Report on deliverables from Theme 3 Work Package 4

Prepared for
The PROTECT COVID-19 National Core Study on transmission and environment

PROTECT (2022)
National Core Study Report

Prepared 2022

The PROTECT COVID-19 National Core Study on transmission and environment is a UK-wide research programme improving our understanding of how SARS-CoV-2 (the virus that causes COVID-19) is transmitted from person to person, and how this varies in different settings and environments. This improved understanding is enabling more effective measures to reduce transmission – saving lives and getting society back towards 'normal'.

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Overview

Work Package Aims

3.4 To carry out complementary statistical analyses of available data sources to improve our understanding of the role of occupation in the risk of infection.

Deliverables

3.4.1 Reports on analyses of key datasets, including ONS Mortality, ONS Infections Survey, and Understanding Society

3.4.2 Reports on evidence synthesis, including specific reports for key sectors such as health care and social care

3.4.3 JEM completed and distributed

Deliverable 3.4.1 Reports on analyses of key datasets, including ONS Mortality, ONS Infections Survey, and Understanding Society

Here we used epidemiological analyses of large UK databases in order to explore how different outcomes relating to COVID-19 (SARS-CoV-2 infection, mortality, proportionate mortality, excess mortality and vaccine uptake) varied by occupation, and how any differences varies over time. We know that each dataset and approach has different biases and therefore aimed to triangulate evidence from multiple sources.

Through these analyses we saw differences in rates for all outcomes, and that these differences varied over time. With analyses of mortality data we saw that large elevated risks for some occupations reduced with adjustment for potential confounders. Analyses of proportionate mortality, excess mortality and infection data saw that elevated risks for healthcare workers seen during the early phases of the pandemic diminished over time. Infection data found that elevated risks for the education sector started after the first national lockdown ended and have persisted. Vaccine analyses shows inequity in vaccine uptake across occupations/sectors.

Publications

Nafilyan V, Pawelek P, Ayoubkhani D, et al. Occupation and COVID-19 mortality in England: a national linked data study of 14.3 million adults. Occupational and Environmental Medicine Published Online First: 27 December 2021. doi: 10.1136/oemed-2021-107818
https://oem.bmj.com/content/early/2021/12/26/oemed-2021-107818

Nafilyan V, Dolby T, Finning K, Morgan J, Edge R, Glickman M, Pearce N, van Tongeren M. Differences in COVID-19 vaccination coverage by occupation in England: a national linked data study. medRxiv 2021
https://doi.org/10.1101/2021.11.10.21266124

Matz M, Allemani C, van Tongeren M, Nafilyan V, Rhodes S, van Veldhoven K, Pembrey L, Coleman M, Pearce N. Excess mortality among essential workers in England and Wales during the COVID-19 pandemic. Journal of Epidemiology and Community Health, in press.

Directed acyclic graphs for the study of effects of occupation on risk of COVID-19-related outcomes
https://figshare.manchester.ac.uk/articles/preprint/DAGs_of_occupation_and_COVID_V1_pdf/16847158

Drafts

Cherrie M, Rhodes S, Wilkinson J, Pearce N, Mueller W, Nafilyan V, van Tongeren M Longitudinal changes in proportionate mortality due to COVID-19 by occupation in England and Wales. To be submitted to Scand J Work Environ Health March 2022.

Rhodes S, Wilkinson J, Pearce N, Mueller W, Cherrie M, Stocking K, Gittins M, Katikireddi V, van Tongeren M. Occupational differences in infection from SARS-CoV-2: Analysis of the UK ONS Coronavirus (COVID-19) Infection Survey. Submitted to Journal of Epidemiology and Community Health.

Conference presentations

van Tongeren M, Pearce N, Nafilyan V, et alS-141 Occupation and COVID-19 mortality in England: a national linked data study of 14.3 million adults. Occupational and Environmental Medicine 2021;78:A151. EPICOH Conference Oct 2021. https://oem.bmj.com/content/78/Suppl_1/A151.2

Beale S, Rhodes S. Occupational Risk of COVID-19 Transmission. PROTECT Conference. Nov 2021. https://figshare.manchester.ac.uk/articles/presentation/Occupational_Risk_of_COVID-19_Transmission/19130717

Rhodes S, Wilkinson J, Pearce N, Mueller W, Cherrie M, van Tongeren M. Occupational differences by time in COVID-19 infection using the UK Coronavirus (COVID-19) Infection Survey; 15th Annual UK and Ireland Occupational and Environmental Epidemiology Conference April 4th https://figshare.manchester.ac.uk/articles/presentation/Occupational_differences_in_COVID-19_infection_in_the_UK_ONS_Coronavirus_COVID-19_Infection_Survey/19453850/1

Cherrie M, Rhodes S, Wilkinson J, Pearce N, Mueller W, van Tongeren M. Longitudinal changes in proportionate mortality due to COVID-19 by occupation in England and Wales; 15th Annual UK and Ireland Occupational and Environmental Epidemiology Conference April 4th

Other

We have successfully applied for access to the Longitudinal Linkage Collaboration (LLC) to enable analysis of UK cohorts and linked NHS data

We have successfully applied for add on funding from the ONS to look at questions about long COVID and viral load by occupation, and relationships between occupation, ethnic group, region, vaccine and COVID. Report to be published by ONS in April 2022.

Deliverable 3.4.2 Reports on evidence synthesis, including specific reports for key sectors such as health care and social care

Here we aimed to explore the evidence available in the UK and beyond in terms of transmission risks in the workplace and how they vary by sector.

We provided an overview of the available data in the UK and described and developed suitable methods to analyse it. We looked at the different biases inherent in different types of dataset, and recommended a framework for analyses that aimed to address these. We performed a rapid evidence review in key sectors and performed a comprehensive literature review to provide an international database of studies relating to occupational analyses of COVID-19 data. We collaborated with international colleagues on a Cochrane review looking at workplace mitigation.

