

Agility and vulnerability: the UK logistics sector in the face of the COVID-19 pandemic

Hua Wei^{1,4*}, Sarah Daniels^{1,4}, Carl A. Whitfield^{2,4}, Yang Han^{2,4}, David W. Denning^{3,4}, Ian Hall^{2,4,5}, Martyn Regan^{1,4,6}, Arpana Verma^{1,4}, and Martie van Tongeren^{1,4}

¹Division of Population Health, Health Services Research & Primary Care, School of Health Sciences, University of Manchester, Manchester, England; ²Department of Mathematics, University of Manchester, Manchester, England; ³Division of Infection, Immunity & Respiratory Medicine, School of Biological Sciences, University of Manchester, Manchester, England; ⁴Manchester Academic Health Science Centre, University of Manchester, Manchester, England; ⁵Public Health, Advice, Guidance and Expertise, UK Health Security Agency, London, England; ⁶National COVID-19 Response Centre, UK Health Security Agency, London, England

* Correspondence: Hua Wei, hua.wei@manchester.ac.uk

INTRODUCTION

The emergence of SARS-CoV-2 triggered a chain of public health responses that radically changed our ways of living and working. Non-healthcare sectors, such as the supply chains play a key role in a country's pandemic preparedness, whilst understanding about implementation of non-pharmaceutical interventions (NPI) in these sectors are so far limited.

This project investigated how the UK logistics sector responded to the COVID-19 pandemic, including the risk management measures introduced, facilitators and barriers to implementation and other impacts the pandemic and relevant public health policies had on the business.

AIMS AND OBJECTIVES

The aim of the project was to understand the role of the logistics sector and delivery workers in the UK's COVID-19 response, in order to strengthen the UK's pandemic preparedness.

Our key objectives were:

- To assess the measures companies in this sector implemented to protect staff and customers.
- To estimate the impact of risk-mitigation measures using mathematical modelling.
- To develop a set of recommendations for the sector to protect from similar future threats.

METHODS

Nine semi-structured interviews with 11 company representatives were conducted between July and August 2020, and May and June 2021. Interviewees represented six companies occupying a range of positions in the UK's logistics sector, including takeaway food delivery, large and small goods delivery, home appliances delivery and installation, as well as logistics technology providers.

QUALITATIVE ANALYSIS

We adapted the Hierarchy of Control (HoC) evaluation of a collection of COVID-19 risk mitigation measures (RMMs) implemented in the UK logistics sector, with a focus on delivery workers (Fig 1). Thematic analysis of the nine interviews was completed using NVivo12.

MATHEMATICAL MODELLING

We developed a network-based model of workplace contacts based on the data collected from the consultations and the logistics companies. We used these in stochastic simulations of disease transmission to predict the probability of workplace outbreaks in delivery settings.

