SHAREABLE PDF

# Respective roles of non-pharmaceutical interventions in bronchiolitis outbreaks: an interrupted time-series analysis based on a multinational surveillance system

Lea Lenglart[1,45], Naim Ouldali[2,3,4,5,45], Kate Honeyford[6], Zsolt Bognar[7], Silvia Bressan[8], Danilo Buonsenso[9], Liviana Da Dalt[8], Tisham De[10], Ruth Farrugia[11], Ian K. Maconochie[12,13], Henriette A. Moll[14], Rianne Oostenbrink[14], Niccolo Parri[15], Damian Roland[16,17], Katy Rose[12], Esra Akyüz Özkan[18], François Angoulvant[2], Camille Aupiais[4,19], Clarissa Barber[20], Michael Barrett[21,22], Romain Basmaci[23], Susana Castanhinha[24], Antonio Chiaretti[9], Sheena Durnin[25], Patrick Fitzpatrick[26], Laszlo Fodor[27], Borja Gomez[28], Susanne Greber-Platzer[29], Romain Guedj[30], Florian Hey[31], Lina Jankauskaite[32], Daniela Kohlfuerst[33], Ines Mascarenhas[34], Anna Maria Musolino[35], Zanda Pučuka[36], Sofia Reis[37], Alexis Rybak[1,4,5], Petra Salamon[7], Matthias Schaffert[38], Keren Shahar-Nissan[39], Maria Chiara Supino[35], Ozlem Teksam[40], Caner Turan[41], Roberto Velasco[42], Ruud G. Nijman[10,12,13,46], Luigi Titomanlio[1,43,46] and the EPISODES Study Group[44]

[1]Paediatric Emergency Department, Robert Debré University Hospital, AP-HP, Université de Paris, Paris, France. [2]Department of General Paediatrics, Paediatric Infectious Disease and Internal Medicine, Robert Debré University Hospital, AP-HP, Université de Paris, Paris, France. [3]Infectious Diseases Division, CHU Sainte Justine, Montreal University, Montreal, QC, Canada. [4]Paris University, INSERM UMR 1123, ECEVE, Paris, France. [5]Association Clinique et Thérapeutique Infantile du Val-de-Marne, St Maur-des-Fossés, France. [6]Health Informatics Team, Division of Clinical studies, Institute of Cancer Research, London, UK. [7]Paediatric Emergency Department, Heim Pal National Paediatric Institute, Budapest, Hungary. [8]Division of Paediatric Emergency Medicine, Department of Women's and Children's Health, University Hospital of Padova, Padova, Italy. [9]Department of Woman and Child Health and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy. [10]Section of Paediatric Infectious Diseases, Department of Infectious Diseases, Faculty of Medicine, Imperial College London, London, UK. [11]Department of Child and Adolescent Health, Mater Dei Hospital, Msida, Malta. [12]Department of Paediatric Emergency Medicine, Division of Medicine, St Mary's Hospital, Imperial College NHS Healthcare Trust, London, UK. [13]Centre for Paediatrics and Child Health, Faculty of Medicine, Imperial College London, London, UK. [14]Department of General Paediatrics, ErasmusMC – Sophia, Rotterdam, The Netherlands. [15]Emergency Department and Trauma Center, Ospedale Paediatrico Meyer Firenze, Florence, Italy. [16]SAPPHIRE Group, Health Sciences, Leicester University, Leicester, UK. [17]Paediatric Emergency Medicine Leicester Academic (PEMLA) Group, Leicester Hospitals, Leicester, UK. [18]Paediatric Emergency Department, Ondokuz Mayıs University, Samsun, Turkey. [19]Paediatric Emergency Department, Jean Verdier Hospital, AP-HP, Sorbonne Paris Cité, Bondy, France. [20]Paediatric Emergency Department, University Hospitals Bristol NHS Foundation Trust, Bristol, UK. [21]Paediatric Emergency Department, Children's Health Ireland at Crumlin, Dublin, Ireland. [22]Women's and Children's Health, School of Medicine, University College Dublin, Dublin, Ireland. [23]Paediatric Emergency Department, Louis Mourier Hospital, AP-HP, Université de Paris, Colombes, France. [24]Hospital Dona Estefania, Centro Hospitalar de Lisboa Central, Lisbon, Portugal. [25]Department of Paediatric Emergency Medicine, Children's Health Ireland at Tallaght, Dublin, Ireland. [26]Paediatric Emergency Department, Children's Health Ireland at Temple Street, Dublin, Ireland. [27]Paediatric Emergency Department, Szent Gyorgy University Teaching Hospital of Fejer County, Szekesfehervar, Hungary. [28]Paediatric Emergency Department, Cruces University Hospital, Biocruces Bizkaia Health Research Institute, Barakaldo, Spain. [29]Clinical Division of Paediatric Pulmonology, Allergology and Endocrinology, Department of Paediatrics and Adolescent Medicine, Comprehensive Centre for Paediatrics, Medical University of Vienna, Vienna, Austria. [30]Paediatric Emergency Department, Armand Trousseau Hospital, AP-HP, Sorbonne Université, CRESS Inserm U-1153 Paris, Epopé Team, Paris, France. [31]Pediatric Intensive Care Unit and Emergency Department, Dr von Hauner Children's Hospital, Ludwig-Maximilians-University Munich, Munich, Germany. [32]Hospital of Lithuanian University of Health Sciences Kauno Klinikos, Kaunas, Lithuania. [33]Department of General Paediatrics, Medical University of Graz, Graz, Austria. [34]Departamento da Criança e do Jovem, Urgencia Pediatrica, Hospital Prof. Doutor Fernando da Fonseca, Amadora, Portugal. [35]Emergency Department, Bambino Gesù Children's Hospital, IRCCS, Rome, Italy. [36]Paediatric Emergency Department, Children's Clinical University Hospital, Riga Stradins University, Riga, Latvia. [37]Paediatric Department, Centro Hospitalar Tondela-Viseu, Viseu, Portugal. [38]Department of Pediatrics and Department of Paediatric and Adolescent Surgery, Paracelsus Medical University, Salzburg, Austria. [39]Paediatric Emergency Department, Schneider Children's Medical Center of Israel and Sackler Faculty of Medicine, Petach Tikva, Israel. [40]Division of Paediatric Emergency Medicine, Department of Paediatrics, Hacettepe University School of Medicine, Ankara, Turkey. [41]Department of Paediatrics, Division of Emergency Medicine, Mersin City Training and Research Hospital, Toroslar, Turkey. [42]Paediatric Emergency Unit, Hospital Universitario Río Hortega, Valladolid, Spain. [43]Paris University, INSERM U1141, DHU Protect, Paris, France. [44]A list of EPISODES Study Group members is provided in the Acknowledgements. [45]L. Lenglart and N. Ouldali contributed equally to this work. [46]R.G. Nijman and L. Titomanlio contributed equally to this work.

