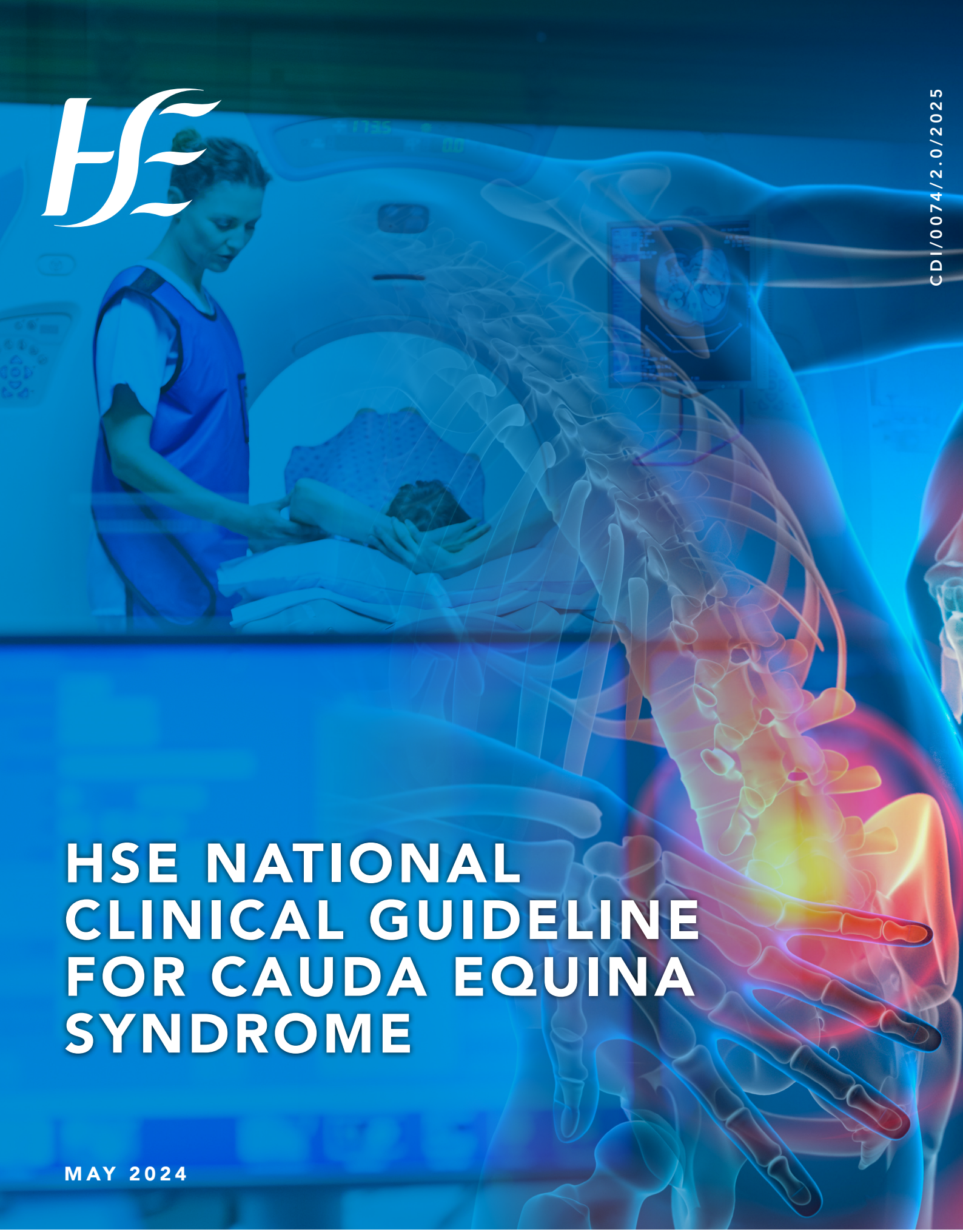

CDI/0074/2.0/2025

HSE NATIONAL CLINICAL GUIDELINE FOR CAUDA EQUINA SYNDROME

MAY 2024

Clinical Design & Innovation
Person-centred, co-ordinated care

NCP T&C
NATIONAL CLINICAL PROGRAMME

IITOS
THE IRISH INSTITUTE OF TRAUMA AND ORTHOPAEDIC SURGERY

RCSI
ROYAL COLLEGE OF SURGEONS IN IRELAND

The National Clinical Programme for Trauma and Orthopaedic Surgery would like to thank the UK's Getting It Right First Time (GIRFT) team, its Clinical Lead for Spinal Services and Chair of the National Suspected Cauda Equina Syndrome Pathway, Mr Mike Hutton and Mr Mike Grevitt Consultant Spine Surgeon for their support during the development of this clinical guideline and for generously sharing and allowing us to use the CES resources that have been developed by GIRFT for our patients.

HSE NATIONAL CLINICAL GUIDELINE FOR CAUDA EQUINA SYNDROME An Evidence Based, Consensus Clinical Guideline for the Irish System Policy ☐ Procedure ☐ Protocol ☐ Guideline ☐ Clinical Guideline ☑	
DOCUMENT GOVERNANCE[1]	
Document Commissioner(s): Dr Colm Henry, HSE's Chief Clinical Officer (CCO). **Document Approver(s):** HSE CCO Clinical Forum. **Development Group Name:** National Clinical Programme for Trauma and Orthopaedic Surgery (NCPTOS). **Development Group Chairperson:** Mr Marcus Timlin, Consultant Trauma and Orthopaedic Surgeon, NCPTOS Clinical Advisor for Spine.	
DOCUMENT MANAGEMENT[2]	
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VERSION CONTROL UPDATE[3]			
Version No.	**Date Reviewed**	**Section numbers changed**	**Author**
1	30/09/2025	change to flow diagram page 7, 16, 26 QR code removed page 2, 31 & 44	Mr Marcus Timlin
0	26/01/2024	Original Document	Mr Marcus Timlin
Document management notes:			

PUBLICATION INFORMATION[4]
Title: HSE National Clinical Guideline on Cauda Equina Syndrome
Topic: Cauda Equina Syndrome
National Group: National Clinical Programme for Trauma and Orthopaedic Surgery
Short summary: Cauda Equina Syndrome (CES) remains one of the most challenging areas of orthopaedic and neurosurgery spine care in Ireland, with litigation a common occurrence. A condition which disproportionately affects the young, working population, its sequelae can have life altering consequences. Long-term bladder, bowel and sexual dysfunction has life-changing consequences, along with chronic pain, motor and sensory disturbances. There is clear, international evidence that prompt diagnosis and management impacts significantly on patients' outcomes. Despite this, challenges remain in the delivery of care for this patient cohort. Currently, there are only four hospitals in the Republic of Ireland offering 24-hour spinal services. Ireland and the Irish Healthcare System are in an ideal position to strive for a standardised pathway of investigation and management of these patients presenting with cauda equina syndrome symptoms (CESS). This clinical guideline aims to lay the foundation for that pathway.
Description: Cauda Equina Syndrome (CES) is a clinical syndrome. The typical symptoms are bilateral sciatica, perianal sensory disturbance and bowel or bladder dysfunction i.e. incontinence, retention or other disturbances of normal bowel or bladder function. CES is most commonly caused by a disc herniation (which can be acute or acute on chronic) but can also be caused by compression of degenerative joints, tumours, infections or bone fragments in fractures. The current gold standard for definitive diagnosis is MRI scanning in conjunction with clinical evaluation, history and examination. There is evidence that clinical evaluation alone, is neither sensitive nor specific enough, to make or rule out a diagnosis of CES, regardless of who performs the evaluation. To avoid missing the diagnosis, all cases of suspected CES should have an urgent MRI scan. As this is a time critical condition this should be performed as soon as possible. To enable this, MRI scanning should be available as close as possible to where a patient with suspected CES will present. On occasions where an MRI is contraindicated, diagnosis may be made with CT scanning with or without myelography. Unfortunately, due to systemic limitations on access to MRI, many patients experience untimely delays at this stage in the process. This can delay onward referral and ultimately, time to surgical intervention. Difficulty in access to MRI and delays associated with this can also act as an incentive towards poor clinical decision-making, leading to overall negative outcomes in patient care. Delays in access to MRI also lead to unnecessary inpatient and overnight stays whilst awaiting access to MRI scans. The aim of this clinical guideline is to provide clear, evidence-based and consensus recommendations for the index reviewing healthcare provider, regardless of level of expertise, on the need for and timing of an MRI Scan. It also provides guidelines for appropriate onward referral to specialist services and aims to streamline pre-transfer and pre-operative work up from the moment of the patients' first presentation.

