AIRBORNE SPREAD OF COVID-19
AND IMPLICATIONS FOR THE WORKPLACE

Dr Jonathan Fluxman 3 September 2020
Number of new UK deaths from COVID-19 per week

These are registered deaths where COVID-19 was mentioned on the death certificate, regardless of location (within 28 days since mid-Aug)

- Northern Ireland
- Scotland
- England and Wales

162 week ending 7th Aug
143 week ending 14th Aug

* Changed from weekly to monthly reporting. Next due 16 Sept
Number of new hospital admissions with COVID-19 per day in England

7-day rolling average stays flat

55 on 14th August

49 on 21st August
Number of new UK confirmed COVID-19 cases (people who have had a positive test)

New confirmed cases

7-day rolling average

Counting changed on 2nd July

1441 on 14th August

1522 on 27th August
The 3 methods of spread

- Aerosols
- Droplet
- Contact
Covid-19 is spread indoors

It's not only about 2m social distancing

Thanks to Dr Sayan Sen of the One Heart Clinic for image
Cough/Sneeze

Talking/Singing

3% > 50 μm  97% < 50 μm

1% > 50 μm  99% < 50 μm
Restaurant in Ghangzhou in China, late January

- Tables 1m apart
- ~1 hour contact time
- Room size large – this part of larger room
- Air flow from right to left

https://wwwnc.cdc.gov/eid/article/26/7/20-0764_article#tnF1
Choir practice in a hall in Washington State, early March

- 2.5 hours choir practice 61 people in a hall
  - × Social distancing not observed very well
  - ✓ Sanitiser at front door
  - ✓ No sharing of sheet music
  - ✓ No one symptomatic should attend

- Over next 4 days 53 people developed symptoms, 2 people died.

- Likely 1-2 “super-spreaders” responsible

- Time in enclosed space very important

Singing
Laughing
Shouting
Exercising
Coughing
Sneezing

These are high risk indoors in enclosed spaces
Call centre in Seoul, South Korea, early March

• 94 of 216 people infected over a period of 5 days (44%) by 1 person

• Note distance of infection spread

• Time in enclosed space very important

• All on one floor, apart from 1-2 people

https://wwwnc.cdc.gov/eid/article/26/8/20-1274_article
Figure 1. Epidemic curve of a coronavirus disease outbreak in a call center, by date of symptom onset, Seoul, Korea, 2020. Asymptomatic cases are excluded.
Coronavirus in Northampton, last eight weeks
Lab-confirmed cases by date of specimen

Seven-day average: 37

Data for the past few days may be revised
Source: Gov.uk dashboard, data as of 19 August 2020
Tönnies outbreak
In June, Germany

- 29/147 workers infected initial outbreak
- 60% of workers within an 8m radius infected
- secondary outbreak over 1500 workers becoming infected in the Tönnies factories overall
- This led to a lockdown of a large area in the North Rhine-Westphalia region in western Germany
Tönnies outbreak - how did infection spread?

- Accommodation and shared transport (carpool) looked at in detail
- Spread occurred in one apartment and one carpools from index case after quarantined
- “...our collective data strongly suggest that the majority of transmissions occurred within the beef processing facility, with (index) case B1 being at the root of the cluster.”

The company told NorthantsLive: “Public Health England has endorsed our measures as being ‘highly effective’ and have noted that we ‘continue to work extremely hard to exceed the requirements needed to be COVID-19 secure within the workplace’.

What happens when you don’t know about airborne spread of Covid-19, or you ignore the evidence for it, and when official guidance fails to recognise it:

“Through investigations by local Environmental Health Officers, Public Health England and NCC Public Health it is evident that Greencore has highly effective measures in place and they continue to work extremely hard to exceed the requirements needed to be COVID-19 secure within the workplace. As part of our processes to aid our understanding about how COVID-19 is being transmitted in the county, we undertake outbreak control meetings with employers, Trade Unions, various Public Health experts and communications partners. Insights provided by Trade Unions and employers has helped us identify activities and circumstances outside of the workplace that may be contributing to onward transmission of COVID-19, such as car sharing, congregation at smoking shelters and shared accommodation.”

The DPH added that there were "no red flags" in Greencore's premises and that PHN are now "pushing through" the messages relating to government guidelines.

