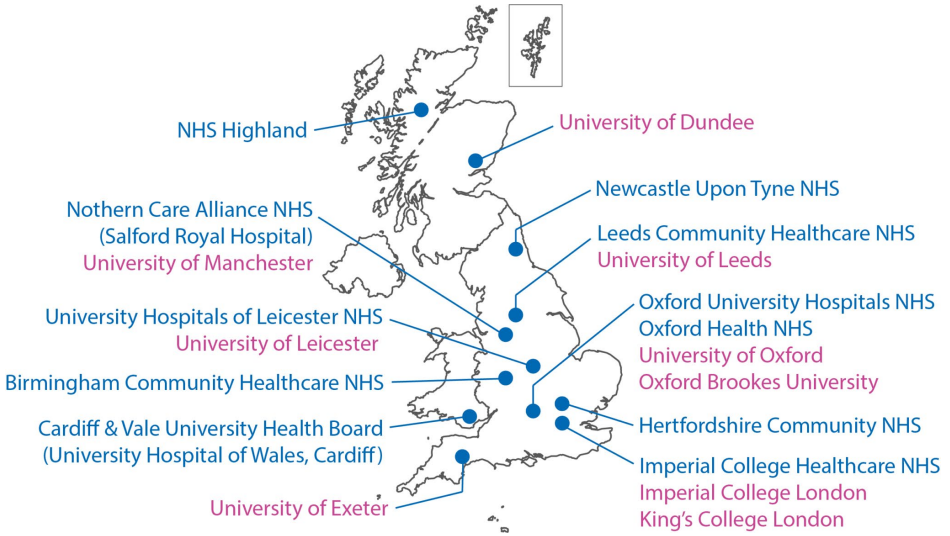
Prevalence of orthostatic intolerance in Long Covid: A multicentre observational study



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LOCOMOTION

Long COVID multidisciplinary consortium
Optimising treatments and services across the NHS

Terminology

- Dysautonomia (Autonomic dysfunction)
- Orthostatic Intolerance
- Postural orthostatic tachycardia syndrome (PoTS)
- Orthostatic Hypotension (OH)

