Accuracy of self-reported COVID-19 vaccination status compared to a public health vaccination registry

Patrick M. Archambault[1,2], **Rhonda J. Rosychuk**[3], **Martyne Audet**[2], Rajan Bola[4], Shabnam Vatanpour[5], Steven C. Brooks[6], Raoul Daoust[7], Gregory Clark[8], Lars Grant[8], Samuel Vaillancourt[9], Michelle Welsford[10], Laurie J. Morrison[9], Corinne M. Hohl[4], and the Canadian COVID-19 Emergency Department Rapid Response Network (CCEDRRN) investigators for the Network of Canadian Emergency Researchers and the Canadian Critical Care Trials Group.

1-Department of Family Medicine and Emergency Medicine, Faculty of Medicine, Université Laval, Québec / 2-Centre de recherche intégrée pour un système apprenant en santé et services sociaux (SASSS), Centre intégré de santé et services sociaux de Chaudière-Appalaches, Lévis / 3-Department of Pediatrics, Faculty of Medicine & Dentistry, University of Alberta, Edmonton / 4-Department of Emergency Medicine, Faculty of Medicine, University of British Columbia, Vancouver / 5-Center for Health Informatics, Cumming School of Medicine, University of Calgary, Calgary / 6-Department of Emergency Medicine, Queen's University, Kingston / 7-Department of Family Medicine and Emergency Medicine, Faculty of Medicine, Université de Montréal, Montréal / 8-Department of Emergency Medicine, Faculty of Medicine, McGill University, Montréal / 9-Department of Medicine, University of Toronto, Toronto / 10-Department of Emergency Medicine, Faculty of Health Sciences, McMaster University, Hamilton

Introduction

As new COVID-19 variants emerge, real-world evidence about vaccine effectiveness is needed to inform current and future strategies to protect the population. To measure real-world vaccine effectiveness, researchers need access to reliable vaccination data. Unfortunately, not all researchers have access to vaccine registries [1], while others have substantial challenges in securing access to individual-level vaccination data even when they exist [2]. Many researchers must then rely on patients' self-reported status to measure real-world vaccine effectiveness.

Objective

This study aimed to compare the accuracy of self-reported vaccination status for COVID-19 with data from an official vaccination registry in the province of Quebec (QC), Canada.

Methods

This study was a diagnostic accuracy study completed by the Canadian COVID-19 Emergency Department Rapid Response Network (CCEDRRN) and authorized by the CISSS Chaudière-Appalaches ethics review board. We compared the self-reported vaccination status of consenting patients diagnosed with COVID-19 who presented to one of four emergency departments (EDs) with their vaccination status in the Québec Vaccination Registry. Our primary outcome was the accuracy of self-reported vaccination status (index test) ascertained during phone follow-up compared to the Québec Vaccination Registry (reference standard). Accuracy was calculated by dividing all correctly self-reported vaccinated and unvaccinated participants by the sum of all correctly and incorrectly self-reported vaccinated and unvaccinated participants. We also report inter-rater agreement with the reference standard as measured by unweighted Cohen's Kappa for self-reported vaccination status at phone follow-up and at the time of their index ED visit, number of vaccine doses, and brand.

Results

Table 1. Sociodemographic and clinical characteristics of study participants.

	Study participants (N=1361)
Age, years, mean (SD)	55.1 (17.4)
Age group, n (%)	
<24 years	45 (3.3)
25-39 years	230 (16.9)
40-64 years	685 (50.3)
65-79 years	272 (20.0)
80+ years	129 (9.5)
Sex, n (%)	
Male	686 (50.4)
Female	675 (49.6)
Intersex	0 (0)
Site, n (%)	
Hôtel-Dieu de Lévis	293 (21.5)
Royal Victoria	501 (36.8)
Montreal General	132 (9.7)
Sacré-Coeur de Montréal	435 (32.0)
Index visit occurred during, n (%)	
Wave 1 (March 1st– August 22nd, 2020)	207 (15.2)
Wave 2 (August 23rd– March 20th, 2021)	725 (53.3)
Wave 3 (March 21st– July 17th, 2021)	285 (20.9)
Wave 4 – early 5 (July 18th– Dec. 31st, 2021)	144 (10.6)
Index visit occurred before start of vaccination campaign in Québec (Dec 14th, 2020)**, n (%)**	
Pre-vaccination campaign	490 (36.0)
Post-vaccination campaign	871 (64.0)
Time elapsed from index visit to TFU, median days (IQR)	202 (108-352)

