Health Information and Quality Authority

An tÚdarás Um Fhaisnéis agus Cáilíocht Sláinte

Protocol: What activities or settings are associated with a higher risk of SARS-CoV-2 transmission?

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Purpose and aim

The purpose of this protocol is to outline the process by which the Health Information and Quality Authority (HIQA) will synthesise evidence to inform advice from HIQA to the National Public Health Emergency Team (NPHET). The advice will take account of expert interpretation of the evidence by HIQA's COVID-19 Expert Advisory Group. This evidence synthesis was requested by NPHET to address the following policy issue:

"Emerging evidence in relation to what constitutes higher risk areas, activities or workplaces in regard to transmission of COVID-19"

The following research question was formulated to inform this policy issue:

"What activities or settings are at a higher risk of SARS-CoV-2 transmission?"

1. Process outline

A standardised approach to the process has been developed and documented to allow for transparency and to aid in project management. Five distinct steps have been identified in the process for completion. These are listed below and described in more detail in Sections 2.1-2.5.

1. Search relevant sources
2. Screen identified studies
3. Data extraction and quality appraisal of included studies
4. Data synthesis
5. Summarise findings.

2. Review process

This review will address the following research question (RQ):

What activities or settings are at a higher risk of SARS-CoV-2 transmission?

This RQ was formulated using the PCEOS (population, comparator, exposure, outcomes, study type) framework as detailed in Table 1.

Table 1. PCEOS for research question "What activities or settings are at a higher risk of SARS-CoV-2 transmission?"

Population	Individuals of any age with a laboratory-confirmed diagnosis of COVID-19, using RT-PCR.
Comparator population (if relevant)	Individuals of any age, tested with RT-PCR, in whom SARS-CoV-2 ribonucleic acid (RNA) was not detected. Control group must be matched by important covariates (for example, age and sex) to the case group.
Exposure	▪ any setting (including household, health and social care, and workplace settings) ▪ any activity.
Outcomes	▪ Number of cases and contacts, per activity or setting. ▪ Number of clusters[‡], outbreaks[†] or super-spreading events[¥], per activity or setting. ▪ Risk of infection with SARS-CoV-2, per activity or setting.
Types of studies	**Include:** ▪ Evidence syntheses of outbreaks, clusters or super-spreading events (including syntheses of media reports). ▪ National or regional retrospective contact tracing studies ▪ Observational studies with a comparator group that aim to estimate the risk of transmission in various settings (for example, case-control studies, cohort studies). ▪ Prospective contact tracing studies that use data from cases and non-cases to estimate the risk of onward transmission in different settings or due to different activities. **Exclude:** ▪ Evidence syntheses without a defined search strategy. ▪ Studies with no information on the setting or activity where transmission occurred. ▪ Studies that do not investigate the source of 'community transmission'.[°] ▪ Studies that do not investigate potential sources of transmission up to 14 days prior to symptom onset or diagnosis (in line with the WHO incubation period).[(1)] ▪ Studies with information on travel-related transmission only.

	▪ Ecological studies that examine the trajectory of the pandemic after policy changes, as these are subject to ecological fallacy. ▪ Mathematical modelling studies. ▪ Individual outbreak/cluster descriptive studies. ▪ Individual media reports. ▪ Editorials/opinion pieces/guidance documents. ▪ Animal studies.

†Clusters are defined as two or more test-confirmed cases of COVID-19 among individuals associated with a specific setting with illness onset dates within a 14-day period.[2]
‡Outbreaks are defined as two or more test-confirmed cases of COVID-19 among individuals associated with a specific setting with illness onset dates within a 14-day period, when there is an epidemiological link between cases, or the absence of local community transmission to explain an alternative source of infection.[2]
¥Super-spreading events are defined as events that transmit infection to a larger number of individuals than is usual.[3]
°Community transmission is defined as the inability to relate confirmed cases through chains of transmission for a large number of cases, or by increasing positive tests through routine screening of sentinel samples or by multiple unrelated clusters in an area.[4]

2.1 Search relevant sources

The search process will aim to identify the best available evidence to determine what activities or settings are at a higher risk of SARS-CoV-2 transmission. The search will include both academic literature as well as epidemiological reports from national public health bodies and ministries of health.

The following electronic databases will be searched using the search strategy defined in Appendix 1:

- PubMed
- Embase
- Europe PMC
- NHS Evidence.

