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Questioning the fundamentals to understand the essentials: Reflecting on 20 years of Speech and Language Therapy practice and research in SCI

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St George's University Hospitals NHS Foundation Trust

MASCIP

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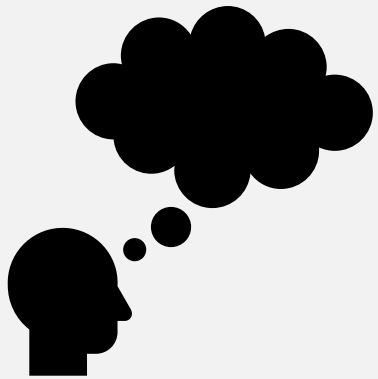
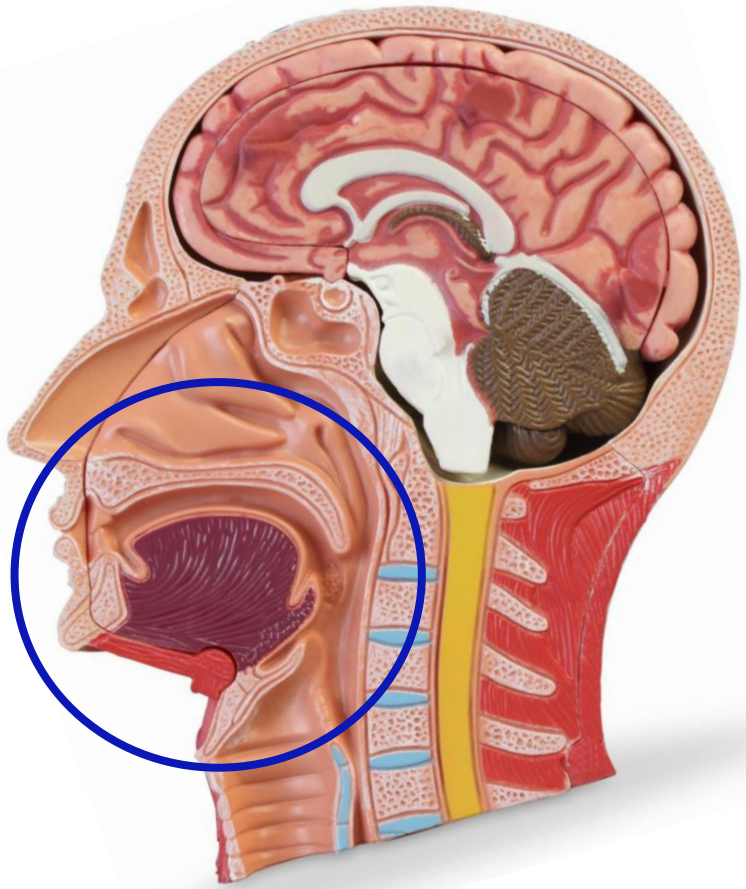
Aims

- My work and learning over 20 years
- The fundamentals in SCI – what's the evidence?
- My research work
- Changes to practice
- Future research



Fundamentals?



- Breathing
- Eating
- Speaking

Essentials for life ….. taken for granted?

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Career journey

1991-2001

- Developing clinical expertise – adult dysphagia

MClinRes

2002-2013

- Clinical specialism – SCI
- MClinRes

London Spinal Cord Injury Centre Stanmore

2014-2019

2020-2025

2005

Learning journey

Neuro caseload

- Cortical/cranial nerve involvement
- Neurosurgery
- Potential systemic disruption linked to neurological damage
- Potential tracheostomy
- Cognitive impairment
- Speech difficulties (dysarthria)
- Language impairments (Aphasia)
- Swallowing impairments (Dysphagia)

SCI

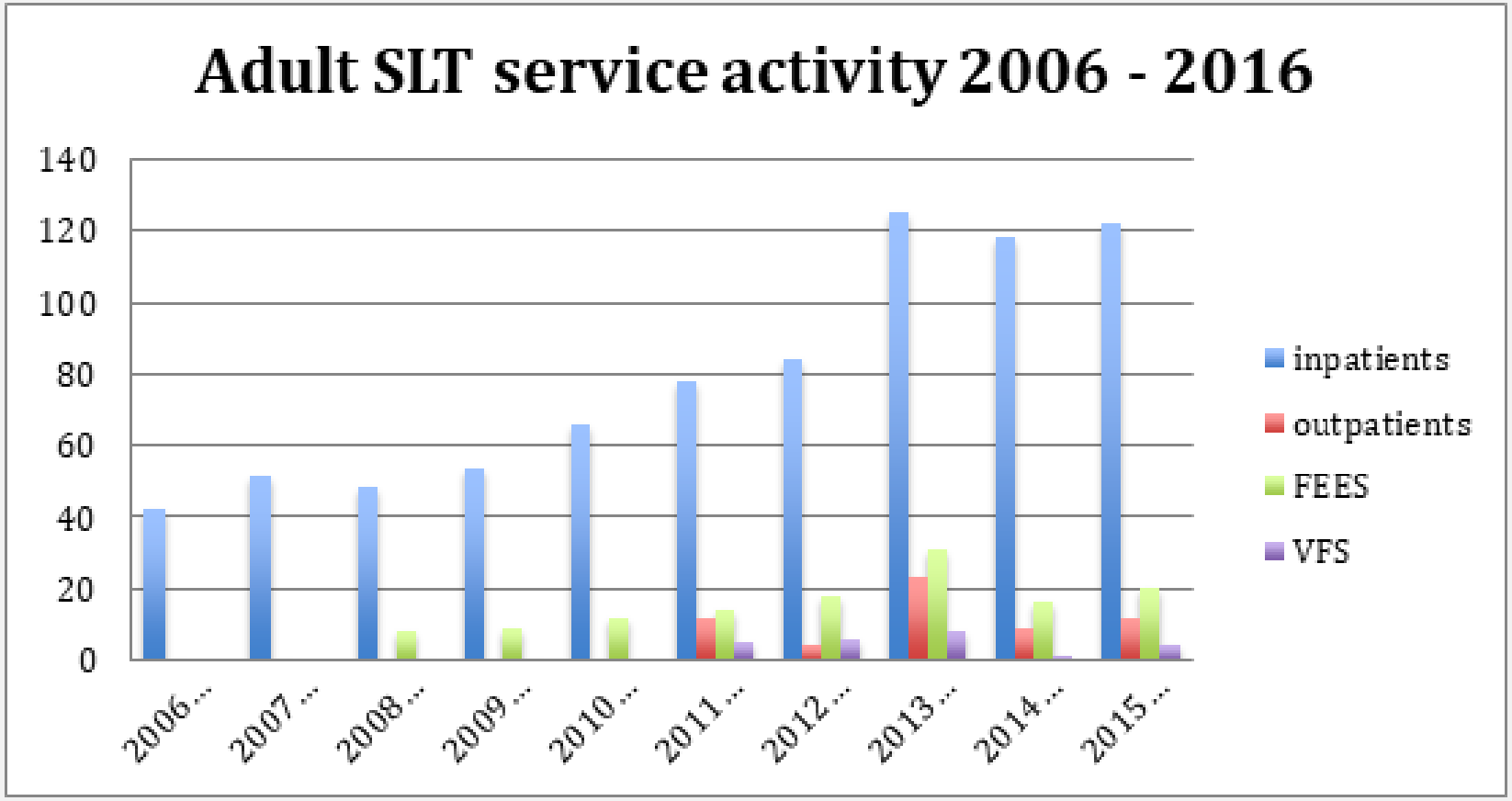
2005

Establishing the role of SLT in SCI

"The post holder will be an autonomous practitioner providing highly specialist speech and language therapy service to patients with spinal surgery and spinal cord injury clients with exceptionally complex needs"

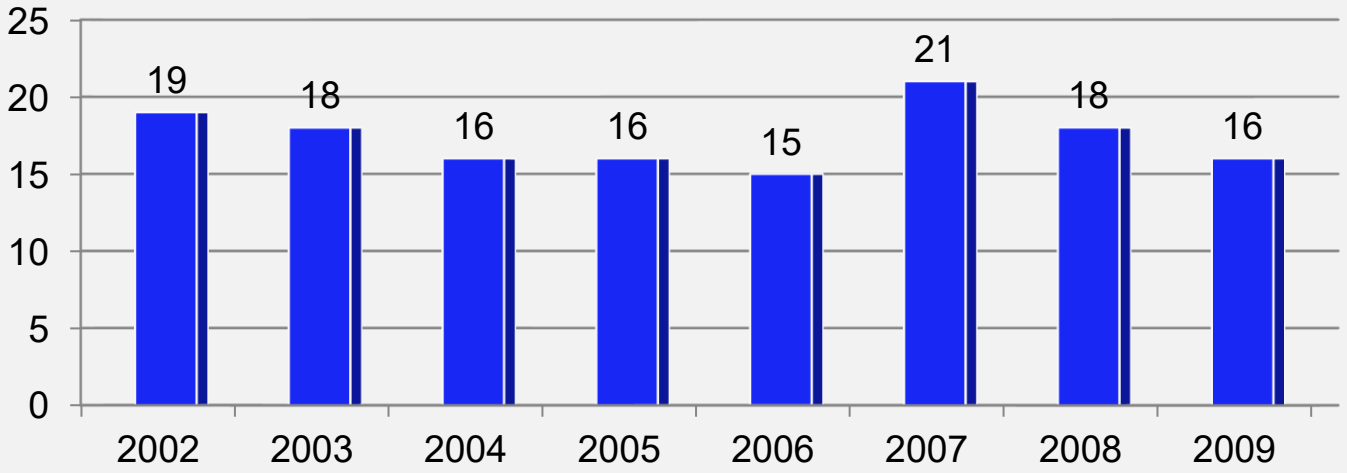
2005

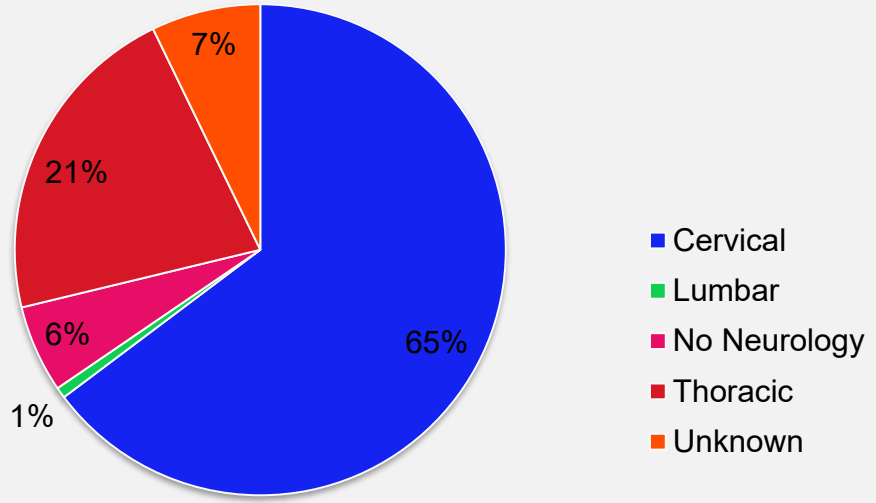
Financial Year	Initial Contacts	% Change	Total Contacts	% Change
2001/02	32	N/A	370	N/A
2002/03	72	125% Increase	425	14% Increase
2003/04	91	26% Increase	557	31% Increase

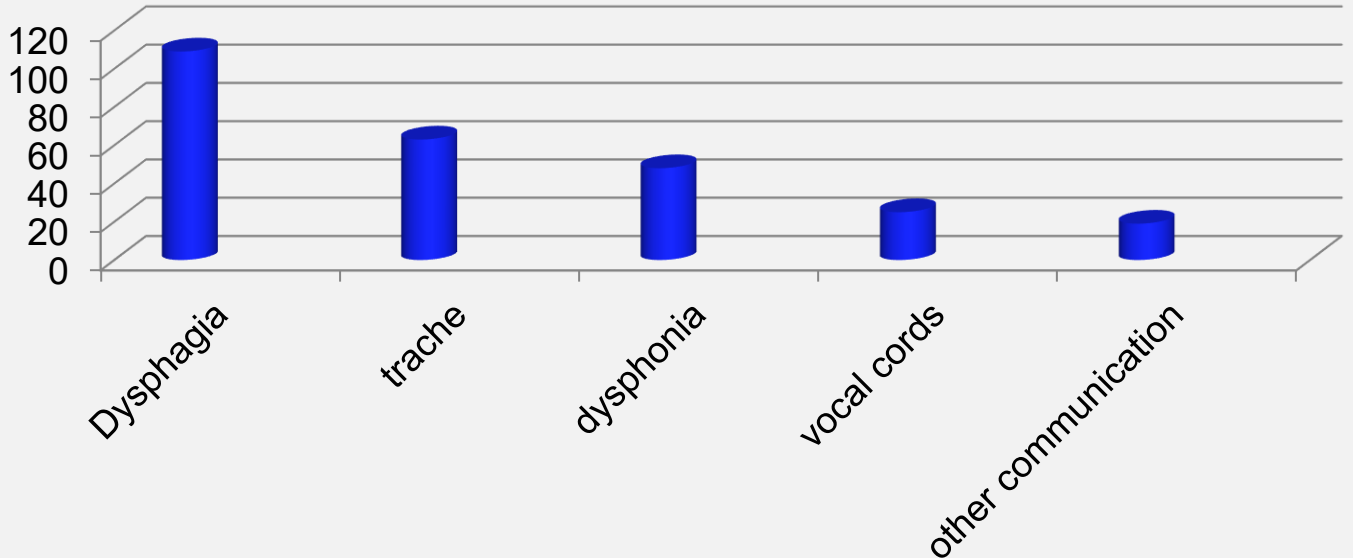


2010

SCI referrals to SLT (n=139)







Evidence in 2005

2005

1999

Predictors of Dysphagia After Spinal Cord Injury

22.5%

Steven Kirshblum, MD, Mark V. Johnston, PhD, John Brown, MD, Kevin C. O'Connor, MD, Paul Jarosz, MA

ABSTRACT. Kirshblum S, Johnston MV, Brown J, O'Connor KC, Jarosz P. Predictors of dysphagia after spinal cord injury. Arch Phys Med Rehabil 1999;80:1101-5.

IN HIGH-LEVEL CERVICAL spinal cord injury (SCI), mechanical and medical causes of swallowing disorders may predispose the individual to aspiration.[1] There has been little

Dysphagia in patients with acute cervical spinal cord injury

2003

C Wolf*,[1] and TH Meiners[1]

[1]*Spinal Cord Injury Center, Werner Wicker Klinik, Bad Wildungen, Germany*

80%

Predictors to Dysphagia and Recovery After Cervical Spinal Cord Injury During Acute Rehabilitation

2004

Susan Brady, MS*
Rhonda Miserendino, MS*
Donna Statkus, MHS*
Teresa Springer, MS†
Mark Hakel, PhD†
Vasilios Stambolis, MD*

55%

Dysphagia 19:87–94 (2004)
DOI: 10.1007/s00455-003-0511-y

Dysphagia

2003

Cervical Spinal Cord Injury and Deglutition Disorders

36%

Rainer Abel, MD, Silke Ruf, and Bernhard Spahn, MD
Department of Orthopedic Surgery and Rehabilitation, Orthopädische Universitätsklinik Heidelberg, Heidelberg, Germany

Factors Associated with Dysphagia in Individuals with High Tetraplegia

2005

Kazuko Shem, Kathleen Castillo, and Bindu Naran

71%

A bitter pill to swallow: dysphagia in cervical spine injury

26%

*John C. Lee, MD, FACS, Brian W. Gross, BS, Katelyn J. Rittenhouse, BS, Autumn R. Vogel, BA, BS, Ashley Vellucci, BS, BA, James Alzate, BSN, RN, Maria Gillio, and Frederick B. Rogers, MD, MS, FACS**

Trauma Services, Lancaster General Health, Lancaster, Pennsylvania

Spinal Cord (2018) 56:1116–1123
https://doi.org/10.1038/s41393-018-0170-3

REVIEW ARTICLE

Risk factors for dysphagia after a spinal cord injury: a systematic review and meta-analysis

J. Iruthayarajah[1] · A. McIntyre[1] · M. Mirkowski[1] · P. Welch-West[2] · E. Loh[1,2,3] · R. Teasell[1,2,3]

Dysphagia in acute tetrap

RO Seidl[1], R Nusser-Müller-Busch[2], M Ku

FACTORS FOR DYSPHAGIA:

AGE
TRACHEOSTOMY
VENTILATION
ANTERIOR CERVICAL SPINE SURGERY
LEVEL/SEVERITY OF INJURY

Dysphagia and Respiratory in Individuals with Tetraple Incidence, Associated Factor Preventable Complication

40%

Kazuko Shem, MD,[1] Kathleen Castillo, MA, CCC-SLP, BRS-S,[2] Sandra Lynn Wong, BA, RCP,[3] James Chang, BA, CBIS,[4] and Stephanie Kolakowsky-Hayner, PhD, CBIST[4]

9, 1008–1013
2-4393/11 $32.00
www.nature.com/sc

2011

8%

al cord injury

and DH Kim[1]

[1]Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul, Korea and [2]Department of Rehabilitation Medicine, Inje University College of Medicine, Ilsan Paik Hospital, Goyang, South Korea

ORIGINAL ARTICLE

Traumatic cervical spinal cord injury: a prospective clinical study of laryngeal penetration and aspiration

2017

73%

T Ihalainen[1,2], I Rinta-Kiikka[3], TM Luoto[4], EA Koskinen[1], A-M Korpijaakko-Huuhka[2] and A Ronkainen[4]

Clinical Study

Risk factors for laryngeal penetration-aspiration in patients with acute traumatic cervical spinal cord injury

Tiina Ihalainen, MA[a,b,*], Irina Rinta-Kiikka, MD, PhD[c], Teemu M. Luoto, MD, PhD[d], Tuomo Thesleff, MD, LicMed[d], Mika Helminen, MSc[e,f], Anna-Maija Korpijaakko-Huuhka, PhD[b], Antti Ronkainen, MD, PhD[d]

71%

Other Factors

Pulmonary Aspiration in Mechanically Ventilated Patients With Tracheostomies*

Ellen H. Elpern, R.N., M.S.N.; Melissa G. Scott, M.A., C.C.C.-S.L.P.; Leslie Petro, M.A., C.C.C.-S.L.P.; and Michael H. Ries M.D., F.C.C.P.

1994

Dysphagia 18:39–45 (2003)
DOI: 10.1007/s00455-002-0083-2

Dysphagia
© Springer-Verlag New York Inc. 2002

The Effects of Cervical Bracing Upon Swallowing in Young, Normal, Healthy Volunteers

Vasilios Stambolis, MD,[1] Susan Brady, MS, CCC-SLP,[1] Deborah Klos, MS, CCC-SLP,[1] Michele Wesling, MA, CCC-SLP,[1] Tamara Fatianov, MD,[2] and Cynthia Hildner, MS, CCC-SLP[3]
[1]Marianjoy Rehabilitation Hospital, Wheaton, Illinois; [2]Rush–Presbyterian–St. Luke, Chicago, Illinois; and [3]Rehabilitation Foundation, Inc., Wheaton, Illinois, USA

Dysphagia (2013) 28:131–138
DOI 10.1007/s00455-012-9421-1

ORIGINAL ARTICLE

The Role of C2–C7 and O–C2 Angle in the Development of Dysphagia After Cervical Spine Surgery

Wei Tian · Jie Yu

SPINE Volume 30, Number 7, pp E179–E182
©2005, Lippincott Williams & Wilkins, Inc.

