Patient characteristics and prevalence of the Post COVID-19 Condition in Canada using the World Health Organization definition: a CCEDRRN patient-oriented cohort study

CITF Scientific Meeting
2023.03.09

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All authors have no conflicts of interest to declare.

Canadian COVID-19 ED Network

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

Fonds de recherche Santé Québec

NCER Network of Canadian Emergency Researchers

CAEP | ACMU

CCCTG Canadian Critical Care Trials Group

Outline

- Context
- Objectives
- Methods
- Results
- Discussion
- Limitations
- Lessons learned

3/1/2023: Johns Hopkins University reported global total cases of COVID-19 =

675,461,646

Depending on the definition and method used, between

40,500,000 < ? < 304,000,000

people in the world could be affected by long term sequelae of COVID-19

POST COVID-19 CONDITION (PCC) - October 6, 2021

Clinical case definition

World Health Organization

Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time.

Canadian statistics - October 17, 2022

- As many as 1.4M Canadians (or nearly 15% of those who contracted COVID-19) report PCC at 3 months.

- Nearly 1/3 of Canadian adults who had PCC symptoms at least three months after their initial infection had fully recovered from their initial symptoms before developing symptoms again

https://www150.statcan.gc.ca/n1/daily-quotidien/221017/dq221017b-eng.htm

Canadian COVID-19 ED Network

What is MISSING in Canadian PCC Statistics ?

The patients' characteristics and prevalence of PCC in populations that are:

Vulnerable

Hard to reach

Underserved

Underrepresented

EMERGENCY DEPARTMENTS (EDs) are the go-to health care service for these populations

Objectives

Determine ED patient characteristics with and without PCC at 3-6-12 months

Determine 3-6-12 month prevalence of PCC among ED patients who tested positive with COVID-19

Canadian COVID-19 ED Rapid Response Network

(CCEDRRN - pronounced *"sedrin"*)

- National collaboration to harmonize data collection related to COVID-19 in 51 EDs across 8 provinces (BC, AB, SK, MB, ON, QC, NS, NB).
- Funded
  - Year 1 by CIHR and provincial health funding agencies and universities
  - Year 2-3 by CITF and CIHR
- 208,000 patients enrolled
- Active and empowered Patient Engagement Committee

Canadian COVID-19 ED Network

www.ccedrrn.com

CCEDRRN's Patient Engagement Committee and PCC

- 11 members with:
  - lived experience of COVID-19
  - ongoing sequelae
  - great interest in better understanding the prevalence, risk factors, and impacts of developing PCC

- In June of 2021, CIHR funded this patient-oriented sub-study to address these questions

Methods

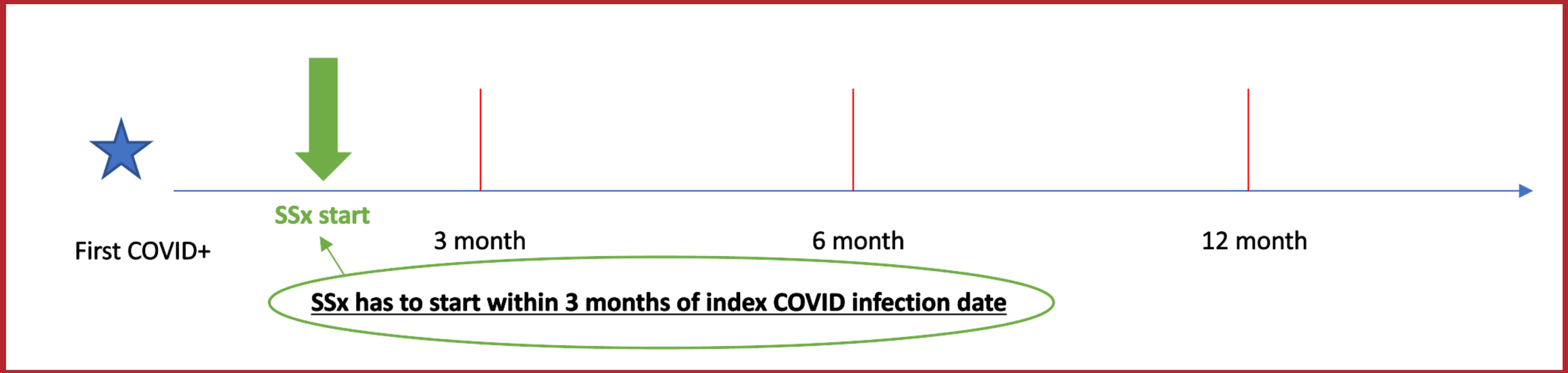
- Co-development of a WHO compliant PCC Assessment Questionnaire with PCC experts, INESSS and patient partners
- Pretested with patient partners and a sample of participants
- Approved by REBs of each site
- Data collection via telephone follow-ups started in November of 2021 on patients with index visits between October 16, 2020 and February 28, 2022
- Follow-ups were conducted at 6 and 12 months (+/- 30 days) after ED index visit