The public health agencies and governmental departments listed below, will also be searched. The agencies listed below will be reviewed, to identify 'enhanced retrospective contact tracing' data, (also called 'source finding' data), at a national or regional level, or relevant evidence syntheses. These 'enhanced retrospective contact tracing' data, describe where known cases of COVID-19 possibly acquired their infection. The countries listed below were selected primarily due to their relevance to the Irish context (in terms of geography, healthcare system, high-income status) and or awareness of 'enhanced retrospective contact tracing' practices. Guidance documents, such as frameworks, principles and recommendations, without any underpinning evidence will not be included. Reports that do not provide information on the potential source of 'community transmission'

will not be included. In other words, the potential source of infection up to 14 days prior to the diagnosis of COVID-19 or symptom onset, must be investigated, in order to meet inclusion criteria.

International public health bodies

- World Health Organization (WHO)
  - https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance-publications?healthtopics=b6bd35a3-cf4f-4851-8e80-85cb0068335b&publishingoffices=aeebab07-3d0c-4a24-b6ef-7c11b7139e43&healthtopics-hidden=true&publishingoffices-hidden=true
- European Centre for Disease Prevention and Control (ECDC)
  - https://www.ecdc.europa.eu/en/search?s=&sort_by=field_ct_publication_date&sort_order=DESC&f%5B0%5D=diseases%3A2942

United Kingdom

- England (Public Health England (PHE); National Health Service (NHS))
  - https://www.gov.uk/government/collections/coronavirus-covid-19-list-of-guidance
  - https://www.nhs.uk/conditions/coronavirus-covid-19/
- Scotland (Health Protection Scotland; Scottish Government)
  - https://www.hps.scot.nhs.uk/a-to-z-of-topics/covid-19/
  - https://www.gov.scot/coronavirus-covid-19/
- Northern Ireland (Public Health Agency)
  - https://www.publichealth.hscni.net/
- Wales (Government of Wales; Public Health Wales)
  - https://gov.wales/coronavirus
  - https://phw.nhs.wales/

Other European countries

- Belgium (The Federal Public Service (FPS); Sciensano)
  - https://www.info-coronavirus.be/en/
  - https://www.sciensano.be/en
- Denmark (The Danish Health Authority)
  - https://www.sst.dk/en/english/corona-eng
- France (Haute Autorité de Santé; Ministry of Solidarity and Health)
  - https://www.has-sante.fr/
  - https://solidarites-sante.gouv.fr/
- Germany (Federal Ministry of Health; Robert Koch-Institut (RKI))
  - https://www.zusammengegencorona.de/en/

  - https://www.rki.de/DE/Home/homepage_node.html;jsessionid=7369113763F70FFEA492C1C6C059E409.internet052
- Italy (Ministry of Health)
  - http://www.salute.gov.it/portale/nuovocoronavirus/homeNuovoCoronavirus.jsp
- Norway (Norwegian Institute of Public Health (NIPH))
  - https://www.fhi.no/en/id/infectious-diseases/coronavirus/
- Spain (Ministry of Health, Consumer Affairs and Social Welfare)
  - https://www.mscbs.gob.es/profesionales/saludPublica/ccayes/alertasActual/nCov/documentos.htm
- Sweden (The Public Health Agency of Sweden)
  - https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/
- Switzerland (Federal Office of Public Health (FOPH))
  - https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov.html
- The Netherlands (National Institute for Public Health and the Environment)
  - https://www.rivm.nl/en/novel-coronavirus-covid-19

North America

- Canada (Government of Canada)
  - https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents.html
- United States (US) (Centers for Disease Control and Prevention (CDC))
  - https://www.cdc.gov/coronavirus/2019-ncov/whats-new-all.html

Australasia

- Australia (Department of Health)
  - https://www.health.gov.au/
- New Zealand (NZ) (Ministry of Health)
  - https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus

Asia

- Singapore (Ministry of Health)
  - https://www.moh.gov.sg/covid-19/
- South Korea (Korea Disease Control and Prevention Agency (KDCA)
  - http://www.cdc.go.kr/cdc_eng/
- Japan (Ministry of Health, Labour and Welfare)

- https://www.mhlw.go.jp/english/

2.2 Screen identified studies

All potentially eligible papers identified in the search strategy will be exported to covidence (www.covidence.org) and single screened against the PCEOS (population, comparator, exposure, outcome, study design) framework (Table 1). No language restrictions will be applied. Non-English studies will be translated via Google translate, and this will be noted as a potential caveat. Full text papers will be single screened against the PEOS framework, with any uncertainty checked by a second reviewer.

