

Covid-19

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2474

Covid-19: breaking the chain of household transmission

We urgently need new measures to protect household contacts

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The UK is one of the countries most severely affected by covid-19. Recent outbreaks in

English towns such as Oldham, predominantly probably involving transmission within large

multigenerational households [consider using “probably” instead of “predominantly”?

I’m not sure there’s hard evidence of this yet], show the importance of getting the right public health measures in place now to prevent more widespread surges in infections.¹

[meaning correct?]

Current test and trace policies have mainly focused on preventing spread in care homes, hospitals, and in the community [OK?].² However, contact within households is thought to be responsible for roughly 70% of SARS-CoV-2 transmission when widespread community control measures are in place.³ [OK? correct?] In Wuhan, the reproduction number (R) dropped from 3.54 to 1.18 after lockdown and cordon sanitaire. But the epidemic was only brought under complete control when Fangcang (field) hospitals were introduced to isolate cases outside the home, with R dropping to 0.51 after two weeks.⁴

Current UK guidance advises household contacts to isolate within the same home as the index case for 14 days.⁵ [OK?] They make up the majority of contacts for infected individuals and are likely to remain exposed to the infected household member during this period of isolation.⁶ Despite guidance advising household members to socially distance, contacts are likely to interact repeatedly—during mealtimes, for example—and to share facilities such as bathrooms.

Comment [SH(oAHR1): Agree

Comment [SH(oAHR2): Yes

Comment [SH(oAHR3): Yes

Comment [SH(oAHR4): Yes

Comment [SH(oAHR5): Yes

We know that transmission is more likely to occur indoors than outdoors.⁷ [ok?] The cumulative risk to household contacts from an infected person is likely to be substantial during peak viral shedding. In one study in New York State, 38% of household contacts tested positive for SARS-Cov-2, and similar secondary infection rates have been reported in China.^{8,9} Transmission ~~is likely to may~~ be even higher among household contacts of essential workers who are at greater risk of being infected than the general population.¹⁰ [Why is transmission more likely? Why would an infected essential worker be more likely than any other infected individual to transmit to a household member?]

Comment [SH(oAHR6)]: Yes

Household members who are older, have underlying medical conditions, or share a bed or a-vehicle with the index case are the most susceptible.^{9,11,12} Children seem to be at lower risk of being infected,¹³ ~~but~~ However, their stool samples and nasopharyngeal swabs can remain positive for SARS-CoV-2 for more than two weeks after symptom resolution,¹⁴ although their role in transmission remains to be established.¹⁴ [please clarify meaning here. Are children at lower risk of infection? Or at lower risk of worse outcomes from infection? Are children particularly risky index cases because they shed for longer than adults?]

Comment [SH(oAHR7)]: Essential workers are more likely to be infected than the rest of the population so they are more likely to be a source of secondary household transmission.

Governments should consider new [ok?] public health measures to prevent household transmission as we prepare for a potential second wave. Household quarantine is likely to remain an important pandemic control measure, and government support for people quarantined at home is conspicuously absent in the UK; this position has been challenged by independent experts [OK?].¹⁵

Comment [SH(oAHR8)]: I hope the above changes clarify this.

Comment [SH(oAHR9)]: Yes, although “robust” would also be a good word to use in place of “new”.

Comment [SH(oAHR10)]: Yes

Effective isolation

Effective isolation of index cases from household members could reduce secondary infections.¹² Wearing masks within quarantined households may help, particularly if used by the index case as soon as infection is suspected.¹⁶ The World Health Organization recommends that infected people and unavoidable close contacts, particularly those in vulnerable groups, should wear medical masks [medical grade masks? Or just regular face coverings?], but Public Health England does not currently recommend this. Other measures that should be considered (and evaluated) include clear advice on enhanced personal hygiene, cleaning and disinfecting shared toilets and other common spaces, door handles, ~~and other common spaces and touch points,~~ and as well as staggering ~~meal times~~ mealtimes. [is this what you mean?]