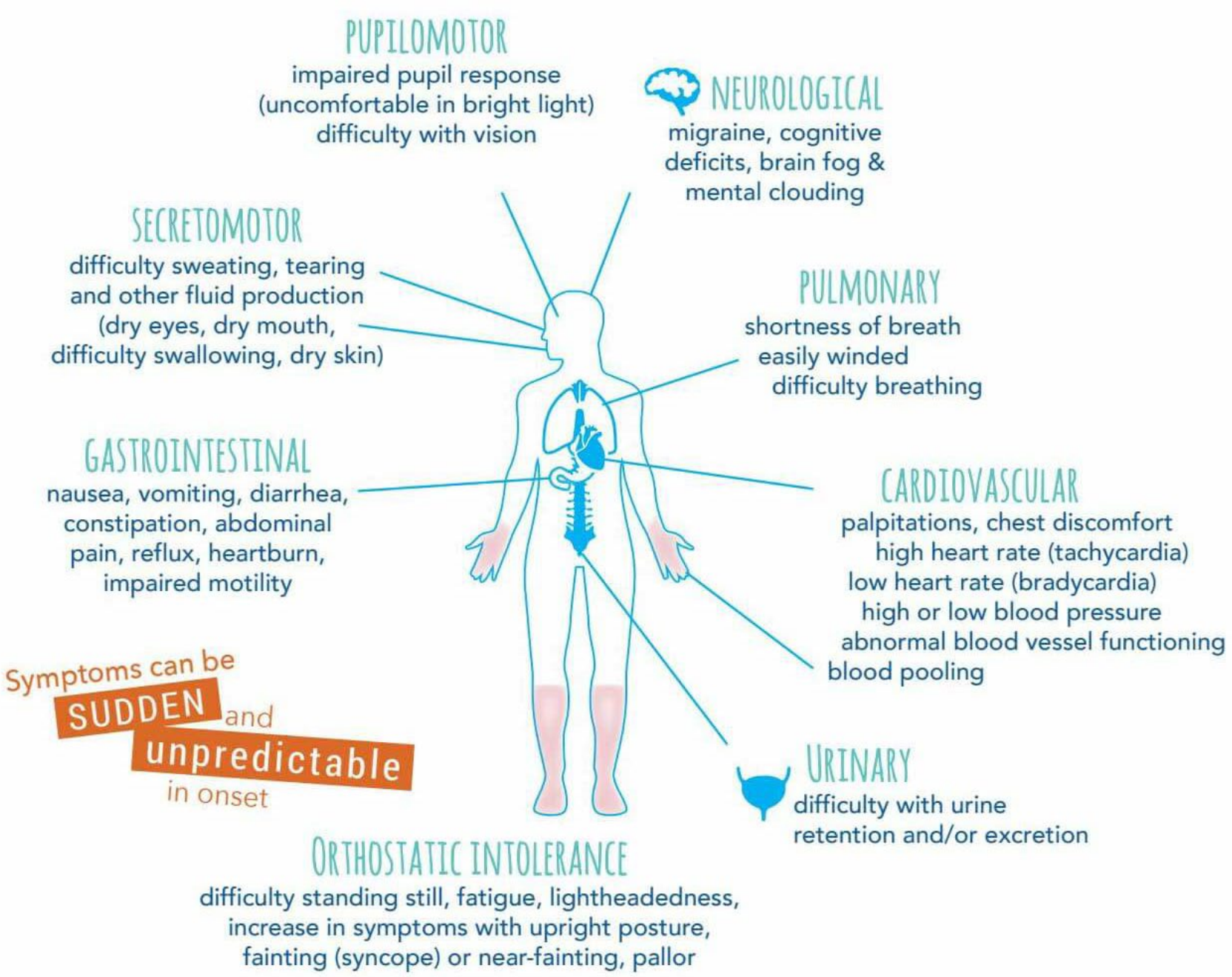
Dysautonomia

Dysfunction of the Autonomic nervous System (ANS)

The ANS controls and regulates the "automatic" functions of the body that we do not consciously think about.

Approx. 2/3rd of patients with LC thought to have **dysautonomia**.

Larsen et al (2022), Front. Neurol., Volume 13 – Characterization of autonomic symptom burden in long COVID: A global survey of 2,314 adults. https://www.frontiersin.org/journals/neurology/articles/10.3389/fneur.2022.1012668/full



Orthostatic Intolerance

Symptoms related to posture, which are worse when upright and improve when recumbent.

Typical symptoms include:

- Light-headedness / Dizziness
- Palpitations
- Atypical chest pain
- Tremulousness