To avoid duplication and hence potentially overstating the evidence, any comparative observational study or national/regional epidemiological analysis that has already been encompassed in an included evidence synthesis, will not be included again as a separate study.

2.3 Data extraction and quality appraisal of included studies

For each study included, data on the study design, participant demographics and relevant outcome data will be extracted by one reviewer and cross-checked by a second reviewer. This will be conducted in a predefined Microsoft Word file under the following headings, as highlighted in Appendix 2:

- study descriptors
- participant demographics
- setting or activity
- number of index cases and close contacts
- secondary attack rate
- number of clusters/outbreaks/super-spreading events, per setting or activity (if synthesed evidence)
- risk of infection (if comparative observational study).

Where available, information from the 'Review of restrictive public policy measures to limit the spread of COVID-19' report which was conducted by HIQA, will be extracted to provide context for the degree of relevant restrictions that were in place in particular countries at the time of data collection. This will not be conducted for evidence syntheses where data from multiple countries are collated and or where the date of data collection is unknown. Furthermore, where information on the level of restrictions for particular countries, are not reported in the review of restrictive measures, these data will not be searched de-novo for the purpose of this review question, given time and resource constraints.

A range of study designs are likely to be included in this evidence summary (such as systematic reviews, cross-sectional, case-control and cohort studies) and hence a range of quality appraisal tools are required. For consistency, the appropriate quality appraisal tool from the suite of tools developed by the Joanna Briggs Institute will be used.[5]

Data from pre-print publications may contain errors and or older data, which may be corrected and or updated when the final published version becomes available in a peer-reviewed journal. Prior to the final version of this evidence summary being published on the HIQA website, pre-print publications will be checked to identify if final published versions have become available since the original search was conducted. Any discrepancies identified will be corrected.

2.4 Data analysis

Given the likely heterogeneity of included study designs and outcomes, a quantitative synthesis of the data will not be conducted. Hence, a narrative synthesis will be undertaken, describing the findings at the various levels of evidence. That is, evidence syntheses firstly, national/regional epidemiological analyses secondly and comparative observational studies thirdly.

2.5 Summarise findings

A summary of the findings will be drafted with all extracted data presented in the report.

3. Evidence to Advice

Following completion of this evidence synthesis, and in conjunction with input from the expert advisory group, advice will be generated. A document outlining the key findings of the evidence synthesis, expert input from the EAG and the resultant advice will be provided to NPHET for consideration.

4. Quality assurance process

The review question will be led by a experienced systematic reviewer. A number of second reviewers will be assigned to assist and to provide cover in the event of illness. The second reviewers will be required to read all the key studies and check that the evidence reports accurately reflect the body of literature. The summary will be reviewed by a senior member of the team, to ensure processes are followed and quality maintained, this will also enable cover to be maintained.

Appendix 1

Search strategy for "What activities or settings are at a higher risk of SARS-CoV-2 transmission?"

