

Evidence check

22 April 2020

Rapid evidence checks are based on a simplified review method and may not be entirely exhaustive, but aim to provide a balanced assessment of what is already known about a specific problem or issue. This brief has not been peer-reviewed and should not be a substitute for individual clinical judgement, nor is it an endorsed position of NSW Health.

Non-invasive ventilation and inspiratory muscle training for spinal cord injury patients

Rapid review questions

1. What evidence is available regarding community or home-based non-invasive ventilation (NIV) for people with spinal cord injuries during COVID-19?
2. What evidence is available regarding inspiratory muscle training (IMT) for people with spinal cord injuries during COVID-19: What is the aerosolisation risk associated with IMT?

In brief

- There are no clinical practice guidelines, systematic reviews, or research papers on community or home-based NIV during COVID-19 for people with spinal cord injuries.
- Some guidance classifies NIV to be potentially aerosol-generating. However, a systematic review found non-significant results for viral transmission via continuous positive airway pressure (CPAP) machines.
- Regulators and medical device companies recommend healthcare professionals utilise personal protective equipment (PPE) when using CPAP on COVID-19 positive patients due to the potential risk of transmission.
- Some advice suggests healthcare workers adopt PPE and aerosol precautions when working with spinal cord injury patients although there have been no cases of viral transmission.
- There are no clinical practice guidelines, systematic reviews, or research papers on IMT during COVID-19 for people with spinal cord injuries.
- Clinical commentaries suggest that IMT is an aerosolising procedure, although it is not included in general lists of aerosol generating procedures and there are no reports of viral transmission.

Limitations

There is limited evidence available on these questions. There are low levels of screening for COVID-19 among SCI patients.(1)

Background

People with spinal cord injury can be affected by respiratory impairment. Community or home-based non-invasive ventilation (e.g. CPAP) may be used to relieve respiratory problems such as sleep apnoea. Resistance-based IMT can increase muscle strength and function.

Methods (Appendix 1)

Databases and grey literature sources were searched on 22 April 2020.

Results (Tables 1 and 2)

Table 1: Community or home based NIV for spinal cord injury patients

Title	Summary	Link
Peer reviewed literature		
COVID-19: the risk of respiratory techniques in healthcare workers. Torres-Castro et al, 2020, (2)	A letter to the editor that recommends healthcare workers adopt PPE and aerosol precautions when working with respiratory interventions for spinal cord injury patients.	https://www.nature.com/articles/s41393-020-0472-0
Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. Tran et al, 2012 (3)	Procedures that might promote the generation of aerosols should be avoided where possible to reduce the risk to healthcare workers, this list includes non-invasive ventilation and CPAP.	https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0035797
Grey literature		
	No papers found	

Table 2: Inspiratory muscle training for spinal cord injury patients

Title	Summary	Link
Peer reviewed literature		
Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. Thomas et al, 2020, Journal of Physiotherapy.(4)	IMT is potentially an aerosol generating procedure. While there is a lack of investigations confirming aerosols for many interventions, the potential for coughing from patients makes IMT a potential aerosol generating procedure. The general recommendation for treating anyone with symptoms and co-existing respiratory or neuromuscular comorbidity (e.g. spinal cord injury) and difficulties with secretion clearance is for staff to use PPE and airborne and aerosol precautions.	https://www.sciencedirect.com/science/article/pii/S183695532030028X
Grey literature		
Advice to ParaQuad on the "Latest update. Advice for SCI community on inspiratory muscle training. 7 th April 2020." (5)	"In the current situation with COVID-19, IMT is best performed as a solitary exercise, unassisted by carers. This reduces the chance of	https://paraquad.org.au/resources/coronavirus-covid-19-and-the-sci-community/

Title	Summary	Link
	transmission from the user to their carer and from carer to the user.”	
Management of SCI patients during COVID-19 pandemic (Clinical practice guidance).(6)	People with SCI may require respiratory physiotherapy (including IMT). These are considered aerosol generating procedures. Proper PPE and aerosol precautions should be followed.	https://www.spinal.co.uk/wp-content/uploads/2020/04/BASCIS-Covid-Guidance-April-7-2020.pdf

References

1. Stillman et al. 2020. “COVID-19 and spinal cord injury and disease: results of an international survey”, Spinal Cord Series and Cases, 6(1), 21. 15 April 2020, <https://doi.org/10.1038/s41394-020-0275-8>
2. Torres-Castro et al, 2020, “COVID-19: the risk of respiratory techniques in healthcare workers.” Spinal Cord, 21 April 2020, <https://doi.org/10.1038/s41393-020-0472-0>. URL: <https://www.nature.com/articles/s41393-020-0472-0>
3. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. PLoS One. 2012; 7(4):e35797. URL: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0035797>
4. Thomas et al, 2020, “Physiotherapy Management for COVID-19 in the Acute Hospital Setting: Clinical practice recommendations.” Journal of Physiotherapy. 30 March 2020, <https://doi.org/10.1016/j.jphys.2020.03.011>. URL: <https://www.sciencedirect.com/science/article/pii/S183695532030028X>
5. Lee et al, 2020, Advice to ParaQuad on the “Latest update. Advice for SCI community on inspiratory muscle training.” 7th April 2020. Prince of Wales Hospital, NSW; Neuroscience Research Australia. URL: <https://paraquad.org.au/resources/coronavirus-covid-19-and-the-sci-community/>
6. Thumbikat et al on behalf of the British Association of Spinal Cord Injury Specialists (BASCIS), 2020, “Management of SCI Patients During COVID-19 Pandemic (Clinical practice guidance).” 7 April 2020. British Association of Spinal Cord Injury Specialists (BASCIS). URL: <https://www.spinal.co.uk/wp-content/uploads/2020/04/BASCIS-Covid-Guidance-April-7-2020.pdf>