Cardiovascular autonomic dysfunction

PoTs

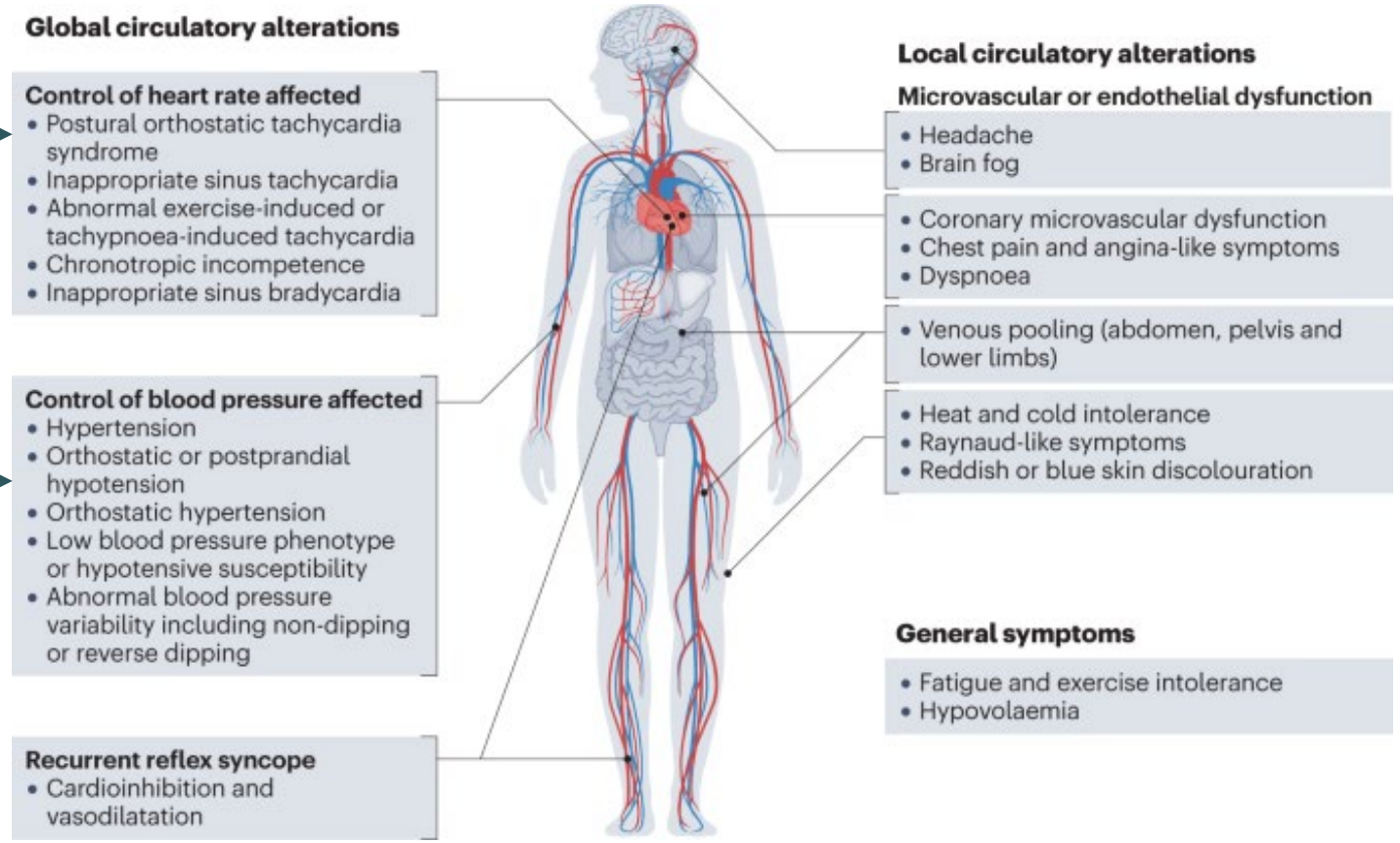
(Postural orthostatic tachycardia syndrome)

When you stand up, HR raises more than 30bpm, in the absence of a drop in BP, with symptoms during the test

OH

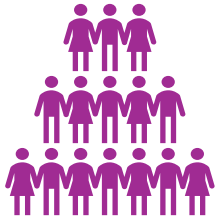
(Orthostatic Hypotension)

When you stand up, blood pressure falls at least 20 systolic or 10 diastolic within first 3 mins, with or without symptoms



Fedorowski, A., Fanciulli, A., Raj, S.R. *et al.* Cardiovascular autonomic dysfunction in post-COVID-19 syndrome: a major health-care burden. *Nat Rev Cardiol* (2024). https://doi.org/10.1038/s41569-023-00962-3

The aims of the study



How many patients within a LC clinic have OI/PoTS/OH?

Explore the characteristics of those with PoTS/OH?

Association between PoTS/OH and symptoms of OI

Method - What we did

- Multicentre (8 sites, clinic and home testing)
- Consecutive patients regardless of specific symptoms
- NASA Lean test (10 mins)
- Agreed testing standards
- Baseline measure in supine
- Symptom, HR and BP at 1, 2, 4, 6, 8, and 10 mins
- Comparison HV group, staff or from healthcare conferences

Bateman Horne Center
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NASA-LeanTest-Instructions-April-2018.pdf (batemanhornecenter.org)

Characteristics

277=Long Covid and 50=HV

Mean age: 48

Gender female: 62% LC; 64% HV

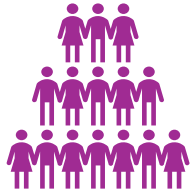
LC group:

