Reason for bringing to SAGE

What is the evidence for the effectiveness of hand hygiene in preventing the transmission of respiratory viruses?

Key conclusions

1. There is evidence from randomised controlled trials in community settings (e.g. household, school, University, workplace) that hand hygiene interventions can reduce the risk of respiratory infections.
2. The size of the effect is heterogenous. The most up to date meta-analysis of randomised trials of hand hygiene interventions reports a 16% reduction in acute respiratory infections (RR 0.84, 95% CI 0.82 to 0.86).[1]
3. It has been estimated that each extra hand hygiene event per day reduces daily transmission probability by about 3% (80% credible interval (-1%, 7%)).
4. Most studies assess the impact of hand hygiene on the frequency of unspecified acute respiratory infection or influenza like illness but there is one paper on seasonal coronaviruses, which concludes that moderate-frequency handwashing was associated with significantly reduced risk of contracting coronavirus.
5. The duration of viral persistence on hands is a key parameter that determines the effectiveness of hand hygiene. The shorter time the virus survives on hands, the less effective increasing hand hygiene frequency.
6. Event-prompted hand washing (e.g. within1 minute of touching a potentially contaminated surface) is likely to be more effective than fixed-time hand washing in reducing the probability of infection.
7. The importance of event prompted hand washing suggests the need to increase availability (and uptake) of hand washing/sanitising facilities in public places, shops, public transport and workplaces to allow rapid hand sanitation after touching potentially contaminated surfaces.
8. The effectiveness of hand hygiene is increased when combined with other measures, such as face masks. Combination measures are therefore most likely to be effective.
9. Achieving the full potential of hand hygiene will require multimodal interventions based on the science of transmission and behaviour change.

Recommendations for further studies

1. Experiments to assess virus pick up rates by fingers from various surfaces.
2. Experiments to attempt virus isolation on contaminated hands at different times points.
3. Field experiments of interventions in public spaces to increase hand hygiene behaviours including use of hand washing and sanitising facilities

The evidence for hand hygiene to prevent transmission of respiratory infections.

1. Viable SARS-CoV-2 persists for up to 72 hours on common surface materials indoors.[2] At 24^{o} C the half-life for SARS-CoV-2 dried onto stainless steel in simulated saliva was 14.5 hours at 20% relative humidity (RH), 7.1 hours at 60% RH and 8.3 hours at 80% RH demonstrating the stability of the virus in indoor environments. Increasing temperature and RH decreased the half-life (1.1 hours at 35^{o} C and 65% RH).[i]

2. Outdoor surfaces exposed to sunlight are lower risk for virus transmission. Solar radiation modelling of London conditions based on laboratory data calculated a decimal reduction of virus viability of 30 minutes at summer solstice, 77 minutes at the autumnal equinox and 177 minutes at vernal equinox. In winter conditions there will be no significant increased viability compare to indoor conditions.[3]

3. Infectious virus is readily transferred from environmental surfaces to hands upon contact.[4] The amount transferred depends on the surface, the particular pathogen, the environmental conditions and the area of touch.[5]

4. Preliminary data from a PHE study of anosmia cases has detected SARS-CoV-2 RNA on the hands of three COVID-19 early symptomatic patients at between 6.7 x 10^2 and 3.2 x 10^3 gene copies per hand swab.

5. Studies suggest that we touch our faces about 20 times per hour.[6] Mechanistic models suggest that some of these contacts could transfer an infectious dose of virus onto oral, nasal or ocular mucosa (see Appendix 3).

6. There is evidence to suggest that SARS-CoV-2 can be transmitted via hands and contaminated surfaces.[7] However, the relative contribution to SARS-CoV-2 transmission of direct contact compared to droplet and aerosol is not known.

7. Randomized controlled trials on the effect of hand hygiene on respiratory tract infections in community settings have been evaluated in at least four meta-analyses.

    a. Aiello *et al* found that the proportion of respiratory illness prevented by all hand hygiene interventions combined was 21% (95% confidence interval 5, 34%).[8]

    b. Warren-Gash *et al* reported high quality evidence of reducing respiratory infection in low-income settings, but not in households with an infected index case.[9]

    c. Wong *et al* reported a 22% reduction in risk of influenza-like illness (95% confidence interval 10, 32%) in studies of hand hygiene interventions with or without face masks, and a 15% reduction (95% confidence interval -4, 29%) when the intervention was hand hygiene alone.[10]

    d. Al-Ansary et al reported a 16% relative reduction in the number of participants with ARI (RR 0.84, 95% CI 0.82 to 0.86) in the intervention group.

[i] EMG-Survival of SARS-CoV-2 in the Environment, SAGE-EMG paper, 12th May 2020

'When we considered the more strictly defined outcomes of ILI and influenza, the RR for ILI was 0.98 (95% CI 0.85 to 1.14), and for influenza the RR was 0.91 (95% CI 0.61 to 1.34)'.[1]

7. Most data are from influenza like illness but there is one paper on coronaviruses, which concludes 'moderate-frequency handwashing (6-10 times per day) predicted a lower personal risk of coronavirus infection (adjusted incidence rate ratio (aIRR) =0.64, *p*=0.04). There was no evidence for a dose-response effect of handwashing, with results for higher levels of hand hygiene (>10 times per day) not significant, although there were few people who washed their hands > 10 times a day. (aIRR =0.83, *p*=0.42).'[11]

8. A meta-analysis of 7 SARS CoV case control studies, primarily amongst health-care workers, also showed a protective effect of frequent hand hygiene (OR 0.54, 95% CI 0.44 to 0.67) . The effect was of a lower magnitude than simple mask use (OR 0.32, 95% CI 0.26 to 0.39). The greatest protective effect was seen with a combination of mask use, gown use, glove use and hand washing (OR 0.09, 95% CI 0.02 to 0.35).[12]

9. An unpublished study analyzing six RCTs (one with low risk of bias, two with some concerns and three with high risk of bias) using Bayesian meta-regression techniques reports a single additional hand hygiene event with soap and water or alcohol-based hand rub was associated with a reduction in the daily risk of infection of just over 3%, with 80% credible interval (-1%, 7%) (see appendix 1).

10. The duration of viral persistence on hands is a key parameter that determines the effectiveness of hand hygiene. The shorter time the virus survives on hands, the less effective increasing hand hygiene frequency.[13]

11. Immediate hand washing after contamination is more effective than hand washing at fixed-time intervals even when the total number of hand washing events is similar.[13]

12. Provision of hand washing/sanitising facilities in public places is necessary to facilitate hand hygiene, but doesn't guarantee use.[14] Interventions that might affect their use include their location, prevalence and messages (see appendix 2).[15]

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