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Vaccination may not have a significant impact on superspreading events

H. Nasir [1,*], M.A. Haris [2], P. Tambyah [3]

[1] *National University Hospital, Medicine, Singapore, Singapore*
[2] *Singapore Polytechnic, Singapore, Singapore*
[3] *National University Hospital, Singapore, Singapore*

Purpose: Vaccination for SARS-CoV-2 is highly effective in preventing severe disease and death but its impact on reducing transmission outside households in reducing super spreading events are not so clear.

Methods & Materials: We reviewed Singapore's Ministry of Health (MOH) daily detailed reports on cases and clusters from April - June 2021. Cases were classified as: Fully vaccinated- completed two doses of vaccine at least fourteen days prior or not fully vaccinated. Cases were also categorized by whether they were diagnosed while under quarantine or by symptomatic or routine surveillance testing. Index cases were defined as the first cases identified in each cluster. Secondary cases were classified as non-index cases. Stratified analysis was performed on VassarStats (Vassar College, USA).

Results: 803 cases were reviewed; 187 (23%) were fully vaccinated, 56 (7%) were partially vaccinated and 560 (70%) were completely unvaccinated. There were a total of 77 clusters reported during this period, ranging from 3 to 108 cases primarily in malls, markets and bars. The proportion of index cases for these clusters who were fully vaccinated (20.8%) was similar (RR 0.864, 95% CI 0.511-1.46) to the secondary cases (23.6%). In contrast, the majority of index cases for clusters were identified through surveillance (96.1%) with only three of the 77 (3.9%) detected in quarantine while the majority of 726 secondary cases (68.2%) were detected in quarantine.

Conclusion: Although many of the clusters may not represent true superspreading events, it is still concerning that vaccinated individuals formed such a significant proportion of the index cases for clusters. More studies are clearly needed to better understand super-spreading events and to devise better vaccination strategies to prevent single cases from sparking clusters. As vaccination rates increase globally, preventing superspreading events will be a major part of controlling the pandemic.

Number of cases stratified by vaccination status.

	Fully vaccinated	Not fully vaccinated	Total	RR (95% CI)	*P*
Index case	16 (20.8%)	61 (79.2%)	77 (100%)	0.864	0.671
Non-Index case	171 (23.6%)	555 (76.4%)	726 (100%)	(0.511 - 1.46)	

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Assessing the epidemiological and economic impact of alternative vaccination strategies: a modeling study

S. Kim [1,*], S. Athar [2], Y. LI [3], S. Koumarianos [2], T. Cheng [4], L. Amiri [5], W. Avusuglo [2], W.A. Woldegerima [2], A.A. Fall [6], A. John-Baptiste [7], A. Diener [8], J. Wu [2]

[1] *New York University School of Global Public Health, Health Policy and Management, New York, United States*
[2] *York University, Department of Mathematics and Statistics, Toronto, Ontario, Canada*
[3] *University of Cincinnati, Department of Mathematics, Cincinnati, Ohio, United States*
[4] *University of Western Ontario, Department of Applied Mathematics, London, Ontario, Canada*
[5] *University of Manitoba, Department of Community Health Sciences, Winnipeg, Manitoba, Canada*
[6] *Université Alioune DIOP de Bambey, Département Mathématique, Bambey, Senegal*
[7] *University of Western Ontario, Department of Epidemiology and Biostatistics, London, Ontario, Canada*
[8] *Health Canada, Strategic Policy Branch, Toronto, Ontario, Canada*

Purpose: Given limited supplies of vaccines, having information on the costs, and associated health and economic impacts, is important for the development of optimal vaccination strategies. This study explores the epidemiological and economic impact, in terms of the value of lost production, of four vaccination strategies – fixed-dose interval (M1), prioritization of the first dose (M2), screen and forego vaccine for those with COVID-19 infection history (M3), and prioritization of the first dose along with screen and forego vaccine for those with COVID-19 infection history(M4), under constraints limiting the daily vaccine supply.

Methods & Materials: Using mathematical and statistical modelling, we quantified the number quarantined, hospitalization days, vaccine doses saved, and deaths averted, and production losses, for each strategy, in comparison to M1. The model parameters and initial conditions were based on Canadian data, and the simulation ran over 365 days starting from June 1, 2021. Sensitivity analyses explored how each strategy changes with different conditions of daily vaccine supply, the initial proportion recovered from COVID-19 infection, and initial coverage of the first dose.

Results: Strategy M2 results in a reduction of 67,130,775 doses of vaccine administered, 20 lives saved, and a reduction of $3.8 billion of lost production in comparison to M1. M3 does not save any vaccine dose administered, but results in 5 lives saved, and a reduction of $575,149 in lost production in comparison to strategy M1. Due to the large proportion of the Canadian population who have already received a first vaccine dose, no screening actually occurs under scenario M3 and the daily vaccine supply was used entirely to provide second doses. While M2 is the dominant strategy under the current Canadian setting, sensitivity analyses revealed that M3 dominates when the vaccine supply increased or when the initial recovered proportion from COVID-19 was large enough.

Conclusion: The findings quantify the potential benefits of alternative vaccination strategies that can save lives and costs. Our study findings can help policymakers identify the optimal COVID-19 vaccination strategy and our study framework can be adapted to other settings.

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