Post COVID Condition (aka ‘Long COVID’) in Children

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Nothing to disclose

Objectives

- Discuss the estimated incidence of long COVID in children
- State various clinical presentations of long COVID in children
- Describe a management approach
- State what is known so far about outcomes in children

Case

- 15 yo girl, previously well
- 8 months prior to presentation, had acute COVID-19
  - Headaches, myalgias, abdominal pain and bloating, fever, shortness of breath
- Recovered after 3 weeks, however abdominal pain and bloating persisted
- Developed intermittent episodes of rash and swelling involving face, back, arms, legs, lymph node swelling?
- Headaches and episodes of feeling lightheaded
- Fatigue, brain fog, difficulty completing school work

Q: Could this be Long COVID?

What is Long COVID?

New or persistent symptoms after recovery from likely or proven acute COVID-19

Wide range of symptoms (pscyhological, physical, cognitive)

Symptoms can fluctuate or relapse over time

Present at least 3 months after initial infection

Can occur even after recovery from seemingly mild acute infection

Can lead to significant morbidity

No alternative diagnosis

Likely being overly inclusive at present as more is being learned

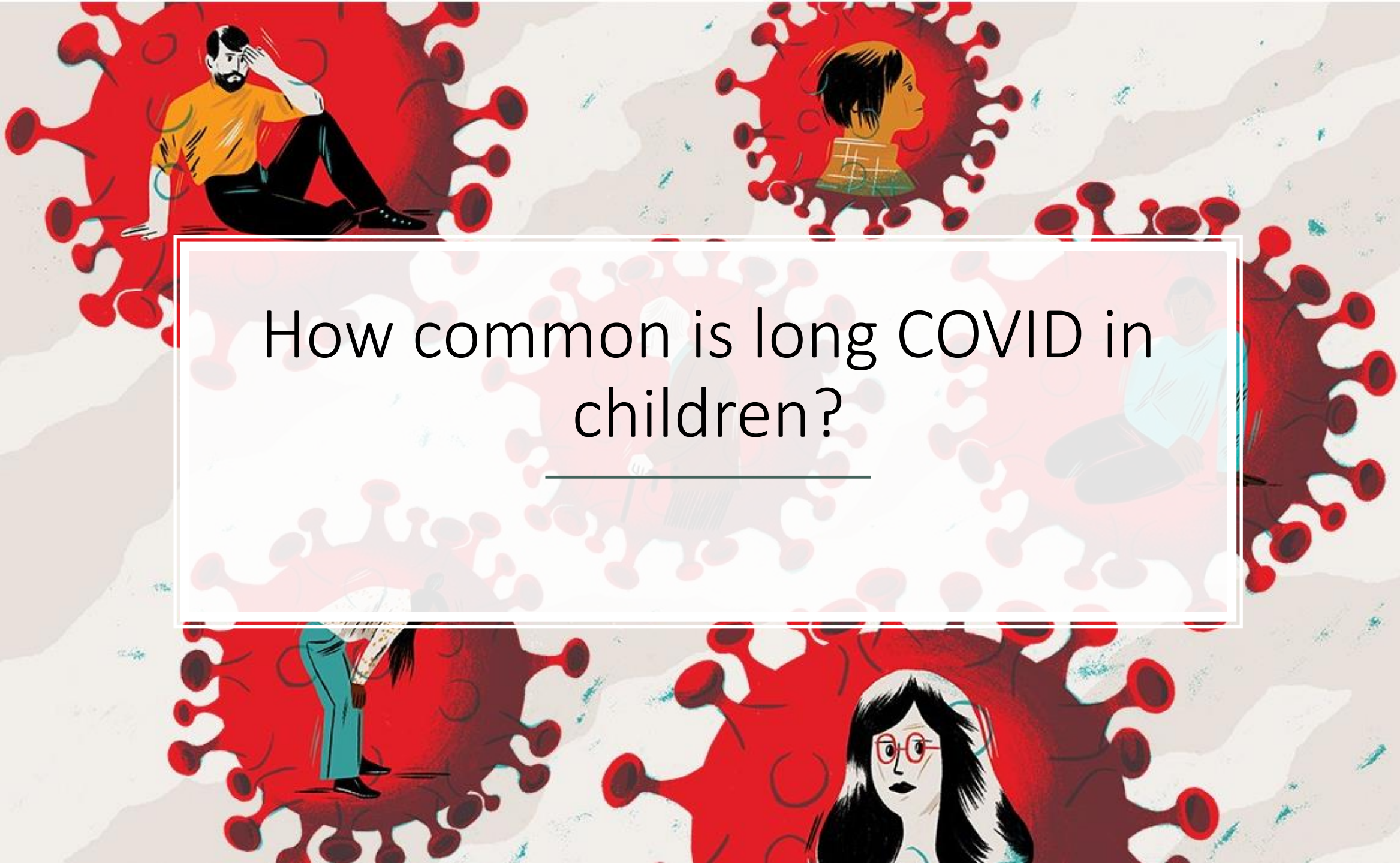
Likely an umbrella term that includes more than one condition or process

Symptoms

Fatigue	SOB, Chest pain, Cough	Anosmia, Dysguesia	Joint pain, Myalgia	Headache, Dizziness
Sleep disturbance	Alopecia	Abdominal pain, diarrhea	Pscyhological (anxiety, depression)	Cognitive, Brain fog, Memory and concentration difficulties

Q: Could this be Long COVID?