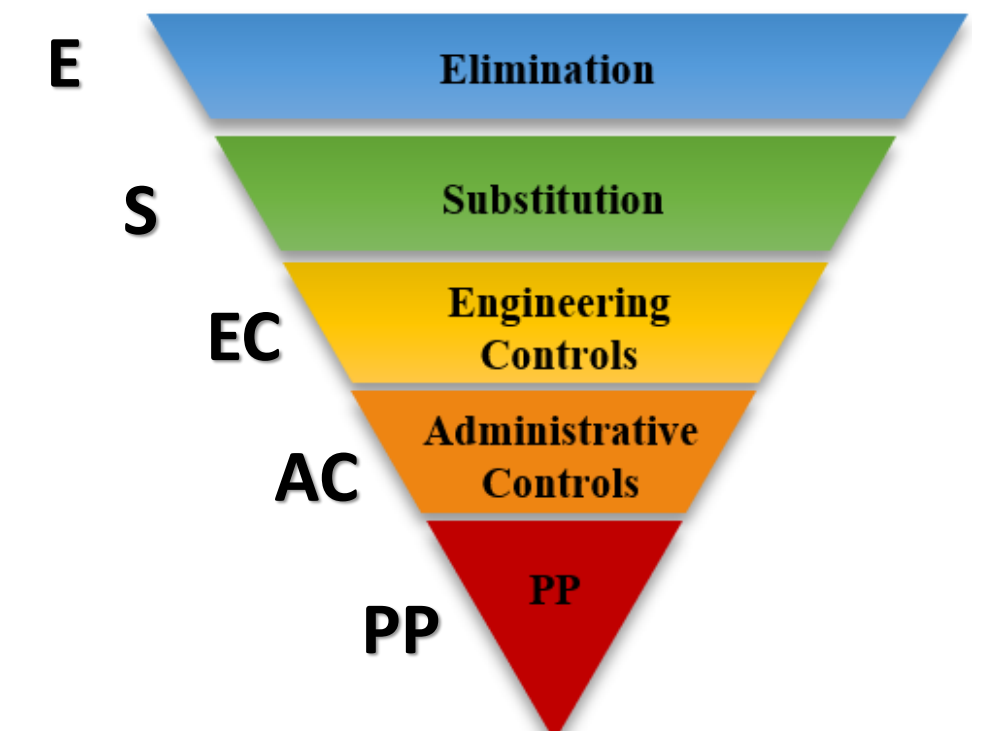
ONLINE CONTACT SURVEY

In collaboration with Lancaster University, we collected data from an online social contact survey aimed at delivery drivers in the UK, which received 170 responses (104 of which were from the workers involved in the delivery of small packages and/or large items).

Key Publications

C. Whitfield et al (2022) Modelling the impact of non-pharmaceutical interventions on workplace transmission of SARS-CoV-2 in the home-delivery sector. MedRxiv. doi: <https://doi.org/10.1101/2022.03.17.22272414>

H. Wei et al (2022) Agility and sustainability: A qualitative evaluation of COVID-19 Non-pharmaceutical Interventions (NPIs) in the UK logistics sector. MedRxiv. doi: <https://doi.org/10.1101/2022.01.28.22270013>



E: Physically remove risk of workplace infection i.e. WFH (not practical for delivery workers)
S: Replace procedures that create work contact with ones that do not i.e. contact-free delivery
EC: Isolate workers from work contact i.e. physical barriers
AC: Change the way of working to reduce work contact i.e. social distancing
PP: Personal protection depending on expert risk assessment i.e. face coverings

Fig 1: HoC – adapted for COVID-19 and delivery workers

RESULTS

QUALITATIVE ANALYSIS

This sector has implemented a wide range of RMMs, with each company developing their own portfolio of measures. Contact-free delivery was the most commonly implemented measure and perceived effective. Process evaluation identified facilitators of rapid responses including capacity to develop interventions internally, localized government support, strong external mandates, effective communication, leadership support and financial support for self-isolation, while barriers included unclear government guidance, shortage of testing capacity and supply, high costs and diversified language and cultural backgrounds.



Table 1: HoC analysis – COVID-19 RMMs implemented by the logistics companies for delivery workers