The Influences of Halo-Vest Fixation and Cervical Hyperextension on Swallowing in Healthy Volunteers

Naohito Morishima, PT,* Kiyohito Ohota, PT,* and Yasushi Miura, MD, PhD†

Dysphagia 12:2–8 (1997)

Dysphagia following Anterior Cervical Spine Su

Ruth E. Martin, PhD,[1,2] Mary Ann Neary, MSc,[1,2] and Nicholas E. Diamant, MD[3]
[1]Department of Speech-Language Pathology, The Toronto Hospital, Toronto, Ontario, [2]Graduate Dep Toronto, Toronto, Ontario, and [3]Departments of Medicine and Physiology, University of Toronto, Pl Toronto Hospital, Toronto, Ontario, Canada

Dysphagia
© Springer-Verlag New York Inc. 1997

Factors Predictive of Voice and Swallowing Outcomes after Anterior Approaches to the Cervical

Saral Mehra, MD, MBA[1,2], Thomas E. Hei
Frank P. Cammisa Jr, MD[3], Federico P. Gi
Andrew A. Sama, MD[3], and David I. Kutle

ELSEVIER
The Spine Journal 14 (2014) 2246–2260

Review Article

Dysphagia after anterior cervical spine surgery: a systematic review of potential preventative measures

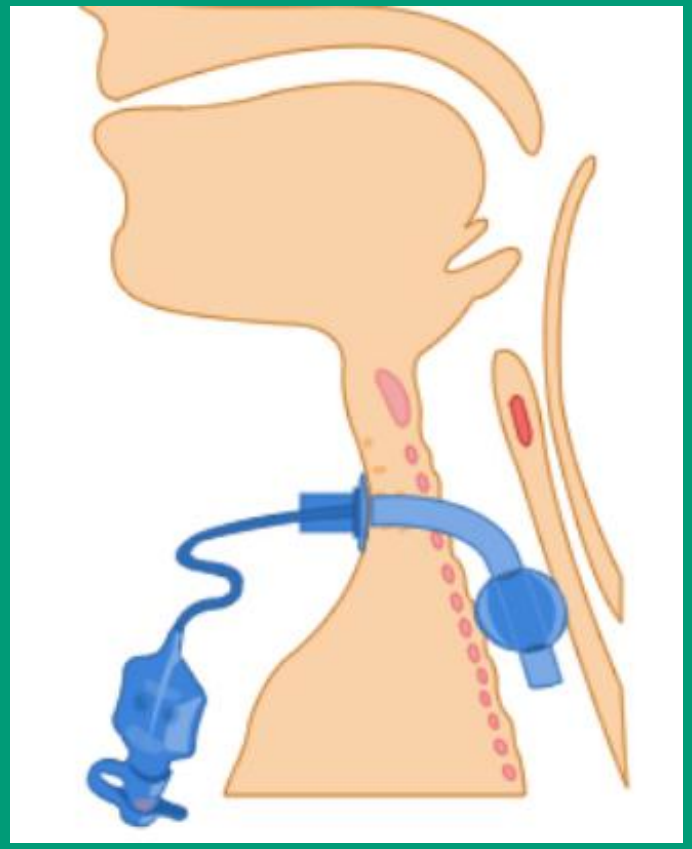
aquim, MD, PhD[a], Jozef Murar, MD[b], Jason W. Savage, MD[b], Alpesh A. Patel, MD, FACS[b,*]
of Neurosurgery, State University of Campinas (UNICAMP), 13083-970 Campinas, SP, Brazil
ery, Northwestern University Feinberg School of Medicine, 676 N St Clair St, Suite 1350, Chicago, IL 60611, USA
Received 30 October 2013; revised 18 February 2014; accepted 16 March 2014

Outcomes of patients with spinal cord injury before and after introduction of an interdisciplinary tracheostomy team

2009

Tanis S Cameron, Anita McKinstry, Susan K Burt, Mark E Howard, Rinaldo Bellomo, Douglas J Brown, Jacqueline M Ross, Joanne M Sweeney and Fergal J O'Donoghue

Fundamentals: Breathing/Airway



- Secretions/Saliva/Sputum
- Tracheostomy/Ventilation & Weaning
- Decannulation

Excessive secretions

Tracheostomy and sputum aspiration

Mrs J. McRae

Senior SALT

The Royal National Ort

47 year old

C7 Complete injury following fall ove
intoxicated
C5/6 facet dislocation
No initial respiratory difficulties. Tran
Anterior and posterior stabilisation da
Ventilated post op for airway safety

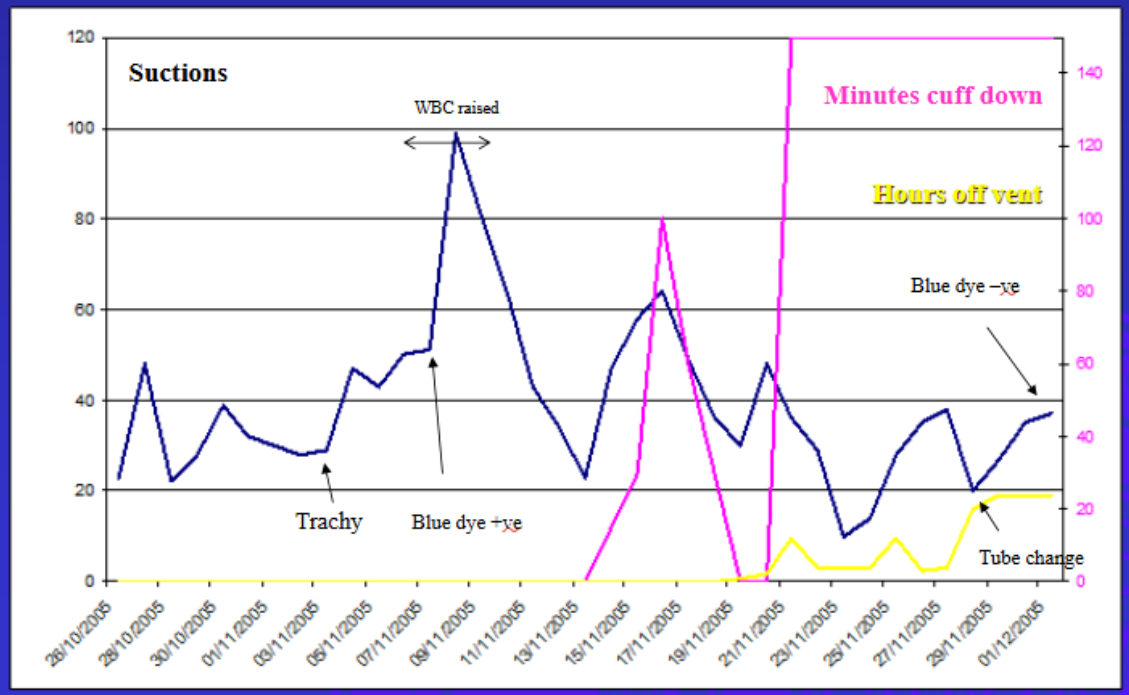
Secretions+++++
Unable to wean/ extubate
Tracheostomy day 10

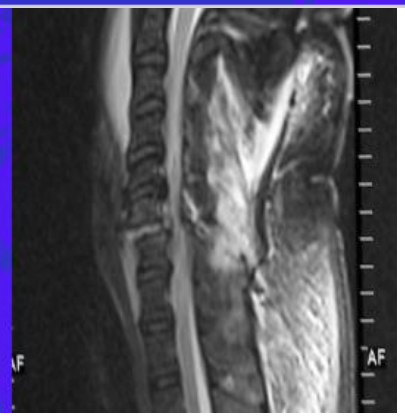
Secretions+++++

" Slow Wean"

Suctions / day

2006





What's in your sputum today?

Sputum

Causes

Normal respiratory physiology, Vagal tone
Humidification, Nebulisation

Test

Microbiology, Microscopy

N.G. Feed or Food

Causes

reflux, supine position, ETT/ Tracheostomy

Test

Observation, Glucose

Saliva

Causes

Aspiration past ETT/Tracheostomy

Test

Blue Dye, starch/ iodine

Moral No. 1

Sputum is not always what it seems

Moral No. 2

Trachy cuffs are not good for you.

Removal of the tracheostomy tube in the aspirating spinal cord-injured patient
J Ross, M White. Spinal Cord. Houndsmills: Nov 2003. Vol. 41, Iss. 11; p. 636

Dry mouth

- Medication induced xerostomia
- Impact on speaking and swallowing
- Thirst

- Oral hygiene
- Oral moisturisation
- Artificial saliva

2011

Dry mouth in spinal cord injury: causes and treatment

The effects of medication often cause dry mouth in people with a high spinal cord injury, who are dependent on others to deliver their mouthcare. This article explains what a spinal cord injury is, and discusses the issues of dry mouth and possible solutions

Table 1. Spinal cord injury dysfunctions and their medications that cause dry mouth

Dysfunction	Medication
Bladder impairment	Oxybutynin/tolterodine/solifenacin
Spasticity	Baclofen/tizanidine/dantrolene
Hypotension	Ephedrine
Gastric reflux	Omeprazole/lansoprazole
Mood disorder	Citalopram/sertraline
Pain	Paracetamol
Respiratory support	Oxygen therapy

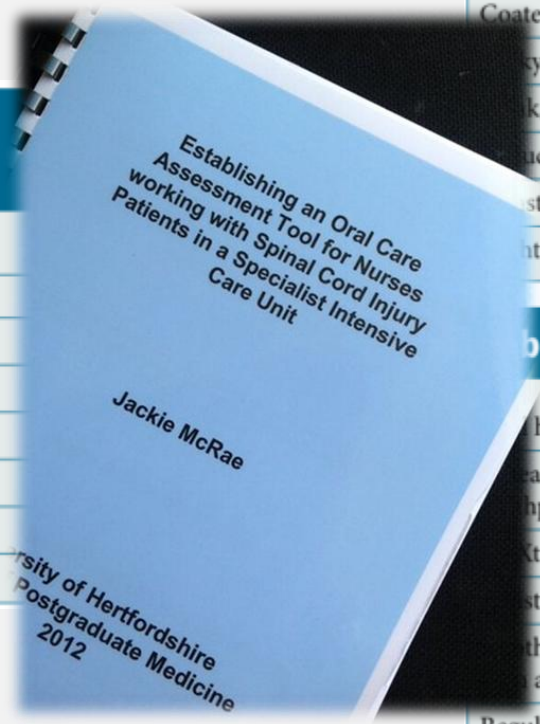


Table 2. Clinical presentation of dry mouth

Dry, cracked or flaking lips
Coated, dry tongue
ky oral secretions coating palate
k, creaky voice
uced appetite, especially for dry foods
stant requests for fluids
t waking with oral discomfort

ble 3. Dry mouth care programme

health assessment to identify problem areas
ast twice daily mouthcare using Dr Barman's Superbrush, BioXtra non-foaming hpaste and BioXtra alcohol-free mouthwash
Xtra gel mouthspray to be used morning and evening and before each meal
sturize lips
ther times during the day, to stimulate saliva as needed, use BioXtra chewing and sucking tablets
Regular fluid hydration (sugar-free and non-acidic)
Regular oral intake and moist food choices

[Dry mouth in spinal cord injury: causes and treatment | Dental Nursing]

2012

FEATURE
SPINAL CORD INJURY

Back to basics

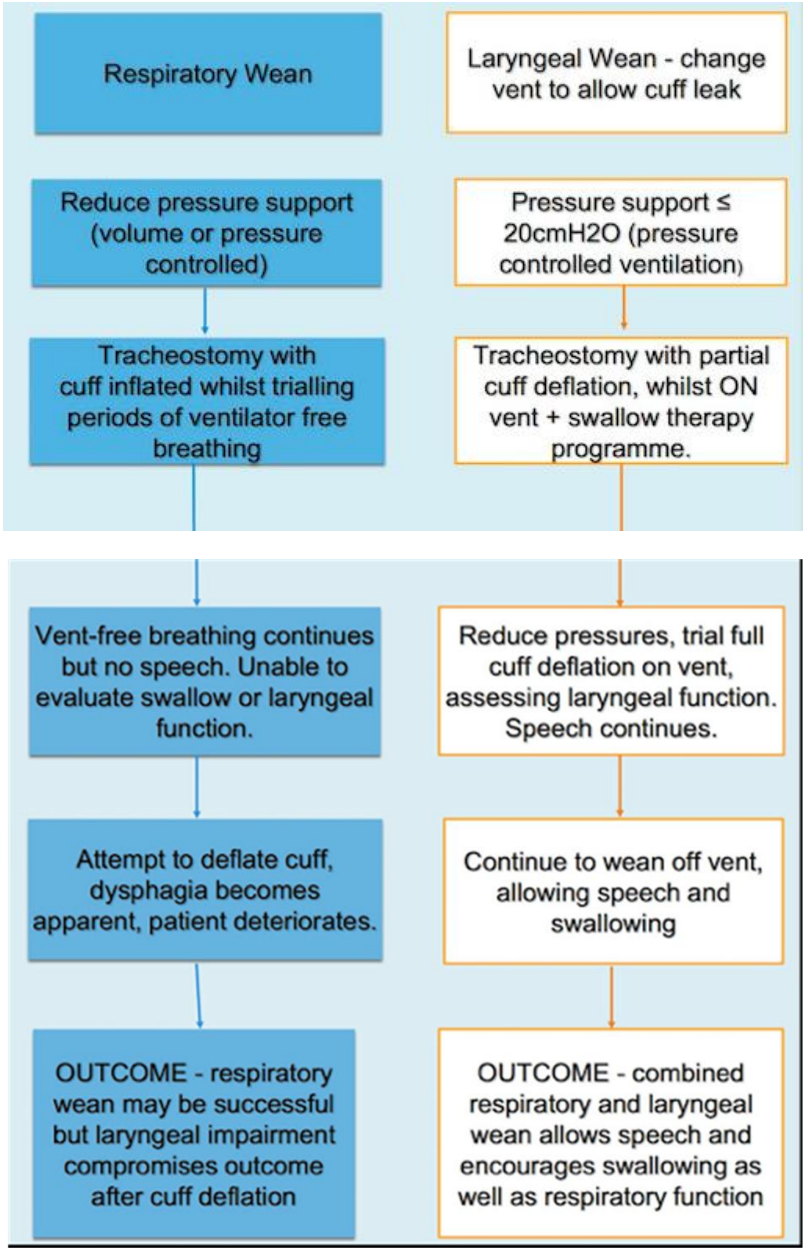
Jackie McRae provides an SLT's guide to acute cervical spinal cord injury

Table one: Impairments and functions at each level of cervical spinal cord injury

Level of SCI	Abilities	Functions
C1-3	C3 may have limited head and neck movement, otherwise complete paralysis, including all respiratory muscles.	Ventilator-dependent, usually via tracheostomy. May need assistance to establish communication, either verbally or using aids. May be able to use mouth/head switches. May need monitoring of swallowing, dependent on tracheostomy and ventilator status.
C4	Has neck movement and may be able to shrug shoulders.	May have initial respiratory problems and require communication support. Laryngeal function may be impaired due to paralysis of respiratory muscles, which will affect the ability to cough and produce voice. Assistance required for eating and drinking. Can be set up with environmental controls, using voice control or eye-gaze software.
C5	Has head and neck control, shoulder control, can bend elbows and has diaphragm control.	Breathing using diaphragm, but fatigues and needs assistance to clear secretions. May be able to feed self and perform some independent care using specialised adaptive devices. Can control an electric wheelchair using hand control. May have residual swallowing problems as a result of spinal fixation surgery.
C6	Movement in head, neck, shoulders, arms and wrists.	Breathing independently, voice may tire with excess usage, due to paralysis of intercostal muscles. Can perform many personal care tasks, such as feeding, dressing and transfers. May be able to drive adapted car using hand controls.
C7	As C6 plus ability to straighten elbows. Complete paralysis of legs and body.	As C6. May be able to live in adapted home with assistance. Can self-propel wheelchair for indoors, or control electric wheelchair for longer distances. Voice and respiratory function may fatigue.
C8	As C7 plus finger flexion.	Can be independent in all personal care, transfers and driving, using full mobility of upper limbs. Adapted housing with assistance. Good voice and respiratory function.

McRae, J. (2012). Back to basics. *Bulletin: Royal College of Speech & Language Therapists(724), 12-15.*

Respiratory vs. laryngeal wean



2014

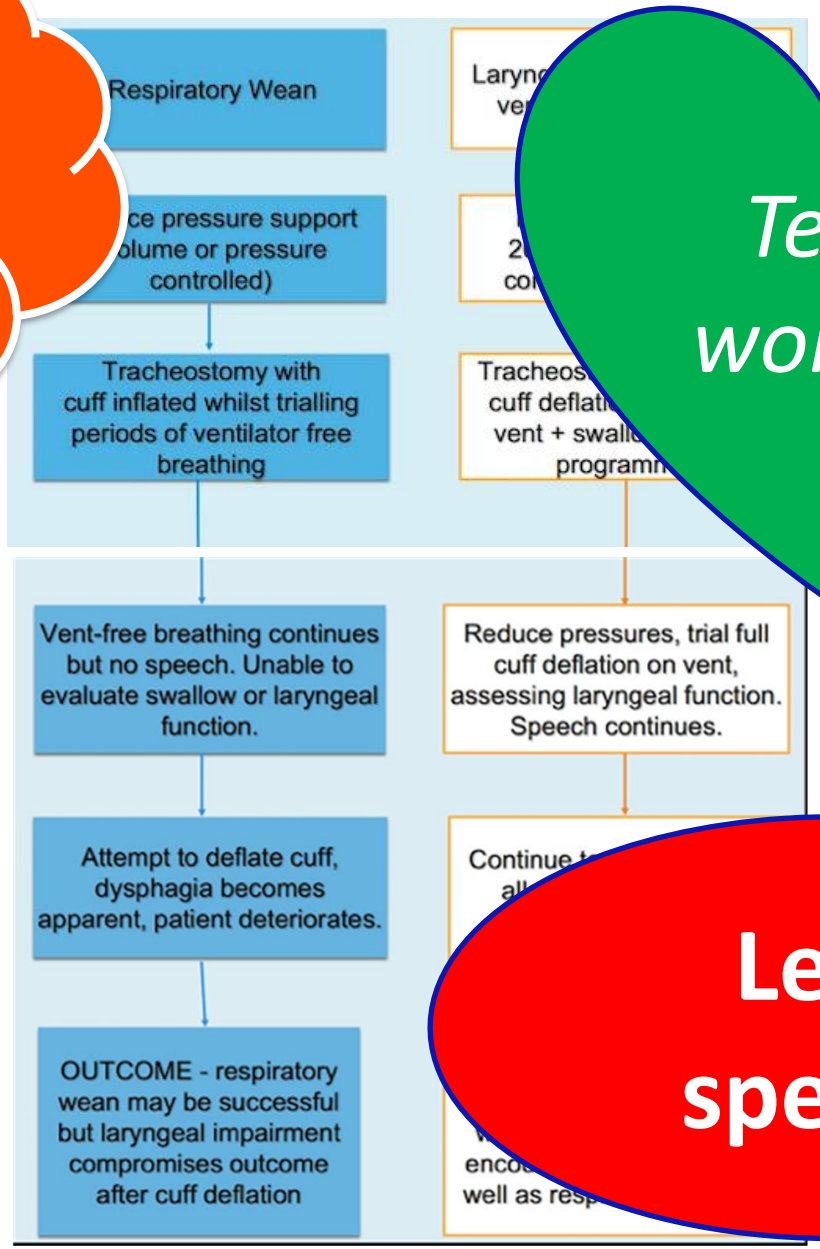
Increasing self-ventilation with expiratory airflow into upper airway