A: **Possible/Probable:** Persistent and new symptoms after recovering from acute COVID-19, now 8 months, no alternate cause



How common is long COVID in children?

Illness duration and symptom profile in symptomatic UK school-aged children tested for SARS-CoV-2

Erika Molteni, Carole H Sudre*, Liane S Canas, Sunil S Bhopal, Robert C Hughes, Michela Antonelli, Benjamin Murray, Kerstin Kläser, Eric Kerfoot, Liyuan Chen, Jie Deng, Christina Hu, Somesh Selvachandran, Kenneth Read, Joan Capdevila Pujol, Alexander Hammers, Tim D Spector, Sebastien Ourselin, Claire J Steves, Marc Modat, Michael Absoud, Emma L Duncan*

Summary

Background In children, SARS-CoV-2 infection is usually asymptomatic or causes a mild illness of short duration. Persistent illness has been reported; however, its prevalence and characteristics are unclear. We aimed to determine illness duration and characteristics in symptomatic UK school-aged children tested for SARS-CoV-2 using data from the COVID Symptom Study, one of the largest UK citizen participatory epidemiological studies to date.

Methods In this prospective cohort study, data from UK school-aged children (age 5–17 years) were reported by an adult proxy. Participants were voluntary, and used a mobile application (app) launched jointly by Zoe Limited and King's College London. Illness duration and symptom prevalence, duration, and burden were analysed for children testing positive for SARS-CoV-2 for whom illness duration could be determined, and were assessed overall and for younger (age 5–11 years) and older (age 12–17 years) groups. Children with longer than 1 week between symptomatic reports on the app were excluded from analysis. Data from symptomatic children testing negative for SARS-CoV-2, matched 1:1 for age, gender, and week of testing, were also assessed.

Lancet Child Adolesc Health 2021

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See Online/Comment
https://doi.org/10.1016/S2352-4642(21)00237-6

This online publication has been corrected. The corrected version first appeared at thelancet.com/child-adolescent on August 31, 2021

How common is long COVID in children?

- Reported to occur in approximately 10% of adults who have recovered from acute infection
- Reported to occur in approximately 1-2% of children who have recovered from acute infection
- Other studies, however, have estimated a higher incidence in children, ranging from 4%-27%

Molteni et al, Lancet Child, Oct 2021
Buonsenso et al, Acta Pediatrica, Apr 2021
Osmanov et al, MedRxiv, Jan 2021

What is causing it?

- Unknown
- Multiple theories
- (Likely more than one process)

- Persistent viral particles?
- Post-viral inflammation?
- Autoimmunity?
- Dysautonomia?
- Direct organ damage?

Is this a new phenomenon?

- There are other post-viral syndromes
- EBV
- MERS-CoV
- SARS
- Dengue
- Chikungunya

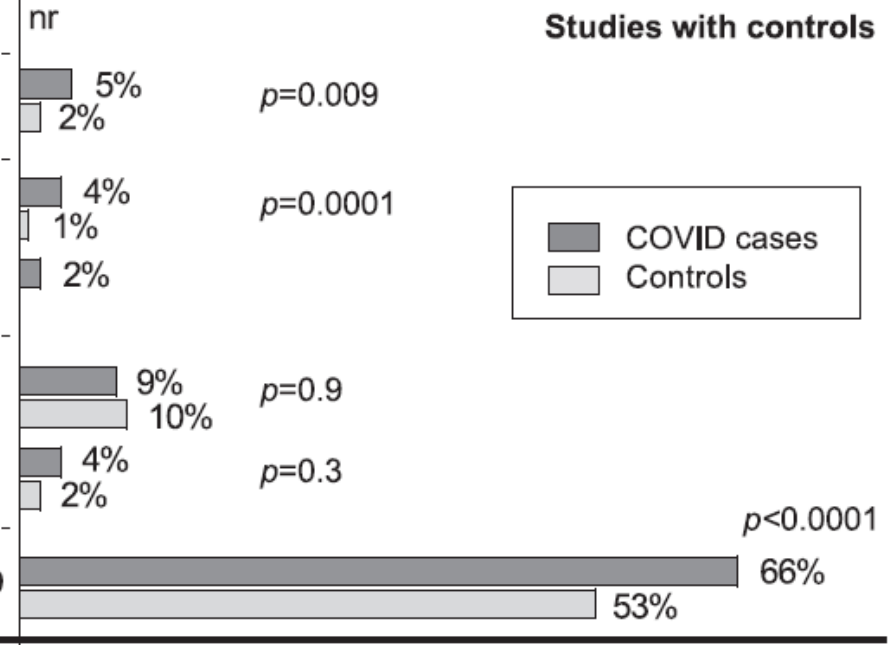
Persistent symptoms after COVID-19:
Long COVID syndrome?
Or Long Pandemic syndrome?

Mental health of Adolescents in the Pandemic: Long-COVID19 or Long-Pandemic Syndrome?