	PubMed
1	"coronavirus"[MeSH Terms] OR "coronavirus infections"[MeSH Terms] OR "coronavirus"[All Fields] OR "covid 2019"[All Fields] OR "SARS2"[All Fields] OR "SARS-CoV-2"[All Fields] OR "SARS-CoV-19"[All Fields] OR "coronavirus infection"[All Fields] OR "severe acute respiratory"[All Fields] OR "pneumonia outbreak"[All Fields] OR "novel cov"[All Fields] OR "2019ncov"[All Fields] OR "sars cov2"[All Fields] OR "cov2"[All Fields] OR "ncov"[All Fields] OR "covid-19"[All Fields] OR "covid19"[All Fields] OR "coronaviridae"[All Fields] OR "corona virus"[All Fields] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]
2	(cluster[Title] OR clusters[Title]) NOT ("randomised controlled"[Title] OR "Randomized controlled"[Title] OR RCT[Title] OR "randomised trial"[Title] OR "randomized trial"[Title] OR "clinical trial"[Title])) OR (outbreak[Title] OR outbreaks[Title])) OR ("high risk activity"[Title/Abstract])) OR ("high risk setting"[Title/Abstract])) OR ("transmission event"[Title/Abstract])) OR (superspread*[Title/Abstract])) OR (super-spread*[Title/Abstract])) OR ("community exposure"[Title/Abstract])) OR ("source finding"[Title/Abstract])) OR (enhanced[Title/Abstract] AND "contact tracing"[Title/Abstract])) OR (backward[Title/Abstract] AND "contact tracing"[Title/Abstract])) OR (retrospective[Title/Abstract] AND "contact tracing"[Title/Abstract])) OR ("Contact Tracing"[Majr])
3	#1 AND #2
4	"animals"[MeSH Terms] NOT "humans"[MeSH Terms]
5	#3 NOT #4
6	Limit to 2020-2021
	EMBASE
1	'coronavirus'/exp OR coronavirus:ti,ab,de,kw OR 'coronavirus infection'/exp OR covid19:ti,ab,de,kw OR 'covid 19':ti,ab,kw OR 'covid-19' OR 'covid 2019' OR 'sars cov 2':ti,ab,kw OR '2019 ncov':ti,ab OR 'novel coronavirus':ti,ab,kw
2	((cluster:ti OR clusters:ti) NOT ('randomised controlled':ti OR 'randomized controlled':ti OR rct:ti OR 'randomised trial':ti OR 'randomized trial':ti OR 'clinical trial':ti) OR outbreak:ti OR outbreaks:ti OR 'high risk activity':ti,ab OR 'high risk setting':ti,ab OR 'transmission event':ti,ab OR 'transmission risk':ti,ab OR superspread*:ti,ab OR 'super spread*':ti,ab OR 'community exposure':ti,ab OR 'source finding':ti,ab OR ('enhanced':ti,ab AND 'contact tracing':ti,ab) OR ('backward':ti,ab AND 'contact tracing':ti,ab) OR ('retrospective':ti,ab AND 'contact tracing':ti,ab) OR 'contact tracing'/mj
3	#1 AND #2
4	Limit to 2020-2021

5	'animal'/exp NOT 'human'/exp
6	#4 NOT #5
7	#6 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)
	Europe PubMed Central
1	(coronavirus OR covid-19 OR "covid 19" OR "SARS-CoV-2") AND ("high risk activity" OR "high risk setting" OR "transmission event" OR "transmission risk" OR superspread* OR "super-spread*" OR "community exposure" OR "source finding" OR "retrospective contact tracing" OR "enhanced contact tracing" OR "backward contact tracing") AND (SRC:PPR) AND (FIRST_PDATE:2020)
	NHS Evidence
1	(coronavirus OR covid 19 OR "covid 19" OR "SARS CoV 2") AND (clusters OR outbreaks OR "high risk activity" OR "high risk setting" OR "transmission event" OR "transmission risk" OR superspread* OR "super spread*" OR "community exposure" OR "source finding" OR "retrospective contact tracing" OR "enhanced contact tracing" OR "backward contact tracing")
2	Limit to 2020, secondary evidence and primary research.

Appendix 2

Template data extraction

Study descriptors	Population characteristics	Primary outcome	Restrictive measures
Author/organisation Country DOI Study design Date of data collection	Sample size Setting or activity Patient demographics	Number of cases and contacts Number of clusters, outbreaks or super-spreading events Risk of infection with SARS-CoV-2	Information of what relevant restrictive measures were in place at time of data collection

References

1. World Health Organization. Coronavirus disease 2019 (COVID-19): Situation Report – 73 2020 [updated 2 Apr 2020; cited 2020 12 Oct]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7_6#:~:text=The%20incubation%20period%20for%20COVID,infected%20persons%20can%20be%20contagious.
2. Public Health England. COVID-19: Epidemiological definitions of outbreaks and clusters in particular settings 2020 [updated 16 Sep 2020; cited 2020 9 Oct]. Available from: https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/epidemiological-definitions-of-outbreaks-and-clusters-in-particular-settings.
3. Al-Tawfiq JA, Rodriguez-Morales AJ. Super-spreading events and contribution to transmission of MERS, SARS, and SARS-CoV-2 (COVID-19). Journal of Hospital Infection. 2020;105(2):111-2.
4. World Health Organization. Coronavirus disease 2019 (COVID-19): Situation Report – 80 2020 [updated 9 Apr 2020; cited 2020 12 Oct]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200409-sitrep-80-covid-19.pdf.
5. Joanna Briggs Institute. Critical Appraisal Tools 2020 [cited 2020 9 Oct]. Available from: https://joannabriggs.org/critical-appraisal-tools.

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