2. The state of the evidence

2.1 The subgroup supported the ECDC group conclusions that the COVID-19 pandemic has illustrated a potential limitation of the application of the widely accepted transmission-based precautions. They also supported the following summary of the evidence in this regard:

2.1.1 Most respiratory viruses have been considered to be transmitted primarily through large droplets, thus indicating the use of droplet precautions such as the use of a medical face mask and eye protection.

2.1.2 Only a few pathogens such as *Mycobacterium tuberculosis* and the measles virus, have traditionally been considered to be transmitted through aerosols, necessitating the application of precautions against 'airborne transmission', including the use of respirators and isolation with negative pressure.

2.1.3 Based on the results of observational studies of SARS, respiratory viruses have also been considered to be transmitted through aerosols when procedures that are associated with increased production of infectious aerosols, such as intubation, are performed.

2.1.4 Emerging scientific evidence and revisiting previously available studies indicates that the distinction between droplets and aerosols is artificial, and the size thresholds for 'large droplets' and 'aerosols' are not fully consistent with the physical properties that are relevant for the transmission of respiratory viruses.

2.1.5 Evidence of the contribution of aerosols to the transmission of respiratory viruses, such as Influenza, has been available but aerosols have not been considered a primary route of transmission. However, accumulating evidence from the COVID-19 pandemic indicates that aerosols play a role in the transmission of SARS-CoV-2.

2.1.6 Evidence from some more recent, well conducted, aerosol studies indicates long range aerosol risk is low for SARS-CoV-2. Nonetheless the '3C' criteria in hospitals are met with high occupancy and whilst in Scotland planning was undertaken to ensure cohort wards for cases to be managed in were well ventilated, this is not always possible with the extant estate and current system pressures.

2.1.7 There remains a lack of convincing evidence on a difference in the protective effect of respirators compared to medical grade surgical masks against SARS-CoV-2 transmission, outside the situations covered in the extant IPC guidance, despite the better filtration efficacy of respirators.

2.1.8 Furthermore, there is evidence that aerosol-generating procedures may be related to increased risk of infection because of the proximity to the patient or other factors about the specific procedures, more than the increased generation of aerosols for some procedures. Given these uncertainties, there have been differences in 2 recommendations regarding transmission-based precautions for COVID-19 since the onset of the COVID-19 pandemic, with some countries opting for droplet precautions while other countries recommending airborne precautions for the routine care of COVID-19 patients.

2.1.9 Understanding the impact that airborne transport has on pathogens and the influence of environmental conditions on pathogen survival can inform the implementation of strategies to mitigate transmission of any respiratory virus. The risk that aerosols may transmit infection is influenced by a range of factors including the amount of virus in the particle, the speed and turbulence of emission, and properties of the ambient environment, solute concentration, pH and evaporative cooling. Although particles <10 mm may remain airborne for longer than larger respiratory droplets (>10 mm), in typical particle size distributions a relatively small portion of total volume are in this range. Establishing the risk of transmission of SARS-CoV-2 associated with respiratory aerosols therefore requires evidence derived from different study designs. Laboratory-based studies can only

provide evidence for part of the transmission process and demonstrate potential rather than actual routes of transmission, whereas clinical studies can provide evidence of actual transmission, although are more difficult to conduct and interpret.

From: [redacted]
Sent: [redacted]
To: [redacted]
Cc: [redacted]
Subject: RE: approach to Staff FRSM recommendations/ submission-update on approach and ask to consider wider points highlighted by smile free campaign by end of day Monday 25th July- if pos

Hi **[redacted]**

1. There is limited evidence that FRSMs provide source control and that they are effective for the prevention of transmission for asymptomatic individuals. This links to an argument that COVID-19 is aerosol rather than droplet for the main method of transmission – **[redacted].** They have provided evidence to support this claim and argue that SG are only focussing on WHO recommendations which do not consider wider research/ pieces of evidence. Evidence is listed below **[redacted].** The argument is that if evidence does not support FRSMs as source control then the negative impact they are having is not justified, fair or proportionate as the intervention is not evidence based. - **[redacted].**

Happy to discuss or provide further information if required to support your response.

Many thanks

[redacted]

Masks for healthcare workers to mitigate airborne transmission of SARS-CoV-2

Summary

We have summarised the evidence on SARS-CoV-2 transmission and mitigation in UK health and care settings, with a specific focus on small particle aerosols and healthcare worker (HCW) facemasks.

[Redacted]

- Improved understanding of aerosol risks supports the need for a greater consideration of this route of transmission within risk assessment and IPC strategies, including ensuring compliance with wearing of FRSM as source control by staff and patients (as far as possible) and paying specific attention to the effectiveness of ventilation in both clinical and non-clinical areas (medium confidence).

[Redacted]

[Redacted]

[Redacted]

Higher frequency of use of FFP3 masks by HCWs in intensive care units has sometimes been suggested as evidence that this element of PPE is a key determinant of HCW COVID-19 infection risk. [Redacted]

[Redacted]

[Redacted]

Estimating the importance of different routes of SARS-CoV-2 transmission in hospital settings

[Redacted]

Between group transmission

[Redacted]

- This is also supported by the Oxford data where universal application of FRSMs after 1 April 2020 was associated with reduced transmission from staff to patients.

[Redacted]

[Redacted]

[Redacted]

- Exhaled breath of 66 COVID-19 patients using facemasks detected viral RNA from 37%; 21 patients were asymptomatic at the time. Results suggest the amount of virus exhaled varies over 5 orders of magnitude. There is no evidence relating to particle size from this [21]

[Redacted]

[Redacted]

Infection prevention approaches and transmission routes

Transmission of respiratory diseases are conventionally classed as either airborne or droplet in a clinical context, and this determines the infection prevention measures. Pathogens classed as airborne require negative pressure isolation rooms with high ventilation rates and strict PPE controls including FFP3 masks, while those classed as droplet focus on barrier precautions including FRSM when within 1m. Single rooms are recommended where possible for diseases spread by droplet transmission, but there are no special requirements for ventilation.

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted] In one study in a community setting, face coverings may have been associated with risk compensation behaviour, for example with the public spending less time at home, more time in moderate to high-risk locations, and social distancing fatigue when living with a face mask mandate.[40] However, extrapolating such findings to healthcare settings is not possible. A number of other studies have shown no evidence for compensatory behaviour,[41] with neither hand washing nor physical distancing reduced in those wearing face coverings.[42]

[Redacted]

Although there is a lack of good evidence surrounding behaviours, compliance and comfort it is important to recognise that any increase in use of FFP3 would need to be accompanied by clear guidance and training for staff to minimise any of the risks highlighted here.

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

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Evidence base for extended use of facemasks

- There is a paucity of evidence specifically relating to the effectiveness of the extended use of facemasks and face coverings by staff in health and care settings beyond the delivery of direct patient care for the prevention of COVID-19 transmission. It is therefore not possible to determine via the extant literature, whether or not staff are at any less risk of COVID-19 acquisition by extended facemask use.
- There is also no evidence available to assess the effectiveness of mask wearing by asymptomatic individuals in preventing onward transmission in health and care settings.
- There is weak evidence to support the wearing of a facemask by an individual with a known or suspected infection spread by the airborne or droplet route to reduce onward transmission.

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