CONTENTS

PART A: OUTLINE OF PPPG STEPS

Title: HSE National Clinical Guideline for Cauda Equina Syndrome

OUTLINE OF PPPG STEPS/RECOMMENDATIONS:

Cauda Equina Syndrome (CES) remains one of the most challenging areas of spinal surgery care in Ireland, with litigation a common occurrence. A condition which disproportionately affects the young, working population, its sequelae can have life altering consequences. Long term bladder, bowel and sexual dysfunction has life changing consequences, along with chronic pain, motor and sensory disturbances. There is clear, international evidence that prompt diagnosis and management impacts significantly on patients' outcomes.

Based on the pathway outlined below, clinical assessment and the level of suspicion that a patient is presenting with Cauda Equina Syndrome (CES) symptoms will indicate the urgency for an MRI Scan. This should be stratifiable by any index reviewing healthcare provider capable of carrying out a neurological exam including per rectum (PR).

In order to standardise care, it is proposed that a specific proforma for initial assessment, examination and documentation of same in the CES patient would be used, including stipulations for the measurement of post void residual (PVR) on index review - an important component of the initial assessment that is often overlooked.

Whilst PVR is a useful adjunct it should not however be used in isolation. A PVR greater than 200mls should raise concern for CES. This guideline recommends and provides a streamlined proforma for the initial assessment of CES. The SPRINT for Spine proforma provided below should be used, and the accompanying mnemonic can act as a memory aid for both providers and patients, while also conveying a sense of urgency to manage the true CESS cases.
This guideline also recommends the adjunctive use of the **American Spinal Injury Association (ASIA) Impairment Scale** (https://asia-spinalinjury.org), to facilitate clear documentation and communication of neurological deficits at presentation. This should include documentation of timings of assessment as well as onset of symptoms.

S - Saddle paraesthesia

P - New onset BILATERAL Radicular Pain

R - Retention

I - Incontinence

N - New motor findings

T - Time for MRI!

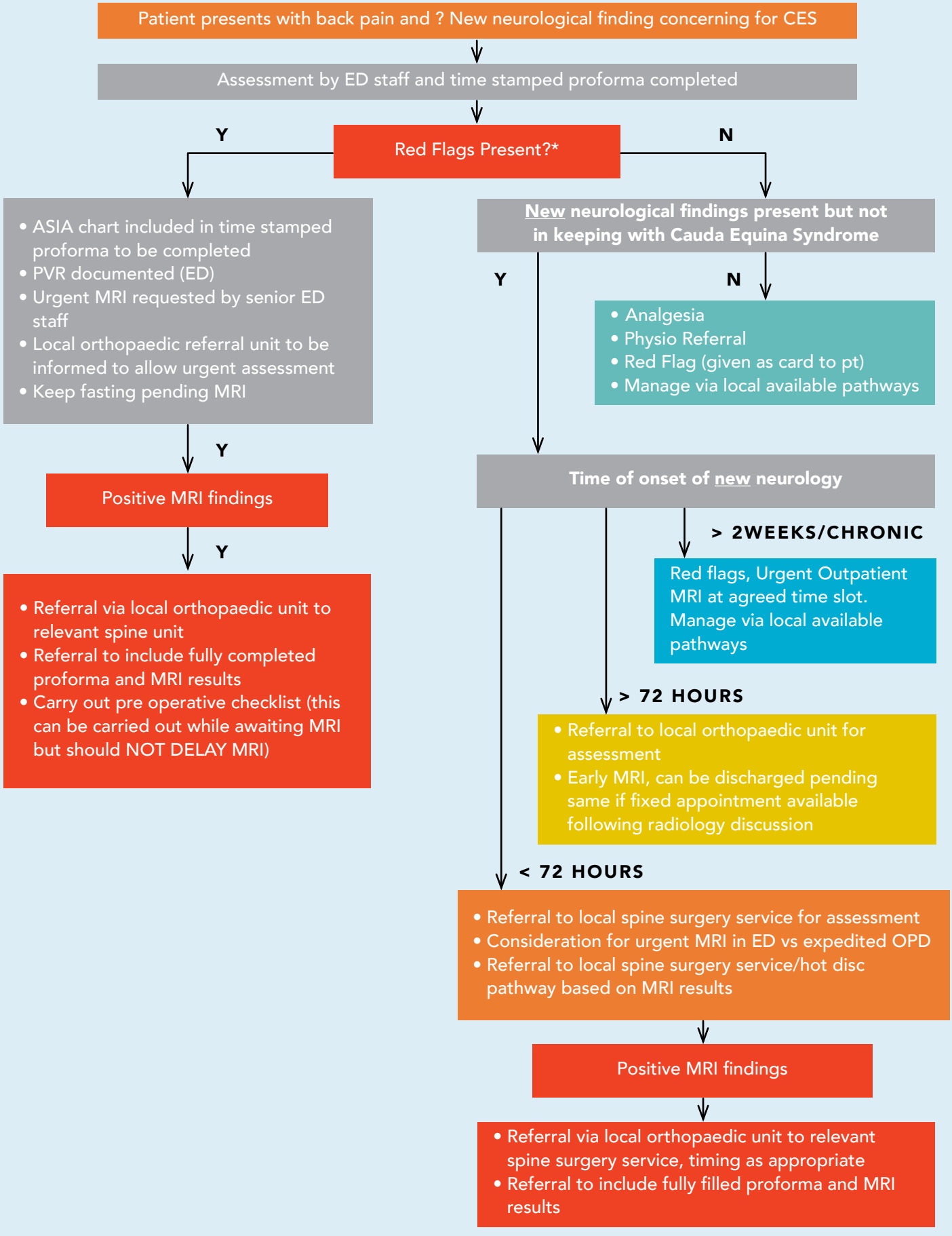
With the implementation of this clinical guideline, the proforma outlined below will be available for and in use in all Emergency Departments throughout Ireland to allow for streamlined early management and investigation of CESS patients.

MRI Scanning is the gold standard for diagnosis of CES. An MRI Scan should be completed as soon as possible in cases with red flag findings. This should ideally be ordered, discussed and followed up by a senior decision-maker in the presenting Emergency Department. MRI Scans should be carried out in the referring unit where possible to minimise delays as well as unnecessary transfers.

An audit completed by the National Spinal Injuries Unit, Kelly et al (2023), looked at the number of lumbosacral MRI's performed out of normal working hours (Monday – Friday 9am – 5pm) for a seven-month period (January – July 2022) for patients presenting with suspected CES.

Of 112 MRI's completed, 16 patients (14%) required surgical intervention. When further analysed 36 (32%) of all patients imaged were from external referrers. Of the 36 external referrals, 4 patients (11%) required surgical intervention.

CAUDA EQUINA PATHWAY



SPRINT PROFORMA

Date: Time of Arrival _____ Time of initial ED assessment_____ Carried out by (print name) _____ MCRN_____	Patient Adressograph Here

SPRINT Proforma for Assessment of Suspected Cauda Equina Syndrome

Presenting Complaint:

Significant co-morbidites:

Antiocoagulant Y/N
Last taken?
Allergies:

***SPRINT* Red Flag* Questions:**

S - Saddle paraesthesia	Impaired perianal /perineal/saddle sensation Y/N Loss of sensation of bladder filling or micturition Loss of sensation of rectal fullness Y/N
P – Pain	New onset BILATERAL radicular pain? Y/N
R – Retention	Painless? Y/N PVR_____mls
I – Incontinence	of Urine Y/N------Timing of 1st episode: of Faeces Y/N------Timing of 1st episode:
N - New motor findings	Bilateral leg symptoms with new neurology Y/N Complete ASIA chart

T - Time for MRI!

If **Yes** to any of above approx. **date and time of onset:**

MRI Booked ☐ MRI Discussed ☐ Radiologist:_____ Time:_____
MRI performed at: _____
Reason for any significant delay to MRI:
_____

Referral to local orthopaedic Unit at Time_____
Accepting Unit:_____
Accepting Consultant: _____

Patient kept NBM ☐ Time NBM:
Emergency Pre OP Checklist Complete ☐

Dr's signature:..... MCRN:.....
Date/Time:.....

ONWARD REFERRAL FOR SURGICAL MANAGEMENT

Once a patient has been confirmed to have CES on MRI with associated clinical findings, that patient should be referred on an **emergent basis** to the relevant local spinal unit.

Where possible, patients with MRI confirmed CES should be referred via the local orthopaedic or neurosurgical service to a tertiary unit offering spinal decompression surgery. This ensures that an accepting local consultant beyond the Emergency Department is responsible for the acceptance of the transfer of this patient post operatively.

Once the diagnosis is confirmed on MRI, the proforma and the required pre-operative checklists are completed, a referral can bypass local orthopaedic unit review, if not available on site, to prevent unacceptable delays in referral and transfer, however there must be a named inpatient team accepting responsibility for repatriation of the patient.

Time of referral, medical personnel discussions, acceptance and transfer of the patient's care to a tertiary centre consultant should all be clearly documented in the patients' healthcare records.