Judith Blankenburg, Magdalena K. Wekenborg, Jörg Reichert, Carolin Kirsten, Elisabeth Kahre, Luise Haag, Leonie Schumm, Paula Czyborra, Reinhard Berner, Jakob P. Armann

- Grade 8-12 students in 14 schools in Germany were enrolled
  - Serial SARS-CoV-2 antibody testing completed in all participants
  - Evaluate occurrence and frequency of difficulties concentrating, memory loss, headache, abdominal pain, myalgia, arthralgia, fatigue, insomnia and mood
- 1560 students
  - Median age of 15 years participated in this study
- 1365 (88%) were seronegative, 188 (12%) seropositive
- No statistical difference between seropositive students and seronegative students

First author	Country	Study	Age (y)[a]	Timing	Cases	Controls	Prevalence of patients with persisting symptoms
Blankenburg	Germany	CS	median 15 (14-16)	nr	nr	nr	nr
Miller	UK	PCS	nr, ≤17	4w	8/174	72/4504	5% vs 2%, p=0.009
Molteni	UK	PCS	median 13 (10-15)	4w	77/1734	15/1734	4% vs 1%, p=0.0001
				8w	25/1734	nr	2%
Radtke	Switzerland	PCS	median 11 (nr)	4w	10/109	121/1246	9% vs 10%, p=0.9
				12w	4/109	28/1246	4% vs 2%, p=0.3
Stephenson	UK	PCS	range 11-17	12w	2038/3065	1993/3739	66% vs 53%, p<0.0001



Zimmerman et al, PIDJ, Sept 2021

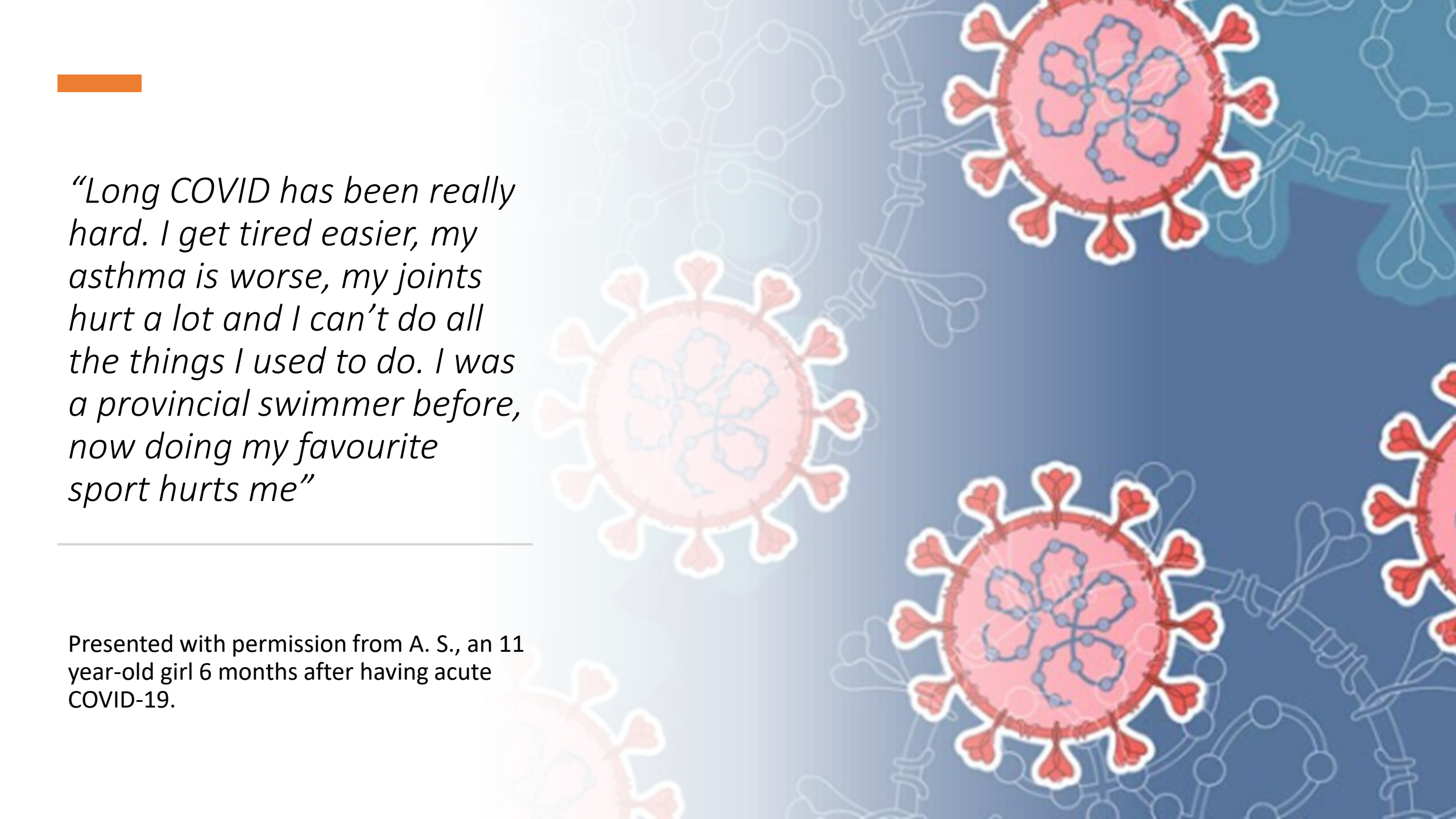
Persistent symptoms after COVID-19:
Long COVID syndrome?
Or Long Pandemic syndrome?