Asked why the factory was not closed when the outbreak was first uncovered, she said: "All evidence is that the setting (factory) is not the risk factor."

Ventilation and air filtering

- Air exchange with fresh air is important
- CO2 level can be used as a proxy measure
- Portable air filters work quite well – spec is important but not very expensive

Aerosol scientists gurus on twitter:
- @jjlcoldorado
- @linseymarr
- @ShellyMBoulder
- @j_g_allen
- @Don_Milton
- @kprather88
A trade union programme

• Employers must recognise airborne spread as a covid-19 risk and take action to assess and minimise risk.

• Improved ventilation and airflow, installation of filtering devices, and use of face masks are required to reduce the infection risk in these environments, alongside other safety measures against Covid-19.

• Trade union supervision and control of workplace safety.

• Weekly surveillance testing on site of all workers, including management, in addition to easily accessible testing for anyone with symptoms or in contact with Covid-19.

• All workers forced to take time off due to having Covid-19 or having been in contact with it should receive full pay while isolating. No-one should have to work while awaiting test results for symptomatic or contact testing.
Masks reduce airborne transmission
Infectious aerosol particles can be released during breathing and speaking by asymptomatic infected individuals. No masking maximizes exposure, whereas universal masking results in the least exposure.

<table>
<thead>
<tr>
<th>Particle size (μm)</th>
<th>100</th>
<th>10</th>
<th>1</th>
<th>0.1</th>
</tr>
</thead>
</table>

- **Mask effectiveness**
  - MASKS WORK!
  - ~50% reduction in exhaling virus
  - ~30% reduction in inhaling virus
  - Average figures; if fit is good even better
  - Don’t take it off to talk!
  - Wear at all times indoors with other people NOT ONLY when you can’t social distance
  - 2-3 layers material better, but something always better than nothing

GRAPHIC: V. ALTOUNIAN/SCIENCE
What should I do myself

- Distancing - 2m or more
- Wear a face covering, and encourage others to
- Open all windows – mini-cabs, bus, train
- Avoid enclosed spaces with other people
- Avoid people who are being loud - >> 2m away
- Keep encounter time short in enclosed space
- Try not to touch your face
- Wash your hands when you get home

Good video about masks:
https://www.facebook.com/341163402640457/posts/3430149270408506/?vh=e
<table>
<thead>
<tr>
<th>Type and level of group activity</th>
<th>Low occupancy</th>
<th>High occupancy</th>
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<tbody>
<tr>
<td></td>
<td>Outdoors and well ventilated</td>
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<tr>
<td>Wearing face coverings, contact for short time</td>
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<tr>
<td>Silent</td>
<td><img src="https://www.bmj.com/content/370/bmj.m3223" alt="Green" /></td>
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<td><img src="https://www.bmj.com/content/370/bmj.m3223" alt="Red" /></td>
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Risk of transmission

- **Low**
- **Medium**
- **High**

* Borderline case that is highly dependent on quantitative definitions of distancing, number of individuals, and time of exposure.
Outdoors walking in the park >2m
Passing someone in the street >2m
Talking to someone outdoors >2m
Supermarket trip (people wearing masks)
Corner shop 2-3 mins
Outdoor gathering 10 people <2m
Football game 5-10 people in park
Small grocery shop, several people ~20 mins
Bus or tube commute 20-30 mins >2m
Taxi / Uber / minicab – windows closed, > 15 mins trip
Laughing, singing, shouting, coughing in enclosed space >2m apart
Indoor gym 30mins workout >2m apart
Small office, no windows, 3-4 people >2m apart

RISK FACTORS FOR SPREAD OF COVID-19

• Anyone can be infected; asymptomatic spread is common
• The distance you are from other people
• The number of people in any given place
• The amount of time you spend near to them
• What activity people are doing while in the space, eg sitting quietly, talking loudly, or coughing.
• The size of the space you and others are in
• The ventilation and airflow in the space you are in
• Are people wearing face covering or mask?
• Surface spread by touching.

And Do Not Talk Aloud So Very Much Sam
CONTACT SPREAD FROM SURFACES

Hands to mouth, nose or eyes – try to remember not to touch your face until you are back home and you have washed your hands.

Med students filmed during lectures – touched their faces 23 times per hour on average

Risky places for contact spread

• Bathrooms and toilets
• Public transport
• Shopping trolleys

Hand-washing and sanitiser use are important