Clear copies of all proforma's and related documentation should be provided on transfer of the patient to the tertiary centre.

PRE-OPERATIVE CHECKLIST

Copies of all relevant investigation results need to be sent with the patient at the time of transfer.

- Bloods to include COAG, FBC, U+E
- ECG
- COVID result or other equivalent as required by spine unit
- Local bed management and spine unit bed management informed
- Time patient has been fasting since needs to be clearly documented
- Information sheet +/- standardised consent form given to patient
- Copy of SPRINT proforma and ASIA score to be sent with patient

PART B: PPPG DEVELOPMENT CYCLE

1.0 INITIATION

1.1. Purpose

The purpose of this guideline will be to provide clear, evidence-based and consensus recommendations for the index reviewing healthcare provider, regardless of level of expertise, on the need for and timing of MRI Scanning for patients presenting with suspected CES. It will also provide guidelines for appropriate onward referral to specialist services and aims to streamline pre-transfer and pre-operative work up from the moment of the patient's first presentation.

1.2. Scope

The scope of this PPPG is to provide clear, evidence-based and consensus recommendations for the prompt diagnosis and timely management of patients presenting with suspected symptoms of cauda equina syndrome.

1.2.1. Target users: All medical professionals in the Acute Hospital Setting.

1.2.2. Population to whom this PPG applies to: Any patient that presents with suspected symptoms of CES to the Acute Hospital Setting.

1.3. Objective(s)

The objective of the PPPG is to limit the long-term and deleterious consequences that a delayed diagnosis of CES can have on patients presenting with this condition to hospitals in the Republic of Ireland.

1.4. Outcome(s)

The outcome of this guideline will be to provide clear, evidence-based and consensus recommendations for the index reviewing healthcare provider, regardless of their level of expertise, on the need for and timing of an MRI Scan.
This guideline will also provide guidance for appropriate onward referral to specialist services, and aims to streamline the pre-transfer and pre-operative work up from the time of the patients' initial presentation.

1.5. PPPG Development Group

See Appendix I for Membership of the PPPG Development Group.

1.6. PPPG Approval Governance Group

1.6.1. See Appendix II for Approval of the Clinical Guideline.

1.7. Supporting Evidence

1.7.1. List relevant legislation/PPPGs
1.7.1.1. MRI Provision for Cauda Equina syndrome – The Royal College of Radiologists (UK) February 2023 www.rcr.ac.uk
1.7.1.2. Spinal Services Getting it Right First Time (GIRFT) Programme National Speciality Report (NHS) January 2019 https://gettingitrightfirsttime.co.uk/surgical_specialties/spinal-surgery/
1.7.1.3. GIRFT Spinal Surgery: National Cauda Equina Syndrome Pathway (NHS) February 2023 (Updated October 2023) https://gettingitrightfirsttime.co.uk/pathway-supports-clinicians-to-diagnose-and-treat-cauda-equina-syndrome-without-delay/
1.7.1.4. GIRFT Interactive Pathway for national Suspected Cauda Equina Syndrome Pathway (October 2023) https://girft-interactivepathways.org.uk/cauda-equina-1
1.7.1.5. American Spinal Injury Association https://asia-spinalinjury.org/

1.7.2. List PPPGs that are being replaced by this PPPG
1.7.2.1. None

1.7.3. List related PPPGs
1.7.3.1. Not Applicable

1.8. Glossary of Terms	
Abbreviation	**Term**
CES	Cauda Equina Syndrome
CESS	Cauda Equina Syndrome Suspected
CESI	Cauda Equina Syndrome Incomplete i.e. red flag signs but no retention
CESR	Cauda Equina Syndrome with retention
MRI Scan	Magnetic Resonance Imaging
CT scan	Computed Tomography
PVR	Post Void Residual
ASIA	American Spinal Injury Association
SPRINT	Sprint for Spine Proforma
COAG	Coagulation
FBC	Full Blood Count
U&E	Urea and Electrolyte
PR	Per Rectum
DRE	Digital Rectal Examination

2.0 DEVELOPMENT OF PPPG

2.1. List the questions (clinical/non-clinical)

Based on available international evidence (see 1.7) the development of a clinical guidance document for the management of patients presenting with suspected CES in the Republic of Ireland is required.
The clinical questions that this PPG addresses are:

- The timely identification of symptoms of possible/probable CES in patients presenting to the Emergency Departments of Acute Hospitals in the Republic of Ireland
- Access to local MRI facilities to ensure the timely diagnosis and management of this patient group
- Streamlining of the processes of pre-transfer and pre-operative work ups for this patient cohort

2.2. Describe the literature search strategy

A systematic review of the literature was undertaken in 2022/2023 to identify all previously published or proposed pathways internationally for CES.
Search terms included *"cauda equina syndrome," "compression," "acute" "pathway" "protocol" "guideline," and modifiers* **AND/OR**

Inclusion Criteria were all adult studies from 2000 onwards. All literature types were included as such pathways may be proposed in a conference abstract, case series etc.

Exclusion Criteria included non-English studies, non-human studies, paediatric and studies prior to 2000.

The search was carried out in *EMBASE, MEDLINE, Web of Science, and the Cochrane Library*. The references of included articles and existing reviews on the topic were also trawled for relevant papers.

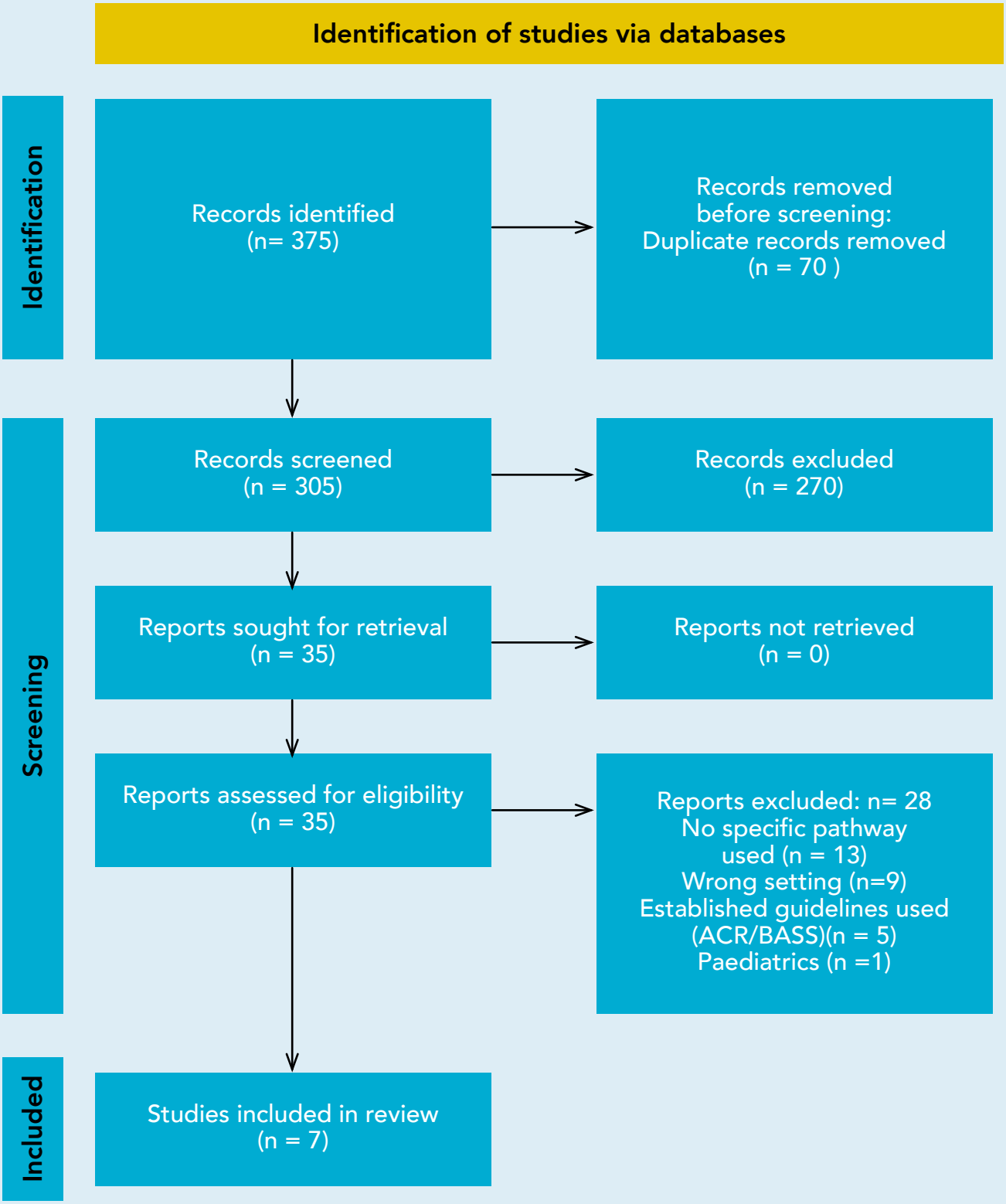
Articles that met the inclusion criteria were reviewed with the data extracted and collected in Excel format.