Could be overcalling ‘Long COVID’ in children

However, long COVID is a phenomenon and children are affected

“Long COVID has been really hard. I get tired easier, my asthma is worse, my joints hurt a lot and I can’t do all the things I used to do. I was a provincial swimmer before, now doing my favourite sport hurts me”

Presented with permission from A. S., an 11 year-old girl 6 months after having acute COVID-19.



Management?

- Multi-disciplinary, integrated approach
- Strategies from medical, rehab, and psychological buckets
- Focus on symptom improvement

How do the children do?

- Early evidence suggests many children improve over time, but can take many months

Say et al, Lancet child, Apr 2021
Molteni et al, Lancet child, Aug 2021

Development of a Long COVID pathway at SickKids

- Initial intake visit in ID COVID follow-up clinic
- Based on presentation and screening, determine further referrals
- Work in progress
- Developing a network of specialists who are seeing these referrals and developing expertise
- Building collaborations with community partners, rehab, psychology

What are we seeing so far?

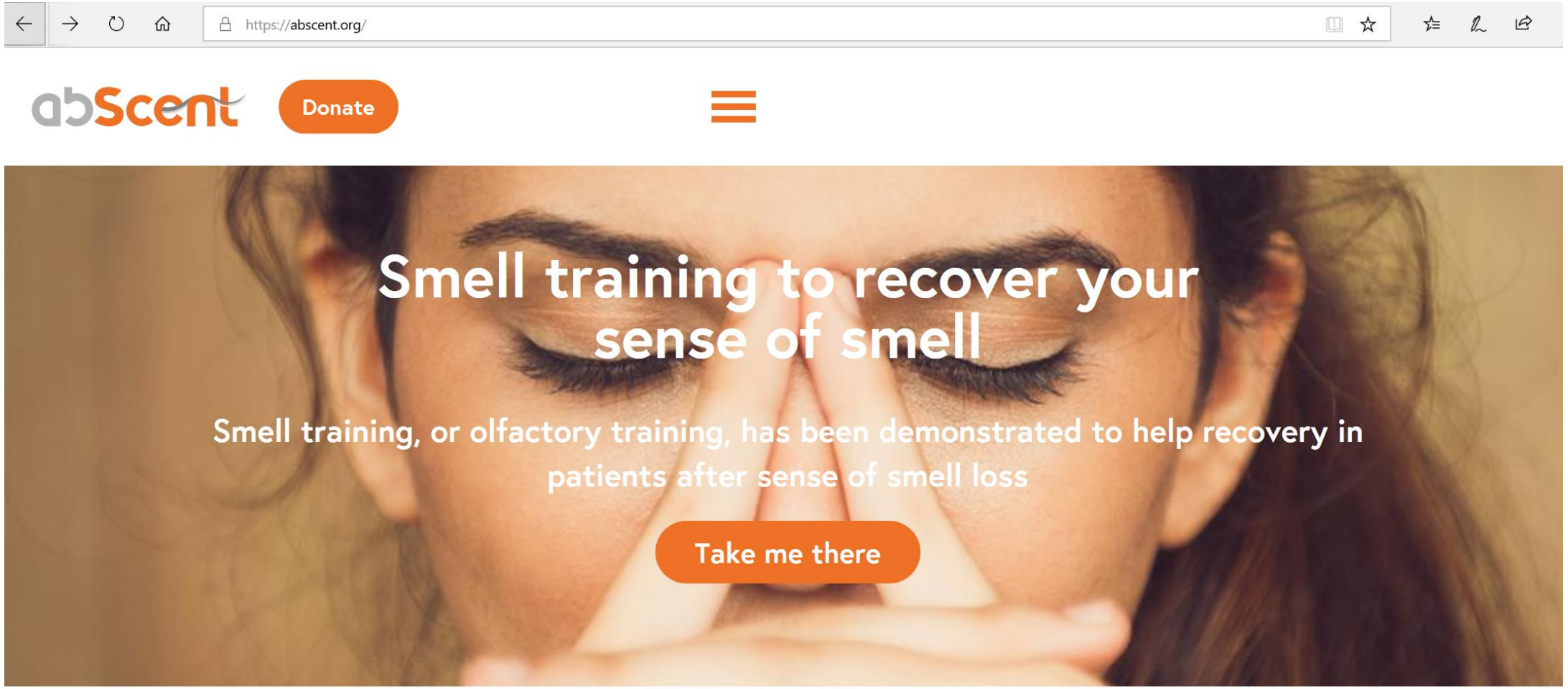
- Isolated anosmia, dysguesia
- Post infectious inflammation – asthma, eczema, angioedema, mesenteric adenitis
- Dysautonomia – headaches, dizziness, abdominal bloating
- Fatigue, difficulty concentrating
- Mental health, somatization

- Most are showing steady improvement over time

Our management approach

- Partnering with their primary care doctor
- Assessing for other conditions
- Judicious use of testing/consultants (‘demedicalizing’ when appropriate)
- Focus on symptoms improvement and recovery
- Reassurance and encouragement based on patients we have seen so far