https://www.researchgate.net/profile/Jackie_McRae/research

Respirat
vs
l

Early cuff deflation

Vent adjustments



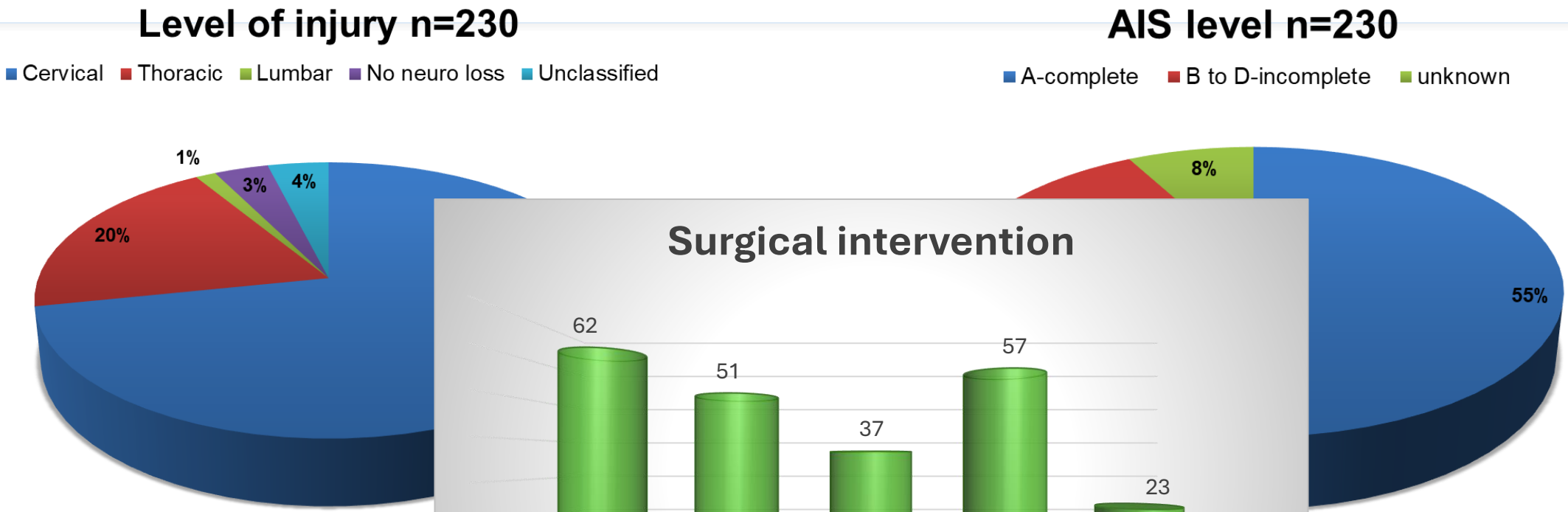
Team working

Leak speech

https://www.researchgate.net/profile/Jackie_McRae/research

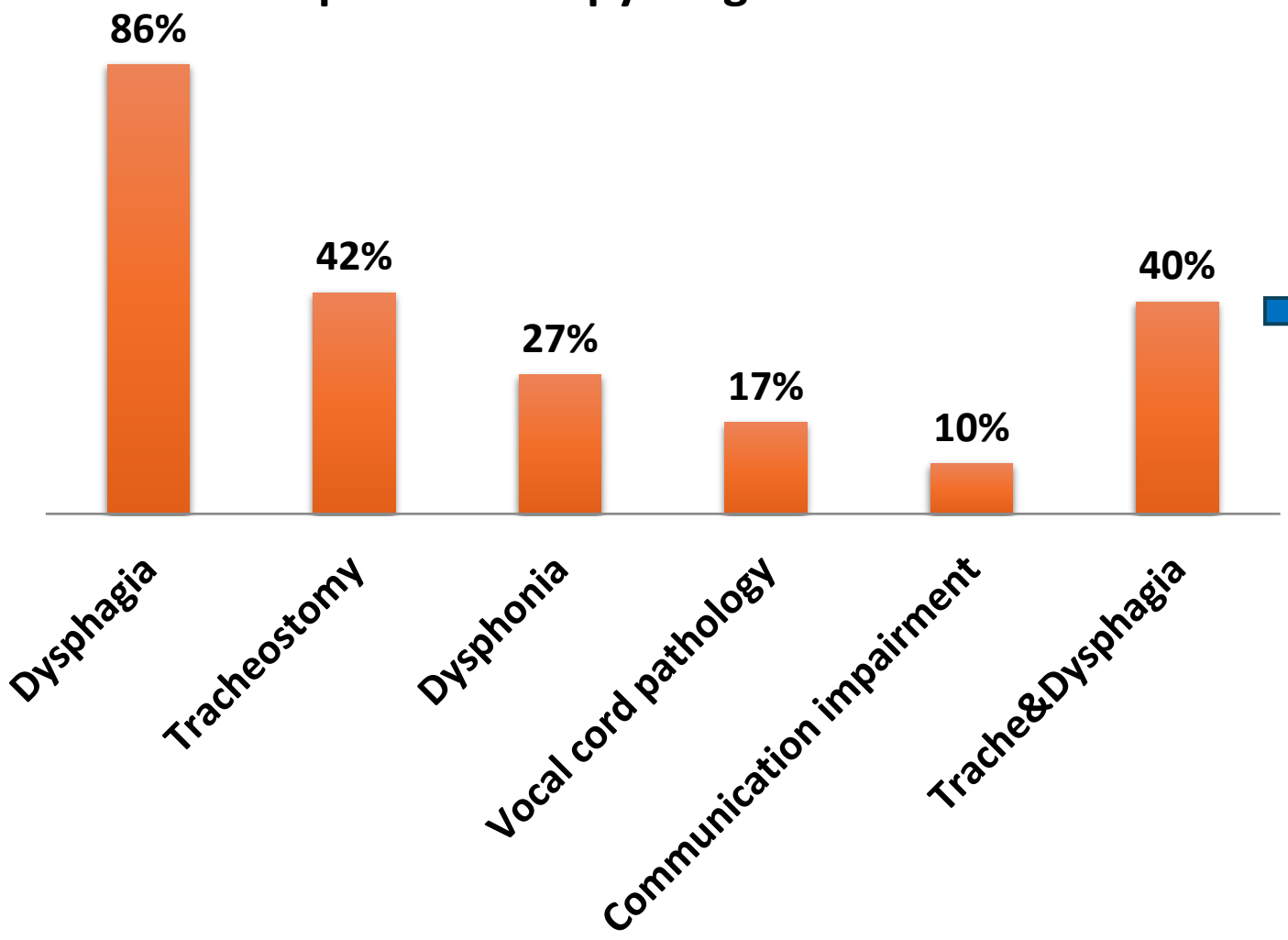
Ventilator weaning in dysphagic spinal cord injured patients: a 12-year retrospective review

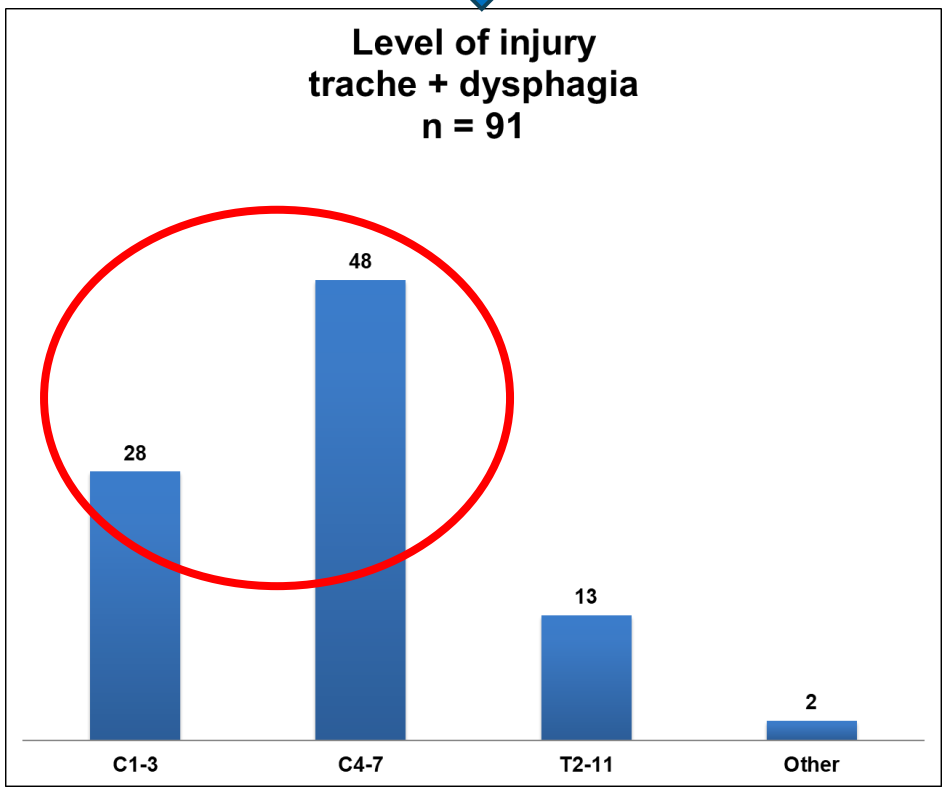
2014



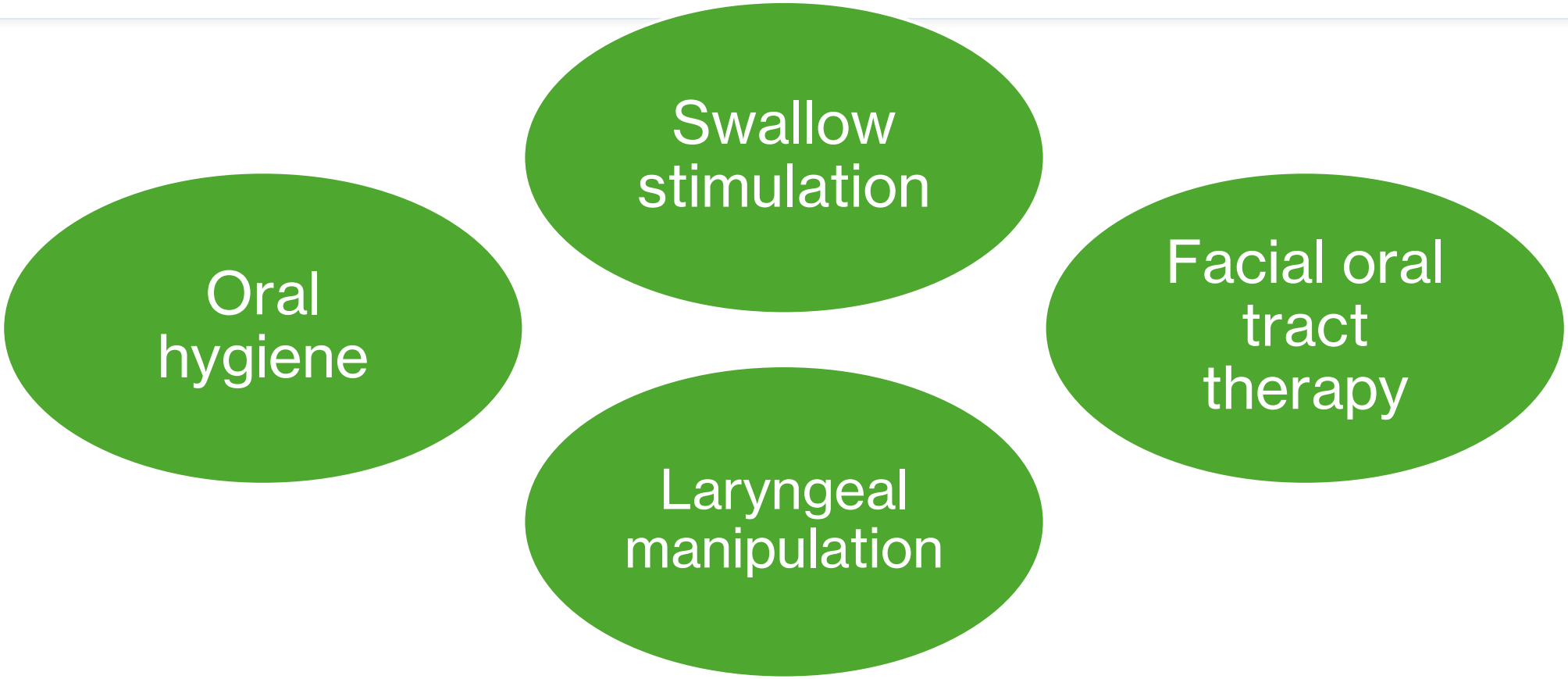
McRae, 2014

Speech Therapy Diagnosis n=230

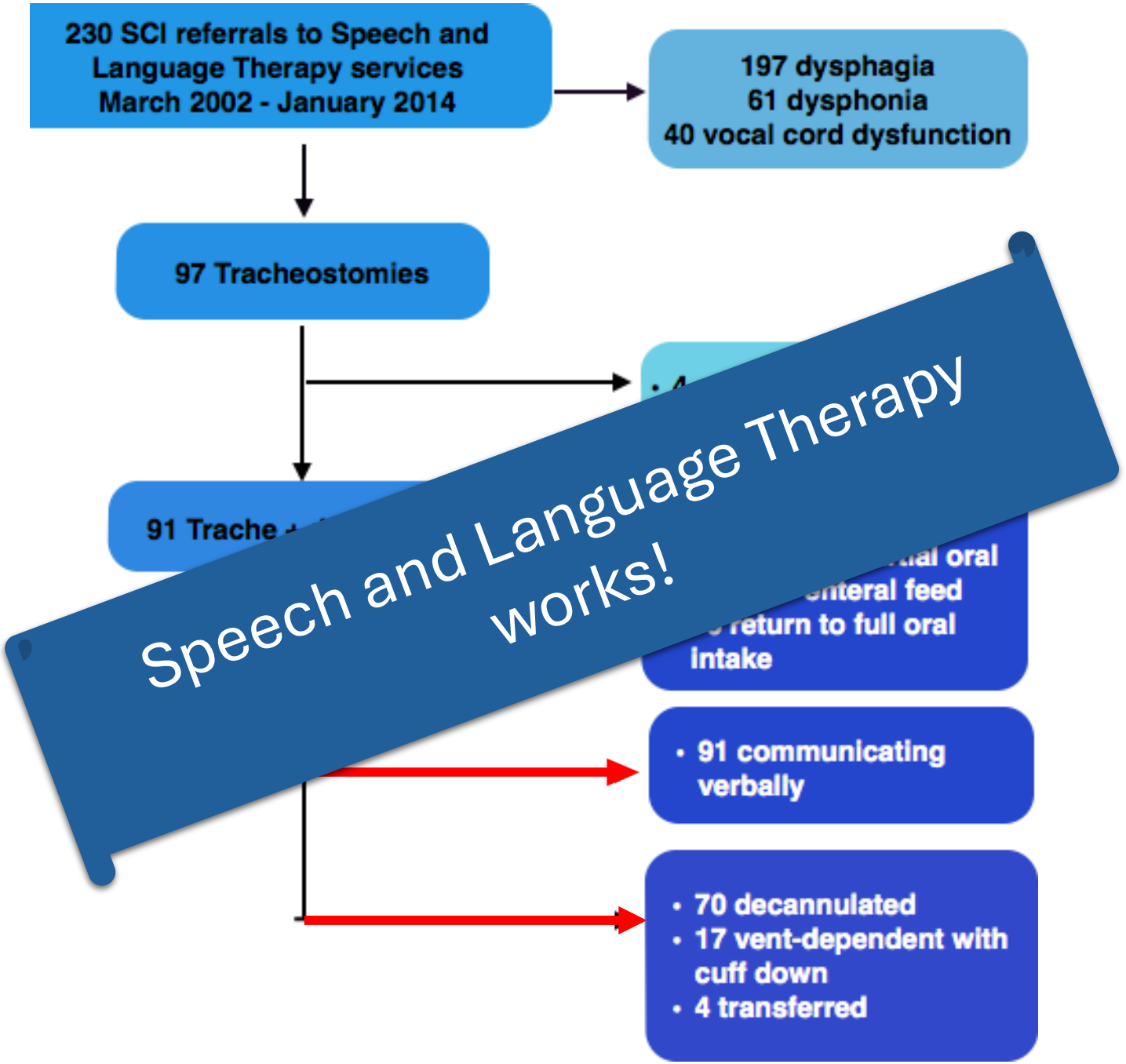




Interventions



2014


230 SCI referrals to Speech and Language Therapy services March 2002 - January 2014
197 dysphagia
61 dysphonia
40 vocal cord dysfunction
97 Tracheostomies
91 Trache
oral feed
return to full oral intake
• 91 communicating verbally
• 70 decannulated
• 17 vent-dependent with cuff down
• 4 transferred
Speech and Language Therapy works!

Changes in SLT practice to improve secretion management

- Use of subglottic suction tubes
- Saliva drying /mouth moisturising agents
- Early cuff deflation alongside respiratory wean
- Active swallow strengthening training
- Engage laryngeal functions to improve swallow frequency and upper airway clearance

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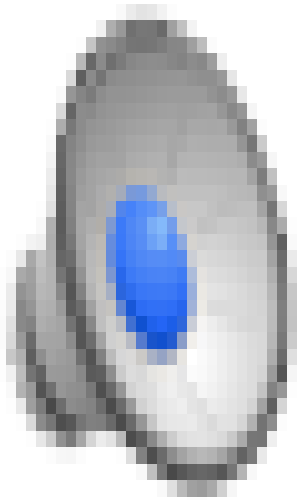
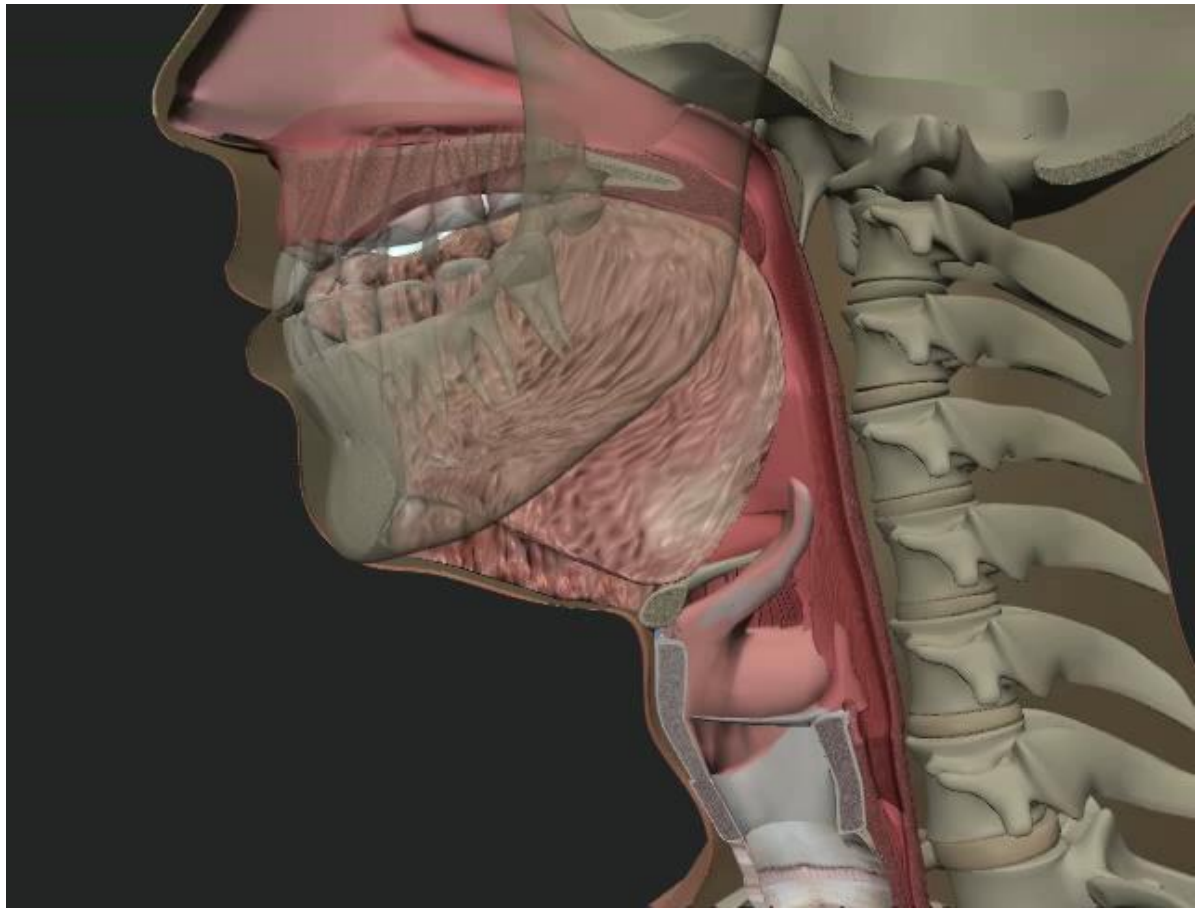
Fundamentals: Eating/Drinking/Swallowing

- Risk of aspiration → pneumonia and increased mortality
- Easy options for alternative feeding