HoC/Measures	Food 1	Parcel 1	Parcel 2	Large 1	Large 2
1. Elimination: Physically remove risk of workplace infection					
None practical					
2. Substitution: Replace work procedures that create work contact with ones that do not					
Contact-free delivery	+	+	+	+	+
3. Engineering Controls: Isolate workers from work contact					
Establish exclusion zones					
Extra car hiring				Discussed but not adopted	March-June 2020*
Install physical barriers	+	+	+	+	+
Re-arrange workplace	+	+	+	+	+
Restricted or discontinued services	+	Temporarily suspended customer collection	Temporarily suspended customer collection	Installation service suspended March-May 2020	RoC* suspended March-May 2020. Initially failed deliveries of customers reported symptomatic or self-isolating
Ventilation in buildings		Believed lack of airflow in water was a cause of outbreaks	Deemed sufficient	Deemed sufficient	+ Open windows
4. Administrative controls: Change the way of working to reduce work contact					
Pairs and bubbles (staff cohorts)	+	+	+	+	+
Social distancing	+	+	+	+	+
Self-isolation (if asymptomatic, tested positive or close contact)	+	+	+	+	+
Staggered working	+	+	+	+	+
Ventilation in shared vehicles				+ Open windows	+ Instructed windows 1/3 down and recirculation turned off
Hygiene measures	+	+	+	+	+
Information Instruction & Training (IIT)	+	+	+	+	+
Working with industry and authorities	+	+	+	+	+
Mental health support	+	+	+	+	+
Compliance behaviour monitoring	+	+	+	+	+
Workplace contact tracing	+	+	+	+	+
Workplace infection monitoring	+	+	+	+	+
Workplace testing		Deployed 3rd party testing at sites had outbreaks	Had concerns about regular workplace LFT testing	Had concerns about regular workplace LFT testing	Some sites used LFD for warehouse staff
Disciplinary action					
5. Personal protection: Protect workers with certain equipment, depending on expert risk assessment*					
Face coverings	+	+	+	+	+
Gloves	+	+	+	+	+

* Indicates the measure was reported as implemented. This table is not a complete list of RMMs implemented by the companies. When some of the measures were not ticked by certain companies, it meant that this measure was neither applicable to the company's situation nor discussed during the interviews.
 a. Time period was estimated by the interviewees during analysis. b. RoC: room of choice c. Lateral Flow Device d. Neither face coverings nor normal gloves were considered PPE. They were issued to prevent transmission rather than protecting workers from getting infected.

A main sustainability issue is the possible mental health impacts caused by sustained high workload and prolonged working from home that could encourage e-presenteeism and lead to job burnout.

We have provided a schematic diagram to illustrate the important findings in Fig 2. It highlights the key characteristics of rapid responses, grouped into five domains (interventions characteristics, external environment, organizational setting, and sustainability), with the implemented NPIs matched with HoC at the centre.

ONLINE SURVEY DATA

5.3% of workers in the logistics sector reported working while having symptoms of COVID-19 or with a member of their household having a suspected or confirmed case of COVID-19. Conversely, 17.2% reported having isolated with symptoms of COVID-19 or due to a member of their household having a suspected or confirmed case of COVID-19.