Some treatment strategies


https://abscent.org/
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Smell training to recover your sense of smell
Smell training, or olfactory training, has been demonstrated to help recovery in patients after sense of smell loss
Take me there

https://abscent.org/learn-us/smell-training

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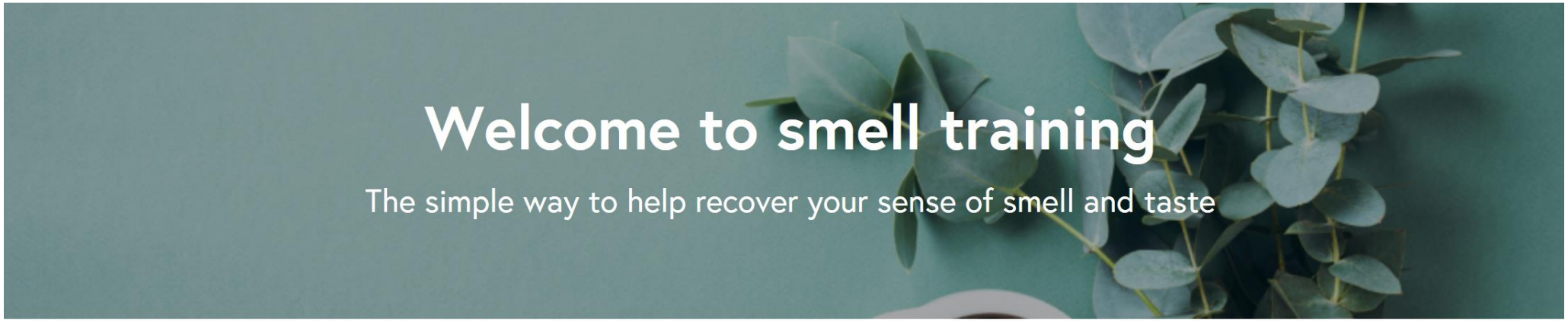


If you've lost your sense of taste and smell for two weeks or more, **smell training** - sometimes called olfactory training - can help recovery.

Smell training is actively sniffing the same four scents every day, spending around 20 seconds on each scent and really concentrating on what you're doing.

It's that easy. It's **safe**, it's **recommended** by doctors, and **anyone can do it**.

JAMA Otolaryngol Head Neck Surg. 2021 Jun 1;147(6):502-509. doi: 10.1001/jamaoto.2021.0086.

Association of Olfactory Training With Neural Connectivity in Adults With Postviral Olfactory Dysfunction

Pawina Jiramongkolchai [1], Michael S Jones [1], Andrew Peterson [1], Jake J Lee [1], Adam Liebendorfer [1], Cristine N Klatt-Cromwell [1], John S Schneider [1], Andrew J Drescher [1], M Allison Ogden [1], Joseph D Brunworth [1 2], Dorina Kallogjeri [1 3], Sara Kukuljan [1], Jonathan E Peelle [1], Jay F Piccirillo [1 4]

Affiliations + expand

PMID: 33734298 PMCID: PMC7974830 DOI: 10.1001/jamaoto.2021.0086

Free PMC article

Post viral inflammation

- Asthma
- Eczema
- Angioedema
- Mesenteric adenitis

Mental Health/Somatization

- Mind/body group
- Psychiatry
- Acceptance and commitment therapy

Dysautonomia

- Dysfunction of the autonomic nervous system
- ‘POTS’ or postural orthostatic tachycardia syndrome is the most common disorder of the autonomic nervous system
- Typically affects the young, females>males
- Symptoms of long COVID seem to overlap with some symptoms of dysautonomia

Dysautonomia - symptoms

- Neuro: Headache, dizziness, fatigue, cognitive complaints
- Heat intolerance
- Cardiac: Palpitations, tachycardia, syncope
- Resp: Tachypnea, chest pain, breathlessness
- GI: abdominal pain, nausea, bloating, alternating bowel habits

POTS

- 40-50% report a preceding infection
  - Theory: could in some cases, the preceding infection be COVID-19 – triggering symptoms of ‘long COVID’
  - Direct effect of the virus or post-infectious inflammation/immune mediated
- Two or more symptoms affecting two or more systems
- Screen with a 10 minute active stand test
  - Flat x 10 min
  - Stand x 10 min
  - 40bpm increase in absence of orthostatic hypotension

POTS - management

- Education, reassurance
- Fluid, salt intake
- Small meals
- Exercise program, pacing
- Avoid dehydration or getting overheated
- Mind/body
- Sleep hygiene
- Manage headaches with medications

Brain Fog

Received: 12 August 2021 | Revised: 1 December 2021 | Accepted: 6 December 2021

DOI: 10.1002/pmrj.12745

CLINICAL GUIDANCE

PM&R

Multi-disciplinary collaborative consensus guidance statement on the assessment and treatment of cognitive symptoms in patients with post-acute sequelae of SARS-CoV-2 infection (PASC)

Jeffrey S. Fine MD, FAAPMR[1] | Anne Felicia Ambrose MD, MS[2] | Nyaz Didehbani PhD[3] | Talya K. Fleming MD[4] | Lissette Glashan MS, CCC-SLP, CBIS[5] | Michele Longo MD, MPH[6] | Alexandra Merlino MS, CCC-SLP[7] | Rowena Ng PhD[8] | Gerald J. Nora MD, PhD[9] | Summer Rolin PsyD[10] | Julie K. Silver MD[11] | Carmen M. Terzic MD, PhD[12] | Monica Verduzco-Gutierrez MD[13] | Sarah Sampsel MPH[14]

[1]Department of Rehabilitation Medicine and Department of Medicine, Rusk Rehabilitation, NYU Langone Health, New York, New York, USA

Brain Fog in Post COVID-19 Recovery

Post COVID-19
Interdisciplinary Clinical Care Network
Recovery | Care | Research | Education

During COVID-19 recovery, many patients say that they experience “brain fog”. This is a term that people use to describe issues that they have with their usual cognition or ‘thinking’ such as problems with concentration, memory, mental speed, planning, and problem-solving. Some people describe this as being unable to focus or to feel sharp in their thinking.