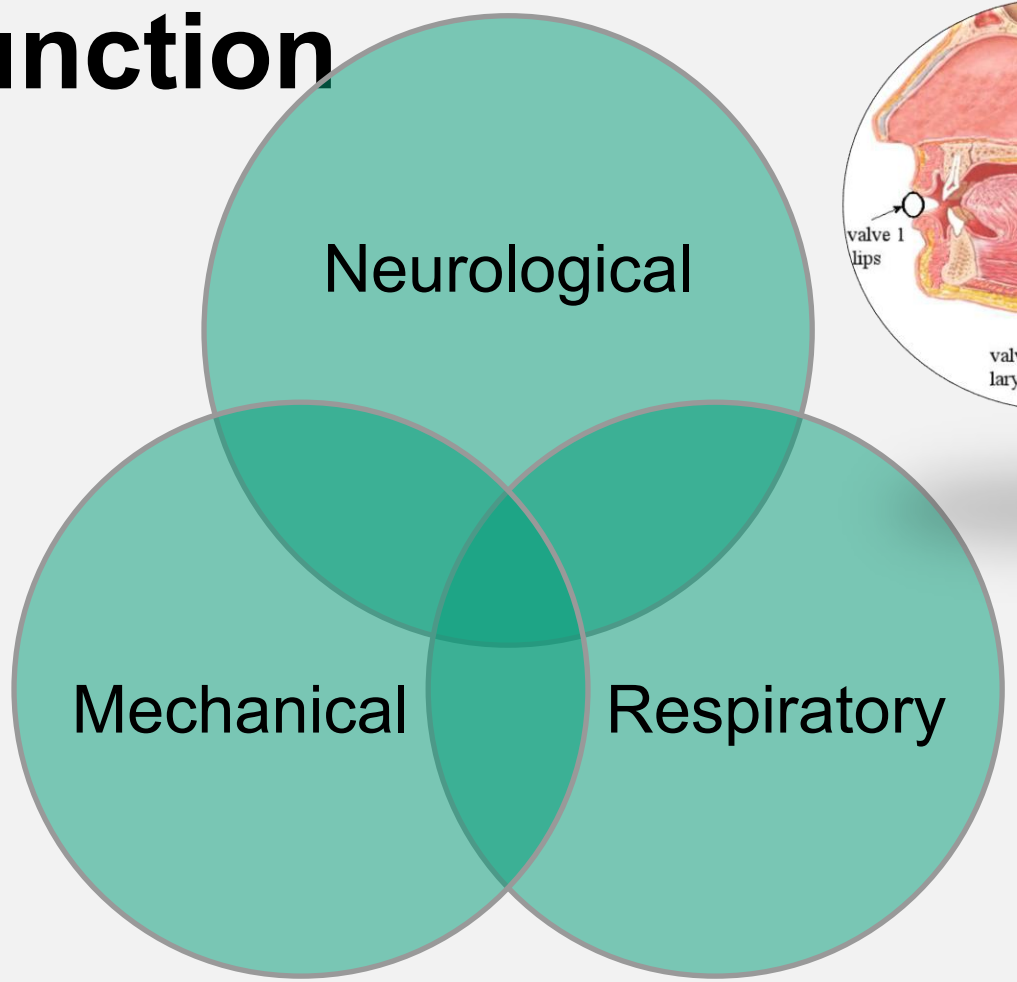
- **Normal Swallowing**

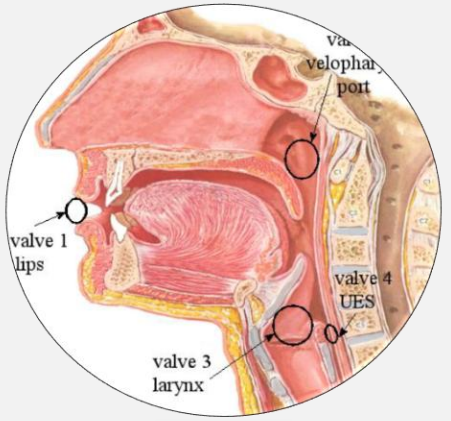


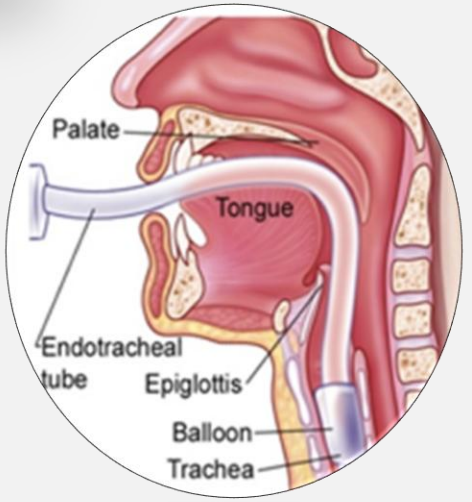
Dysphagia

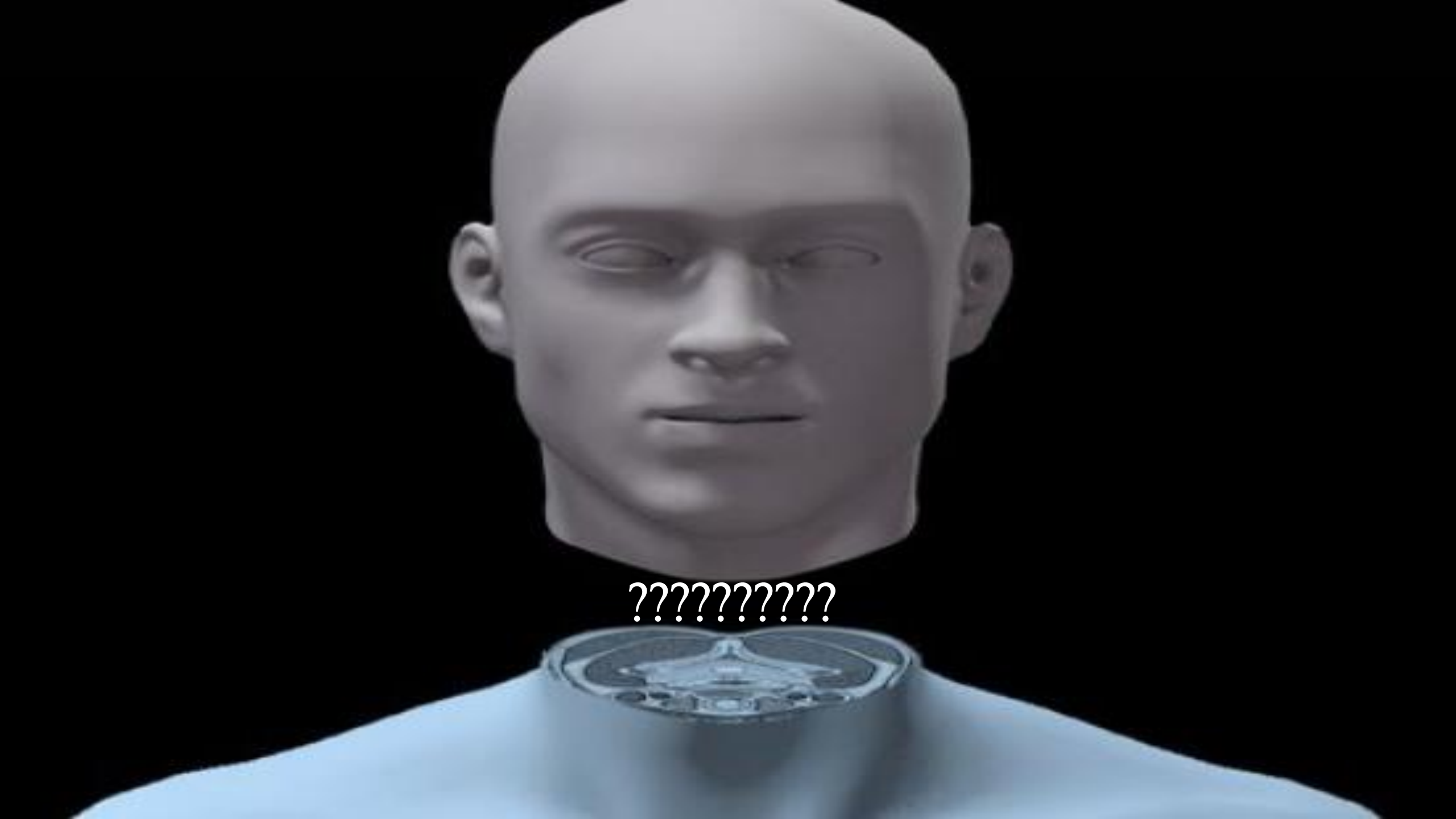


Cervical spinal cord injury and disruption to laryngeal function









2012

The diagnostic value of flexible nasendoscopy in the assessment and management of dysphagia in spinal cord injury

Jackie McRae BSc (Hons) MRCSLT Speech and Language Therapist jackie.mcrae@nhs.net

The London Spinal Cord Injury Centre, Royal National Orthopaedic Hospital, Stanmore, Middlesex, HA7 4LP

Background

Direct view of the pharynx and larynx via flexible nasendoscopy (FNE) has been used by Speech and Language Therapists (SLTs) as an assessment tool to detect laryngeal pathology and swallowing impairments in the critical care setting.

Cervical Spinal Cord Injury (CSCI) patients who experience dysphagia are at high risk of aspiration, which will compromise their respiratory function and may delay weaning. This is likely to extend hospital stay, particularly in the ICU and add to medication costs and interventions. The nature of swallowing problems in this patient group is still unclear, however early assessment and management improves their outcomes. The bedside procedure of flexible nasendoscopy allows the patient to be assessed in their existing position, whether this is supine, side lying or upright and the patient does not need to leave their environment. The pharynx and larynx are observed for anatomical variations and patterns of saliva pooling. Foods of varying consistencies are given to the patient and the swallow movements are viewed on a monitor. The timing and effectiveness of food clearance provides the clinician with information about sensory and motor impairment, which helps to plan therapeutic interventions.

This paper looks at five cases of patients with cervical spinal cord injury who underwent FNE to help diagnose laryngeal and swallowing problems. The SLT is an integral member of the Tracheostomy Team, which plans and directs weaning programmes and ensure a safe return to oral intake.

Case studies

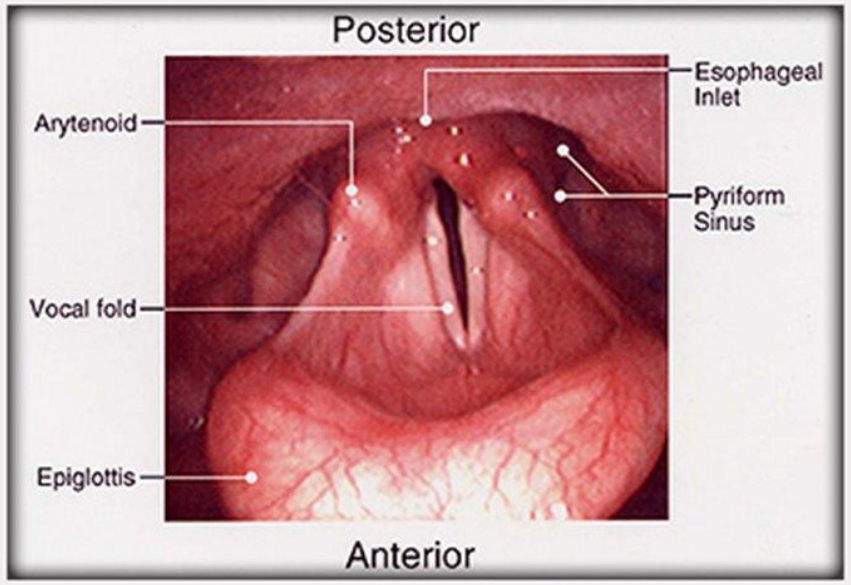
Sub-glottic obstruction

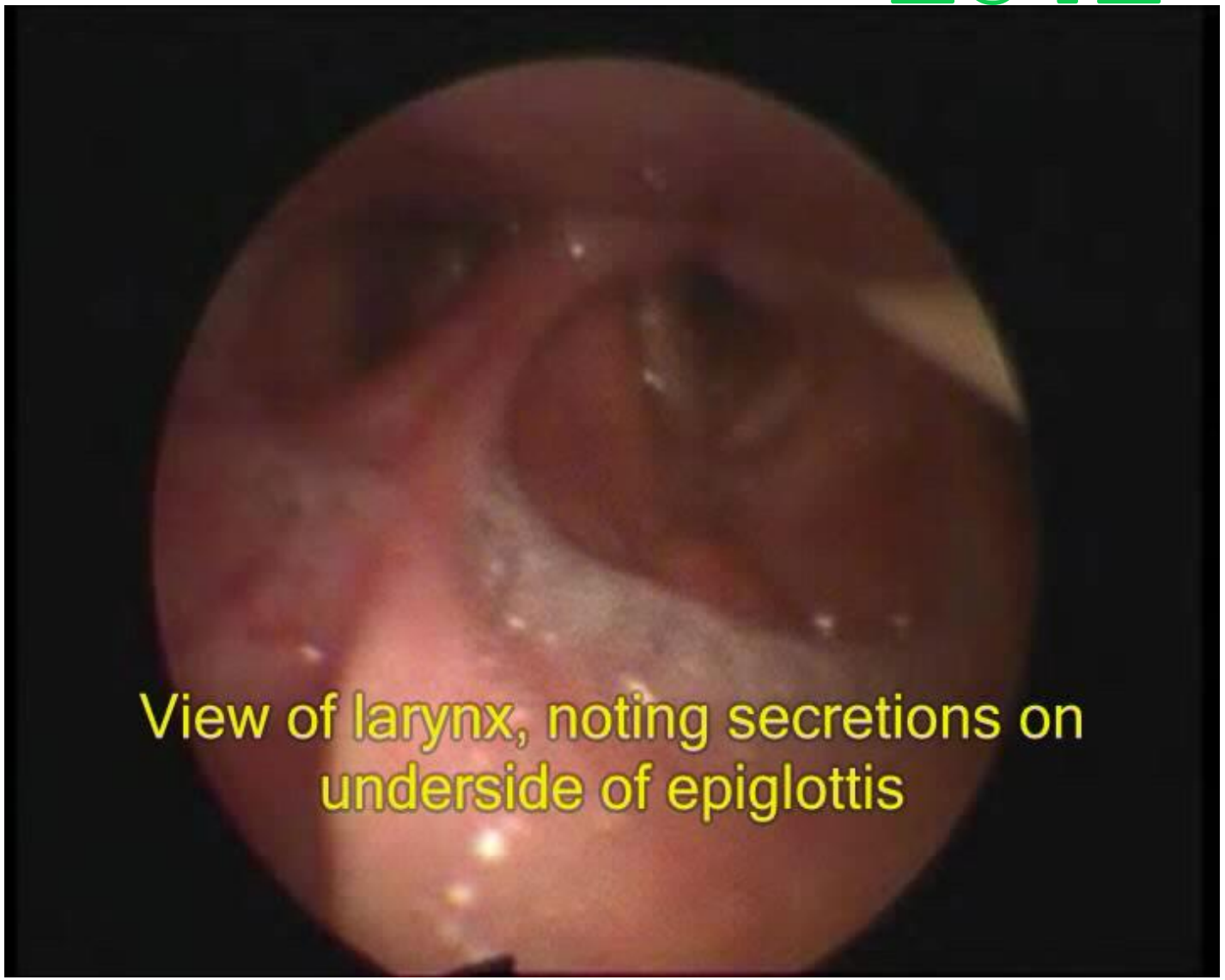
- 57 year old female
- Pedestrian in RTA
- C3 ASIA A
- Anterior cervical discectomy
- Respiratory support via tracheostomy
- Difficulty weaning from tracheostomy
- NBM, fed via gastrostomy

Unilateral vocal cord palsy

- 80 year old male
- Fall, C5 ASIA A
- Anterior decompression and fusion and posterior stabilisation surgery
- Post op – dysphonia and dysphagia
- Fed via nasogastric tube

FNE discovered pharyngeal swelling and right vocal cord palsy





Restoration of Speech and Swallowing in Dysphagic Spinal Cord Injured Patients Receiving Mechanical Ventilation via Tracheostomy: A Case Series

2017

	Case 1	Case 2	Case 3	Case 4
Age:	60	19	26	62
Sex:	Male	Male	Male	Male
AIS score:	C1 C	C1 A	C4 A	C2 B
Aetiology:	Spinal infarct (non-trauma)	Transverse myelitis (non-trauma)	Road traffic accident (trauma)	Fall (trauma)
Surgical intervention:	Cervical spine laminectomy	none	Anterior cervical spine fixation C4-7 Posterior cervical spine fixation C3-T1	Anterior cervical spine fixation C6-7
Date of injury to admission to SCIC (months)	4.5	7	1	2.5
LOS SCIC (months):	5.5	8	4.5	4.5
Intial FEES assessment:	• Copious laryngeal secretions • silent aspiration	• pharyngeal disco-ordination, • Intact swallow initiation.	Copious laryngeal secretions, aspiration.	Left vocal fold palsy, left tongue weakness, copious laryngeal secretions, silent aspiration.

Morgan & McRae, 2017

On admission	Case 1	Case 2	Case 3	Case 4
Tracheostomy:	Y	Y	Y	Y
Ventilation:	Y	Y	Y	Y
Nutrition:	NBM, Gastrostomy tube	Oral trials with puree. Gastrostomy tube	NBM, Gastrostomy tube	NBM, Gastrostomy tube
Communication:	Non-verbal mouthing	Intermittent speech	Non-verbal mouthing	Non-verbal Mouthing
Interventions:	• Facial oral tract therapy • Saliva swallow stimulation • Laryngeal manipulation • Food/fluid trials	• Chewing practice • Reduce yankeur suction use • Facial oral tract therapy • Food/fluid trials	• Saliva swallow stimulation • Laryngeal exercises • Food/fluid trials	• Tongue and voice exercises • Saliva swallow stimulation • Laryngeal manipulation • Food/fluid trials

Each case received daily input for 1 hour. This included patient education, biofeedback and rigorous oral hygiene regimes.

On admission	Case 1	Case 2	Case 3	Case 4
Tracheostomy:	Y	Y	Y	Y
Ventilation:	Y	Y	Y	Y
Nutrition:	NBM, Gastrostomy tube	Oral trials with puree. Gastrostomy tube	NBM, Gastrostomy tube	NBM, Gastrostomy ube
Communication:	Non-verbal mouthing	Intermittent s		n-verbal thing

Speech and Language Therapy works!

On discharge:				
Tracheostomy:			N	N
Ventilation:			N	N
Nutrition:	ids, nal diet	Oral: thin fluids, normal diet	Oral: thin fluids, normal diet	Oral: thin fluids, normal diet
Communication:	Speech	Speech	Speech	Speech

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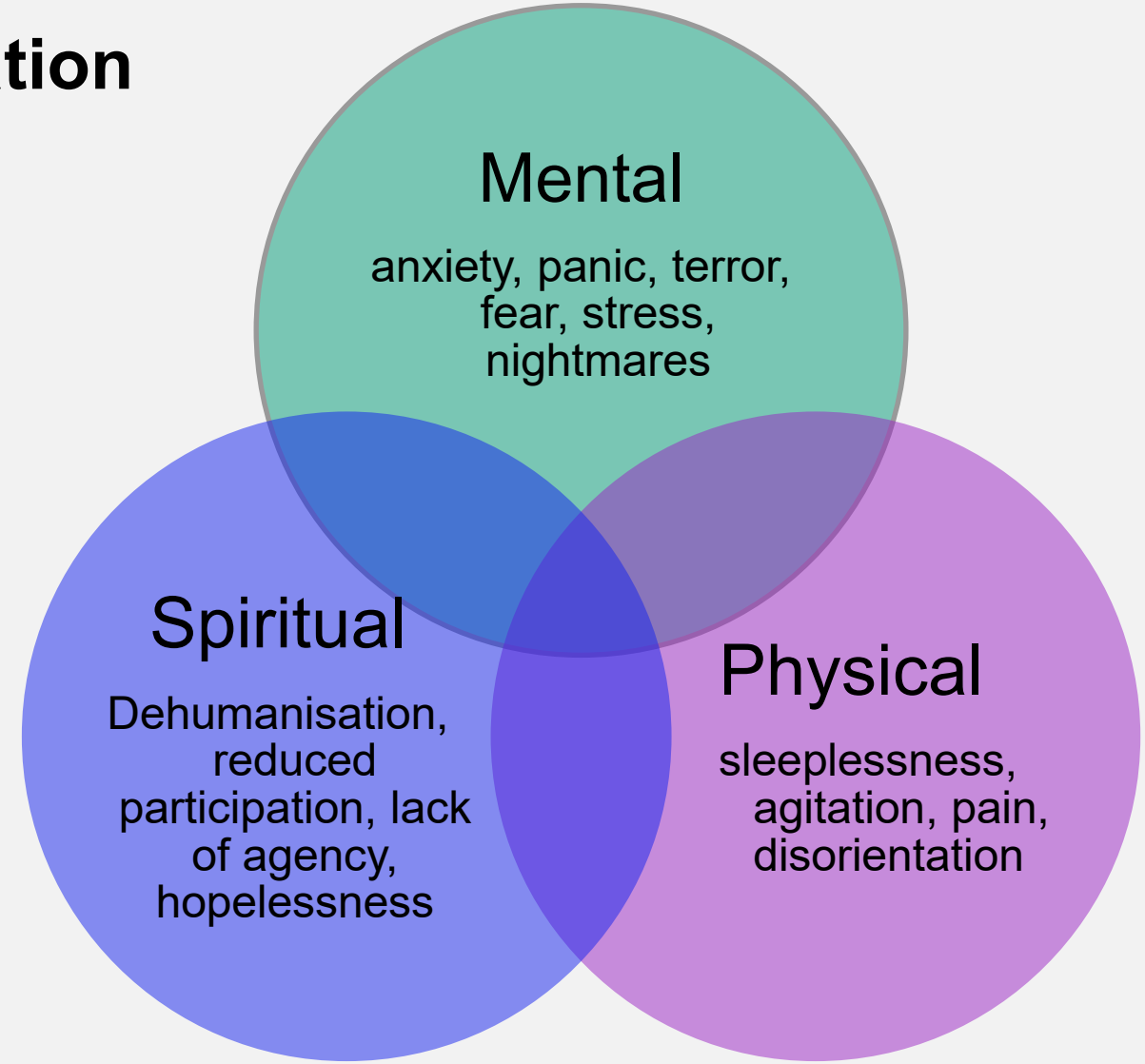
Fundamentals: Speech/communication

