral hospital compared with a coronavirus disease 2019 (COVID-19) referral hospital, working in a hospital with a high number of employees, and working in a hospital with an increased number of patients with COVID-19. In conclusion, the study suggests that healthcare workers represent a high-risk group for SARS-CoV-2 infection. It also shows that there are gaps in infection control in non-referral hospitals. Given the ongoing epidemic in Greece and globally, and the increasing potential for infected cases to seek health care in any healthcare facility, there is a need to raise infection control capacity and to address issues of HCW compliance with the use of PPE in all healthcare facilities.

Olmos et al.[49] conducted a cross-sectional study to determine the asymptomatic infection of health care workers in a private clinic in the city of Santiago, Chile. The study found that a 3.14% of healthcare workers were positive for the presence of SARS-CoV-2 (14/413). Out of these, 7/14 were completely asymptomatic and did not develop symptoms within 3 weeks of testing. Sequencing

of viral genomes showed the predominance of the GR clade; however, sequence comparison demonstrated numerous genetic differences among them suggesting community infection as the main focus of transmission among healthcare workers. The study demonstrates that the protocols applied to protect healthcare workers and patients have been effective as no infection clusters due to asymptomatic carriers were found in the clinic.

Dutta et al.[50] conducted a prospective cohort study to evaluate the implementation of a multidimensional healthcare personnel-centric evidence-based, dynamic policy with the objectives to reduce risk of healthcare personnel (HCP) infection, ensure welfare and safety of the healthcare personnel and to improve willingness to accept and return to duty. Between 31 March and 20 July 2020, the study screened 5553 outpatients, of whom 3012 (54.2%) were COVID-19 suspects managed in the medium-risk zone. Among them, 346 (11.4%) tested COVID-19 positive (57.2% male) and were managed in the high-risk zone with 19 (5.4%) deaths. One (0.08%) of the 1224 HCP in high-risk zone, 6 (0.62%) of 960 HCP in medium-risk zone and 23 (0.18%) of the 12 600 HCP in the low-risk zone tested positive at the end of shift. All the 30 COVID-19-positive HCP have since recovered. This HCP-centric policy resulted in low transmission rates (<1%), ensured satisfaction with training (92%), PPE (90.8%), medical and psychosocial support (79% and improved acceptance of COVID-19 duty with 54.7% volunteering for re-deployment. Overall, a multidimensional HCP-centric policy was effective in ensuring safety, satisfaction and welfare of HCP in a resource-poor setting and resulted in a willing workforce to fight the pandemic.

Specialty care

Thadhani et al.[58] conducted a case-control study evaluating the transmission dynamics within hemodialysis facilities, with a direct interest on possible indirect transmission through shared chairs. The study considered data from 170,234 adult patients from 2,600 outpatient facilities and found that 4,782 (2.8%) patients tested positive for SARS-CoV-2 (mean age 64 years, 44% female). Most facilities (68.5%) had 0 to 1 positive SARS-CoV-2 patient. We matched 2,379 SARS-CoV-2 positive cases to 2,379 non-SARS-CoV-2 controls; 1.30 % (95% CI: 0.90-1.87) of cases and 1.39 % (95% CI 0.97-1.97) of controls were exposed to a chair previously sat in by a shedding SARS-CoV-2 patient. Transmission risk among cases was not significantly different from controls (OR = 0.94; 95% CI: 0.57-1.54; p = 0.80). Results remained consistent in adjusted and sensitivity analyses. The study concluded that indirect patient-to-patient transmission of SARS-CoV2 infection from dialysis chairs was low.

Gianola et al.[59] conducted a cross-sectional study to explore the prevalence, personal- and work-related exposures, and signs and symptoms among physical therapists during the first wave of the COVID-19 pandemic in Italy from April to May 2020. A total of 15,566 respondents and of the physical therapists that received NPS testing, 13.1% (95% CI: 12.1–14.1%) had a positive result, with a peak reached in March 2020 (36%). Working in a health care institution (odds ratio [OR] = 12.0; 95% CI: 7.8–18.4), being reallocated to a different unit (OR = 1.9; 95% CI: 1.3–2.7) and changing job tasks (OR = 1.6; 95% CI: 1.2–2.3) increased the risk of being COVID-19 positive. The study authors found that working in a health care institution, being reallocated to a different unit, and changing job tasks might be risk factors associated with a positive diagnosis of COVID-19; being male with underlying disease was the main feature that characterized infected physical therapists aged older than 51 years. These associations should be confirmed by adequate cohort studies.