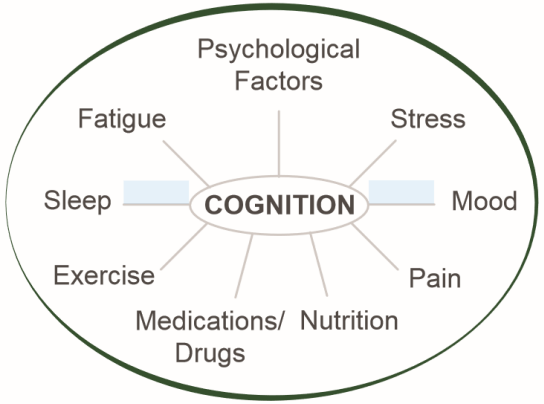
These symptoms can be worse or last longer if you also have other challenges such as a learning disability, sleep problems, pain, or mental health issues.

Many things affect cognition. By managing them, cognition generally improves. Since many of these factors are connected, a positive change in one area can have an effect in other areas, resulting in an even bigger impact on cognition.

General strategies that help

Here are some general ways or ‘strategies’ to manage cognitive changes following your COVID-19 illness:

1. Use ‘pacing’ to make the best use of your energy across the day and week.
2. Avoid drugs and alcohol.
3. Make sure you are managing stress.
4. Pay attention to your mood and sleep.
5. Get regular, safe amounts of physical exercise that don’t flare your symptoms.
6. Remind yourself it is normal to have cognitive slips sometimes.



Specific strategies

Here are some more detailed tips for managing cognitive difficulties:

1. Break difficult tasks into smaller steps and write them down.
2. Use a calendar or day planner to keep track of appointments.
3. Set reminders on your phone.
4. Keep your environment tidy.
5. Keep important things like your wallet and keys in the same place.
6. If you are stuck for a word, try thinking of a similar word, or describing the word.
7. Reduce distractions when you are trying to concentrate (e.g. turn off the radio, go to a quiet corner).
8. Focus on one task at a time.
9. Choose a time when you are most alert to take on challenging mental tasks.
10. Ask someone for help if you need it.

Talk to your Primary Care Provider if your cognitive function is not improving. They can discuss symptom management with you or make a referral if needed.

Fatigue

Received: 7 June 2021 | Revised: 26 July 2021 | Accepted: 28 July 2021

DOI: 10.1002/pmrj.12684

CLINICAL GUIDANCE

PM&R

Multidisciplinary collaborative consensus guidance statement on the assessment and treatment of fatigue in postacute sequelae of SARS-CoV-2 infection (PASC) patients

Joseph E. Herrera DO[1] | William N. Niehaus MD[2] | Jonathan Whiteson MD[3] | Alba Azola MD[4] | John M. Baratta MD, MBA[5] | Talya K. Fleming MD[6] | Soo Yeon Kim MD[4] | Huma Naqvi MD[7] | Sarah Sampsel MPH[8] | Julie K. Silver MD[9] | Monica Verduzco Gutierrez MD[10] | Jason Maley MD[11] | Eric Herman MD[12] | Benjamin Abramoff MD, MS[13]

[1]Department of Rehabilitation and Human Performance, Icahn School of Medicine at Mount Sinai, New York, New York, USA

- **Brain Fog, Fatigue**
- Need for comprehensive rehab program and psychological support for children
- Work in progress
- Collaboration with Holland Bloorview

Back to the Case

- 15 yo girl, previously well
- 8 months prior to presentation, had acute COVID-19
  - Headaches, myalgias, abdominal pain and bloating, fever, shortness of breath
- Recovered after 3 weeks, however abdominal pain and bloating persisted
- Developed intermittent episodes of rash and swelling involving face, back, arms, legs, lymph node swelling?
- Headaches and episodes of feeling lightheaded
- Fatigue, brain fog, difficulty completing school work

Back to the case

- Seen by pediatric medicine, immunology, neurology, psychology

- Immunology – rash and swelling consistent with post-viral angioedema, high dose antihistamine with good effect
- Neurology – element of dysautonomia, fluid and salt intake, exercise program
- Psychological assessment – for coping/support (private)
- Brain fog and fatigue – self management (accessed private PT)

Q: Can she get vaccinated?

Annals of Internal Medicine®

Letters | September 2021

Symptoms After COVID-19 Vaccination in Patients With Persistent Symptoms After Acute Infection: A Case Series

David T. Arnold, MBChB, BSc, Alice Milne, MSc, Emma Samms, Louise Stadon, BSc, ... See More +

Author, Article and Disclosure Information

https://doi.org/10.7326/M21-1976

Q: Can vaccination prevent long COVID?