Data extracted included the year of publication, author, time to MRI in the pathway, inclusion or exclusion of post void residual measurement and specific CES red flags that were used.

2.3. Describe the method of appraising evidence

Following removal of duplicates a total of 305 articles underwent title and abstract screening. Following the application of the exclusion and inclusion criteria as above, a total of 35 articles underwent full text review, from which 7 were eventually included for data extraction.

Reasons for exclusion are detailed in the Prisma Flow Diagram below:



Overall, heterogeneity found in the literature highlights the lack of a clear definition of CES and the need to standardise this going forward. This is especially important in the context of creating a national pathway.

Based on this literature review, Todd et al (2022) suggestion to use the following categories - **CESS (suspected)**,

CESI (incomplete i.e. red flag signs but no retention) and

CESR (with retention)

provides the clearest stratification based on symptomatology, and to guide management decisions.

CESS based on the presence of red flags needs an urgent MRI scan at the earliest possible time point.

CESI and CESR needs urgent MRI and has the highest likelihood of surgical referral. These are the definitions that are being proposed to be included in this pathway and clinical guidance document.

While specific red flags used show minor variability, overall, the current literature presents a consensus that in cases of suspected cauda equina syndrome an MRI Scan should be carried out on an urgent basis. In jurisdictions where they have implemented, structured and dedicated pathways for the assessment and referral of the suspected patient with CES, a reduction in time to MRI has been demonstrated.

In this systematic review the following red flags were identified for inclusion in this clinical guidance document:

- Bilateral leg symptoms with new neurology
- Impaired perianal /perineal/saddle sensation
- Painless retention of urine
- Loss of sensation of bladder filling or micturition
- Loss of sensation of rectal fullness
- New incontinence of Urine
- New incontinence of Faeces

Safety netting of the above symptoms will also be key prior to discharge in patients not suspected to have cauda equina syndrome. This information should be provided to the patient by the HSE in the form of a pocket size warning card similar to those frequently employed in head injury/concussion pathways. Evidence also shows that multimedia communication such as providing video links etc. improves communication. The development of these resources will require funding and support from the HSE.

2.4. Describe the process the PPPG Development Group used to formulate recommendations

The recommendations outlined in this clinical guidance document were formulated based on extensive stakeholder engagement including:

- State Claims Agency September – December 2021
- CCO, NCAGL for Acute Operations & National Director for Acute Operations – February 2022
- Engagement with orthopaedic leads at local sites February 2022 onwards
- Ongoing engagement with Ciaran Brown – Acute Hospital Operations – February 2022 onwards
- Irish Institute for Trauma and Orthopaedic Surgery Annual General Meetings – November 2022 & 2023
- Irish Spine Society Annual Meeting – September 2022
- National Patient Safety Office (NPSO) – Department of Health – 15th May 2023
- Faculty of Radiologists and Radiation Oncologists & Clinical Lead for the Emergency Medicine Programme – 26th June 2023
- Review and approval of the Clinical Guideline by the Clinical Lead for the Emergency Medicine Programme – 8th December 2023.

2.5. Provide a summary of the evidence from the literature

Hennessy O, Devitt A, Synnott K, Timlin M "Cauda Equina Syndrome – An evidence based national pathway with consensus approval for the Irish System" (under review)

Kelly et al (2023) "Out of Hours Referrals for Cauda Equina Syndrome in Ireland: What is the best pathway?" Irish Spine Society Meeting.

GIRFT Spinal Surgery: National Cauda Equina Syndrome Pathway (NHS) February 2023 updated October 2023. https://girft-interactivepathways.org.uk/cauda-equina-1
American Spinal Injury Association (ASIA) https://asia-spinalinjury.org/

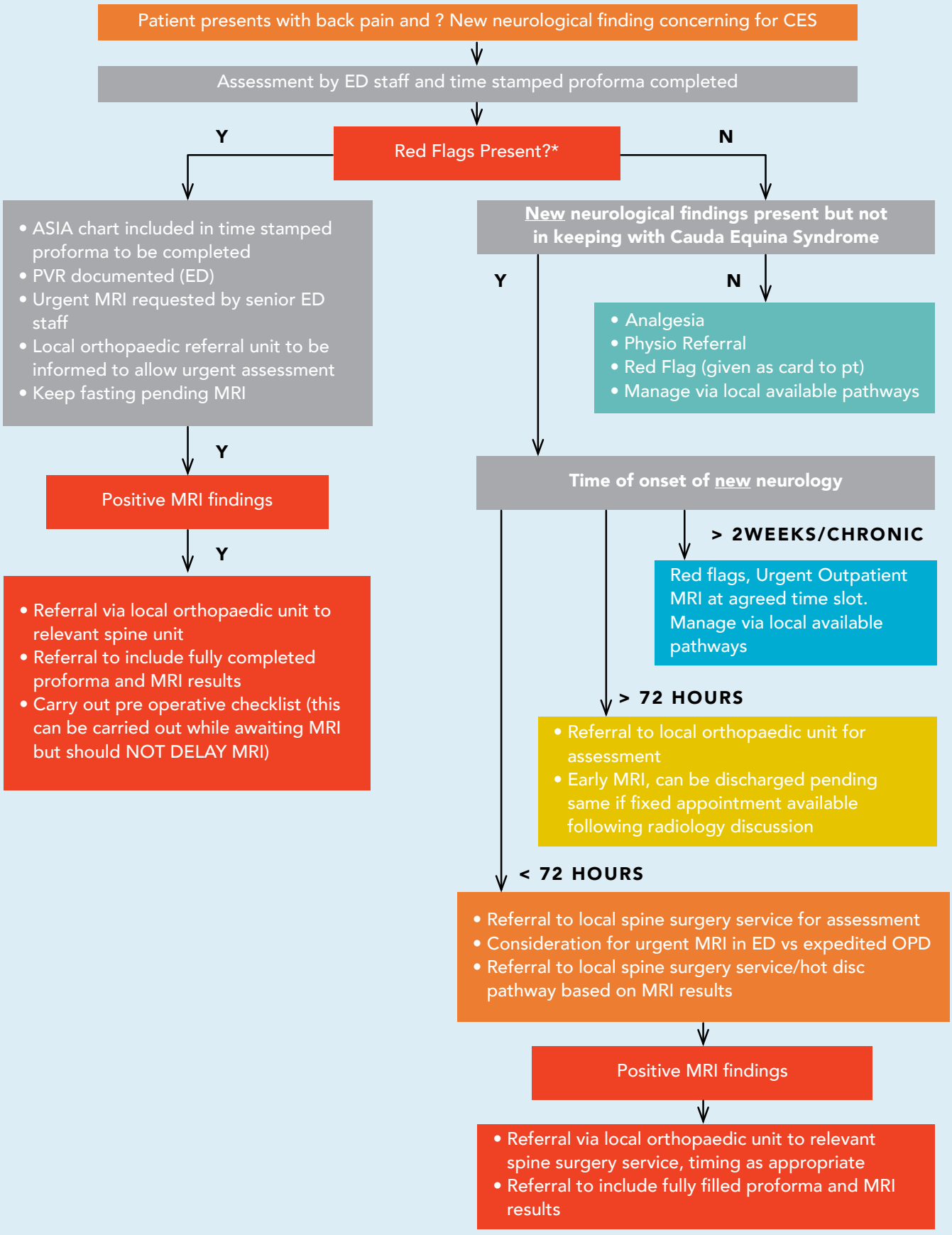
2.6. Detail resources necessary to implement the PPPG recommendations

To implement this clinical guidance document the main resources necessary are outlined below.

1. In addition to neurological assessment and exam as taught in standard medical school curricula, the ASIA Instep education is a succinct online resource (https://asia-spinalinjury.org/learning/). This is a potential resource for further training for relevant staff to complete in their own time.
2. Each Emergency Department should have access to a bladder scanner to complete a PVR – this may require re-education and ongoing training updates for relevant nursing staff.
3. All team members need to be aware of the National Ambulance Service Protocol 37 "The Emergency Inter-Hospital Transfer Policy" when patients need to be transferred out to another unit for ongoing management.
4. Timely access to MRI facilities locally. Consideration of an 8am and/or the last available working day slot to be protected for an urgent MRI for this patient cohort. For those hospitals around the country that do not have access to MRI scanning 24 hours/7 days a week, for hospital management to consider the possibility of an extended working day in collaboration with all relevant stakeholders.