For Lidstrom et al.[42] see Hospitals under Healthcare.

Primary care

Froberg et al.[60] conducted a prospective cohort study in Stockholm, Sweden to explore SARS-CoV-2 infections among healthcare workers in healthcare settings outside the hospital. SARS-CoV-2 seropositivity was found among 12% (100/839) of healthcare workers, ranging from 0% to 29% between care units. Seropositivity decreased by age and was highest among healthcare workers. The study authors found that previous SARS-CoV-2 infections were common among younger healthcare workers in this setting. Pre-symptomatic infection was uncommon, in line with the strong variability in SARS-CoV-2 exposure between units. Prioritizing infection prevention and control including sufficient and adequate personal protective equipment, and vaccination for all healthcare workers are important to prevent nosocomial infections and infections as occupational injuries during an ongoing pandemic.

Residential and long-term care

Tang et al.[62] conducted a prospective cohort study to investigate care homes reporting a single suspected or confirmed case to assess whether early mass testing might reduce risk of transmission during the pandemic in London, UK. Four care homes were investigated. SARS-CoV-2 positivity was 20% (65/333) overall, ranging between 3-59%. Among residents, positivity ranged between 3-76% compared to 3-40% in staff. Half of the SARS-CoV-2 positive residents (23/46, 50%) and 63% of staff (12/19) reported symptoms within 14 days before or after testing. Repeat testing eight days later in two care homes with the highest infection rates identified only two new cases. Genomic analysis demonstrated a small number of introductions of the virus into care homes, and distinct clusters within three of the care homes. The study authors concluded that during periods of continuous community SARS-CoV-2 transmission, care homes are extremely vulnerable to large outbreaks.

For Froberg et al.[60] see Primary Care.

Sports and activities

Sports

Schreiber et al.[69] conducted a cross-sectional study to investigate the risk of transmission among potentially infectious SARS-CoV-2-positive football players while participating in training or matches at amateur, youth, and professional levels in Germany. The authors found that out of 1247 identified football matches and training sessions (1071 amateur and youth level, 176 professional level), 104 cases (38 training sessions, 66 matches) with 165 potentially infectious players were detected. Follow-up PCR testing at the professional level (44 cases) revealed no transmission. At the amateur and youth level, the combination of partial PCR testing (31 of 60 cases) and symptom monitoring within 14 days postexposure (46 of 60 cases) identified 2 of 60 matches in which follow-up infections occurred that were attributed to non-football activities. This is consistent with the video analysis of 21 matches demonstrating frontal contacts were <1 per player-hour (88%, 30 of 34 players), each lasting no longer than 3 seconds. Given these findings, the study authors concluded that in both football matches and training, the on-field transmission risk of SARS-CoV-2 is very low throughout amateur, youth and professional football (based on data from a nationwide registry), and sources of infection in football players are most likely not related to activities on the pitch.

Transportation

Modes of transportation

For Lentz et al.[26] see Hospital under Healthcare.

Workplaces

Salesperson

Lan et al.[81] conducted a cross-sectional study to evaluate SARS-CoV-2 infection and exposure risks among grocery retail workers in the USA and to investigate their mental health during the pandemic. The study found that among 104 employees tested, 21 (20%) had positive viral assays. Seventy-six per cent positive cases were asymptomatic. Employees with direct customer exposure had an odds ratio of 5.1 (95% CI: 1.1 to 24.8) being tested positive for SARS-CoV-2 after adjustments. Overall, in this single store sample, the authors found a considerable asymptomatic SARS-CoV-2 infection rate among grocery workers. Employees with direct customer exposure were five times more likely to test positive for SARS-CoV-2.

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