Link to published version: https://doi.org/10.1183/13993003.01172-2022

Corresponding author: Lea Lenglart (lea.lenglart@gmail.com)

Shareable abstract (@ERSpublications)
**Among the various non-pharmaceutical interventions implemented against SARS-CoV-2 in Europe, full lockdown, school closure, facial masking and teleworking were preventive measures associated with a reduction in the number of bronchiolitis cases** https://bit.ly/3SyqqYS

**Cite this article as:** Lenglart L, Ouldali N, Honeyford K, *et al*. Respective roles of non-pharmaceutical interventions in bronchiolitis outbreaks: an interrupted time-series analysis based on a multinational surveillance system. *Eur Respir J* 2023; 61: 2201172 [DOI: 10.1183/13993003.01172-2022].





This article has an editorial commentary: https://doi.org/10.1183/13993003.02214-2022

Received: 8 June 2022
Accepted: 23 Sept 2022

## Abstract

***Background*** Bronchiolitis is a major source of morbimortality among young children worldwide. Non-pharmaceutical interventions (NPIs) implemented to reduce the spread of severe acute respiratory syndrome coronavirus 2 may have had an important impact on bronchiolitis outbreaks, as well as major societal consequences. Discriminating between their respective impacts would help define optimal public health strategies against bronchiolitis. We aimed to assess the respective impact of each NPI on bronchiolitis outbreaks in 14 European countries.

***Methods*** We conducted a quasi-experimental interrupted time-series analysis based on a multicentre international study. All children diagnosed with bronchiolitis presenting to the paediatric emergency department of one of 27 centres from January 2018 to March 2021 were included. We assessed the association between each NPI and change in the bronchiolitis trend over time by seasonally adjusted multivariable quasi-Poisson regression modelling.

***Results*** In total, 42 916 children were included. We observed an overall cumulative 78% (95% CI −100– −54%; p<0.0001) reduction in bronchiolitis cases following NPI implementation. The decrease varied between countries from −97% (95% CI −100– −47%; p=0.0005) to −36% (95% CI −79–7%; p=0.105). Full lockdown (incidence rate ratio (IRR) 0.21 (95% CI 0.14–0.30); p<0.001), secondary school closure (IRR 0.33 (95% CI 0.20–0.52); p<0.0001), wearing a mask indoors (IRR 0.49 (95% CI 0.25–0.94); p=0.034) and teleworking (IRR 0.55 (95% CI 0.31–0.97); p=0.038) were independently associated with reducing bronchiolitis.

***Conclusions*** Several NPIs were associated with a reduction of bronchiolitis outbreaks, including full lockdown, school closure, teleworking and facial masking. Some of these public health interventions may be considered to further reduce the global burden of bronchiolitis.