



Public Health  
England

**NHS**

**Test and Trace**

# COVID-19 transmission patterns and the value of enhanced (backwards) contact tracing

Professor Isabel Oliver, Director National Infection Service, PHE & Senior Public Health Adviser to Trace, NHS Test and Trace

13 December 2020

Draft

OFFICIAL: SENSITIVE

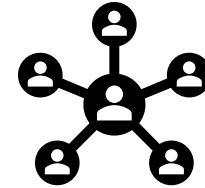
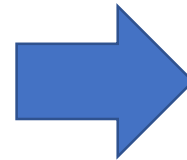
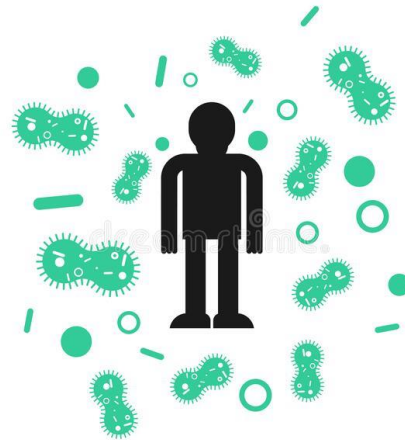
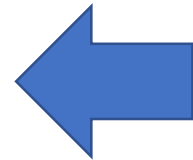
# The contribution of contact tracing to reducing transmission of SARS-CoV-2

The identification and isolation of cases and tracing and testing and quarantining their contacts is still the key public health intervention to reduce transmission of SARS-CoV-2



## Identify Sources of Transmission

- **Collect information** from cases to identify the source of infection
- **Provide information to target public health action** to break the chains of transmission
- **Support individuals, businesses and public services** to better understand and manage risks of COVID-19 transmission
- **Provide insights on risk factors** associated with transmission to inform policy and guidance



## Prevent Onwards Transmission

- **Advise the case** to get tested and isolate
- **Identify contacts more quickly** so they can be tested, and self-isolate swiftly where they test positive
- **Ensure effective isolation** through provision of support as needed

# Factors associated with transmission

## Heterogeneity

- Transmission of SARS-CoV-2 shows significant variation between cases (overdispersion) resulting in what has been referred to as super-spreading events
  - A small number of individuals (~10%) are responsible for a large proportion of infections (~80%)

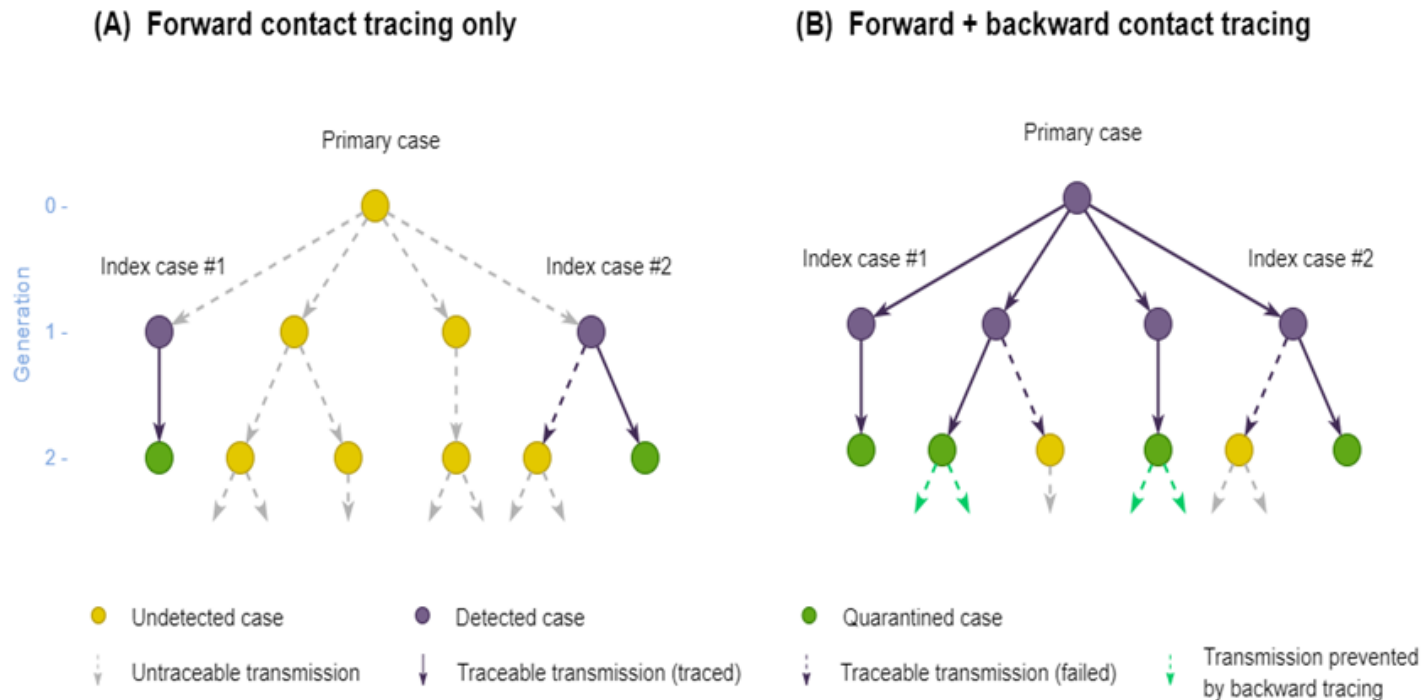
## Factors associated with transmission

- Transmission risk is influenced by contact patterns, environmental factors and socio-economic inequalities
- Transmission can take place in any setting but some settings facilitate greater risk of transmission due to a combination of environmental and behavioural factors (some settings may amplify transmission)
- Close proximity, prolonged contact, high frequency of contacts and confined shared environments are strongly associated with a higher risk of transmission
- Viral load is highest at the earliest stages of infection, which occurs around the time of symptom onset to day 5 of symptoms for symptomatic cases. Onward transmission risk is highest at this time.