Inclusion Exclusion Criteria

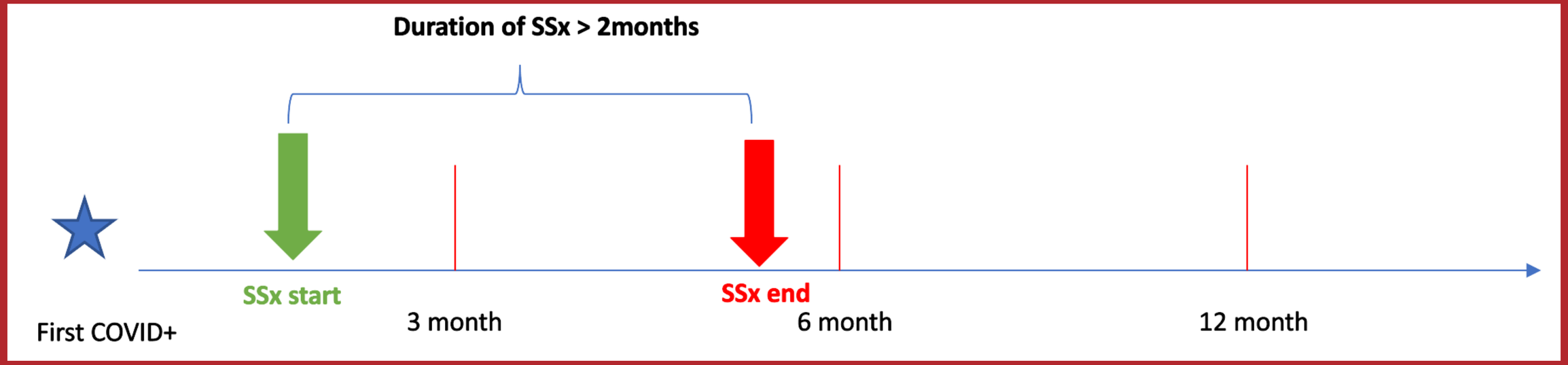
Positive SARS-CoV-2 test (NAAT/RAT) 14 days before or after ED visit if admitted
≥18 years
Capable to consent (proxy allowed in BC)