- Average duration of LC 18 (14-28) months
- Majority not hospitalised
- More co-morbidities
- Slightly higher BMI
- Slight difference in ethnicity

	long covid patients (n=277)	Healthy volunteers (n=50)
Mean age (years) (SD)	**48 (13)**	**48 (16)**
Sex: Female (%)	173 (62%)	32 (64%)
Mean body mass index (kg/m^2) (SD)	**29 (7)**	**25 (5)**
Ethnicity:		
White (%)	**219 (79%)**	31 (62%)
Black (%)	7 (3%)	0 (0%)
Asian (%)	23 (8%)	3 (6%)
Mixed/other (%)	16 (6%)	**14 (28%)**
Not recorded (%)	12 (4%)	2 (4%)
Known medical conditions:		
Allergies or autoimmune conditions (%)	**44 (16%)**	6 (12%)
Other respiratory conditions (%)	1 (<1%)	0 (0%)
Other inflammatory conditions (%)	12 (4%)	2 (3%)
Hypertension (%)	**28 (10%)**	4 (6%)
Hypotension (%)	0 (0%)	0 (0%)
Other heart conditions (%)	**22 (8%)**	2 (4%)
Type 2 diabetes mellitus (%)	**16 (6%)**	1 (2%)
Mental health condition (%)	**43 (16%)**	0 (0%)
Median duration of long Covid (IQR) (months)	**18 (14 to 28)**	-
Admitted to hospital with initial SARS-CoV-2 infection (%)*	**16 (9%)**	-
Admitted to intensive care with initial SARS-CoV-2 infection (%)*	**4 (2%)**	-

* Where numbers do not sum to totals, this is because of incomplete data

Results



How many patients within a LC clinic have OI/PoTS/OH?

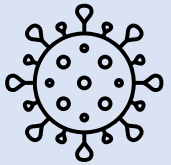
Healthy volunteers = 50

No HR rise of ≥ 30 no PoTS

5 (10%) had OH but all asymptomatic

No history of OI symptom

No acute symptoms



Long Covid group = 277

15% (41) had an abnormal NLT, of which

7% (20) met criteria for PoTS

8% (21) had OH – 11 were symptomatic

47% (130) had history of OI symptoms

52% (144) had acute symptoms during the test

Results

Characteristics of those with PoTS/OH?

PoTS = 20 (7%)

Tended to be younger (39) and female (70%)

Reported slightly more mental health conditions

Reported a history of typical OI symptoms.

Orthostatic Hypotension = 21 (8%)

Tended to be older (58)