2.7. Outline of PPPG Steps / Recommendations

CAUDA EQUINA PATHWAY



3.0 GOVERNANCE AND APPROVAL

3.1. Outline Formal Governance Arrangements

3.1.1. The HSE's National Clinical Guideline for Cauda Equina Syndrome is governed by the HSE's CCO Clinical Forum via CDI (Clinical Design and Innovation). This group reviews the clinical guideline, signs the checklist used in assessing the clinical guideline and recommends it to the HSE's Chief Clinical Officer.

3.1.2. The final document once approved is converted to pdf to ensure the integrity of the clinical guideline.

3.1.3. Once approved and in the pdf version the clinical guideline will be disseminated to all six health region executive officers, acute hospital general managers and CEO's via CDI.

3.2. List method for assessing the PPPG in meeting the Standards outlined in the HSE National Framework for Developing PPPGs (2016).

3.2.1. A checklist based on the HSE's National Framework for Developing PPG's was used to evaluate this clinical guideline by CDI.

3.2.2. A signed and dated copy of the checklist is attached to the master copy which is retained by the HSE's Clinical Design and Innovation Division

3.3. Attach any copyright/permission sought (attach Appendix, as appropriate).

GIRFT Spinal Surgery: National Cauda Equina Syndrome Pathway (NHS) February 2023 updated October 2023. https://girft-interactivepathways.org.uk/cauda-equina-1

American Spinal Injury Association (ASIA) https://asia-spinalinjury.org/

3.4. Approved Checklist for the HSE Evidence Based Consensus Clinical Guidance on CES

Standards for developing Clinical PPPG	Checklist
Stage 1 Initiation	√
The decision-making approach relating to the type of PPPG guidance required (policy, procedure, protocol, guideline), coverage of the PPPG (national, regional, local) and applicable settings are described.	√
Synergies/co-operations are maximised across departments/organisations (Hospitals/ Hospital Groups/Community Healthcare Organisations (CHO)/National Ambulance Service (NAS)), to avoid duplication and to optimise value for money and use of staff time and expertise.	√
The scope of the PPPG is clearly described, specifying what is included and what lies outside the scope of the PPPG.	√
The target users and the population/patient group to whom the PPPG is meant to apply are specifically described.	√
The views and preferences of the target population have been sought and taken into consideration (as required).	√
The overall objective(s) of the PPPGs are specifically described.	√
The potential for improved health is described (e.g. clinical effectiveness, patient safety, quality improvement, health outcomes, quality of life, quality of care).	√
Stakeholder identification and involvement: The PPPG Development Group includes individuals from all relevant stakeholders, staff and professional groups.	
Conflict of interest statements from all members of the PPPG Development Group are documented, with a description of mitigating actions if relevant.	N/A
The PPPG is informed by the identified needs and priorities of service users and stakeholders.	√
There is service user/lay representation on PPPG Development Group (as required).	N/A
Information and support is available for staff on the development of evidence-based clinical practice guidance.	√

4.0 COMMUNICATION AND DISSEMINATION

4.1 Describe Describe communication and dissemination plans

4.1.1 The HSE's National Clinical Director for Integrated Care, Clinical Design and Innovation within the Office of the CCO will ensure widespread awareness of this clinical guideline to all relevant stakeholders both within and external to the HSE using existing communication channels.

4.1.2 This clinical guideline will be available on the National Clinical Programme for Trauma and Orthopaedic Surgery website https://www.hse.ie/eng/about/who/cspd/ncps/trauma-and-orthopaedic-surgery/ and https://www.rcsi.com/surgery/practice/national-clinical-programmes/trauma-and-orthopaedics

5.0 IMPLEMENTATION

5.1 Describe implementation plan listing actions, barriers and facilitators and timelines

(Include implementation tools such as algorithms, teaching resources, checklists etc.)

5.1.1 Each Acute Hospital that has an Emergency Department and manages patients presenting with possible CES should adopt and implement the recommendations within this guideline from the date of approval and publication.

5.1.2 Sample tools to assist in the implementation are included in the appendices of this document. These include the algorithm, proforma's and check-lists.

5.1.3 This guideline does not replace the clinical judgement of a qualified healthcare professional, and where there are clinical concerns, it is the responsibility of the healthcare professional to refer to their line management and/or seek appropriate specialist input.

5.1.4 Access to timely MRI Imaging is a major facilitator to a successful outcome for patients who present with suspected CES symptoms and require surgical intervention. Each hospital will need to identify all relevant stakeholders that need to meet to discuss how access to MRI for those patients presenting out of normal working hours can be facilitated.

5.2 Describe education/training plans required to implement the PPPG

5.2.1 Resources required to implement this guideline within each hospital needs to be determined locally

5.2.2 Information sessions on this guideline will be required locally to brief relevant staff working in the various departments that this clinical guideline applies to. Key staff should be provided with access to the relevant clinical training required to support them in implementing the recommendations of this guideline.

5.3 Identify lead person(s) responsible for the implementation of the PPPG

It is recommended that the Clinical Director for each hospital in collaboration with senior consultant colleagues in the relevant departments i.e. Emergency Department, Trauma & Orthopaedic Surgery, Radiology and if available Neurosurgery are the lead senior decision makers for the implementation of this clinical guidance document.

5.4 Outline specific roles and responsibilities

5.4.1 The HSE's National Clinical Director for Integrated Care, Clinical Design and Innovation within the Office of the CCO will ensure widespread awareness of this clinical guideline to all relevant stakeholders both within and external to the HSE using existing communication channels.

5.4.2 The Regional Executive Officers (REO's) of the new Health Regions **are responsible for the implementation and evaluation of this clinical guideline** within their area by assigning personnel with responsibility, accountability and autonomy to implement this guideline locally and supporting local clinical staff as required.

5.4.3 The Regional Executive Officers will report on the implementation and operationalisation of this guideline to the HSE's National Clinical Director for Integrated Care, Clinical Design and Innovation.

5.4.4 Each Acute Hospital's General Manager/Chief Executive Office are responsible for ensuring that this clinical guideline is implemented by assigning personnel with responsibility, accountability and autonomy to implement this guideline locally and supporting local clinical staff as required.

5.4.5 It is intended that this guideline will assist all doctors and associated healthcare professionals to adhere to best practice, to maintain competency and to be aware of the role of appropriate delegation.

6 MONITORING, AUDIT AND EVALUATION

6.1 Describe the plan and identify lead person(s) responsible for the following processes:

6.1.1 **Monitoring**

Each Acute Hospital should implement a systematic process of gathering information and tracking over time to achieve the objectives of this guideline.

6.1.2 **Audit**

Each acute hospital should audit the implementation of this guideline at least biannually and the outcome of the audit to be reported to the Local Clinical Governance Clinical Risk Committee at each site for escalation through the health region structure if and when appropriate.

Please refer to **Appendix III** for a sample audit tool. It is intended that this audit tool will provide each acute hospital with a baseline tool through which they can identify areas that require improvements.

Users of this audit tool are free to add in additional statements, as they deem appropriate and adopt this tool for use in their own setting. This audit tool is to be used to retrospectively audit processes.

6.1.3 **Evaluation**

Each Acute Hospital will define a mechanism to measure how timely access to MRI and conversion rate to surgery for those patients with CES has changed since the implementation of this clinical guideline.

The following measurements should be considered:

- Incidence and prevalence of suspected CES as recorded using the ICD Code
- Number of cases with suspected CES that were referred for an MRI Scan and time to same
- Number of cases with suspected CES that converted to surgery

7 REVISION/UPDATE

7.1 Describe procedure for the update of the PPPG

The recommendation of this group is that this PPPG is reviewed on a 3-yearly basis. This will include a review of all available international evidence on this subject.

7.2 Identify method for amending PPPG if new evidence emerges

Any new supporting evidence identified by findings from audit and evaluation, scope of practice changes or advances in technology or research will be reviewed, amended, and updated as necessary.

7.3 Complete version control update on PPPG Template cover sheet

8 REFERENCES

S. Fraser, L. Roberts, and E. Murphy, "Cauda equina syndrome: a literature review of its definition and clinical presentation," Arch. Phys. Med. Rehabil., vol. 90, no. 11, pp. 1964–1968, Nov. 2009, doi: 10.1016/j.apmr.2009.03.021.

T. Germon, S. Ahuja, A. T. H. Casey, N. V. Todd, and A. Rai, "British Association of Spine Surgeons standards of care for cauda equina syndrome," Spine J., vol. 15, no. 3, pp. S2–S4, Mar. 2015, doi: 10.1016/j.spinee.2015.01.006.

N. V. Todd, "Cauda equina syndrome: the timing of surgery probably does influence outcome," Br. J. Neurosurg., vol. 19, no. 4, pp. 301–306; discussion 307-308, Aug. 2005, doi: 10.1080/02688690500305324.

N. V. Todd, "Cauda equina syndrome," Bone Jt. J., vol. 97-B, no. 10, pp. 1390–1394, Oct. 2015, doi: 10.1302/0301-620X.97B10.35922.