A: Maybe

Adults with breakthrough infection had decreased odds of having symptoms last longer than 28 days when compared with unvaccinated controls

Risk factors and disease profile of post-vaccination SARS-CoV-2 infection in UK users of the COVID Symptom Study app: a prospective, community-based, nested, case-control study

Michela Antonelli, Rose S Penfold, Jordi Merino, Carole H Sudre, Erika Molteni, Sarah Berry, Liane S Canas, Mark S Graham, Kerstin Klaser, Marc Modat, Benjamin Murray, Eric Kerfoot, Liyuan Chen, Jie Deng, Marc F Österdahl, Nathan J Cheetham, David A Drew, Long H Nguyen, Joan Capdevila Pujol, Christina Hu, Somesh Selvachandran, Lorenzo Polidori, Anna May, Jonathan Wolf, Andrew T Chan, Alexander Hammers, Emma L Duncan, Tim D Spector, Sebastien Ourselin, Claire J Steves**

Summary

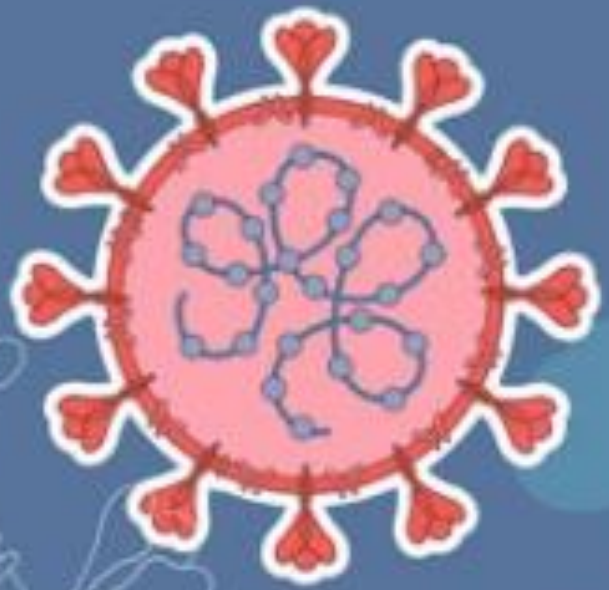
Background COVID-19 vaccines show excellent efficacy in clinical trials and effectiveness in real-world data, but some people still become infected with SARS-CoV-2 after vaccination. This study aimed to identify risk factors for post-vaccination SARS-CoV-2 infection and describe the characteristics of post-vaccination illness.