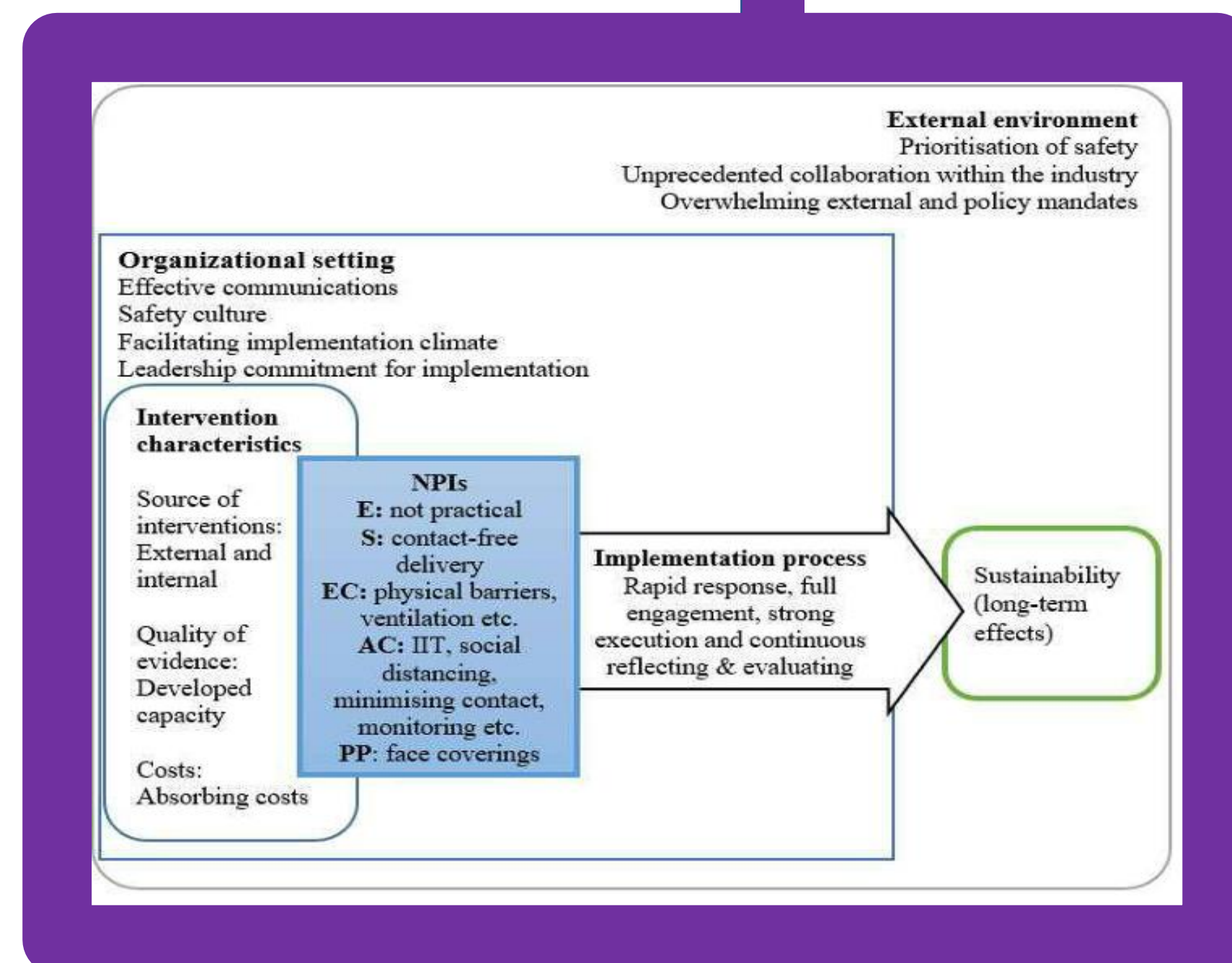


Fig 2: Qualitative evaluation of non-pharmaceutical interventions in non-healthcare sector: an example of the UK logistics sector during COVID-19 pandemic

RESULTS continued

MODELLED EFFECT OF THE RISK MITIGATION MEASURES

- Models of contacts in parcel delivery and large-items delivery workplaces based on consultations, surveys and assumptions (Fig 3 and 4).
- Agent-based network model with time-since infection dynamics.
- Includes work-related contacts and car/household sharing.
- Probability of infection based on proximity, duration and setting.
- Measures evaluated in the context of repeat introductions.