- Lack of voice
- Reduced volume
- Limited access to alternative communication aids

Impact of loss of communication



McRae et al, The Power of Communication, 2020

Impact of no speech on care

Consent process	Limited delirium management	Capacity and restraint	Mis-interpretation of symptoms	Over or under-treatment	Frustration/ Avoidance	Pretend to understand

McRae et al, The Power of Communication, 2020

Alternative Communication options (AAC)

No technology

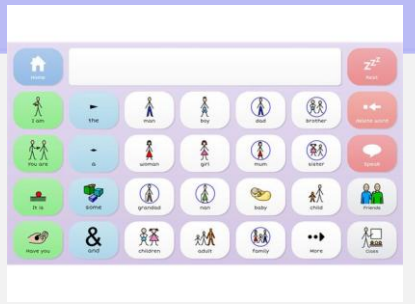
- Facial/hand gestures
- Y/N responses
- Mouthing

Low technology

- Picture charts
- Eye tracking aids
- Pen and paper/whiteboard

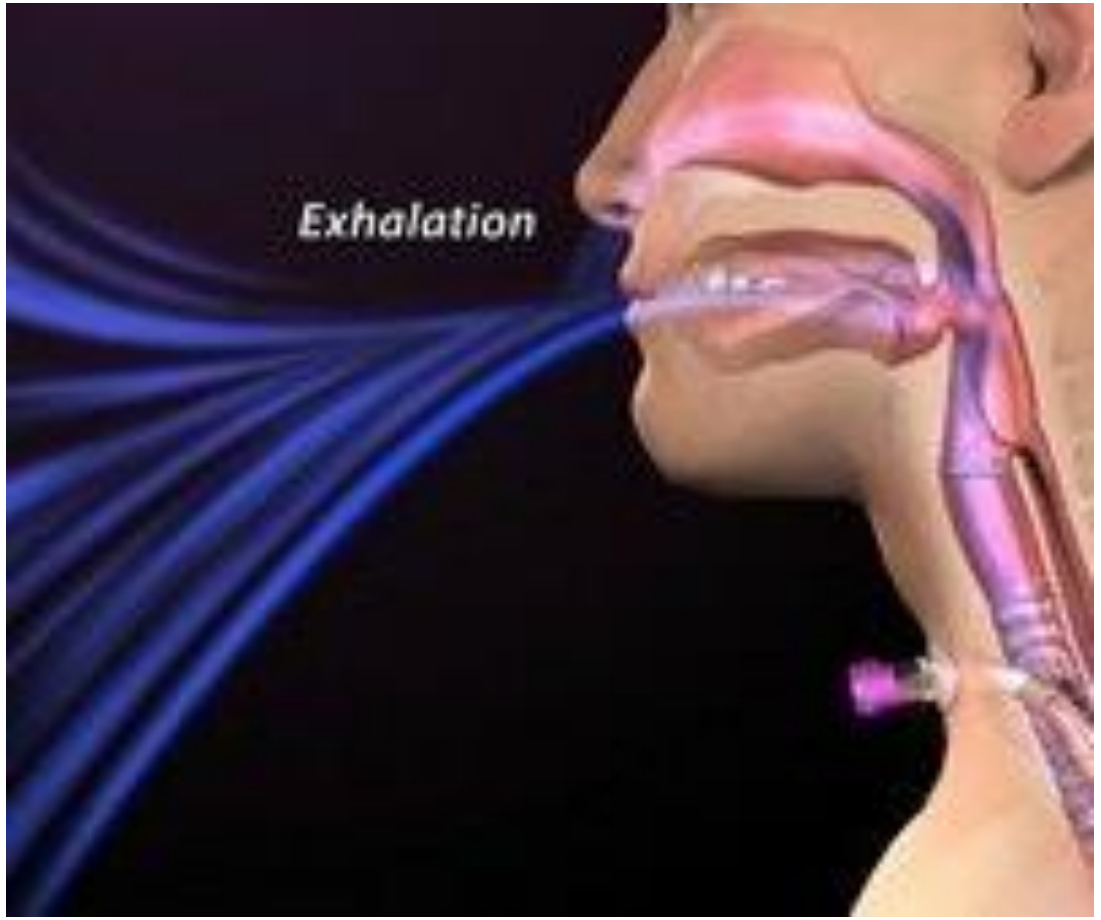
High technology

- Eye gaze device
- Voice output communication aid
- PC based application



Enabling voice

- Downsize tube
- Cuff deflation
- Ventilator Assisted Leak Speech (VALS)
- Speaking valves*



Learning journey

Neuro caseload

- Cortical/cranial nerve involvement
- Neurosurgery
- Potential systemic disruption linked to neurological damage
- Potential tracheostomy
- Cognitive impairment
- Speech difficulties (dysarthria)
- Language impairments (Aphasia)
- Swallowing impairments (Dysphagia)

SCI

- Localised spinal column damage
- Spinal Surgery – anterior/posterior/both
- Cardiovascular disruption
- Respiratory disruption
- Alternative airway – ETT/Tracheostomy
- Paralytic Ileus
- Autonomic dysreflexia
- Prolonged supine positioning
- Intact cognition
- Speech/language intact

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Career journey

1991-2001

- Developing clinical expertise – adult dysphagia

MClinRes

2002-2013

- Clinical specialism – SCI
- MClinRes

London Spinal Cord Injury Centre Stanmore

Ph.D.

2014-2019

- PhD Dysphagia
- Clinical academic

2020-2025

How is dysphagia detected and managed across specialised and non-specialised units?

What is the added impact of dysphagia on CSCI patients?

What is best way to identify subtle dysphagia in CSCI patients?

Can patient outcomes be improved with early dysphagia identification?

The DAISY project:
Dysphagia following Acute Cervical Spinal Cord injury

2014-2018

Patient Advisory Group

Literature review – Swallowing and respiratory function in CSCI

National survey – Current practice to MDT staff

Interviews – Lived experience of CSCI patients and carers

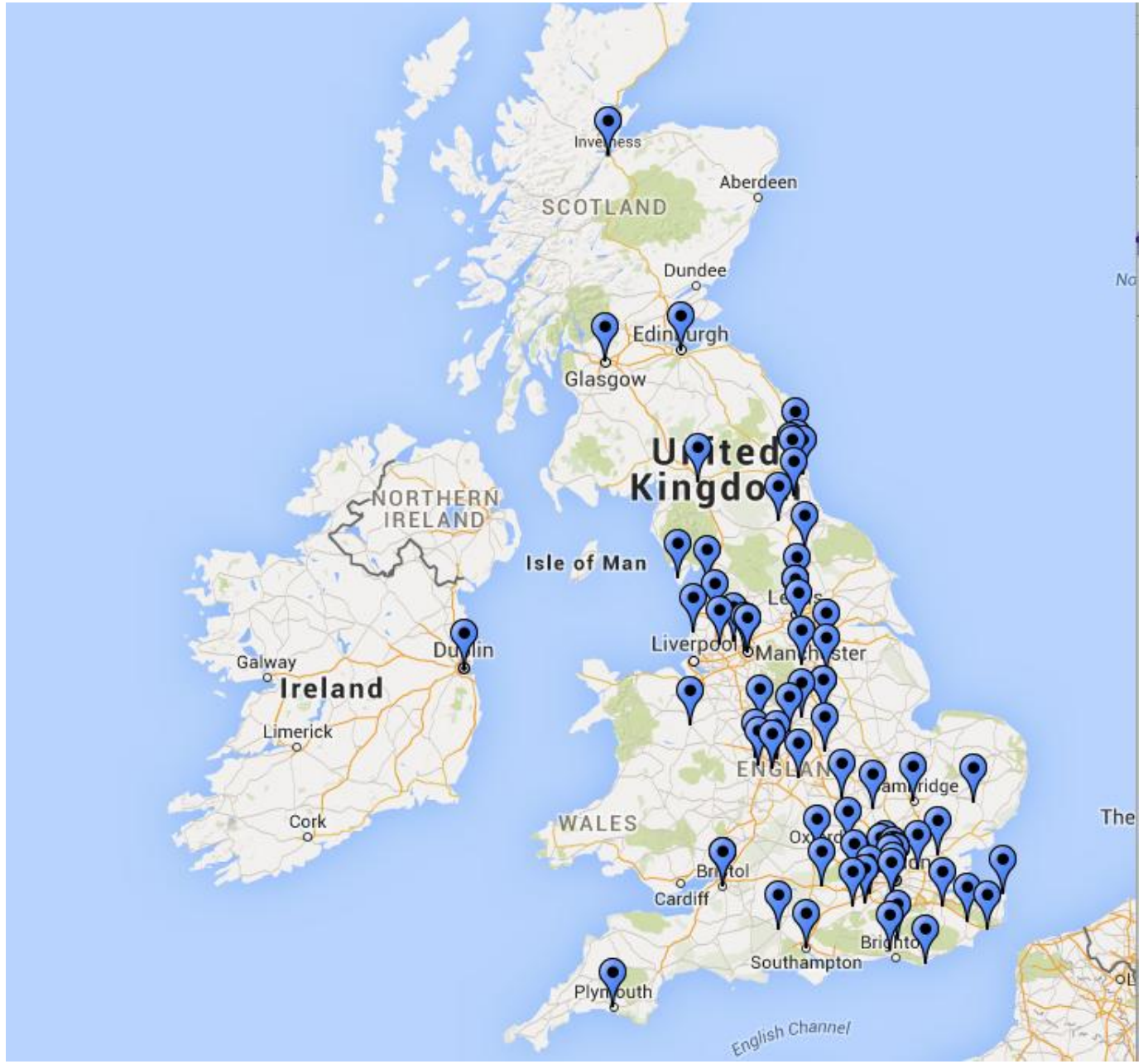
Delphi – International Expert consensus – dysphagia identification and management

Feasibility study – DAISY swallow screening tool

https://youtu.be/x5qf7TFVmpk

McRae, 2018 https://discovery.ucl.ac.uk/id/eprint/10046891/

Funded by NIHR


Inverness
Aberdeen
SCOTLAND
Dundee
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Glasgow
United Kingdom
NORTHERN IRELAND
Isle of Man
Dublin
Galway
Ireland
Limerick
Cork
Liverpool
Manchester
ENGLAND
Cambridge
WALES
Bristol
Cardiff
Brighton
Southampton
Plymouth
English Channel

Spinal Cord Series and Cases (2019)5:31
https://doi.org/10.1038/s41394-019-0175-y

ISCoS The International Spinal Cord Society

ARTICLE

Oropharyngeal dysphagia management in cervical spinal cord injury patients: an exploratory survey of variations to care across specialised and non-specialised units

Jackie McRae[1,2] · Christina Smith[3] · Suzanne Beeke[3] · Anton Emmanuel[1]

2019

- MDT survey; 219 respondents, 87 hospitals admitting SCI.
- Routine SLT/+ve swallow screen
- **6% no SLT**
- >40% **blue dye and thickened fluids**
- **bedside** >90% **rely on cough**
- <35% use FEES/VFS
- **cuff up eating** >50% sometimes

McRae *et al. BMC Health Services Research* (2020) 20:783
https://doi.org/10.1186/s12913-020-05659-8

BMC Health Services Research

RESEARCH ARTICLE Open Access

The experiences of individuals with cervical spinal cord injury and their family during post-injury care in non-specialised and specialised units in UK

Jackie McRae[1*], Christina Smith[2], Anton Emmanuel[3] and Suzanne Beeke[2]

- Semi-structured interviews, 9 people >3 months post SCI + dysphagia

Themes:

- difficulties in adjustment,
- need for multiple transitions,
- loss of 'golden opportunity' for specialist rehab, confusion over test and decision to be NBM

DISABILITY AND REHABILITATION
https://doi.org/10.1080/09638288.2021.2012607

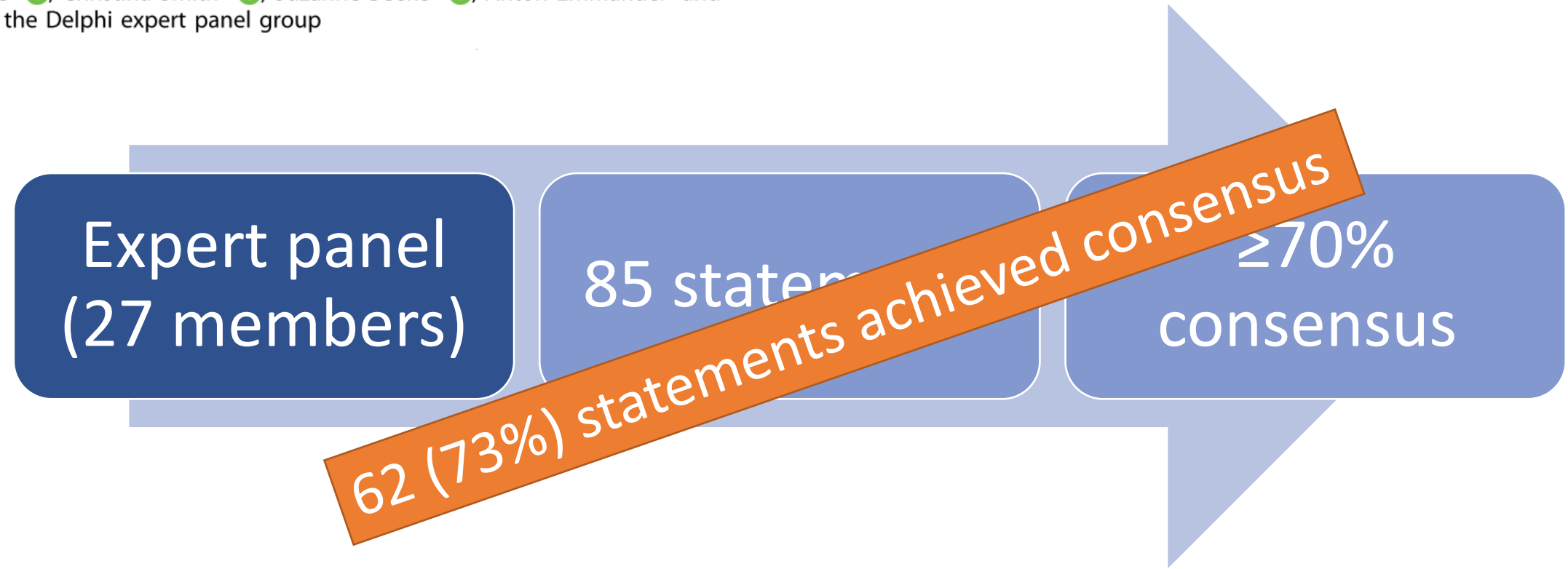
Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

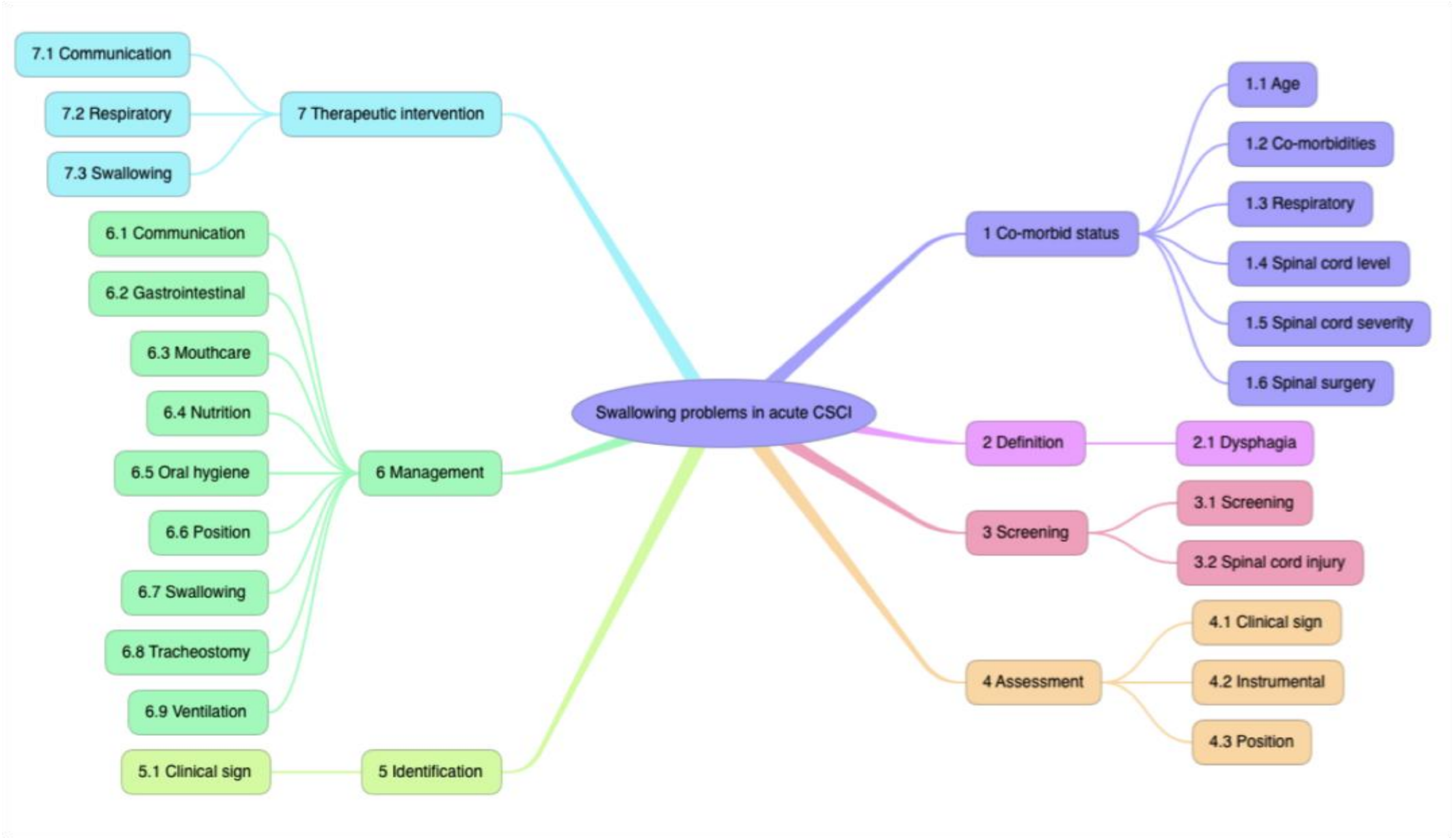
OPEN ACCESS Check for updates

Development of a swallowing risk screening tool and best practice recommendations for the management of oropharyngeal dysphagia following acute cervical spinal cord injury: an international multi-professional Delphi consensus

Jackie McRae[a], Christina Smith[b], Suzanne Beeke[b], Anton Emmanuel[c] and Members of the Delphi expert panel group



Topics and subcategories for Delphi statements



2021

Table 7. Best practice recommendations for acute cSCI management of dysphagia and associated complications.