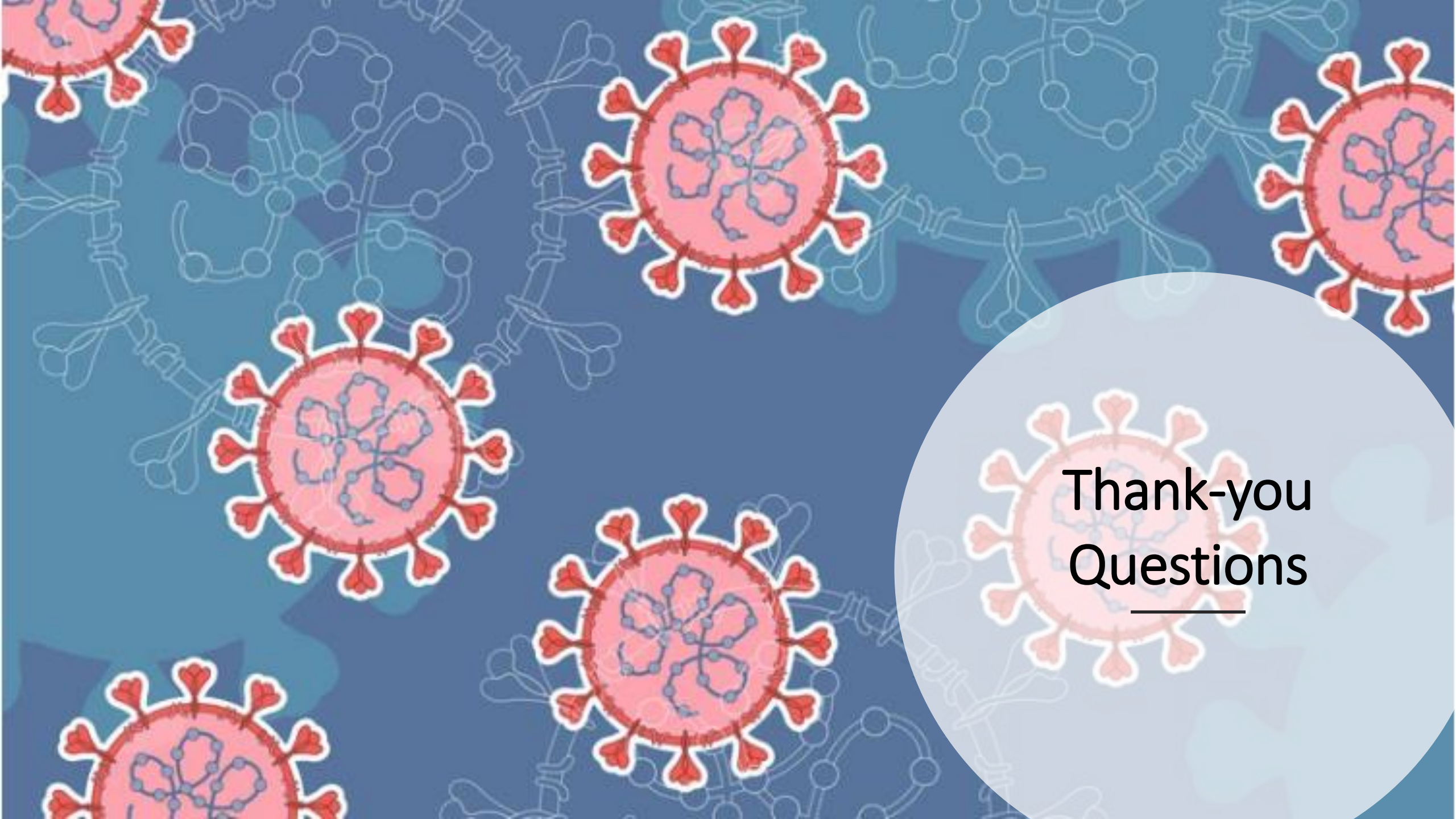
Lancet Infect Dis 2021

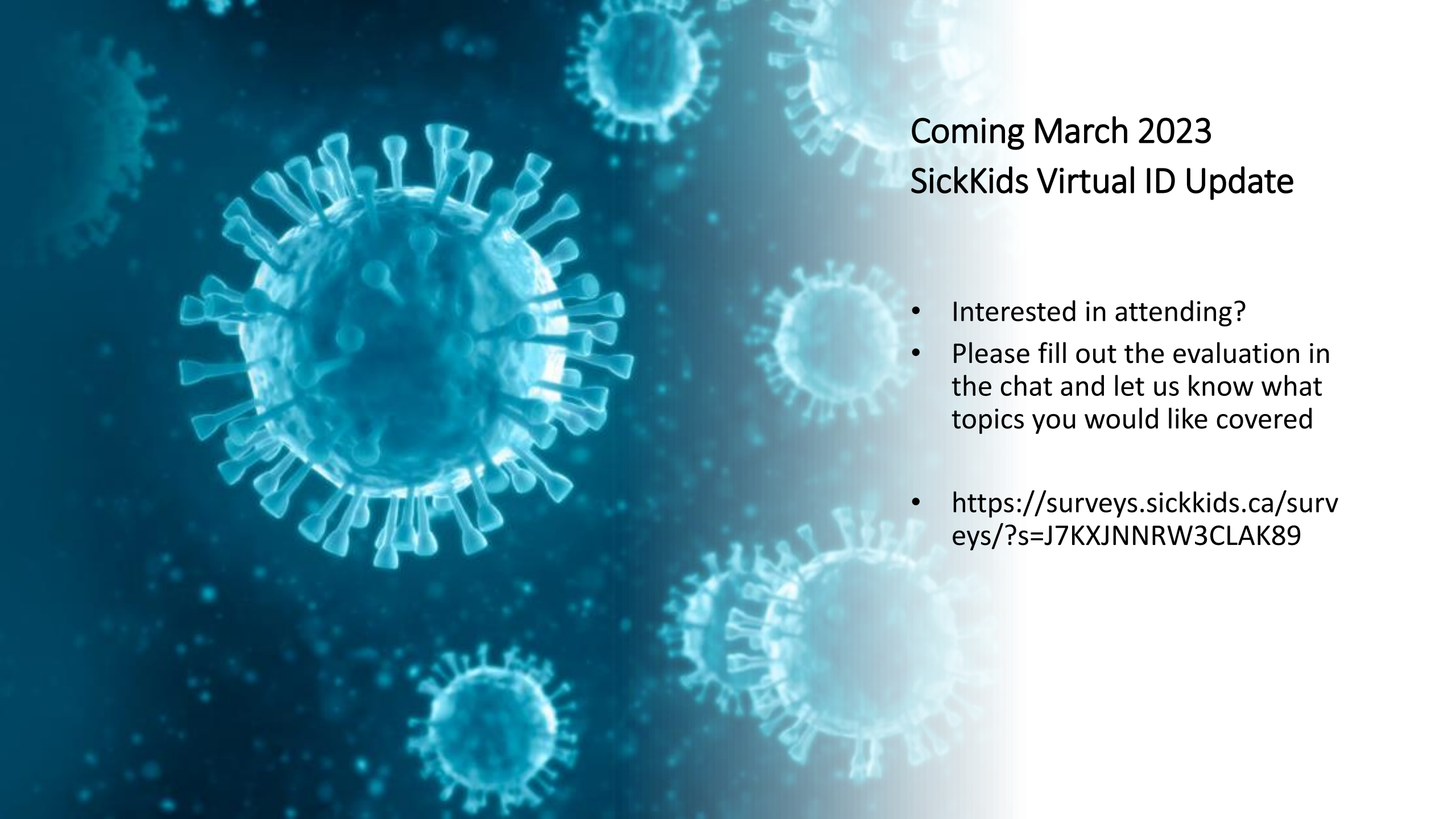
Published Online September 1, 2021 https://doi.org/10.1016/S1473-3099(21)00460-6

Long COVID in Children - Summary

- Children are affected, but less so than adults
- Are some ‘long COVID’ diagnoses overcalling it? Maybe, but something is going on
- Estimates that 1%-2% of all children with symptomatic COVID-19 may be affected
- Multi-d, integrated approach
- SickKids pathway, work in progress, progress being made
- Improvement in symptoms over time




Thank-you
Questions



Coming March 2023
SickKids Virtual ID Update

- Interested in attending?
- Please fill out the evaluation in the chat and let us know what topics you would like covered

- https://surveys.sickkids.ca/surveys/?s=J7KXJNNRW3CLAK89