Comment [SH(oAHR11)]: WHO recommend infected people to wear a medical grade mask but do not specify which type of mask household contacts should use. They do state that people over 60 years or those with underlying comorbidities should also wear a medical mask in settings where physical distancing and increased risk of infection cannot be achieved. ([https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak))

Comment [SH(oAHR12)]: Yes

Comment [SH(oAHR13)]: Yes

People who are unable to self-isolate safely at home [meaning correct?] could be accommodated in special isolation facilities such as hotels and hostels, an approach adopted

by some other countries, including Italy, Finland, and Lithuania.¹⁷ In China, field hospitals were created to manage **and strictly isolate [and isolate?]** patients with mild-to-moderate covid-19.¹⁸ Nightingale hospitals in the UK could be similarly repurposed to support isolation of infected people with mild-to-moderate disease **[also those who are asymptomatic?]**. As medical and nursing care needs are mostly modest, the cost would be relatively low. However, such a system depends on access to rapid testing for anyone with symptoms or possible exposure so that infection can be confirmed and isolation started before transmission occurs **[meaning correct?]**. It would also require public trust that isolation in these facilities would be voluntary, safe, and supportive.

Important questions about household transmission remain. Research should be done to identify the determinants of household transmission **[ok?]** and the optimal strategies for isolating cases and protecting household contacts. These strategies will be particularly important for those at higher risk of adverse outcomes, including ethnic minority communities, people in low income households, and those living in urban areas with overcrowded housing. **[OK? We shouldn't conflate low socioeconomic status with ethnicity]**.

Until an effective vaccine is widely available, strategies to prevent household transmission and to support those in quarantine will be vital and should be a core part of any government's strategy. It is high time that the UK government amend its mantra of "test and trace" to "test, trace, isolate, and support."

Competing interests: We have read and understood BMJ policy on declaration of interests and declare the following interests: **None [list them or state "none"]**

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<eref>1 Oldham takes measures to avoid full coronavirus lockdown. *Guardian* 2020 Jul 28. <https://www.theguardian.com/uk-news/2020/jul/28/oldham-greater-manchester-takes-measures-to-avoid-full-coronavirus-covid-19-lockdown></eref>

<eref>2 UK Government. COVID-19: number of outbreaks in care home—management information, 7 Jul 2020. <https://www.gov.uk/government/statistical-data-sets/covid-19-number-of-outbreaks-in-care-homes-management-information> </eref>

<jrn>3 Shen M, Peng Z, Guo Y, et al. Assessing the effects of metropolitan-wide quarantine on the spread of COVID-19 in public space and households. *Int J Infect Dis* 2020;96:503-5. [PubMed doi:10.1016/j.ijid.2020.05.019](https://pubmed.ncbi.nlm.nih.gov/32311111/)</jrn>

<jrn>4 Hao X, Cheng S, Wu D, Wu T, Lin X, Wang C. Reconstruction of the full transmission dynamics of COVID-19 in Wuhan. *Nature* 2020. [Epub ahead of print.] [PubMed doi:10.1038/s41586-020-2554-8](https://pubmed.ncbi.nlm.nih.gov/32311111/)</jrn>

<eref>5 UK Government. COVID-19: guidance for households with possible coronavirus infection. 7 July 2020. <https://www.gov.uk/government/publications/covid-19-stay-at-home-guidance></eref>

Comment [SH(oAHR14): I don't think there is any experience or evidence to support housing asymptomatic SARS-CoV-2 positive individuals in a hospital. How asymptomatic individuals should be isolated remains a grey area but I suspect either home quarantine or quarantine in a non-medical facility, such as a specially purposed hotel or hostel, would be appropriate.