H. Fraig, D. M. R. Gibbs, G. Lloyd-Jones, N. R. Evans, G. S. Barham, and H. V. Dabke, "Early experience of a local pathway on the waiting time for MRI in patients presenting to a UK district general hospital with suspected cauda equina syndrome," Br. J. Neurosurg., pp. 1–7, Mar. 2022, doi: 10.1080/02688697.2022.2039377.

M. M. Hussain, A. A. Razak, S. S. Hassan, K. A. Choudhari, and G. M. Spink, "Time to implement a national referral pathway for suspected cauda equina syndrome: review and outcome of 250 referrals," Br. J. Neurosurg., vol. 32, no. 3, pp. 264–268, May 2018, doi: 10.1080/02688697.2018.1457771.

K. G. Buell, S. Sivasubramaniyam, M. Sykes, K. Zafar, L. Bingham, and A. Mitra, "Expediting the management of cauda equina syndrome in the emergency department through clinical pathway design," BMJ Open Qual., vol. 8, no. 4, p. e000597, 2019, doi: 10.1136/bmjoq-2018-000597.

S. Graham, P. Madhavan, and Cauda Equina Syndrome Study Group at Somerset Foundation Trust, "Implementation of a cauda equina service in a medium-sized district general hospital in the UK," Br. J. Hosp. Med. Lond. Engl. 2005, vol. 82, no. 9, pp. 1–7, Sep. 2021, doi: 10.12968/hmed.2021.0040.

T. L. Alberti and A. Nannini, "Patient comprehension of discharge instructions from the emergency department: a literature review," J. Am. Assoc. Nurse Pract., vol. 25, no. 4, pp. 186–194, Apr. 2013, doi: 10.1111/j.1745-7599.2012.00767.x.

N. Todd, K. Dangas, and C. Lavy, "Post-void bladder ultrasound in suspected cauda equina syndrome-data from medicolegal cases and relevance to magnetic resonance imaging scanning," Int. Orthop., vol. 46, no. 6, pp. 1375–1380, Jun. 2022, doi: 10.1007/s00264-022-05341-0.

J. Woodfield et al., "Presentation, management, and outcomes of cauda equina syndrome up to one year after surgery, using clinician and participant reporting: a multi-centre prospective cohort study," Lancet Reg. Health – Eur., vol. 24, Jan. 2023, doi: 10.1016/j.lanepe.2022.100545.

Rupp, F. Biering-Sørensen, S.P. Burns, D.E. Graves, J. Guest, L. Jones, M. Schmidt Read, G.M. Rodriguez, C. Schuld, K.E. Tansey, K. Walden, S. Kirshblum: International Standards for Neurological Classification of Spinal Cord Injury: Revised 2019. Top Spinal Cord Inj Rehabil 27 (2): 1–22, 2021. https://doi.org/10.46292/sci2702-1

9 APPENDICES

Appendix I: Membership of the PPPG Development Group

Appendix II: Approval of the Clinical Guideline

Appendix III: Resources

Appendix IV: Abstracts

APPENDIX I: MEMBERSHIP OF THE PPPG DEVELOPMENT GROUP

Please list all members involved in the development of the document. Identify chairperson/co-chair of the Development Group.

Membership of the Cauda Equina Syndrome Guidance Development Group	
Name	**Role and position**
Mr Marcus Timlin **Chairperson**	Consultant Trauma and Orthopaedic surgeon, clinical lead for the National Spinal Injuries Unit, Mater Misericordiae University Hospital Spine Clinical advisor to the National Clinical Programme for Trauma and Orthopaedic Surgery
Dr Orla Hennessy	Specialist Registrar in Trauma and Orthopaedic Surgery
Mr Keith Synnott	Clinical Lead for National Office for Trauma Services
Mr Paddy Kenny	Joint National Clinical Lead for the National Clinical Programme for Trauma and Orthopaedic Surgery
Mr Finbarr Condon	Joint National Clinical Lead for the National Clinical Programme for Trauma and Orthopaedic Surgery
Mr Aidan Devitt	Consultant Trauma and Orthopaedic surgeon University Hospital, Galway
Mr Mark Dolan	Consultant Trauma and Orthopaedic surgeon, Cork University Hospital
Professor Ciaran Bolger	Consultant Neurosurgeon, Beaumont Hospital, Dublin
Dr Éimear Smith	Consultant in Rehabilitation Medicine
Dr Patricia Cunningham	Dean of Faculty of Radiologists & Radiation Oncologists
Dr Gerry McCarthy	National Clinical Lead for the Emergency Medicine Programme
Ruth Kiely	Programme Manager, National Clinical Programme for Trauma and Orthopaedic Surgery

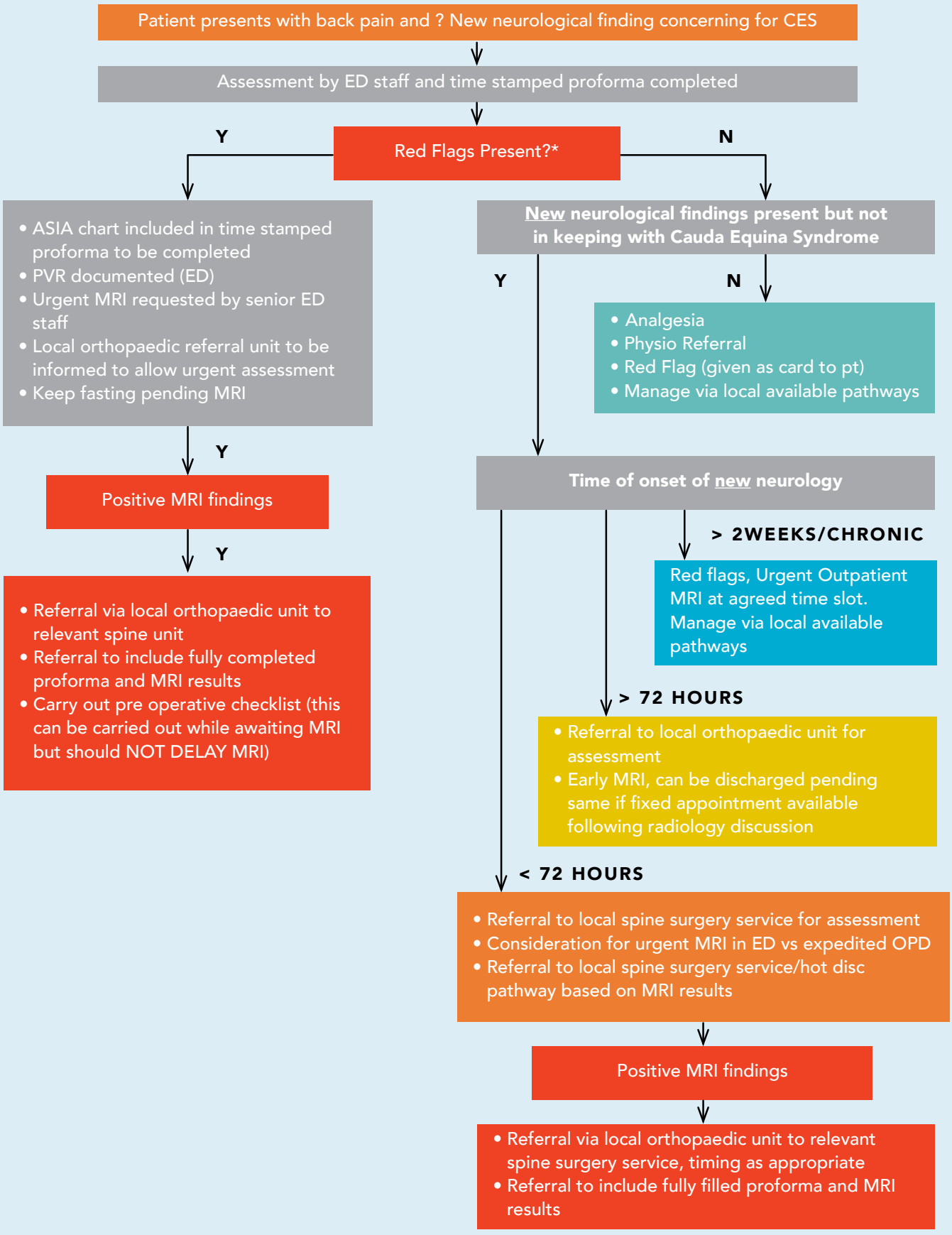
APPENDIX II: APPROVAL OF THE CLINICAL GUIDELINE

Sign-off by Chair of Approval Governance Group
HSE National Clinical Guideline for Cauda Equina Syndrome was formally ratified and recorded in the minutes of the CCO Clinical Forum on 18/01/2024.