Key areas	Best practice recommendations
Swallowing	• Early screening by a team for dysphagia risk factors and symptoms.
	• Specialist SLT assessment for those with risks or symptoms, especially those requiring trach
	• Access to instrumental assessments including Fibreoptic Endoscopic Evaluation of Swallowi pharyngeal and laryngeal functions.
	• Avoid routine use of thickened fluids and blue dye without SLT assessment.
	• Do not restrict oral intake based on position or ventilation status alone.
Respiratory	• Nationally agreed weaning guidance should be used routinely, aiming for self-ventilation w
	• Tracheostomy cuff deflation trials can help speech and improve swallowing ability and sho
	• Use vital capacity as an outcome measure as part of weaning.
	• Specialist training is required for all staff undertaking respiratory rehabilitation.
Communication	• Early options for communication are vital to support patient involvement in decision-makir
	• Options for natural speech should be considered including tracheostomy cuff deflation and
	• For those people who are unable to speak, a variety of communication aids should be trial
Nutrition	• Early nasogastric tube feeding for high cervical SCI ensures consistent and adequate nutriti
	• If dysphagia persists gastrostomy tube feeding should be considered in consultation with reversed when eating resumes
	• Avoid prolonged nil by mouth status as this can decondition the swallowing and speech m
Oral care	• Mouthcare should routinely be provided at least twice a day to reduce the risk of ventilato
	• Staff need to pay attention to dry mouth due to medication
	• Additional oral moisturisation will be required (link to local mouthcare policy)

SCI BEST PRACTICE RECOMMENDATIONS

Optimising management of patients with cervical spinal cord injury and dysphagia

SWALLOWING

- Early screening for risk factors
- Specialist SLT assessment
- Use instrumental swallow assessments
- AVOID thickened fluids without SLT review

RESPIRATORY

- Use weaning guidelines
- Consider cuff deflation
- Use vital capacity measures
- Specialist training needed

COMMUNICATION

- Early options needed to engage in care
- Consider ways to allow speech
- Variety of aids may be needed

NUTRITION

- Early NGT feeding
- Consider PEG if > 6 weeks
- Avoid prolonged NBM status

ORAL CARE

- Regular mouthcare required (min x2/day)
- Actively review and manage dry mouth

REFERENCES

International multi-professional expert consensus
McRae et al., 2021

12 risk factors for dysphagia

https://youtu.be/vc3amlGV5Ww

Injury Risk	Clinical Risk	Urgency
• Brain Injury • Cervical SCI C1-C7 • Complete or Incomplete AIS scale • Cervical spine surgery	• Tracheostomy tube • > 48 hour intubation • ≳24 hours ventilation • Reduced nutritional intake	• Recent chest infection • Spiking pyrexia • Increased need for oral care • Increased need for suction

Clinical indicators in 'injury' or 'clinical' risk areas → consider SLT referral

Signs of urgency → change in management

Feasibility study in two trauma units

Methods

A two-phase pragmatic prospective observational feasibility study (Figure 1) took place over four months, in two matched intensive care units (ICU). A swallow risk screening tool (Figure 2) was previously developed through a Delphi consensus study.

Phase one
- Usual practice - identifed staff member makes decision about oral intake/nutrition
- Staff profession, level of injury, oral intake status and decision documented

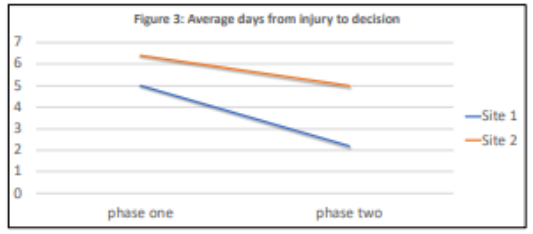
Training
- Screening tool training video sen to all staff
- Face-to-face support from research nurse

Phase two
- Identifed staff member uses Screening tool to make decision about oral intake/nutrition
- Staff profession, level of injury, oral intake status and decision documented
- Feedback on tool utility

Figure 1: Plan of Two-phase pragmatic observational feasibility study

Key Results

- Site 1 n = 9
- Site 2 n = 8
- Both units showed a reduction in the average number of days to a decision using the tool (Figure 3) and a small increase in the number of decisions made for each patient (Figure 4).



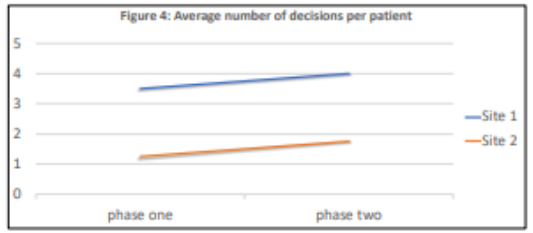


Figure 2: Daisy swallow risk screening tool

Staff feedback on tool utility

"tool is very useful and will help prevent aspirations/deterio rations"

"[Query the] use of tool, as protocol in place ensuring NG fed + SALT. Reviewed every 7 days in [ward round]"

Staff comments on use of tool

Spinal Cord (2018) 56:1116–1123
https://doi.org/10.1038/s41393-018-0170-3

REVIEW ARTICLE

Risk factors for dysphagia after a spinal cord injury: a systematic review and meta-analysis

J. Iruthayarajah[1] · A. McIntyre[1] · M. Mirkowski[1] · P. Welch-West[2] · E. Loh[1,2,3] · R. Teasell[1,2,3]

Cervical surgery and tracheostomy increase dysphagia risk

JOURNAL OF NEUROTRAUMA 37:2315–2319 (November 1, 2020)

DOI: 10.1089/neu.2020.6983

Morphological changes to pharynx

Mechanism of Dysphagia after Acute Traumatic Cervical Spinal Cord Injury

Tetsuo Hayashi,[1,2] Yuichi Fujiwara,[3] Yuto Ariji,[1] Hiroaki Sakai,[2] Kensuke Kubota,[1,2] Osamu Kawano,[2] Muneaki Masuda,[2] Yuichiro Morishita,[2] and Takeshi Maeda[2]

Spinal Cord (2017) 55, 979–984

www.nature.com/sc

ORIGINAL ARTICLE

Traumatic cervical spinal cord injury: a prospective clinical study of laryngeal penetration and aspiration

T Ihalainen[1,2], I Rinta-Kiikka[3], TM Luoto[4], EA Koskinen[1], A-M Korpiiaakko-Huuhka[2] and A Ronkainen[4]

Use risk factors to initiate preventative measures

Monitor cSCI patients for 2 weeks after injury

Spinal Cord (2020) 58:53–57
https://doi.org/10.1038/s41393-019-0347-4

ARTICLE

The time course of dysphagia following traumatic cervical spinal cord injury: a prospective cohort study

Tetsuo Hayashi[1,2] · Yuichi Fujiwara[3] · Hiroaki Sakai[2] · Kensuke Kubota[1,2] · Osamu Kawano[2] · Eiji Mori[2] · Tsuneaki Takao[2] · Muneaki Masuda[2] · Yuichiro Morishita[2] · Takeshi Maeda[2]

DAISY swallow risk screening tool

Domains	Category	Sub-category	Tick if risk is present
Injury Risk	➢ Co Morbid ➢ Level of injury ➢ Severity of injury ➢ C-spine surgery	• Brain injury/cognitive deficit • Cervical SCI C1-C7 • Complete/incomplete injury • Anterior or posterior cervical spine surgery	☐ ☑ ☑ ☑
Clinical Risk	➢ Intubation ➢ Tracheostomy ➢ Ventilation ➢ Nutrition	• >48 hours • Cuffed or uncuffed tube • Requiring upto 24 hours ventilation • Reduced nutritional intake	☑ ☐ ☑ ☐
Urgency	➢ Chest infection ➢ Pyrexia ➢ Oral hygiene ➢ Suction	• Recent chest infection • Spiking pyrexia • Increased need for oral care • Increased need for suction	☑ ☐ ☑ ☐

2026?

Risk area	Clinical Category	Clinical indicators			
		1	2	3	4
Injury	Brain injury or cognitive deficit	Nil	Mild-moderate/resolving head trauma	Moderate-severe deficit	
	Level of spinal cord injury	Other (Lumbar/sacral)	Thoracic +	Cervical levels 5-7	Cervical levels 1-4
	Severity	AIS CDE	Incomplete/ AIS B	Complete/AIS A	
	Cervical spine surgery	None	Posterior/ 1 level	Anterior surgery	Anterior and Posterior/ 2+ levels
Clinical interventions	Intubation	< 24 hours/none	24-48 hours	> 48 hours	
	Tracheostomy	none	Tracheostomy tube – uncuffed/cuff deflated	Tracheostomy tube – cuff inflated	
	Ventilation	<12 hours/none	12-24 hours	Requiring > 24 hours ventilation	
	Oral Nutrition	Eating full oral diet	Taking half oral diet	Unable to eat or drink/NBM	
Clinical Urgency	Chest infection	none	Resolved chest infection	Current/deteriorating chest infection	
	Pyrexia	none	Resolved pyrexia	Spiking pyrexia	
	Oral hygiene	Independent for oral care (2 x day)	Support for oral care (2x day)	Dependency for oral care (4 x day)	1-2 hourly oral care
	Suction for secretion management	Reduced suction need/none (1xday)	Stable suction needs (2x day)	Increased need for suction (3-5x day)	High suction needs (hourly)

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Where are we now?

Unknowns → Knowns

Cause of mortality

2022

Spinal Cord (2013) 51, 413–418

www.nature.com/sc

Article

Long-Term Survival and Causes of Death in Age of 60 with Traumatic Spinal Cord Injury

Roland Thietje [1,*], Birgitt Kowald [1], Ralf Böthig [1], Arndt P. Schulz [1,2], Markus [illegible], [illegible] and Sven Hirschfeld [1]

ORIGINAL ARTICLE

Risk factors for mortality after spinal cord injury in the USA

Y Cao, JS Krause and N DiPiro

Table 5. Causes of death according to neurological level and severity of injury ($n = 223$); Abbreviations: Group 1: C1–4 AIS A, B or C; Group 2: C5–8 AIS A, B or C; Group 3: T1–S5 AIS A, B or C; Group 4: AIS D at any level; Group 5: Ventilator-dependent.

Cause of Death	1	2	3	4	5	Total
Pneumonia	50.9%	21.3%	15.3%	14.3%	22.2%	26.0%
Cardiovascular Diseases	13.2%	19.1%	39.8%	57.2%	0.0%	28.2%
Pressure sore	5.7%	12.8%	13.3%	0.0%	0.00%	9.9%
Urosepsis	11.3%	6.4%	5.1%	0.0%	0.0%	6.3%
Other sepsis	0.0%	4.3%	2.0%	0.0%	22.2%	2.7%
Bladder cancer	1.9%	12.8%	7.1%	7.1%	0.0%	6.7%
Other tumor	1.9%	8.5%	10.2%	14.3%	11.1%	8.1%
Suicide	9.4%	10.5%	5.2%	7.1%	33.3%	8.5%
Others	5.7%	4.3%	2.0%	0.0%	11.1%	3.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Pneumonia				
No	7741	1262	73678	17.13
Yes	442	119	2584	46.05

Physiological changes

2022

american physiological society | JNP JOURNAL OF NEUROPHYSIOLOGY

J Neurophysiol 128: 405–417, 2022.
First published July 13, 2022; doi:10.1152/jn.00469.2021

RESEARCH ARTICLE

Spinal Networks and Spinal Cord Injury: A Tribute to Reggie Edgerton

Laryngeal and swallow dysregulation following acute cervical spinal cord injury

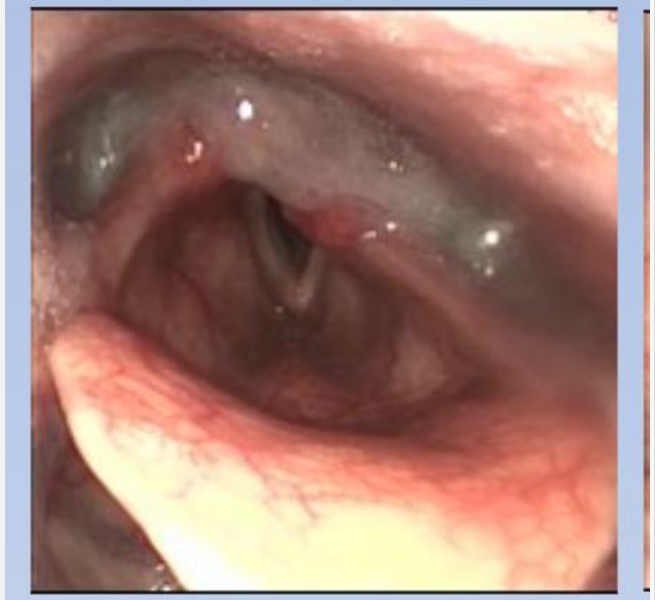
Teresa Pitts,[1] Kimberly E. Iceman,[1] Alyssa Huff,[2] M. Nicholas Musselwhite,[1] Michael L. Frazure,[1] Kellyanna C. Young,[1] Clinton L. Greene,[1] and Dena R. Howland[1,3]

[1]Kentucky Spinal Cord Injury Research Center, Department of Neurological Surgery, University of Louisville, Louisville, Kentucky; [2]Center for Integrative Brain Research, Seattle Children's Research Institute, Seattle, Washington; and [3]Research Service, Robley Rex VA Medical Center, Louisville, Kentucky

significant. Overall, we found that spinal cord injury alters laryngeal drive during swallow and breathing, and alters swallow-related diaphragm activity. Our results show behavior-specific effects, suggesting that swallow may be more affected than breathing is by cSCI, and emphasizing the need for additional studies on laryngeal function during breathing and swallow after spinal cord injury.

Laryngeal pathology

2022
2025



Left vocal fold paresis with accumulation of secretions

bilateral vocal cord
sy

Use of the Patterson Oedema Scale in the clinical management of airway and swallowing in Spinal Cord Injury: A retrospective service review

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Dr Jackie McRae[1], Sarah Morgan[2] and Sharon Leigh[3]

NSIC Stoke Mandeville

Spinal cord injury (SCI) is a complex condition affecting multiple body systems. Cervical SCI patients have a high risk of airway complications and an 8-80% reported incidence of dysphagia [1]. The underlying pathophysiology is not clearly understood but **silent aspiration** is a key feature and leads to increased respiratory complications, hospital length of stay (LOS) and reduce quality of life (QoL).

Complications associated with respiration are the leading cause of morbidity and mortality in SCI patients[2]

In the UK, Flexible Endoscopic Evaluation of Swallowing (FEES) is a diagnostic tool used by Speech and Language Therapists (SLTs) to evaluate swallowing and airway physiology[3]. **Laryngeal oedema** has been reported inconsistently, making it difficult to track changes over time. The Revised Patterson Oedema Scale[4], originally developed for use in head and neck cancer, offers a structured approach to rating oedema severity and location.

This review explores the clinical utility of the Patterson Oedema Scale in describing oedema and its impact on dysphagia and respiratory function in people with SCI.

METHOD:
Retrospective data was collected from SLT services at two UK specialist spinal cord injury centres (SCIC) over a 12-month period.

Data was collected for:

- Age
- Level and severity of SCI
- Respiratory status on admission and discharge from the SCIC
- FEES assessment findings, penetration aspiration scores (PAS) *[high score= worse outcome]*
- Diet outcomes using the Functional Oral Intake Scale (FOIS) *[high score=best outcome]* at **three** time points: pre-admission, on admission, and at discharge from the SCIC.
- Oedema rating using the Patterson Oedema Scale

References:
1. McRae, J., et al., Oropharyngeal Dysphagia in Acute Cervical Spinal Cord Injury: A Literature Review. Dysphagia, 2023
2. Lee Boettcher P, Fleming JC, Gurr KR et al. Predicting the need for tracheostomy in patients with cervical spinal cord injury. J Trauma Acute Care Surg. 2012; 73: (680-4)
3. Tecklin, P., et al., Therapy professionals in critical care: A UK wide workforce survey. Journal of the Intensive Care Society, 2023. 24(1): p. 24-31
4. Starmer, H.M., et al., Development and reliability of the revised Patterson Edema Scale. Clin Otolaryngol, 2021. 46(4): p. 752-757

Demographics n=25

- Average age: 60 years (20-88 yrs)
- 80% male
- 96% had cervical level injuries 72% had SCI at or above C4
- 64% had anterior cervical discectomy and fusion (ACDF) surgery

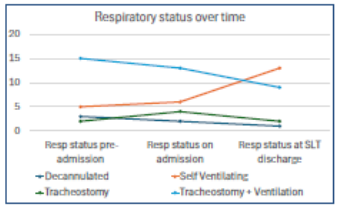

Figure 1: Changes in respiratory status at each time point n=26

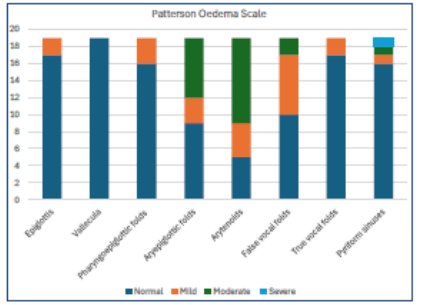

Figure 2: Reported Patterson Oedema Scale following FEES at SCIC n=19

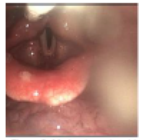

Figure 3: Moderate arytenoid oedema

Figure 4: Vocal fold paresis with moderate arytenoid & aryepiglottic fold oedema

Pre-SCIC admission

- 56% had FEES, an average of 43 days post injury
- 44% reports noted oedema/structural changes, Patterson Oedema Scale not used
- 60% ventilated via a tracheostomy

72%

FOIS ≤ 3 and required tube-feeding

36% scored ≥7 Penetration Aspiration Scale (PAS)

On admission

- 76% (n=19) had FEES, at average of 134 days post injury (range 35-645)
- The Patterson Oedema Scale identified moderate or mild oedema in the arytenoids (74%) and aryepiglottic folds (53%) (Figures 2, 3 & 4)

56%

FOIS ≤ 3, 20% had FOIS 7 and taking full oral diet

40% scored ≥7 PAS

On discharge

- 36% required ongoing ventilation, whilst 44% were able to self ventilate
  - Oedema severity may influence respiratory status and dysphagia.
  - Outcomes improve with SLT rehabilitation

84%

FOIS 7 and no tube feeding

Discussion

The Patterson Oedema Scale used for patients admitted with SCI, can be a valuable tool to identify and track oedema patterns over time as part of a comprehensive FEES protocol.

- Oedema persisted for months post injury.
- Oedema was observed in the arytenoids and aryepiglottic folds bilaterally.
- Oedema severity negatively impacts on respiratory status, and dysphagia.
- FEES assessment can be used frequently in specialist SCICs.

These observations enhance clinical decision-making and selection of suitable interventions.

Future multi-site data collection will aid understanding of the underlying mechanism of oedema and its impact on laryngeal function in SCI.

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2. Northwest Regional Spinal Injuries Centre, Mersey and West Lancashire Teaching Hospitals NHS Trust, UK
3. National Spinal Injuries Centre, Stoke Mandeville Hospital, UK.

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SLT Interventions

2024

Swallow Assess and Advise (47%)	Swallowing interventions (36%)	Communication Interventions (20%)	Airway interventions (13%)
Single assessment	Saliva swallowing therapy	Voice therapy	Expiratory Muscle Strength Training
Refer to gastroenterology	Oral trials (pre-diet)	Aphasia therapy	Tracheostomy cuff deflation
Reflux advice	Diet trials	AAC (alternative communication)	Ventilator weaning
	McNeill Dysphagia Therapy Program	Dysarthria therapy	Refer to ENT
	Biofeedback with sEMG	Communication support	Passy Muir Valve trials
	Swallow strategies		
	Indirect therapy advice		

Jackie McRae ResearchGate

Clinical Management of Silent Aspiration and Dysphagia in Acute Spinal Cord

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Introduction

Silent aspiration is a known feature of dysphagia in cervical spinal cord injury (cSCI), however there is little evidence on optimal management. UK Speech and Language Therapists (SLTs) are trained to use instrumental assessments, such as Fibreoptic Endoscopic Evaluation of Swallowing (FEES) and videofluoroscopy (VFS) to evaluate and manage swallowing for safe oral intake. FEES has the added benefit of providing visualisation of the upper airway for the assessment of airway patency and laryngeal injury, allowing for safe weaning and eventual decannulation. This paper reviews Speech and Language Therapy services in three UK spinal injury units and the impact of using instrumental assessments.

Methods

A retrospective review of all SCI referrals to SLT services at three UK spinal units between August 2019 to August 2020, with outcomes of initial FEES and VFS assessments. Demographic data was collected alongside presence of silent aspiration, laryngeal pathologies, SLT recommendations and outcomes.

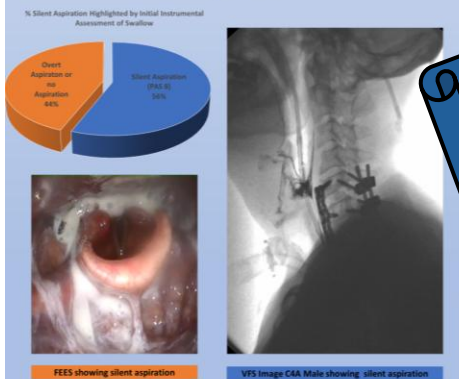
Demographics and Aetiology

- **Spinal Cord injury Level:** Cervical 42; Thoracic 5; Lumbar 1
- **AIS Score:** A 24; B 6; C 15; D 3
- **Age Range** 32 - 86 years with average age 60.1
- **Male** 37 **Female** 11

Results

In the 12 month period, there were a total of 108 referrals made to SLT services across three sites. FEES was undertaken in 31% patients of which 29% had a tracheostomy and 26% were ventilated. VFS was undertaken in 15% of which 27% had a tracheostomy and only one patient was ventilated. COVID restricted use of instrumental assessments which may have delayed progress.