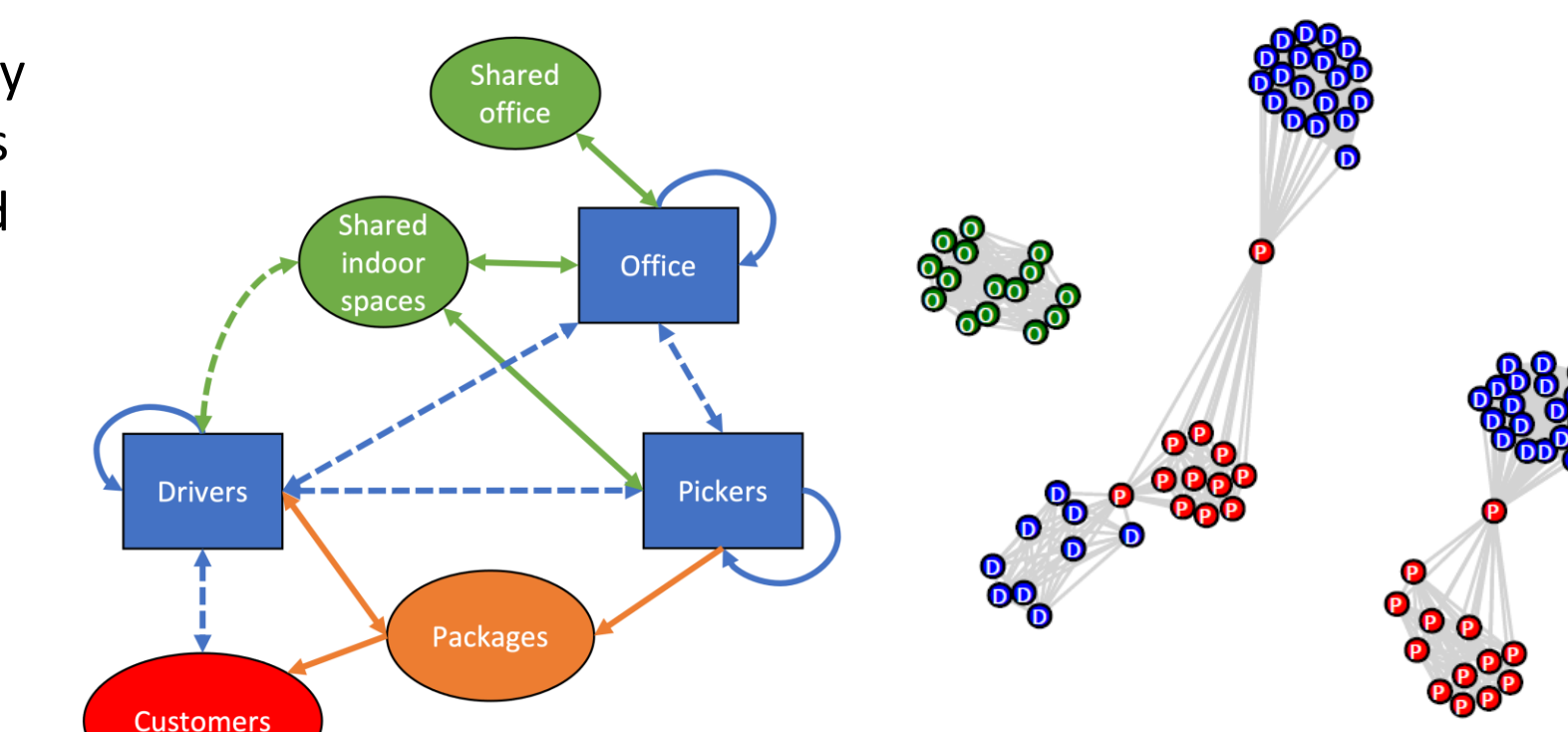
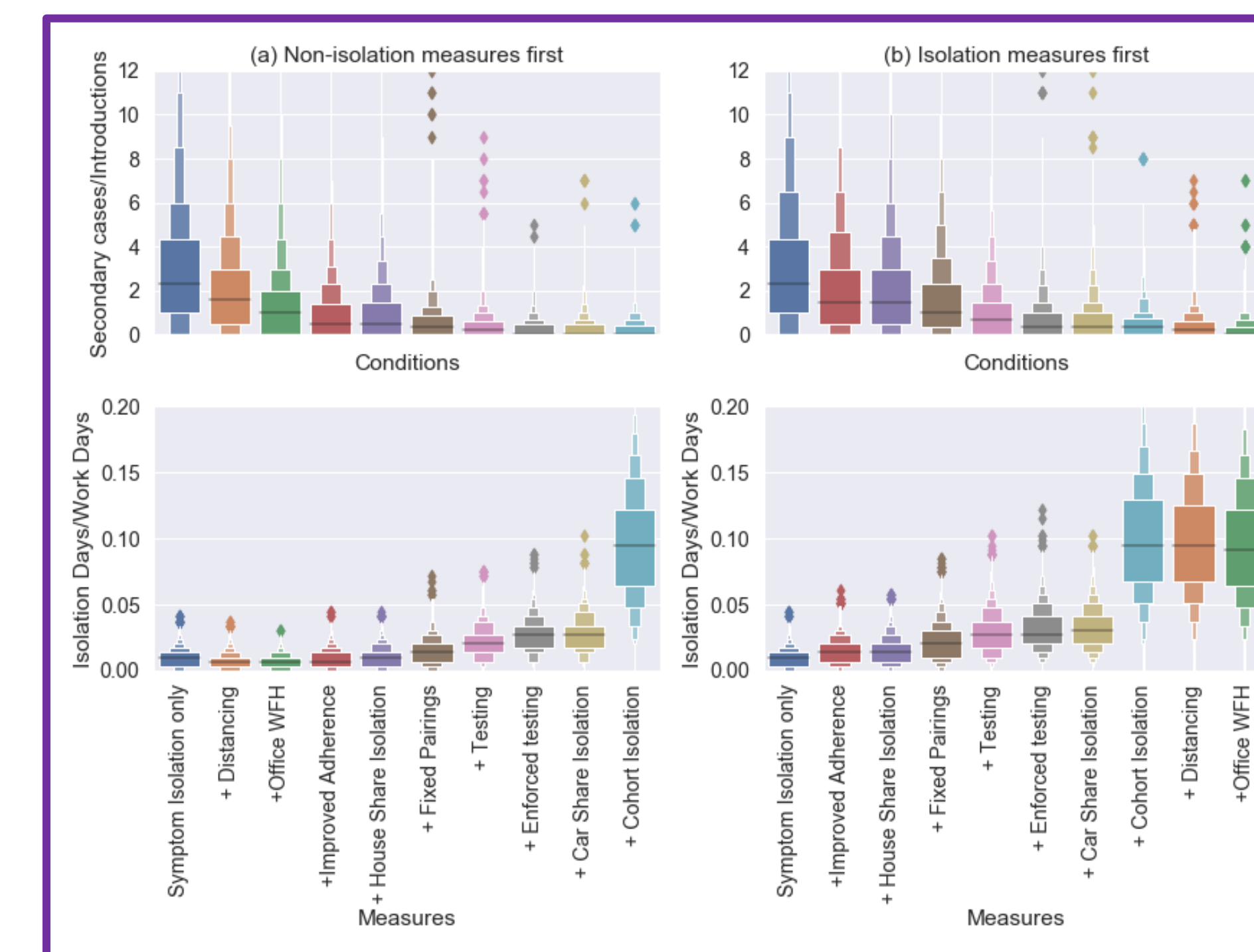


Fig 3. Left: Sketch of the different routes of workplace contact simulated, with dashed lines showing less common contacts. Note that carpooling and house-sharing contacts are included in the model but not shown. Right: Example network of the "cohort" contacts, blue nodes are drivers, red nodes are warehouse staff and green are office staff.

Fig 4. Top: Cumulative impact of different intervention measures on the number of secondary cases in the workplace per new introduction. Measures are applied left to right and applied to the large-items delivery workplace. Bottom: Number of isolation days per number of work days observed in the simulations given the cumulative interventions shown.



KEY RECOMMENDATIONS

- Fixed pairings (for close-contact work) can limit the number of high-risk contacts in the workplace
- Identifying moderate and high-risk contacts (car-sharing, house sharing, close-proximity working) and deploying group isolation of them
- Workplace testing can be effective if adherence rate is high, particularly if paired with small group isolation measures.
- Isolating larger low-risk groups can be inefficient and costly.

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