Does not speak French/English
Deceased before phone follow-up

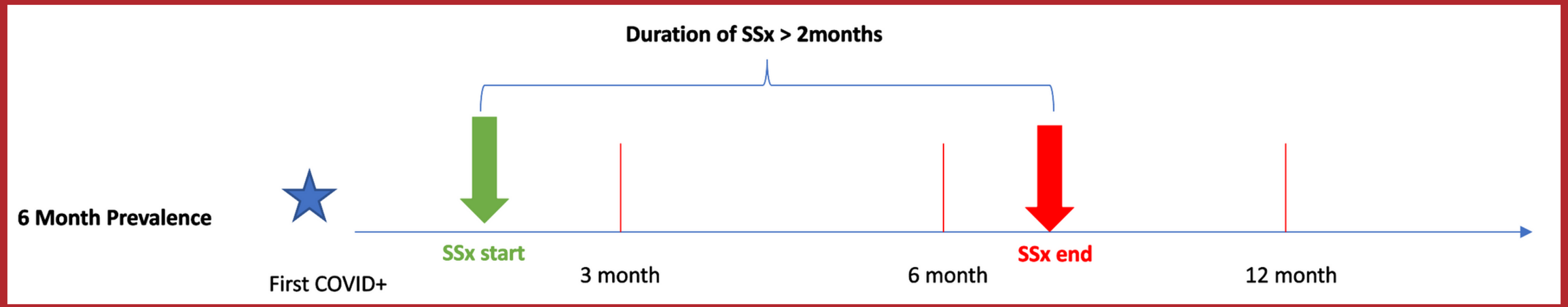
Prevalence at 3 months



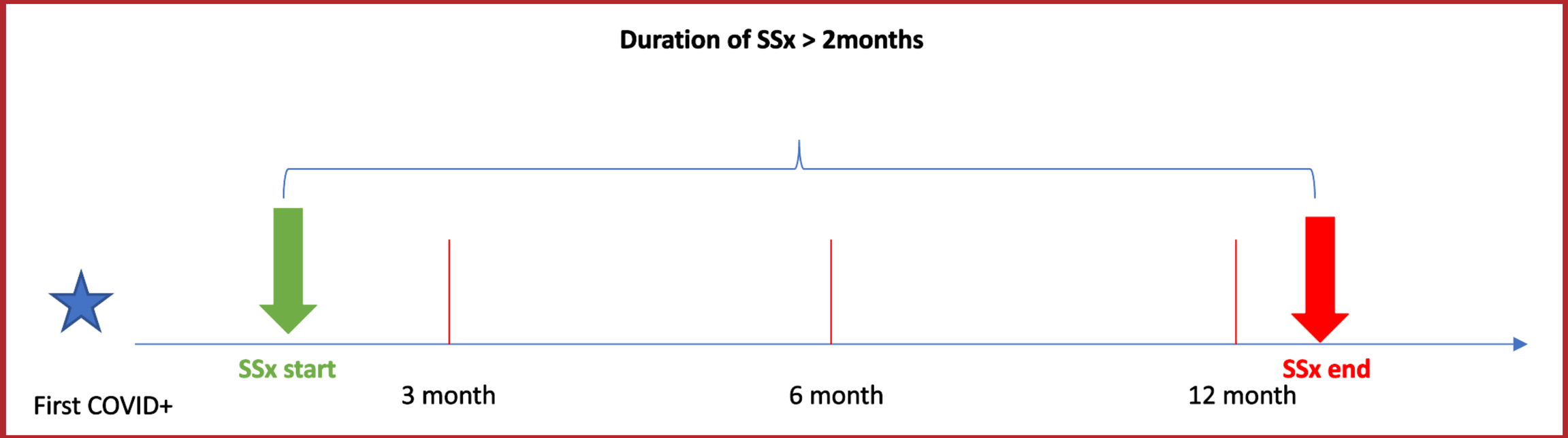
Prevalence at 3 months



Prevalence at 6 months



Prevalence at 12 months



PARTICIPANT FLOW CHART

Patients from 33 EDs conducting TFUs

94,303

Exclusions:
- 57,338 negative controls
- 328 < 18 years
- 6,799 out of window

Patients attempted to contact

29,838

Exclusions:
- 20,706 who refused, could not be contacted, or could not consent
- 1,023 Deceased

8,109

Exclusions:
- 3980 test negative controls

Patients included in study

4,129

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
Age (in years) mean (S.D)	49.5 (17.0)	52.0 (16.3)	<0.001
Female Sex, (%)	1083 (43.4)	930 (56.9)	<0.001
Pandemic wave			
Wave 2	516 (20.7)	339 (20.8)	0.53
Wave 3	1365 (54.7)	871 (53.3)	
Wave 4	285 (11.4)	182 (11.1)	
Wave 5	329 (13.2)	242 (14.8)	

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
Race/Ethnicity, (%)			
Arab/Middle Eastern	221 (8.9)	153 (9.4)	<0.001
Black	158 (6.3)	88 (5.4)	
East/Southeast Asian	211 (8.5)	121 (7.4)	
Indigenous	60 (2.4)	40 (2.5)	
Latin American	66 (2.7)	60 (3.7)	
South Asian	510 (20.4)	140 (8.6)	
White	1062 (42.6)	915 (56.0)	

Patient characteristics 3 m

Number of comorbidities reported at ED arrival, (%)			
	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
None	967 (38.8)	505 (30.9)	<0.001
1	624 (25.0)	418 (25.6)	
2	382 (15.3)	277 (17.0)	
3	225 (9.0)	183 (11.2)	
4	137 (5.5)	109 (6.7)	
5+	160 (6.4)	142 (8.7)	

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
Comorbidity types reported at ED arrival, (%)			
Hypertension	595 (23.9)	446 (27.3)	0.01
Diabetes	381 (15.3)	266 (16.3)	0.38
Coronary artery disease	95 (3.8)	107 (6.6)	<0.001
Heart failure	38 (1.5)	34 (2.1)	0.18
Chronic kidney disease	62 (2.5)	53 (3.2)	0.15
Psychiatric condition/Mental health diagnosis	191 (7.7)	188 (11.5)	<0.001
Organ transplant	25 (1.0)	9 (0.6)	0.12

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
ED Disposition			
Discharged	1739 (69.7)	1076 (65.9)	<0.001
Admitted	594 (23.8)	388 (23.8)	
ICU admission	129 (5.2)	147 (9.0)	
Other	33 (1.3)	23 (1.4)	
Intubation			
Intubation in ED or Admitted	51 (2.0)	51 (3.1)	0.03