Name: (print)	Dr Siobhán Ní Bhríain
Title:	HSE's National Clinical Director Integrated Care Clinical Design and Innovation
Signature: (e-signatures accepted)	
Registration number: (if applicable)	MCRN 15579

APPENDIX III: RESOURCES

CAUDA EQUINA PATHWAY



SPRINT PROFORMA

Date: Time of Arrival _____ Time of initial ED assessment_____ Carried out by (print name) _____ MCRN_____	Patient Adressograph Here

SPRINT Proforma for Assessment of Suspected Cauda Equina Syndrome

Presenting Complaint:

Significant co-morbidites:

Antiocoagulant Y/N
Last taken?
Allergies:

***SPRINT* Red Flag* Questions:**

S - Saddle paraesthesia	Impaired perianal /perineal/saddle sensation Y/N Loss of sensation of bladder filling or micturition Loss of sensation of rectal fullness Y/N
P – Pain	New onset BILATERAL radicular pain? Y/N
R – Retention	Painless? Y/N PVR_____mls
I – Incontinence	of Urine Y/N------Timing of 1st episode: of Faeces Y/N------Timing of 1st episode:
N - New motor findings	Bilateral leg symptoms with new neurology Y/N Complete ASIA chart

T - Time for MRI!

If **Yes** to any of above approx. **date and time of onset:**

MRI Booked ☐ MRI Discussed ☐ Radiologist:_____ Time:_____
MRI performed at: _____
Reason for any significant delay to MRI:
_____

Referral to local orthopaedic Unit at Time_____
Accepting Unit:_____
Accepting Consultant: _____

Patient kept NBM ☐ Time NBM:
Emergency Pre OP Checklist Complete ☐

Dr's signature:..... MCRN:.....
Date/Time:.....

INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)

ASIA American Spinal Injury Association — ISCOS International Spinal Cord Society

Patient Name _____ Date/Time of Exam _____

Examiner Name _____ Signature _____

RIGHT

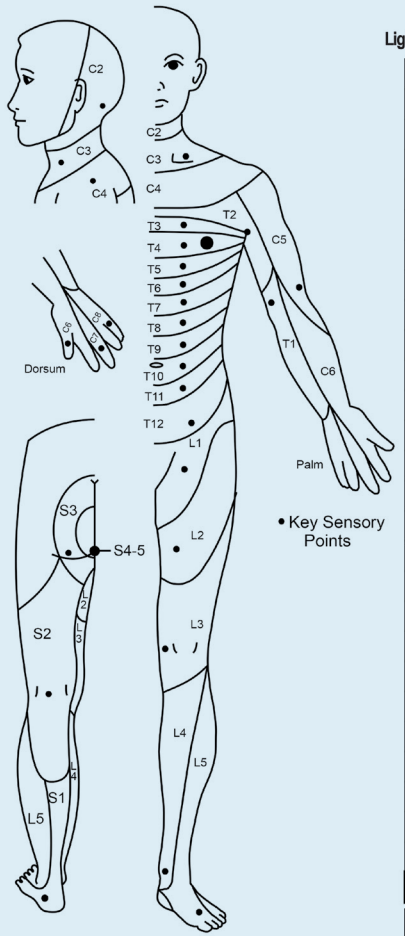
MOTOR KEY MUSCLES		SENSORY KEY SENSORY POINTS Light Touch (LTR)	Pin Prick (PPR)
	C2		
	C3		
	C4		
Elbow flexors	C5		
Wrist extensors	C6		
Elbow extensors	C7		
Finger flexors	C8		
Finger abductors (little finger)	T1		
	T2		
	T3		
	T4		
	T5		
	T6		
	T7		
	T8		
	T9		
	T10		
	T11		
	T12		
	L1		
Hip flexors	L2		
Knee extensors	L3		
Ankle dorsiflexors	L4		
Long toe extensors	L5		
Ankle plantar flexors	S1		
	S2		
	S3		
	S4-5		
RIGHT TOTALS			
(MAXIMUM)		(50)	(56) (56)

UER (Upper Extremity Right)

LER (Lower Extremity Right)

Comments *(Non-key Muscle? Reason for NT? Pain? Non-SCI condition?):*

(VAC) Voluntary Anal Contraction (Yes/No) ☐



LEFT

SENSORY KEY SENSORY POINTS Light Touch (LTL)	Pin Prick (PPL)	MOTOR KEY MUSCLES	
		C2	
		C3	
		C4	
		C5	*Elbow flexors*
		C6	*Wrist extensors*
		C7	*Elbow extensors*
		C8	*Finger flexors*
		T1	*Finger abductors (little finger)*
		T2	
		T3	
		T4	
		T5	
		T6	
		T7	
		T8	
		T9	
		T10	
		T11	
		T12	
		L1	
		L2	*Hip flexors*
		L3	*Knee extensors*
		L4	*Ankle dorsiflexors*
		L5	*Long toe extensors*
		S1	*Ankle plantar flexors*
		S2	
		S3	
		S4-5	
		LEFT TOTALS	
(56)	(56)	**(MAXIMUM)**	(50)

UEL (Upper Extremity Left)

LEL (Lower Extremity Left)

(DAP) Deep Anal Pressure (Yes/No) ☐

MOTOR (SCORING ON REVERSE SIDE)

0 = Total paralysis
1 = Palpable or visible contraction
2 = Active movement, gravity eliminated
3 = Active movement, against gravity
4 = Active movement, against some resistance
5 = Active movement, against full resistance
NT = Not testable
0, 1*, 2*, 3*, 4*, NT* = Non-SCI condition present*

SENSORY (SCORING ON REVERSE SIDE)

0 = Absent *NT = Not testable*
1 = Altered *0*, 1*, NT* = Non-SCI*
2 = Normal *condition present*

MOTOR SUBSCORES

UER ☐ +UEL ☐ = *UEMS TOTAL* ☐ — *MAX (25) (25) (50)*

LER ☐ + LEL ☐ = *LEMS TOTAL* ☐ — *MAX (25) (25) (50)*

SENSORY SUBSCORES

LTR ☐ + LTL ☐ = *LT TOTAL* ☐ — *MAX (56) (56) (112)*

PPR ☐ + PPL ☐ = *PP TOTAL* ☐ — *MAX (56) (56) (112)*

NEUROLOGICAL LEVELS *Steps 1- 6 for classification as on reverse*

	R	L
1. SENSORY	☐	☐
2. MOTOR	☐	☐

3. NEUROLOGICAL LEVEL OF INJURY (NLI) ☐

4. COMPLETE OR INCOMPLETE? ☐
Incomplete = Any sensory or motor function in S4-5

5. ASIA IMPAIRMENT SCALE (AIS) ☐

(In injuries with absent motor OR sensory function in S4-5 only)

6. ZONE OF PARTIAL PRESERVATION *Most caudal levels with any innervation*

	R	L
SENSORY	☐	☐
MOTOR	☐	☐

Cite: Rupp et al.: ISNCSCI: Revised 2019.https://doi.org/10.46292/sci2702-1

REV 04/19

Muscle Function Grading

0 = Total paralysis

1 = Palpable or visible contraction

2 = Active movement, full range of motion (ROM) with gravity eliminated

3 = Active movement, full ROM against gravity

4 = Active movement, full ROM against gravity and moderate resistance in a muscle specific position

5 = (Normal) active movement, full ROM against gravity and full resistance in a functional muscle position expected from an otherwise unimpaired person

NT = Not testable (i.e. due to immobilization, severe pain such that the patient cannot be graded, amputation of limb, or contracture of > 50% of the normal ROM)

0*, 1*, 2*, 3*, 4*, NT* = Non-SCI condition present [a]

Sensory Grading

0 = Absent **1** = Altered, either decreased/impaired sensation or hypersensitivity

2 = Normal **NT** = Not testable

0*, 1*, NT* = Non-SCI condition present [a]

[a] Note: Abnormal motor and sensory scores should be tagged with a '*' to indicate an impairment due to a non-SCI condition. The non-SCI condition should be explained in the comments box together with information about how the score is rated for classification purposes (at least normal / not normal for classification).

When to Test Non-Key Muscles:

In a patient with an apparent AIS B classification, non-key muscle functions more than 3 levels below the motor level on each side should be tested to most accurately classify the injury (differentiate between AIS B and C).

Movement	Root level
Shoulder: Flexion, extension, adbuction, adduction, internal and external rotation **Elbow:** Supination	C5
Elbow: Pronation **Wrist:** Flexion	C6
Finger: Flexion at proximal joint, extension **Thumb:** Flexion, extension and abduction in plane of thumb	C7
Finger: Flexion at MCP joint **Thumb:** Opposition, adduction and abduction perpendicular to palm	C8
Finger: Abduction of the index finger	T1
Hip: Adduction	L2
Hip: External rotation	L3
Hip: Extension, abduction, internal rotation **Knee:** Flexion **Ankle:** Inversion and eversion **Toe:** MP and IP extension	L4
Hallux and Toe: DIP and PIP flexion and abduction	L5
Hallux: Adduction	S1

ASIA Impairment Scale (AIS)

A = Complete. No sensory or motor function is preserved in the sacral segments S4-5.