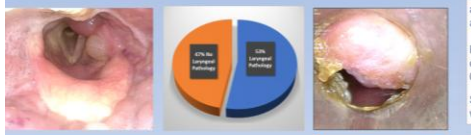
Silent Aspiration



FEES showing silent aspiration

VFS Image C4A Male showing silent aspiration

Laryngeal and Airway Pathology



FEES showing a Polyp and oedema

Tracheal granuloma visualised with tracheoscopy

Outcomes

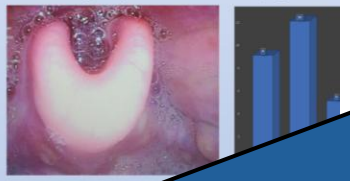
Functional Oral Intake Scale (FOIS) PRE and Post A

FOIS is a rating scale ranging from Level 1 (Nothing to Level 7 (Total oral diet with no restrictio

An improvement in FO importance of carrying ou assessment in the decisio and potentially reducing t non-oral nutrition. If the stay the same, this wo bedside assessment was a recommendation was re the FEES assessment, reduces the risk of aspi and weaning complicatio guide the appropriate re the future return to oral instrumental assessment.

Murray Secretion Scale (MSS)

The MSS is a scale used in FEEs evaluation rangin (Most Normal Rating – no visible secretions) to severe rating – any secretions in the laryngeal vesti



A FEES showing sali the vallecular within

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Brodsky ryngeal Injury and Upper Airway Sympto Endotrac ation With Mechanical Ventilation During C Systemat Critical care medicine, 46 (12): 2010-2017.

Crary, M.A. G.D., & Groher, M.E. (2005). Initial psychometr of a functional oral intake scale for dysphagia in stroke patients. A Rehabil, 86(8), 1516-1520. doi:10.1016/j.apmr.2004.11.049

Murray, J., Langmore S.E., Ginsberg, S., & Dostie, A. (1996). The accumulated oropharyngeal secretions and swallowing frequenc aspiration. Dysphagia 11(2):99–103.

Rodrigues, L.B. & Nunes, T.C. (2015). Importance of flexible br decannulation of tracheostomy patients. Rev. Col. Bras. Cir. 201 080.

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Special acknowledgement to Sarah Cole (SLT) for her assistance with collating the data at the Injury Centre

Features and Outcomes of Oropharyngeal Dysphagia in SCI

A Retrospective Review of cases across three spinal units in UK

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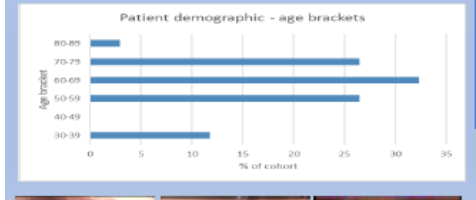
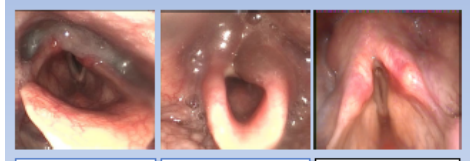
Belen Lopez & Sarah Cole, London Spinal Cord Injury Centre, Royal National Orthopaedic Hospital, UK belen.lopez1@nhs.net
Sharon Leigh, National Spinal Injuries Centre, Stoke Mandeville Hospital, UK sharon.leigh@nhs.net

Introduction

- Dysphagia is a recognised complication of Spinal Cord Injury (SCI), particularly in those with cervical level injuries with an estimated incidence of 40%. This has negative consequences for care and outcomes, particularly if it is not identified
- Information on the pathophysiology is limited although silent aspiration has been reported as a key feature, based on clinical symptoms after the event.
- Instrumental assessment (videofluoroscopy or Fibreoptic Endoscopic Evaluation of Swallow – FEES) can b complications of aspiration.
- In the UK, Speech and Languag visualisation of anatomy, support diag
- SLTs from multiple SCI units have support each other, work collabora practice.
- This audit presents data from this c use of FEES for management of th SCI
- It is important to note that during subclinical dysphagia/laryngeal imp period.

Results





Left vocal fold paresis with accumulation of secretions | Oedema of larynx, arytenoids, aryepiglottic folds and epiglottis, obscuring vocal folds | Arytenoid oedema with bilateral vocal cord palsy

Future Projects

- To look at standardisation for SLTs working within SCI across UK
- To establish an international working group for SLTs Working within SCI

SCIENCEPOSTERS

Improving communication and dysphagia outcomes for patients with Spinal Cord

How expert Speech and Language Therapy services add value in UK specialised SC

Dr Jackie McRae, Centre for Allied Health, St George's University of London, UK jmcrae@sgul.ac.uk
Sarah Morgan, The North West Regional Spinal Injuries Centre, Southport & Ormskirk Hospital, UK sarah.morgan36@nhs.net
Belen Lopez, London Spinal Cord Injury Centre, Royal National Orthopaedic Hospital, UK belen.lopez1@nhs.net
Sharon Leigh, National Spinal Injuries Centre, Stoke Mandeville Hospital, UK sharon.leigh@nhs.net

Introduction

- Dysphagia in cervical spinal cord injury (cSCI) has a reported incidence of 41%, with silent aspiration as a key feature.[1,2]
- ech and language therapists (SLTs) ained to assess and manage gia and communication ents, with the goals of g a return to full oral diet and munication.
- dance recommends a f one SLT for ten atients in order to therapy and improve
- ns from major ialist spinal cord re delayed due leaving local interventions.
- ise attempts at or weaning resulting in delays to restoring verbal communication and ability to eat and drink.[3]

Methods

- A retrospective review was undertaken of SCI referrals (n= 152) to three SLT services based in SCICs in England over a three-year period (2020-2022).
- SLT workforce varied per site with each site delivering a part time service at ratios of 1:170; 1:140; 1:40, so results are reported as averages across three sites.
- Each site provided de-identified demographic data alongside time from injury to SLT contact, SLT diagnosis, SLT intervention, frequency and outcomes.

Table 1: Population demographics

Total (n)	**152**
Male gender	**73% (111)**
Average age	**59.1 years**
Age range	**17-86 years**
Injury type (trauma)	**72% (109)**
Level of injury:	
Cervical	**87% (132)**
Thoracic	**11% (16)**
Lumbar	**3% (4)**
Cervical SCI levels (n=132)	
C1-4	**80% (105)**
C5-8	**20% (27)**
AIS scale:	
A	**36% (55)**
B	**17% (26)**
C	**18% (28)**
D	**28% (43)**

Results

- 152 people with SCI were referred to SLT services (Table 1).
- Average time from injury to SLT at SCIC was **123 days** (range: **0-1218** days). Only **11** patients saw SLT within **30** days of injury.

On admission:

- Key referral diagnosis was dysphagia (86%) followed by dysphonia (28%), see Figure 1.
- 39% were nil by mouth, whilst 60% were taking oral diets that were either normal (50%) or modified (10%) textures.
- 47% received an instrumental assessment of swallowing, either FEES (22%), videofluoroscopy (14%) or both (11%).
- 44% required a tracheostomy and 33% were ventilated.
- 30% had communication problems and were non-verbal for more than 12 hours a day.

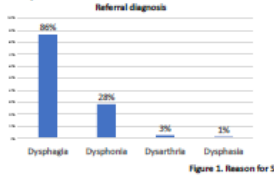


Figure 1. Reason for SLT referral

SLT interventions:

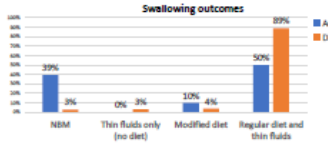
- Interventions were delivered under four key themes according to clinical need (Figure 2). Overall, only 35% of patient received intensive therapy 3-5 times a week.

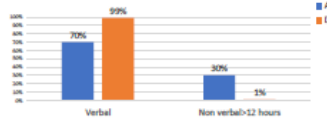
Swallow Assess and Advise (47%)	Swallowing interventions (36%)	Communication interventions (20%)	Airway interventions (13%)
Single assessment	Saliva swallowing therapy	Voice therapy	Expiratory Muscle Strength Training
Refer to gastroenterology	Oral trials (pre-diet)	Aphasia therapy AAC (alternative communication)	Tracheostomy cuff deflation
Reflux advice	Diet trials		Ventilator weaning
	McNeill Dysphagia Therapy Program	Dysarthria therapy	Refer to ENT
	Biofeedback with sEMG	Communication support	Passy Muir Valve trials
	Swallow strategies		
	Indirect therapy advice		

Figure 2. SLT Interventions

Outcomes on discharge:

- 3% remained nil by mouth, all other patients resumed regular diet and thin fluids (89%) or modified diet and/or fluids (7%).
- 1% had ongoing communication problems, with all other patients communicating verbally.





Conclus

This review demonstra dedicated SLT input for population. SLTs should core members of the in team.

- Expert SLTs facilitate improvements despi admission.
- The majority of patie oral diet and were a communicate verbal quality of life indicat
- Early screening and enable earlier SLT int reduce need for prol feeding and use of c aids.
- Multi-site data ident variations and help t care and efficacy of for SCI patients.
- Further research nee the most effective dy communication inter (i.e. type, dose, timi

Future P

- Establishing a Comm for SLTs to benchmar clinical practices and complex cases.
- Currently growing ou 'SLT in SCI' working g
- Provide education ar in non-specialist SCI
- Set up an Internatio collate large cohort

Referen

1. Shem, K., Castillo, K., Wong, S. Dysphagia in individuals with ten risk factors. *Journal of Spinal Cor* 92.

2. McRae, J., Morgan, S., Wallace (2022). Oropharyngeal Dysphagi Spinal Cord Injury: A Literature R 1025–1038 (2023). https://doi.or 10585-0

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4. GPICS: Guidelines for the Prov Services (2022), Version 2.1. https://ics.ac.uk/resource/gpics-

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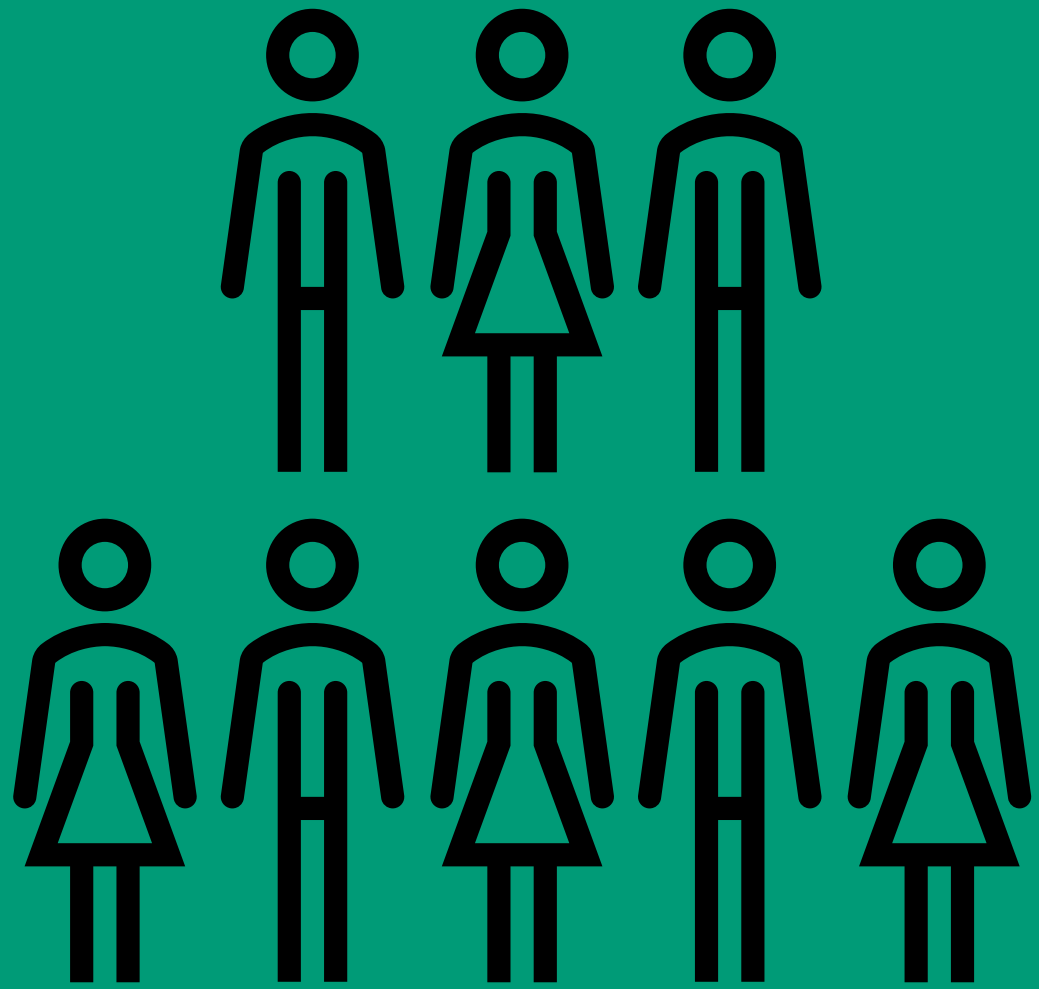
Essentials: SLT workforce



2006

Speech & Language Therapy Services in 13 Spinal Injury Units in UK

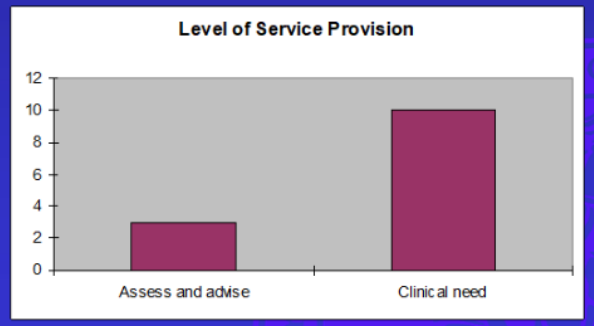
An audit of service provision 2006

Jackie McRae
Lead Principal Speech & Language Therapist
Reg. MRCSLT

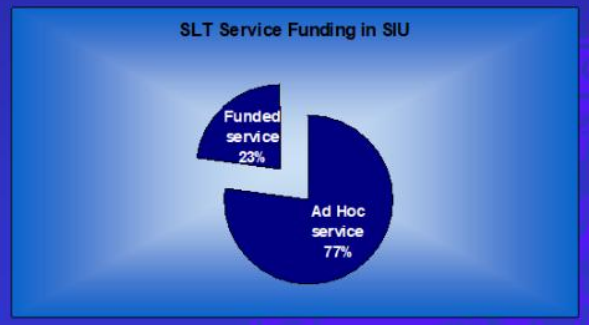
Making Contact

- Belfast
- Dublin-Mater
- Dublin-NMRC
- Glasgow
- Middlesbrough
- Oswestry
- Rookwood
- Salisbury
- Sheffield
- Southport
- Stanmore
- Stoke Mandeville
- Wakefield

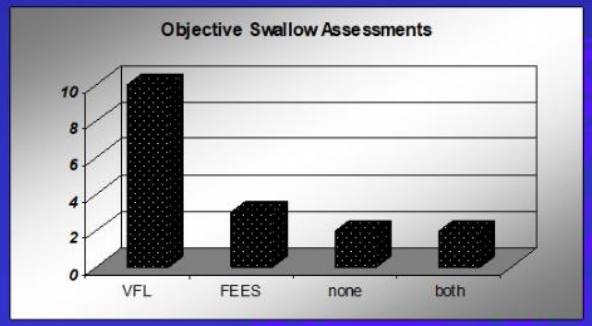
Service provision….



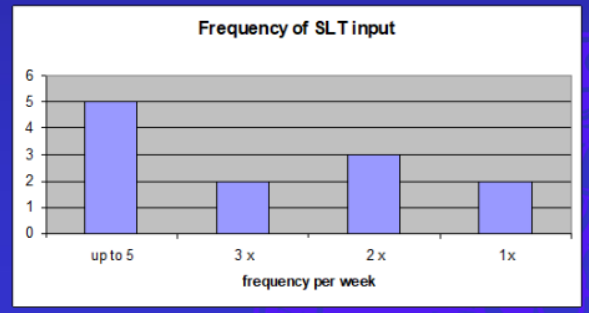
What is the level of funded services?



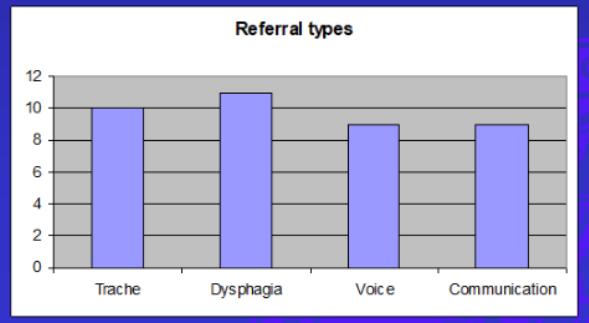
What Objective Swallow Assessments are used?



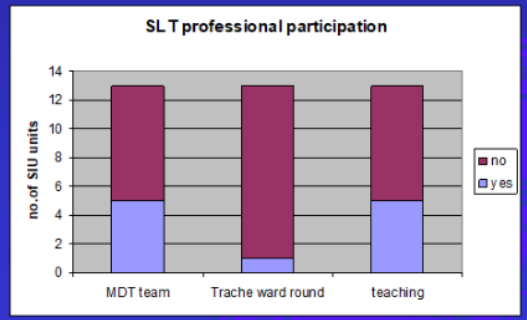
How often can they provide a service per week?



What types of referrals?



Do SLT's participate in other professional activities within the SIU?



Snapshot Audit

- How many units know the name of their SLT?
- Do you understand their role?
- Do you value their input?
- If your lost the service, would you support a bid to re-establish it?

Received: 16 June 2021 | Revised: 17 August 2021 | Accepted: 18 August 2021

DOI: 10.1111/1460-6984.12671

International Journal of Language & Communication Disorders

RESEARCH REPORT

Speech and language therapy service provision in spinal injury units compared to major trauma centres in England: Are services matched?

Jackie McRae

2016

National SLT staffing recommendations ICU & rehab 1:10

TABLE 2 Availability and access to instrumental swallowing assessments

Unit	VFS availability	FEES availability	SLT access to FEES
M1	Weekly	Weekly	SLT owned
M2	Weekly	Weekly	SLT owned
M3	Weekly	>Twice weekly	SLT owned
M4	Weekly	>Twice weekly	SLT owned
S5	Weekly	>Twice weekly	SLT owned
S6	Weekly	N	–
S7	Weekly	Ad hoc	Shared equipment
S8	None	None	–
S9	Weekly	Twice weekly	Shared equipment
S10	Weekly	None	–
S11	Weekly	None	–

FEES = Fibreoptic Endoscopic Evaluation of Swallowing; SLT= speech and language therapist; VFS = videofluoroscopy.

2026?

M = major trauma centres; S = spinal cord injury units; NR = no response.

*Additional support provided by general ward staff to deliver daily input.