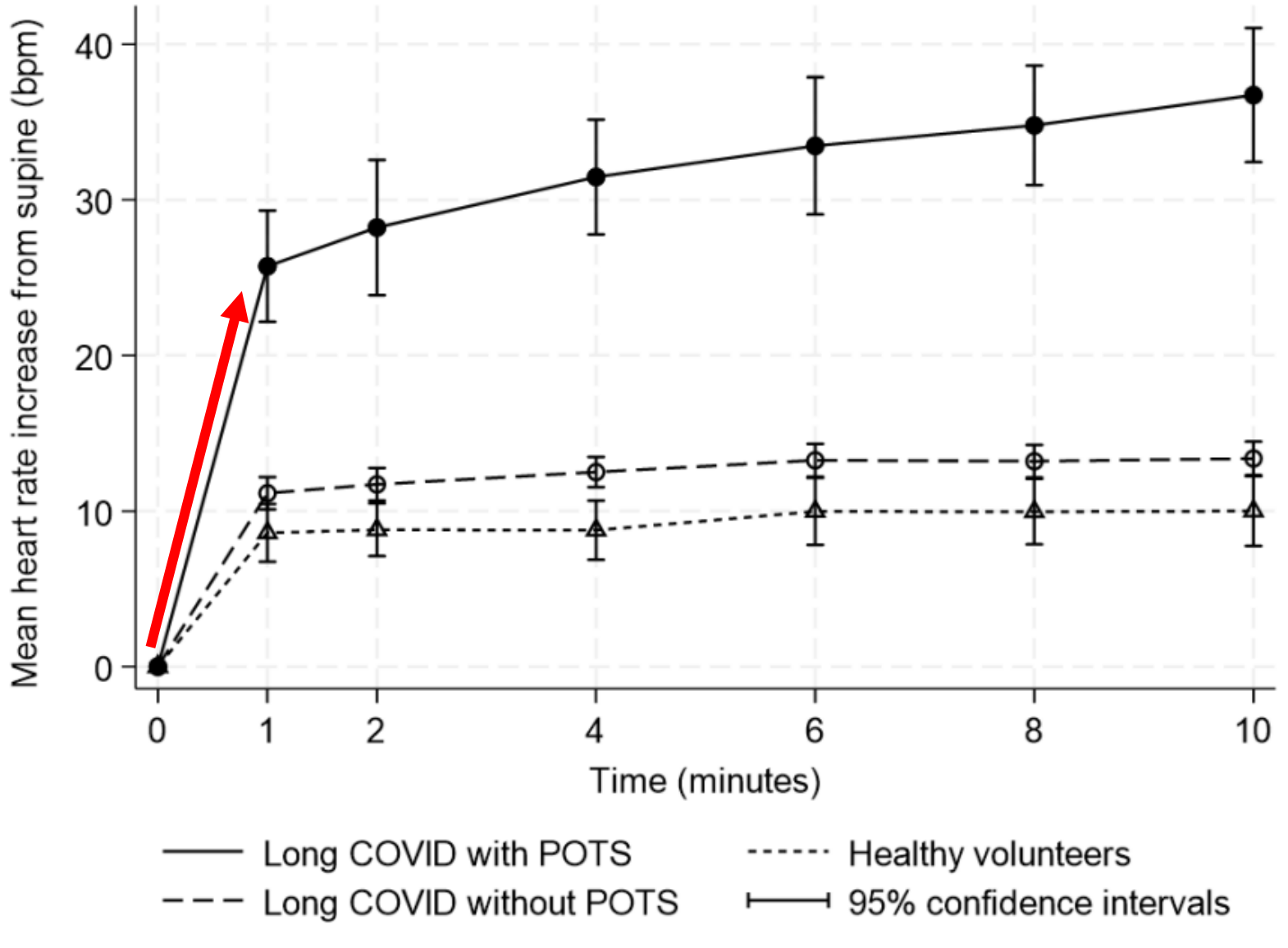
More physical health comorbidities.

Did not report typical history of OI symptoms

HR rise during the NLT

Quick initial rise with average reaching ≥ 30 within 4 mins

Figure 1. Mean heart rate increases for Long Covid patients who met the criteria for PoTS during the Lean Test, Long Covid patients during the Lean Test, compared to healthy volunteers who did not meet the criteria for PoTS



Long Covid OI symptoms and a positive test

Association between PoTS/OH and symptoms of OI

	long covid patients (n=277)			Healthy volunteers (all no Hx of OI) (n=50)
	With previous **history** of OI (n=130)	**No** previous **history** of OI (n=147)	**All long covid patients** (n=277)	
Met criteria for **PoTS** (%)	**14 (11%)**	**6 (4%)**	**20 (7%)**	**0 (0%)**
Met criteria for **OH** (%) With/without acute symptoms	**7 (5%)**	**14 (10%)**	**21 (8%)**	**5 (10%)**