Publications

Pearce, N., et al. (2021). "Occupational differences in COVID-19 incidence, severity, and mortality in the United Kingdom: Available data and framework for analyses. Wellcome Open Research 6(102).
https://wellcomeopenresearch.org/articles/6-102

Rhodes, S., et al. (2021). Comparison of reported relative risks for health care, transport, and food processing workers, University of Manchester.
https://doi.org/10.48420/16871797.v1

Rhodes, S., et al. (2022). Protocol for a systematic review of relative risks for Covid-19 related to working within occupational sectors where workplace attendance is essential, University of Manchester. Protocol for a systematic review
https://doi.org/10.48420/16558035.v2

Pizarro AB, Persad E, Durao S, Nussbaumer-Streit B, Garritty C, Engela-Volker JS, McElvenny D, Rhodes S, Stocking K, Fletcher T, Van Tongeren M, Martin C, Noertjojo K, Sampson O, Jørgensen KJ, Bruschettini M. Workplace interventions to reduce the risk of SARS-CoV-2 infection outside of healthcare settings. Cochrane Database of Systematic Reviews 2021, Issue 9. Art. No.: CD015112. DOI: 10.1002/14651858.CD015112. (Systematic review is complete and under review by Cochrane after response to peer reviewers)
https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD015112/full

Conference presentations

Rhodes S, Gittins M, Stocking K, et alS-497 Comparison of reported relative risks for health care, transport, and food processing workers. Occupational and Environmental Medicine 2021;78:A16h. Presented at EPICOH Oct 2021
https://oem.bmj.com/content/78/Suppl_1/A164.3

Pearce NS-498 Methodological issues in studying occupational differences in risk of COVID-19Occupational and Environmental Medicine 2021;78:A165. Presented at EPICOH Oct 2021
https://oem.bmj.com/content/78/Suppl_1/A165.1.abstract

Other

Contributed to Theme 3 Work Package 5 website on sector specific evidence in the transport industry.

Systematic literature review. After full text screening we have a database of 56 studies worldwide relating to relative occupational risks.

Deliverable 3.4.3 JEM completed and distributed

Here we aimed to produce a Job Exposure Matric (JEM) relating to workplace exposures specific to COVID-19. We also aimed to validate and utilize the JEM by applying it to epidemiological data sets.

With European collaborators through OMEGA-NET we developed and refined a JEM which rates each 4-digit ISCO occupational classification code according to 8 domains. We have also translated this to a UK specific JEM using SOC 2010 codes. We have used the JEM on 2 large UK cohorts, and European colleagues have applied the JEM to cohorts in the Netherlands and Denmark. We have also shared the JEM with collaborators at the ONS and LLC and recently we have also updated it to include also SOC 2000 and 2020 codes in order to increase its relevance and applicability to external UK cohorts.

Publications

Oude Hengel KM, Burdorf A, Pronk A, Schlünssen V, Stokholm ZA, Kolstad HA, van Veldhoven K, Basinas I, van Tongeren M, Peters S.
Exposure to a SARS-CoV-2 infection at work: development of an international job exposure matrix (COVID-19-JEM).
Scand J Work Environ Health. 2022 Jan 1;48(1):61-70. doi: 10.5271/sjweh.3998. Epub 2021 Nov 17.
https://www.sjweh.fi/article/3998

Submitted

Van der Felts S, Peters S, Pronk A, Schlünssen V, Stokholm ZA, Kolstad HA, van Veldhoven K, Basinas I, van Tongeren M, Burdorf A, Oude Hengel KM. Validation of a COVID-19 Job Exposure Matrix (COVID-19-JEM) for occupational risk of a SARS-CoV-2 infection at work: using data of Dutch workers. Submitted to: Annals of Work Exposures and Health

Drafts

Rhodes S, Beale S, Wilkinson J, Mueller W, Pearce N, van Veldhoven K, Basinas I, van Tongeren M. Application of a COVID-19 Job Exposure Matrix to two UK cohorts. In preparation

In progress

Eekhout I, van Tongeren M, Pearce N, Oude Hengel KM. The role of work in relation to COVID-19 infection rates in the Netherlands.
Planning for submission: autumn 2022

Van der Felts S, Schlünssen V, Stokholm ZA, Peters S, Pronk A, van Veldhoven K, Basinas I, van Tongeren M, Burdorf A, Oude Hengel KM, Kolstad HA. Validation of a COVID-19 Job Exposure Matrix (COVID-19-JEM) for occupational risk of a SARS-CoV-2 infection in Denmark: using objective data
Planning for submission: summer 2022

Conference presentations

Van Veldhoven K**.** Development of a Job Exposure Matrix for work related risk factors for transmission of SARS-CoV2. Presented at 14th UK & Ireland Occupational & Environmental Epidemiology Meeting. June 2021.

Van Veldhoven K. Development and validation of a Job Exposure Matrix for work related risk factors for COVID-19. Presented at World Congress of Epidemiology. Sept 2021.
https://academic.oup.com/ije/article/50/Supplement_1/dyab168.678/6361960

Oude Hengel K, Burdorf L, Pronk A, Schlunssen V, Stockholm ZA, Kolstad HA, van Veldhoven K, Basinas I, van Tongeren M, Peters S. S-106 Risk of exposure to a SARS-CoV-2 infection at work: development of a Job Exposure Matrix (COVID-19-JEM) for Denmark, the Netherlands and the United Kingdom. Presented at Presented at EPICOH Oct 2021
https://oem.bmj.com/content/78/Suppl_1/A149.2

Other

Job Exposure Matrix translated to SOC 2010 coding (Appendix 1).

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