Comment [SH(oAHR15): Yes

Comment [SH(oAHR16): Yes

Comment [SH(oAHR17): Agree

<jrn>6 Yu H-J, Hu Y-F, Liu X-X, et al. Household infection: The predominant risk factor for close contacts of patients with COVID-19. *Travel Med Infect Dis* 2020;36:101809. [PubMed doi:10.1016/j.tmaid.2020.101809](https://pubmed.ncbi.nlm.nih.gov/doi/10.1016/j.tmaid.2020.101809/)</jrn>

<unknown>7 Nishiura H, Oshitani H, Kobayashi T, et al. Closed environments facilitate secondary transmission of coronavirus disease 2019 (COVID-19). *medRxiv* 2020.02.28.20029272. [Preprint.] 2020. doi:10.1101/2020.02.28.20029272</unknown>

<jrn>8 Rosenberg ES, Dufort EM, Blog DS, et al; New York State Coronavirus 2019 Response Team. Covid-19 testing, epidemic features, hospital outcomes, and household prevalence, New York State—March 2020. *Clin Infect Dis* 2020;ciaa549. [PubMed doi:10.1093/cid/ciaa549](https://pubmed.ncbi.nlm.nih.gov/doi/10.1093/cid/ciaa549/)</jrn>

<jrn>9 Wu J, Huang Y, Tu C, et al. Household transmission of SARS-CoV-2, Zhuhai, China [PubMed.]. *Clin Infect Dis* 2020 [Epub ahead of print.] [PubMed](https://pubmed.ncbi.nlm.nih.gov/)</jrn>

<unknown>10 McDade TW, McNally E, Zelikovich A, et al. High seroprevalence for SARS-CoV-2 among household members of essential workers detected using a dried blood spot assay. *medRxiv* 2020.06.01.20119602. [Preprint.] 2020. doi:10.1101/2020.06.01.20119602</unknown>

<jrn>11 Jing Q-L, Liu M-J, Zhang Z-B, et al. Household secondary attack rate of COVID-19 and associated determinants in Guangzhou, China: a retrospective cohort study. *Lancet Infect Dis* 2020:S1473-3099(20)30471-0. doi:10.1016/S1473-3099(20)30471-0. [PubMed](https://pubmed.ncbi.nlm.nih.gov/)</jrn>

<jrn>12 Li W, Zhang B, Lu J, et al. The characteristics of household transmission of COVID-19. *Clin Infect Dis* 2020;ciaa450; [Epub ahead of print.]. [PubMed](https://pubmed.ncbi.nlm.nih.gov/) doi:10.1093/cid/ciaa450</jrn>

<unknown>13 Dattner I, Goldberg Y, Katriel G, et al. The role of children in the spread of COVID-19: Using household data from Bnei Brak, Israel, to estimate the relative susceptibility and infectivity of children. *medRxiv* 2020.06.03.20121145. 2020. [Preprint.] doi:10.1101/2020.06.03.20121145</unknown>

<jrn>14 Mao L, Xu J, Xu ZH, et al. A child with household transmitted COVID-19. *BMC Infect Dis* 2020;20:329. [PubMed doi:10.1186/s12879-020-05056-w](https://pubmed.ncbi.nlm.nih.gov/doi/10.1186/s12879-020-05056-w/)</jrn>

<eref>15 Independent SAGE. COVID-19: what are the options for the UK? Recommendations for government based on an open and transparent examination of the scientific evidence. 2020. <http://www.independentsage.org/wp-content/uploads/2020/05/The-Independent-SAGE-Report.pdf>.</eref>

<jrn>16 Wang Y, Tian H, Zhang L, et al. Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. *BMJ Glob Health* 2020;5:e002794. [PubMed doi:10.1136/bmjgh-2020-002794](https://pubmed.ncbi.nlm.nih.gov/doi/10.1136/bmjgh-2020-002794/)</jrn>

<eref>17 How do measures for isolation, quarantine, and contact tracing differ among countries? Cross-country analysis. 19 May 2020. <https://analysis.covid19healthsystem.org/index.php/2020/05/19/how-do-measures-for-isolation-quarantine-and-contact-tracing-differ-among-countries/></eref>

<jrn>18 Chen S, Zhang Z, Yang J, et al. Fangcang shelter hospitals: a novel concept for responding to public health emergencies. *Lancet* 2020;395:1305-14. [PubMed doi:10.1016/S0140-6736\(20\)30744-3](https://pubmed.ncbi.nlm.nih.gov/doi/10.1016/S0140-6736(20)30744-3/)</jrn>