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
Doses of COVID vaccine received before index visit, (%)			
None	2018 (80.9)	1284 (78.6)	0.19
1	243 (9.7)	175 (10.7)	
2 or more	234 (9.4)	175 (10.7)	

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
COVID specific therapies received during ED visit			
Dexamethasone	386 (15.4)	311 (19.0)	0.003
Remdesivir	34 (1.4)	48 (2.9)	<0.001
Rocilizumab	< 5	< 5	0.02
Sotrovimab	< 5	< 5	0.60
Nirmatrelvir	-	-	-

Patient characteristics 3 m

	PCC Negative (N=2,495)	PCC Positive (N=1,634)	P-value
Perceived baseline level of fitness, (%)			
Fit and well	1616 (64.8)	896 (54.8)	<0.001
Managing well	698 (28.0)	611 (37.4)	
Frail	102 (4.1)	93 (5.7)	
Don’t remember	34 (1.4)	9 (0.6)	

Prevalence at 3-6-12 months

3 month	6 month	12 month
39,6% (1634/4129)	38,8% (1408/3621)	34,1% (758/2220)

Discussion

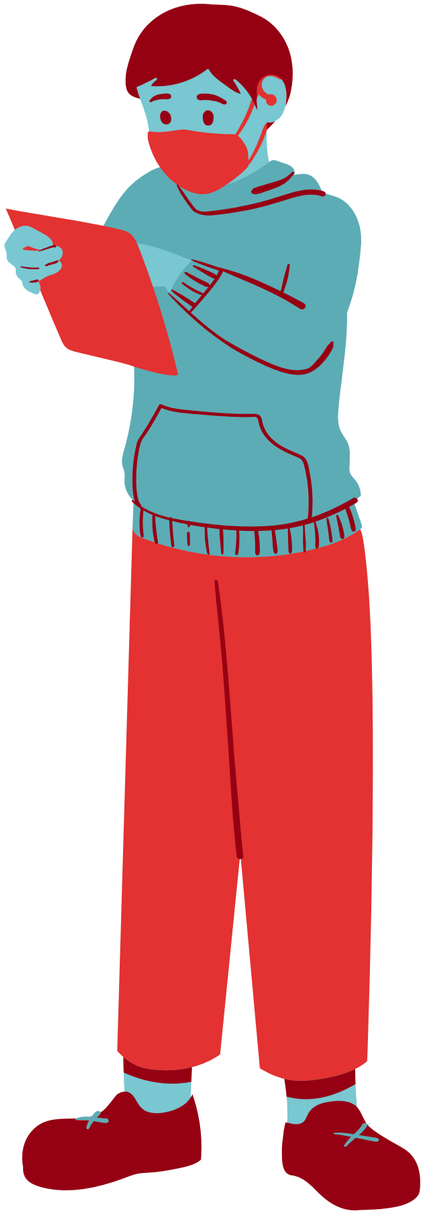
- High prevalence of PCC at 3, 6 and 12 months in our ED cohort
  - Higher than previously reported risk in Canadian patients
- Low decrease (5.5%) in symptoms over time
- PCC prevalence remains high at 12 months (34%)
- Many potential candidate risk factors for PCC clinical prediction rule

- Potential explanations for this could be:
  - More severe COVID-19 cases
  - Patients with multiple co-morbidities
  - Vulnerable patients (e.g. elderly, frail, immunosuppressed)

Limitations

- WHO definition very hard to operationalize
- Vague and complicated time cut-off points
- Relapsing symptoms
- Non-specific symptoms
- New vs. worsening pre-existing symptom?

- Future work
  - Compare our results to negative controls (analyses ongoing)
  - Develop clinical prediction tool to help identify high-risk patients



Lessons learned

- What went well?
  - Strong patient partner involvement and guidance
  - Large cohort of patients
  - Pancanadian network ready to collect data in multiple EDs, signed data sharing agreements, research infrastructure and harmonized data collection forms

- Implementation challenges?
  - WHO definition hard to operationalize
  - Difficult/impossible access to provincial vaccination registries
  - Access to more timely administrative data and linked data sets
  - Pandemic urgency was a challenge to developing valid tools
  - Vulnerable ED populations (indigenous, homeless, linguistic minorities) remain hard to follow
  - Rapid turnover in human resources

- What could have been done differently?
  - Validate our questionnaire prospectively
  - Parallel biomarker study could improve our understanding of pathophysiology

Questions?

Comments?

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www.ccedrrn.com