Table 2. Québec Vaccination Registry information and self-reported vaccination status of participants during the initial telephone follow-up

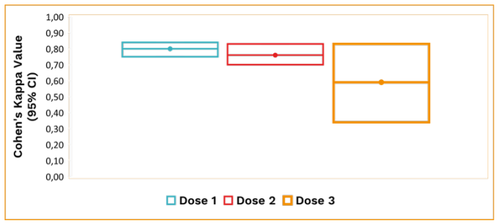
Vaccination status	**Québec Vaccination Registry, n (%)**	**Self-reported, n (%)**
Yes (at least one dose)	913 (67.1)	932 (68.5)
No (no dose given)	448 (32.9)	429 (31.5)
Unknown or not assessed	0 (0)	0 (0)
1st Vaccine brand		
Pfizer-BioNTech	707 (51.9)	689 (50.6)
Moderna	162 (11.9)	158 (11.6)
AstraZeneca/COVISHIELD	42 (3.1)	42 (3.1)
Johnson & Johnson	< 5	< 5
Unknown, but vaccinated	0 (0)	37 (2.7)
Unknown/Not vaccinated	448 (32.9)	433 (31.8)
Number of vaccines doses		
Zero (0)	448 (32.9)	429 (31.5)
One (1)	366 (26.9)	368 (27.0)
Two (2)	501 (36.8)	511 (37.5)
Three (3)	46 (3.4)	53 (3.9)

Additional results:
Participants with discordant self reported vaccination status were younger (mean age (SD): 51.1 (20.5) vs. 55.3 (17.3) years), had lower self-reported income (9.4% with a reported current income more than $73,701 per year vs. 22.5%), education level (9.4% with a university degree vs. 33.9%) and vaccination rate according to the Québec Vaccination Registry (32.1% vs. 68.5%).

Table 3. Self-reported vaccination status and Québec Registry data with performance measures

Self-reported Vaccination status	**Vaccination status in the Québec Vaccination Registry**	
	Yes (N)	*No (N)*
Yes (N)	896	36
No (N)	17	412
	Measure (95% Confidence Interval)	
Sensitivity	0.98	(0.97, 0.99)
Specificity	0.92	(0.89, 0.94)
Accuracy	0.96	(0.95, 0.97)
Cohen's Kappa	0.91	(0.89, 0.93)

Figure 1. Inter-rater agreement for self-reported brand by dose compared to Québec Registry.



Conclusions

- Accuracy of self-reported COVID-19 vaccination status was high for adult ED patients without cognitive disorders who can express themselves in English or French.
- The inter-rater agreement between self-reported number of doses and vaccination status was strong, but accuracy of vaccine brand decreased with the number of doses.
- Researchers can use self-reported COVID-19 vaccination data to guide future research with certain groups of patients, but access to official vaccine registries is still needed to determine the vaccination status in certain vulnerable populations.

References

1. Apophia Namageyo-Funa et al. Considerations for the development and implementation of electronic immunization registries in Africa. Pan African Medical Journal. 2018;30:81. [doi: 10.11604/pamj.2018.30.81.11951]
2. Andrew D. McRae, Patrick Archambault, Patrick Fok, Hana Wiemer, Laurie J. Morrison and Matthew Herder; for the Canadian COVID-19 Emergency Department Rapid Response Network Investigators CMAJ July 18, 2022 194 (27) E943-E947; [doi: 10.1503/cmaj.211712]

Canadian COVID-19 ED Network

CIHR IRSC Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

COVID-19 IMMUNITY TASK FORCE / GROUPE DE TRAVAIL SUR L'IMMUNITÉ FACE À LA COVID-19