Appendix 1

Non-invasive ventilation search strategy and strings

- PubMed: (“non-invasive ventilation” OR NIV OR CPAP OR “continuous positive airway pressure” OR BIPAP OR “Bilevel Positive Airway Pressure”) AND (spine OR spinal) AND restrict to year 2020.
- LitCovid: “non-invasive ventilation” OR NIV OR CPAP OR “continuous positive airway pressure” OR BIPAP OR “Bilevel Positive Airway Pressure” AND (spine OR spinal)
- Google: (“non-invasive ventilation” OR NIV OR CPAP OR “continuous positive airway pressure” OR BIPAP OR “Bilevel Positive Airway Pressure”) AND (covid19 OR covid 19 OR 2019-nCoV OR nCoV OR covid-19 OR coronavirus OR SARS) AND (spine OR spinal) AND restrict to year 2020.
- TRIP Database: (“non-invasive ventilation” OR NIV OR CPAP OR “continuous positive airway pressure” OR BIPAP OR “Bilevel Positive Airway Pressure”) AND (spine OR spinal) AND restrict to year 2020.
- Cochrane Library: (“non-invasive ventilation” OR NIV OR CPAP OR “continuous positive airway pressure” OR BIPAP OR “Bilevel Positive Airway Pressure”) AND (spine OR spinal) AND restrict to year 2020.

Inspiratory muscle training search strategy and strings

- PubMed: (“respiratory muscle training” OR RMT OR “inspiratory muscle training” OR IMT) AND (spine OR spinal) AND restrict to year 2020.
- LitCovid: (“respiratory muscle training” OR RMT OR “inspiratory muscle training” OR IMT) AND (spine OR spinal)
- Google: (“respiratory muscle training” OR RMT OR “inspiratory muscle training” OR IMT) AND (covid19 OR covid 19 OR 2019-nCoV OR nCoV OR covid-19 OR coronavirus OR SARS) AND (spine OR spinal) AND restrict to year 2020.
- TRIP Database: (“respiratory muscle training” OR RMT OR “inspiratory muscle training” OR IMT) AND (spine OR spinal) AND restrict to year 2020.
- Cochrane Library: (“respiratory muscle training” OR RMT OR “inspiratory muscle training” OR IMT) AND (spine OR spinal) AND restrict to year 2020.

Australian Government sources

- Australian Therapeutic Goods Administration
- Australian Government Medical Services Advisory Committee

Other sources (e.g. medical technology regulators and medical technology peak bodies)

- USA
 - Center for Disease Control
 - Food and Drug Administration
 - AdvaMed
 - USA National Academy of Medicine
 - American Spinal Injury Association
 - Shepherd Center

- Christopher and Dana Reeve Foundation
- Paralyzed Veterans of America
- Europe
 - European Medicines Agency
 - UK Medicines and Healthcare Products Regulatory Agency
 - MedTech Europe
 - EuroScan International Network
 - UK NICE
 - UK NHS
 - UK Spinal Injuries Association
 - British Association of Spinal Cord Injury Specialists
- Australia
 - Medical Technology Association of Australia MTAA
 - Australian Sleep Association
 - Spinal Cord Injuries Australia
 - NSW Spinal Outreach Service
 - Royal Rehab
 - ParaQuad Australia
- Canada
 - Canadian Agency for Drugs and Technologies in Health (CADTH)
 - Spinal Cord Injury Canada
 - Spinal Cord Injury Research Evidence (SCIRE) Project
- International
 - International Spinal Cord Society (ISCOS)

Non-invasive ventilation companies

- ResMed
- Philips

Respiratory muscle training (RMT)/IMT companies

- VacuMed Threshold Inspiratory Muscle Trainer:
<http://www.vacumed.com/zcom/product/Product.do?compid=27&prodid=399>
- Philips Respironics Threshold IMT:
<https://www.philips.com.au/healthcare/product/HCHS730010/treshold-inspiratory-muscle-trainer>
Respifit S: <https://www.biegler.com/en/respifit>
- Powerbreathe: <http://www.powerbreathe.com.au>
- Ultrabreathe: <http://www.ultrabreathe.com>
- Aerosure Medic: <http://www.aerosure.com.au/imt-pep/>