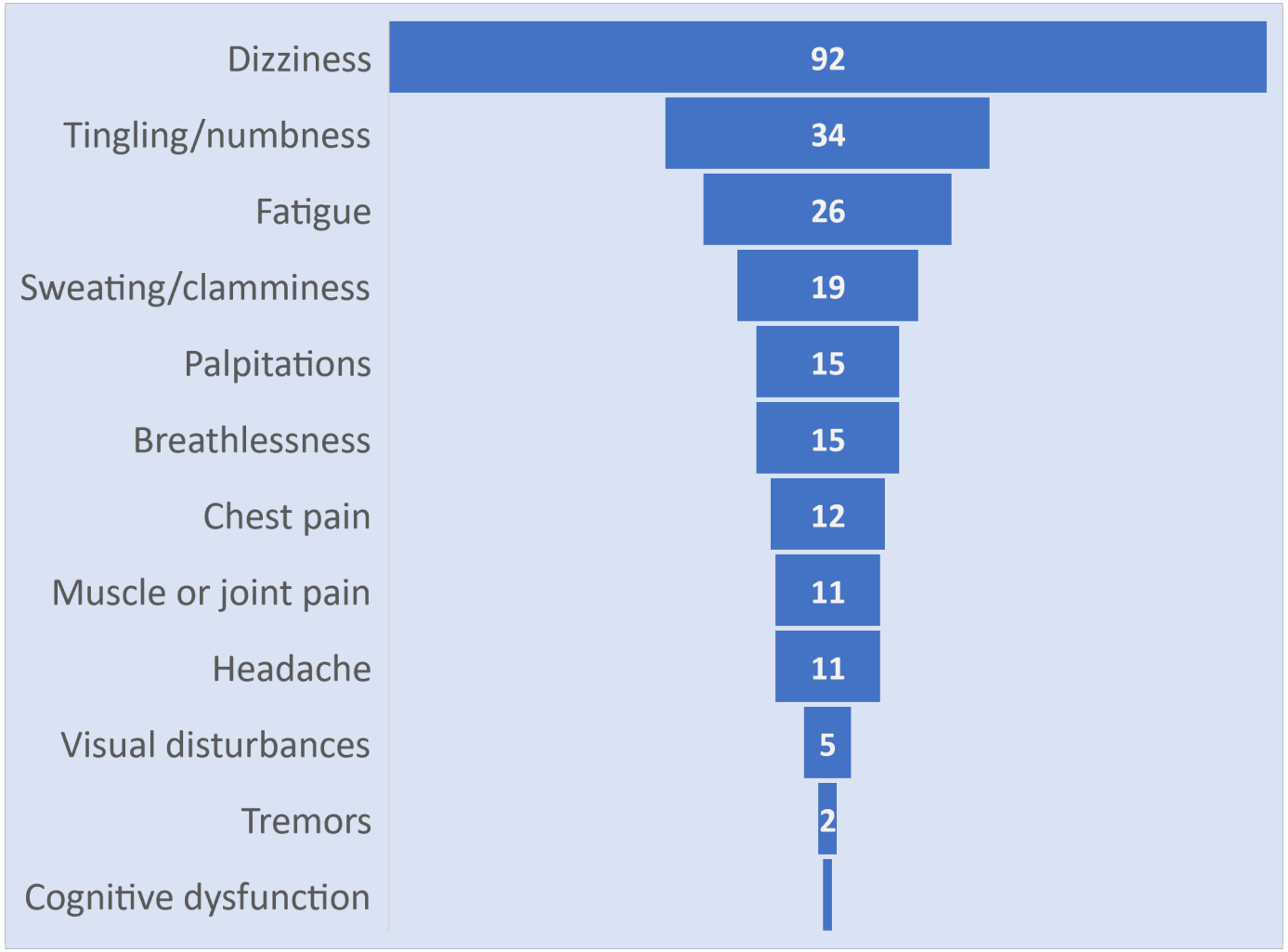
Symptoms during NLT test

52% (144) patients were symptomatic during the NLT

65% (84) of those who reported a history of OI also symptoms were symptomatic during NLT