# The implications for contact tracing

## Identify Sources of Transmission

- Larger clusters are likely to be detected through backward tracing in the presence of overdispersion
- It has been estimated that backward tracing typically increases in the overall effectiveness of contact tracing by a factor of 2-3
- Combination of forward and backward tracing optimal for control of community transmission (SAGE)



Source: Endo et al <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7610176/>

## Summary of factors associated with risk of transmission (NERVTAG / SAGE)

Factors associated with risk of transmission	Lowest risk of transmission	Highest risk of transmission
<b>Environmental factors</b>		
Proximity	Always maintain >2m	Regular close interaction < 1m
Duration	A few minutes or less	Several hours
Number of occupants	People spaced out, large space	People closely packed, small space
Shared air and Environmental conditions	Outdoors, well ventilated indoor Normal indoor temperature, humidity, fresh air	Indoors with poor ventilation, recirculated air Low temperature, low humidity
Viral emission	Passive activity, face coverings	Aerobic activity, singing, loud talking, no face covering
Shared surfaces	Rarely touch shared surfaces, good cleaning	Regular touching shared surfaces, infrequent cleaning
<b>Human factors</b>		
Contact frequency	Case isolation, infrequent contact	Daily, regular contact
Networked	Contacts maintained within a small bubble	Shared space with multiple strangers
Hygiene behaviours	Regular hand hygiene, use of face coverings	Poor hand hygiene, no face coverings
Occupational factors	Small network, not public facing	Care/health sector, public facing, long working hours
Socio-economic factors	Work from home, able to isolate	Poverty, crowded housing, inability to isolate for both space and financial reasons

## Introduction to extended contact tracing questionnaire:

**A: Forwards contact tracing:** the infectious period (day -2 to day +7):

*To identify individuals whom the case may have infected*

 Incubating infection

 Infectious, before symptoms appear\*

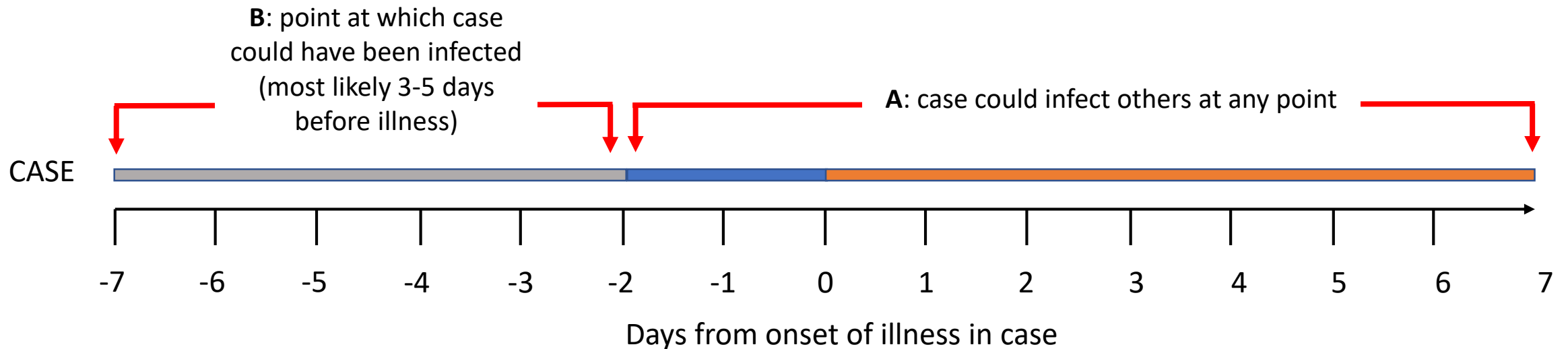
 Infectious period

 Time periods of interest

**B: Backwards contact tracing:** includes the likely day of infection

(most likely day -3 to -5):

*To identify where/from whom the case might have caught the infection*



*\*Note many cases are asymptomatic*

# A highly effective enhanced contact tracing function

## Collect and analyse information from cases to identify sources of infection and possible super-spreader events:

- Identify links between cases that indicate possible transmission events
- Provision of daily alerts to HPTs & Local authorities to help target local investigation & action
- Each local authority has a systematic approach to reviewing the information in the daily alerts and undertaking risk assessment to identify situations requiring further investigation
- Local authorities work with PHE to investigate and control outbreaks and super-spreader events.
- Provide insights of risk factors associated with transmission to inform national policy and local action.
- As incidence decreases, make every efforts to identify the source of infection of each case to contain spread.
- Use the digital app to provide an alerting service

Detect



Alert



Investigate



Control