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Career journey

1991-2001

- Developing clinical expertise – adult dysphagia

2002-2013

- Clinical specialism – SCI
- MClinRes

Kingston University London

St George's University of London

2014-2019

- PhD Dysphagia
- Clinical academic

London Spinal Cord Injury Centre Stanmore

St George's University of London

SCI NETWORK

2020-2025

- Strategic roles
- Research and Education

CITY ST GEORGE'S UNIVERSITY OF LONDON

Dysphagia
https://doi.org/10.1007/s00455-022-10535-0

2022

REVIEW

Oropharyngeal Dysphagia in Acute Cervical Spinal Cord Injury: A Literature Review

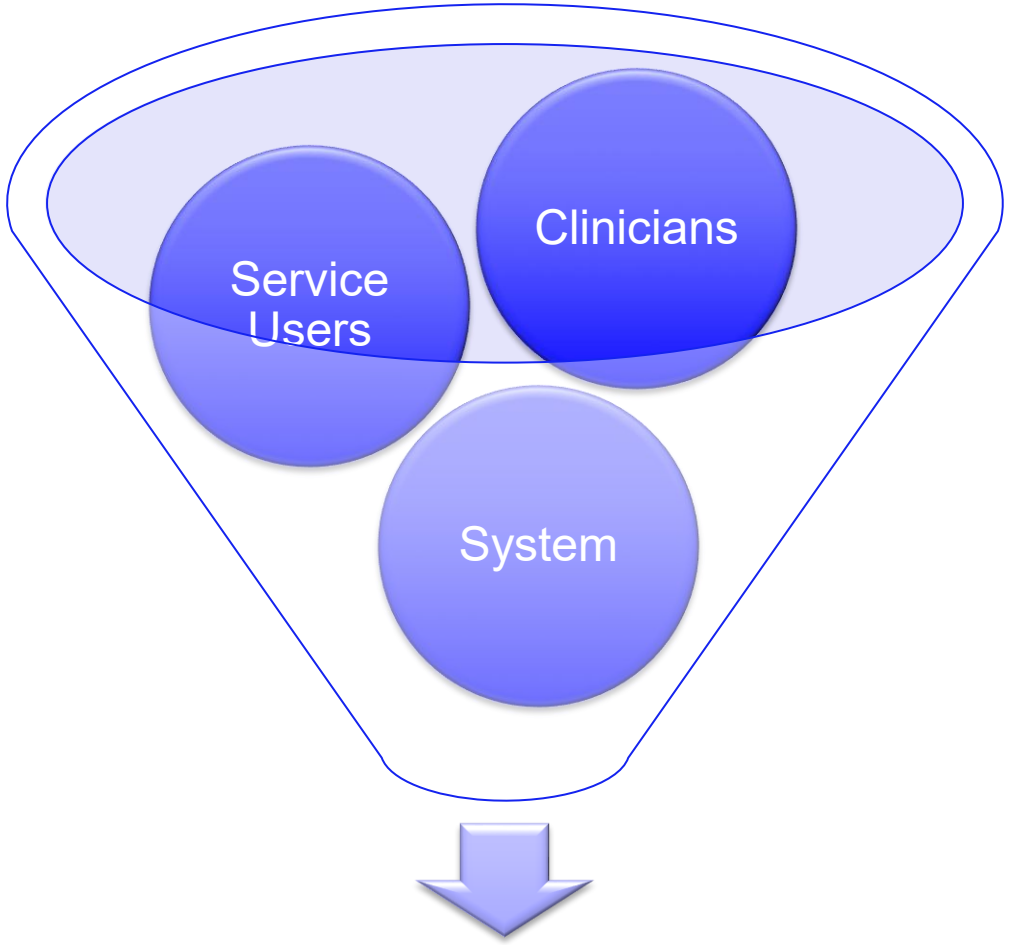
Jackie McRae[1] · Sarah Morgan[2] · Emma Wallace[3] · Anna Miles[4]

Table 4 Multidisciplinary treatment approaches for patients after SCI

Timing	Intervention	Literature/Evidence
Early interventions	Secretion management (hypersalivation vs. dry mouth)	[99–101]
	Tracheostomy manipulation for swallow therapy	[102]
Rehabilitation	Treating the neurological impairments—swallow exercises	[82, 103]
	Ear Nose Throat surgeries, e.g., vocal fold augmentation	[104–106]
	Respiratory therapies incl. EMST	[31, 107, 108]
	Cough therapies	[109]
	Emerging Therapies	
	Respiratory Muscle Training	[110]
	Abdominal functional electrical stimulation	[111]
	Acute Intermittent Hypoxia	[112]

Evidence based guidance

Competencies



Education and Training

Resources

Improved care and outcomes

National guidance documents

2.10 Speech and Language Therapy

Access to Speech and Language Therapy for a minimum of five days a week for patients with communication and swallowing difficulties on admission is mandatory and should be part of the MDT assessment.

2.10.1 A baseline assessment must include case history, cranial nerve assessment, secretion management, voice, communication (speech and language), cognition, oral health, swallowing, associated respiratory function and outcome measures.

2.10.2 The therapists may be required to undertake instrumental assessment (including as appropriate Videofluoroscopy (VF), Fibreoptic Endoscopic Evaluation of Swallow (FEES), Ultrasound, Manometry, Surface EMG) to provide assessment, treatment and recommendations for dysphagia rehabilitation, to support airway management and weaning as well as laryngeal function and patency.

2.10.3 The rehabilitation process should also include targeted and physiologically specific interventions e.g. biofeedback surface EMG, FEES, respiratory muscle strength training, oral trials, secretion management and oral care, breath support and voice, alternative and augmentative communication and above cuff vocalisation as required.

2.10.4 There should also be access to instrumental assessment of swallow either FEES (during acute phase when tracheostomy is placed and when patient extubated) and VF for returning to oral intake or to support tracheostomy and vent weaning.

2.10.5 The assessment of voice and breath support for adequate communication is essential.

2.10.6 Other areas will include rehabilitation of swallow and communication and advice on mouth care.

NICE National Institute for Health and Care Excellence

NICE guideline

Rehabilitation after traumatic injury

NICE guideline

Published: 18 January 2022

www.nice.org.uk/guidance/ng211

Respiratory function, swallowing and speech

1.15.13 Keep the person nil by mouth until their risk of aspiration has been assessed

1.15.14 Be aware that people with cervical spine injuries and those managed on flat bed rest, are particularly at risk of swallowing and speech difficulties and should be assessed early for risk of aspiration.

Respiratory function, swallowing and speech

Recommendations 1.15.13 to 1.15.17

Why the committee made the recommendations

Spinal cord injury can cause problems with speech and swallowing, so the committee agreed that people should be nil by mouth until they have been assessed for aspiration risk. They used their expertise to highlight groups of people that are at a particularly high risk, and should be assessed early. Referral to specialists may be needed.

World Health Organization

Rehabilitation 2030

4 Package of interventions for rehabilitation for spinal cord injury

Communication	
Assessment of communication	Limitations in communication present a frequent problem in people with tetraplegia. The development group considers the assessment of communication as essential and, as a consequence, the assessment result relevant for the detection of intervention needs. To the knowledge of the development group, no severe harms are associated with the assessment of communication. The cost-benefit ratio in relation to the clinical benefits justifies the inclusion of the assessment in the Package of interventions for rehabilitation. Furthermore, the assessment is considered as feasible and accepted by people with SCI.
Provision and training in the use of assistive products for communication	Limitations in communication present a frequent problem in people with tetraplegia. The development group considers the provision and training in the use of assistive products for communication as an effective intervention to address these limitations. To the knowledge of the development group, no severe harms are associated with this intervention. The cost-benefit ratio in relation to the clinical benefits justifies the inclusion of the provision and training in the use of assistive products for communication in the Package of interventions for rehabilitation. Furthermore, the provision and training in the use of assistive products for communication is considered as feasible and accepted by people with SCI.

Assessments and interventions	Original recommendation from SCIRE systematic reviews	Quality of the evidence	Reference
Swallowing functions			
Assessment of swallowing	Videofluoroscopy Swallow Study (VFSS), Bedside Swallowing Examination (BSE) and Fiberoptic Endoscopic Evaluation of Swallowing (FEES) are all appropriate screening tools for diagnosing dysphagia in individuals with SCI.	• There is level 5 evidence that VFSS and BSE are adequate measures of diagnosing dysphagia in a SCI population. • There is level 5 evidence that VFSS and BSE are comparable in diagnosing dysphagia in a SCI population. • There is level 5 evidence that FEES is an adequate tool to diagnose dysphagia and monitor treatment progress in a SCI population.	Benton et al. *(29)*

SLT Community of practice

Modified SLT practices for SCI patients

Early airway and weaning involvement using FEES

Capturing data on laryngeal features

Monitoring post-surgery complications

NOT thickener – impaired pharyngeal squeeze and transit

NOT PMV – not well tolerated, move to leak speech

More Laryngeal weaning – cuff deflation along with reducing pressures to engage larynx

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School of Health
& Medical Sciences

citystgeorges.ac.uk

Future?

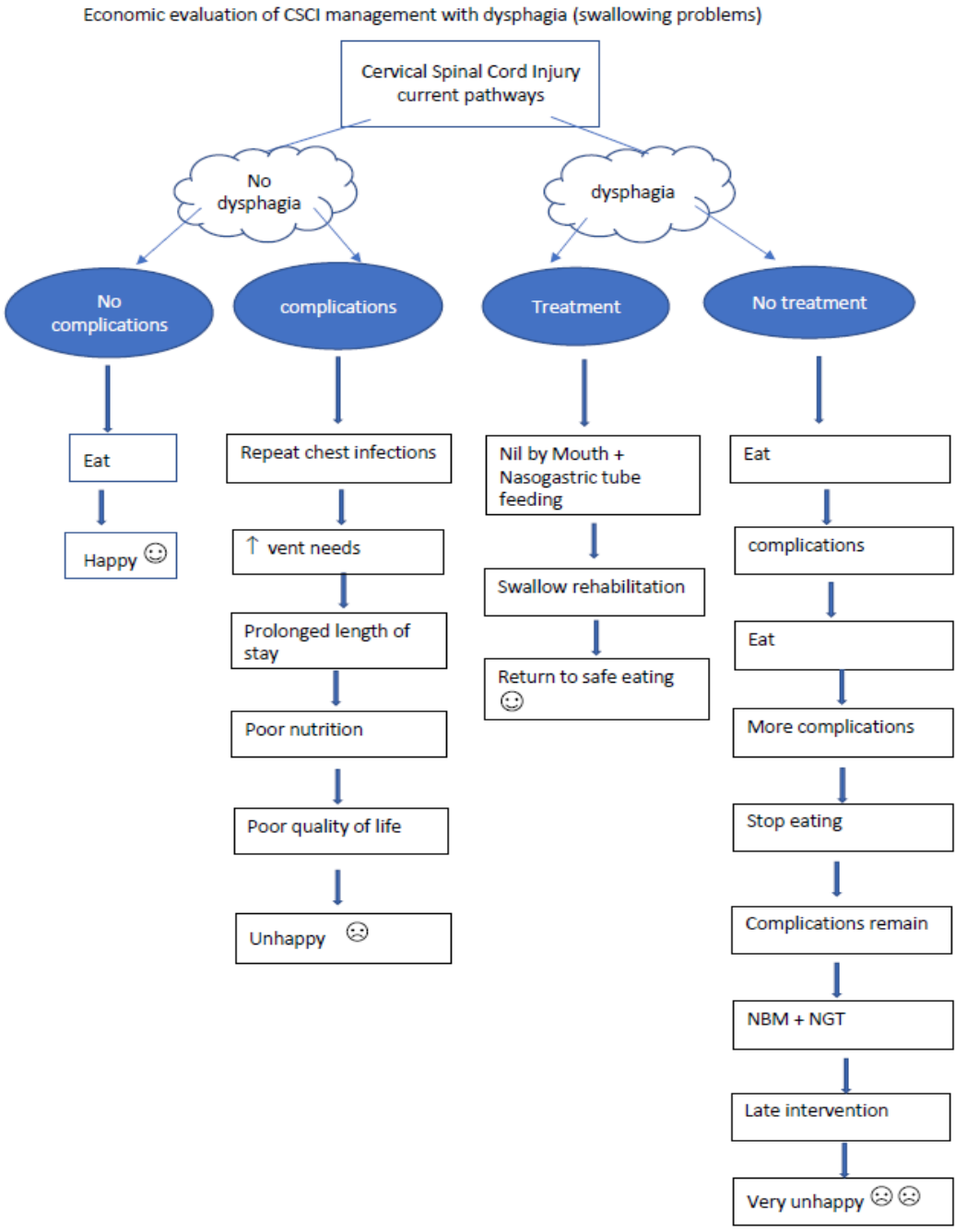
PPI

There's a disconnect of services, for example, trache management seen separately by ENT and respiratory. There's no joined up thinking

Preventative medicine is important. Think about the mental health impact of illness, carers and the NHS can't cope. Prevention is better than cure, it's cheaper.

Specialist services are not always in place, you have to fight for your corner.

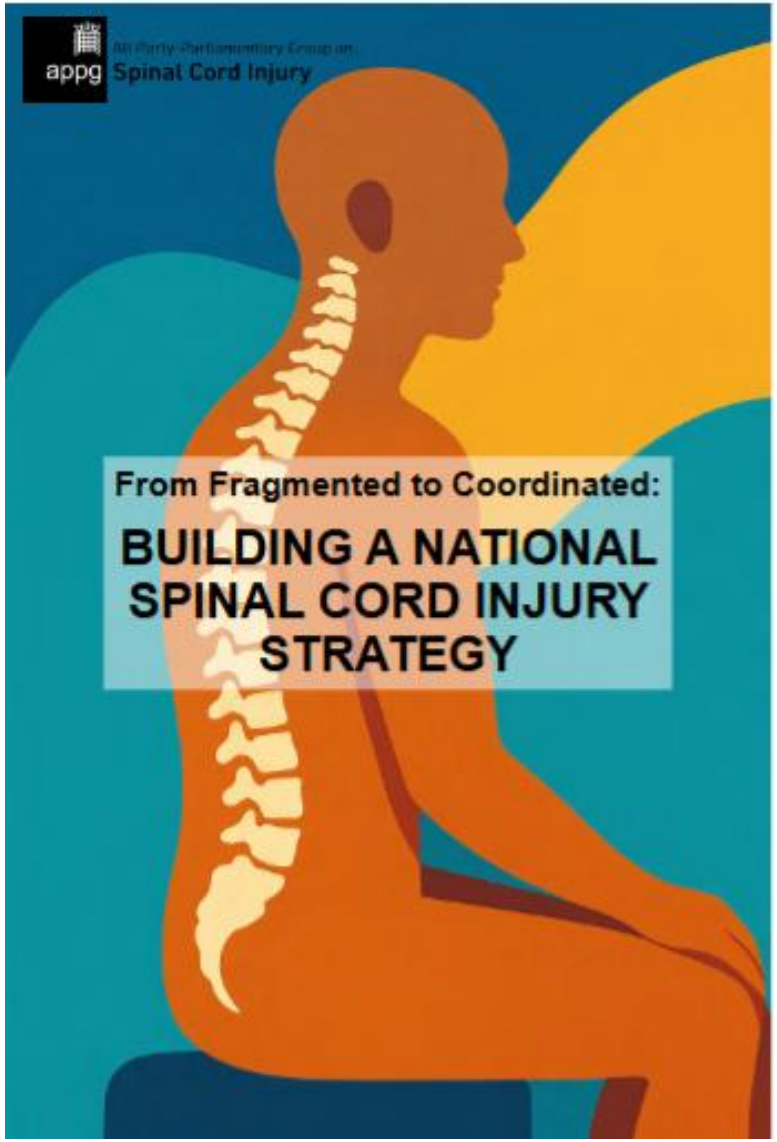
After a SCI…you lose your self-esteem and confidence. It's a vicious cycle, there is psychological impact, you are dependent on others, especially brushing teeth.



2025-2028

DAISY CHAIN

Dysphagia In Acute CerviCal Spinal Cord InjurY – Collaborative Healthcare Assessment & INterventions



Rehabilitation

Standards and Training

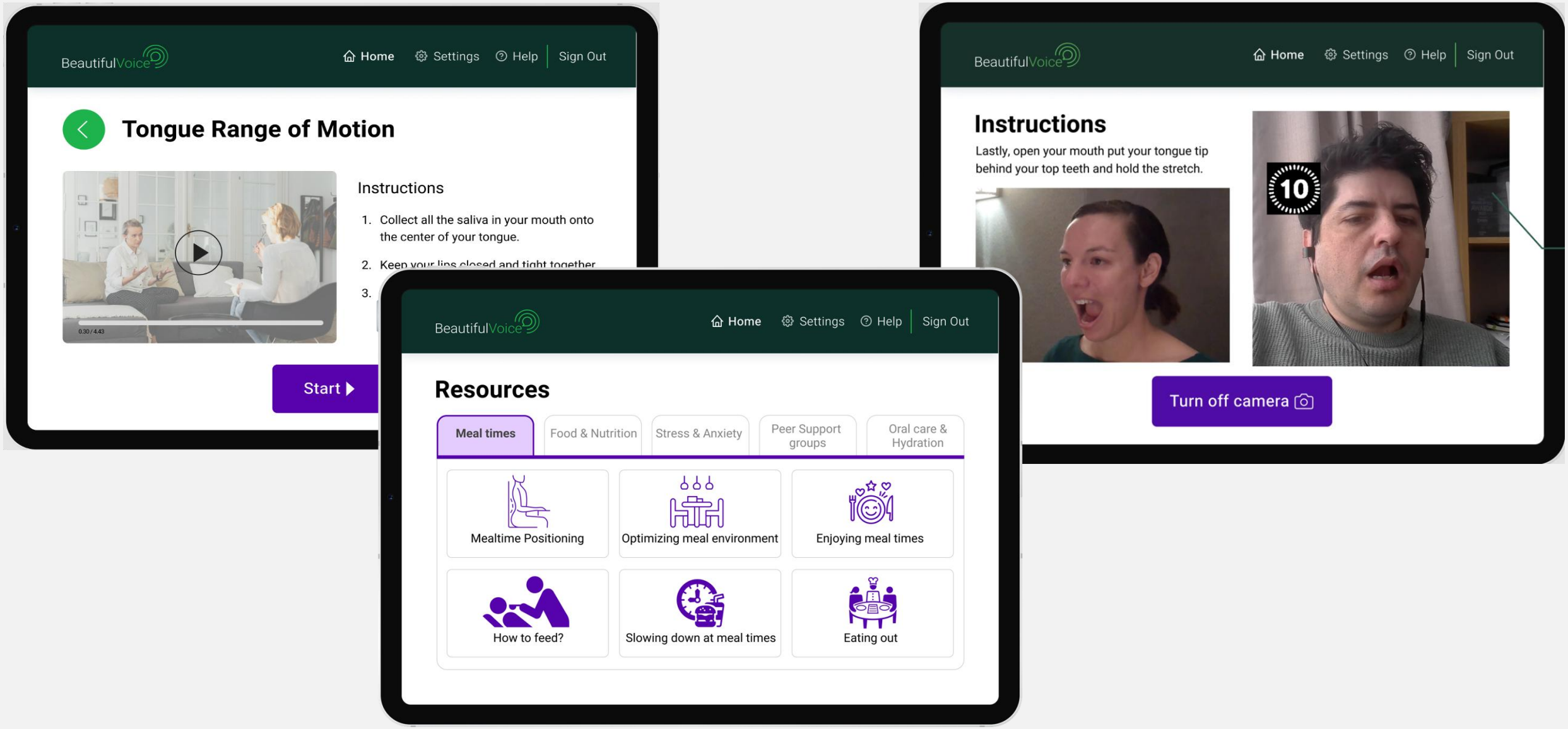
Data and National SCI registry

Patient Voice

Community Reintegration

Research and Innovation

Digital healthcare innovations



Professional and industry collaborations

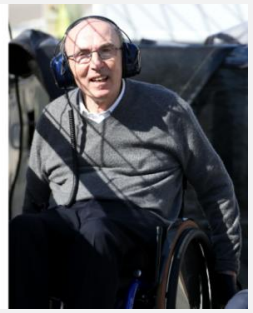
Aspire
Supporting people with spinal injury

RISCI

ISCoS The International Spinal Cord Society

LONDON SCI NETWORK

FWA FRANK WILLIAMS ACADEMY
Powered by Spinal Injuries Association



RCSLT

sia spinal injuries association
for life after spinal cord injury

SPINAL RESEARCH INSTITUTE

CITY ST GEORGE'S UNIVERSITY OF LONDON

EUROPEAN SOCIETY FOR SWALLOWING DISORDERS ESSD

Bridges SELF-MANAGEMENT

spinal research
Curing paralysis together

MASCIP
Multidisciplinary Association for Spinal Cord Injury Professionals

UNIVERSITY OF LIVERPOOL

SUPPORTED BY NIHR | National Institute for Health and Care Research

Successes


Spinal Injuries Association's
Rebuilding Lives
Award for
Innovation and Research
Jackie McRae


2018
ADVANCING
HEE/NIHR award
for research champions
WINNER
Jackie McRae
2018
ADVANCING
WINNER


RCSLT
Awards 2022


INTERNATIONAL SPINAL CORD SOCIETY
THE HANS FRANKEL AWARDS
61st ISCoS
ANNUAL
SCIENTIFIC
MEETING
EARLY CAREER SCHOLAR AWARD
DR JACKIE MCRAE
Features and outcomes of oropharyngeal dysphagia in SCI
– a retrospective review of cases across three spinal units in UK
B. Lopez, S. Leigh & S. Morgan
A/Prof Ruth Marshall
President of ISCoS
Dr G Scivoletto
ISCoS Scientific Chair


Giving Voice
Speech and Language Therapy transforms lives
Award
Presented to Dr Jackie McRae
Royal College of Speech and Language Therapists
December 2021


BEST SPOKEN PRESENTATION
8th European Conference on Weaning & Rehabilitation in Critically Ill Patients
Queen's University Belfast
22-23 April 2023
Dr Bronwen Connolly MSc, PhD, MCSP
Senior Lecturer
Wellcome-Wolfson Institute for Experimental Medicine
Queen's University Belfast
Conference Director


HELLO
I'M AN:
Expert

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