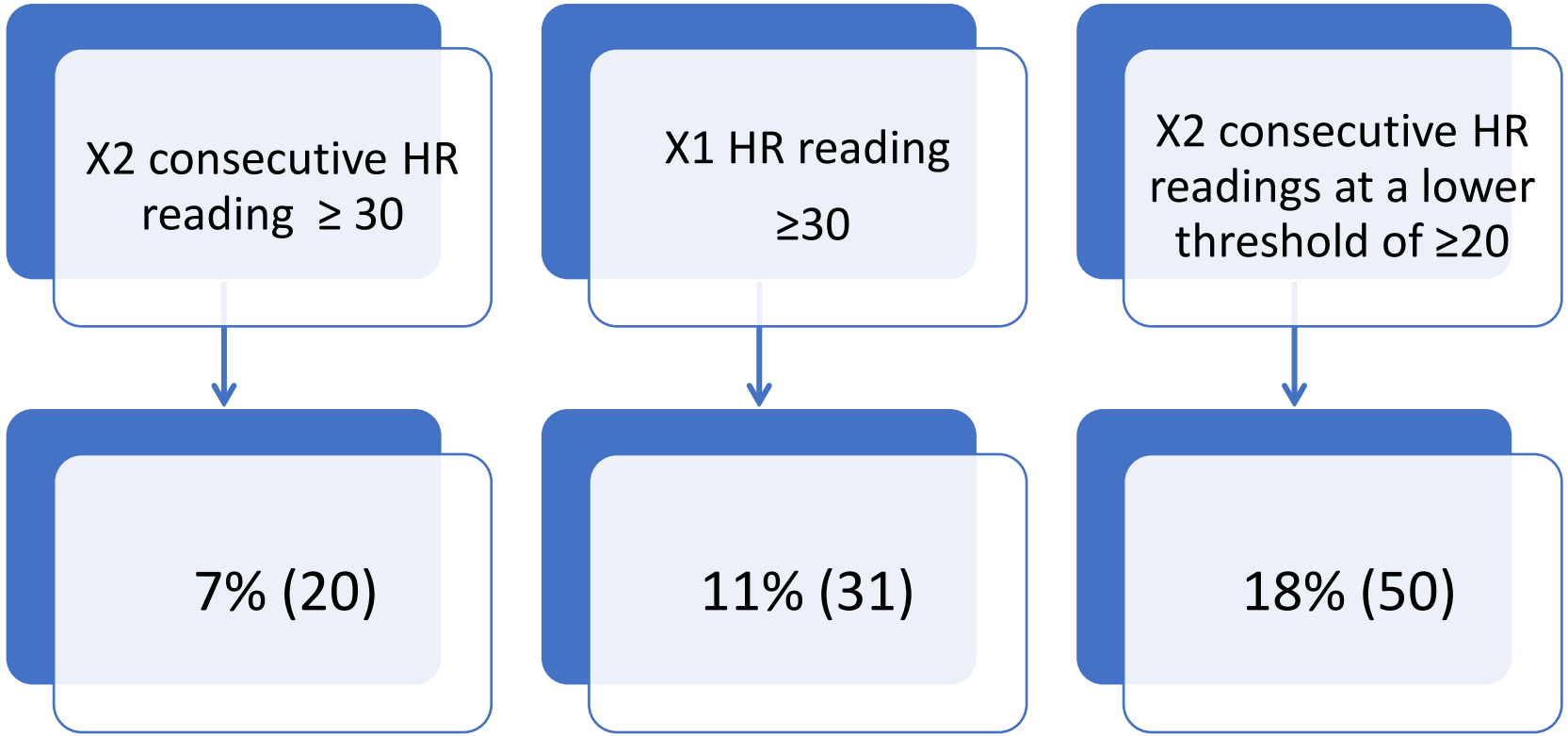
17% (46) terminated the test early because of excessive symptoms

79% (114) did not meet the threshold for PoTS or OH



Number of patients reporting each symptom during the NLT

Relaxing the HR threshold



In summary

≥15% of patients had an abnormal lean test

7-11% met the criteria for PoTS and 8% had OH

48% of patient with a positive test did not report typical symptoms of OI

Almost 1/2 of positive findings may have been missed if testing limited to specific symptoms

Resources

https://www.standinguptopots.org/orthostaticintolerance

https://www.potsuk.org/

https://stopfainting.com/

Quote from patient with long covid

"The impact of getting treatment including simple medication, was life-changing.

I went from being unable to walk more than a few yards and becoming dizzy after a few seconds standing to being able to walk and be upright for longer.

I hadn't even realised these symptoms were due to autonomic dysfunction until the medication reversed a lot of it"

Questions and thanks

With thanks to the Locomotion Consortium, patient and healthy volunteers.

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Cassie Lee, Darren C Greenwood, Harsha Master, Kumaran Balasundaram, Paul Williams, Janet T. Scott, Conor Wood, Rowena Cooper, Julie L. Darbyshire, Ana Espinosa Gonzalez, Helen E. Davies, Thomas Osborne, Joanna Corrado, Nafi Iftekhar, Natalie Rogers, Brendan Delaney, Trish Greenhalgh, Manoj Sivan on behalf of the Locomotion Consortium. Dec 2023 - Pre-print
https://www.medrxiv.org/content/10.1101/2023.12.18.23299958v1

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