B = Sensory Incomplete. Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-5 (light touch or pin prick at S4-5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body.

C = Motor Incomplete. Motor function is preserved at the most caudal sacral segments for voluntary anal contraction (VAC) OR the patient meets the criteria for sensory incomplete status (sensory function preserved at the most caudal sacral segments S4-5 by LT, PP or DAP), and has some sparing of motor function more than three levels below the ipsilateral motor level on either side of the body. (This includes key or non-key muscle functions to determine motor incomplete status.) For AIS C – less than half of key muscle functions below the single NLI have a muscle grade ≥ 3.

D = Motor Incomplete. Motor incomplete status as defined above, with at least half (half or more) of key muscle functions below the single NLI having a muscle grade ≥ 3.

E = Normal. If sensation and motor function as tested with the ISNCSCI are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade.

Using ND: To document the sensory, motor and NLI levels, the ASIA Impairment Scale grade, and/or the zone of partial preservation (ZPP) when they are unable to be determined based on the examination results.

ASIA
AMERICAN SPINAL INJURY ASSOCIATION

INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY

ISCOS
INTERNATIONAL SPINAL CORD SOCIETY

Steps in Classification

The following order is recommended for determining the classification of individuals with SCI.

1. Determine sensory levels for right and left sides.
The sensory level is the most caudal, intact dermatome for both pin prick and light touch sensation.

2. Determine motor levels for right and left sides.
Defined by the lowest key muscle function that has a grade of at least 3 (on supine testing), providing the key muscle functions represented by segments above that level are judged to be intact (graded as a 5).
Note: in regions where there is no myotome to test, the motor level is presumed to be the same as the sensory level, if testable motor function above that level is also normal.

3. Determine the neurological level of injury (NLI).
This refers to the most caudal segment of the cord with intact sensation and antigravity (3 or more) muscle function strength, provided that there is normal (intact) sensory and motor function rostrally respectively.
The NLI is the most cephalad of the sensory and motor levels determined in steps 1 and 2.

4. Determine whether the injury is Complete or Incomplete.
(i.e. absence or presence of sacral sparing)
*If voluntary anal contraction = **No** AND all S4-5 sensory scores = **0***
*AND deep anal pressure = **No**, then injury is **Complete.***
*Otherwise, injury is **Incomplete**.*

5. Determine ASIA Impairment Scale (AIS) Grade.
Is injury Complete? If YES, AIS=A

NO ↓

Is injury Motor Complete? If YES, AIS=B

NO ↓ (No=voluntary anal contraction OR motor function more than three levels below the motor level on a given side, if the patient has sensory incomplete classification)

Are at least half (half or more) of the key muscles below the neurological level of injury graded 3 or better?

NO ↓ **AIS=C**

YES ↓ **AIS=D**

If sensation and motor function is normal in all segments, AIS=E
Note: AIS E is used in follow-up testing when an individual with a documented SCI has recovered normal function. If at initial testing no deficits are found, the individual is neurologically intact and the ASIA Impairment Scale does not apply.

6. Determine the zone of partial preservation (ZPP).
The ZPP is used only in injuries with absent motor (no VAC) OR sensory function (no DAP, no LT and no PP sensation) in the lowest sacral segments S4-5, and refers to those dermatomes and myotomes caudal to the sensory and motor levels that remain partially innervated. With sacral sparing of sensory function, the sensory ZPP is not applicable and therefore "NA" is recorded in the block of the worksheet. Accordingly, if VAC is present, the motor ZPP is not applicable and is noted as "NA".

PRE-OP CHECKLIST FOR REFERRING UNIT

Patient confirmed fasting since:

Clear Fluids __:__hrs

Food__:__hrs

Please confirm below completed:

Please confirm below completed:

	Y	N	N/A
Consent process started			
Next of kin contacted as appropriate			
Information leaflet provided to patient			
Bloods:			
FBC			
U+E			
Coag			
Pregnancy test (if applicable)			
ECG			
Anticoagulant held?			
If applicable last taken:			
Antiplatelet held?			
If applicable last taken:			
Imaging accessible to accepting unit?			
All above results checked and any abnormalities addressed/ communicated to accepting spine surgery service			

Please ensure copies of all the above documentation as well as the spine proforma is sent with the patient.

A consent form does not need to be completed locally but if your patient has been accepted for transfer for surgery, please commence the informed consent process locally by explaining the expected procedure, risks etc to the patient. Please provide patient information leaflet to the patient.

Pre - Operative Checklist

- Bloods to include COAG, FBC, U+E- copy to be sent with patient
- ECG copy to be sent with patient
- COVID result or other equivalent as required by spine unit
- Local bed management and spine unit bed management informed
- Time fasted since clearly documented

CAUDA EQUINA RED FLAGS	
S	Numbness on your inner thighs, like sitting on a Saddle or around your private areas
P	Pain- New onset pain radiating into backs of both legs
R	Retention- Not being able to pass urine
I	Incontinence- Passing urine or bowel motions without control and/or feeling
N	New weakness
T	**Time!** You may require an emergency MRI and should present to your local emergency department

Proposed Audit Tool to monitor the implementation of the Cauda Equina Syndrome Clinical Guideline		
1	Number of cases of suspected CES that presented to the Emergency Department within the last month	
2	Number of patients presenting with possible CES sent for MRI Scan on site	
3	Number of patients presenting with possible CES transferred out to a tertiary centre for MRI Scan	
4	Time from presentation with CES to MRI Scan	
5	Number of patients with CES that required surgical intervention and were managed locally	
6	Number of patients with CES that required surgical intervention and were transferred to their local orthopaedic spinal centre or a centre of excellence.	

PATIENT INFORMATION LEAFLET- CAUDA EQUINA SYNDROME (CES)

You are being given this leaflet as you may have a suspected diagnosis of Cauda Equina Syndrome (CES).

What Is Cauda Equina Syndrome? (CES)

- CES results from pressure on the end of spinal cord where it splits into the nerve roots resulting in damage to the nerves. It is an uncommon condition which affects 0.3-0.5 people per 100,000
- The key presenting symptoms are:
  - Back pain running down one or both legs
  - Loss of feeling in the private areas or inner thighs - like where you would sit on the saddle of a horse
  - Difficulty passing urine or not feeling yourself passing urine
  - Loss of bowel control or not being able to move your bowels
  - Problems with sexual function or feeling

What will happen when I present with these symptoms?

- Your doctor will examine the working of your nerves by asking if you can do certain movements and have sensation in certain areas
- They may also perform an examination of your back passage to check your bowel/ bladder function
- You should have a bedside scan of your bladder done after passing urine to check if you are keeping any in your bladder without realising
- If you are having difficulty urinating, a tube known as a catheter may be inserted to help you pass water
- Most people will have an MRI scan to confirm the diagnose of CES
- Following this you may be referred for an opinion to a spinal surgeon. These services are provided by specialist orthopaedic or neurosurgical services which are only available in specific hospitals, and sometimes may require you to be transferred as an emergency overnight

What causes it?

The most common cause is a large bulging disc, usually in your lower back. In most cases of CES this bulge and the symptoms are sudden, but some people can present with slowly worsening symptoms over time. In CES, the disc bulge presses on the central part of the end of your spinal cord, where it splits into lots of nerve roots that looks like a "horses' tail" (Latin - cauda equina)

It can also be caused by trauma, or as a result of a tumour, infection or bleeding causing pressure on the spinal cord. Some people also have changes to their spine that they may have been born with, or from previous surgery. Your doctor will be able to advise you based on your MRI scan if there is concern for any of these causes.

Some patients will have a disc that presses on a single nerve as it exits the spine, and causes pain shooting down the leg, rarely associated with weakness or numbness in the leg/foot. While similar, this is different to CES in that it does not cause bowel, bladder or sexual problems, or numbness is the private/saddle area. This is sometimes called sciatica or radiculopathy, and up to 80% of these cases may settle down without the need for surgery

How is it treated?

**Please note that optimal care can vary from case to case, your doctor/surgeon will discuss the specifics of your individual case with you.*
** Figures given for risk are approximate and will vary on a case by case basis*

- Most cases of Cauda Equina Syndrome are managed with surgery to take the pressure off the nerves and spinal cord. The most common surgery is called a lumbar (L) "decompression" or "discectomy". You may also hear a "level" referenced with a number such a L4/5. This is the level of the compression on your MRI scan.
- The aim of surgery is to take the pressure off the nerves. Surgery does not repair the nerves. While there is potential for them to recover, this can be very variable from case to case. There is a good chance of surgery reducing the pain from CES. Unfortunately, return to normal bowel/bladder/sexual function, and normal sensation/power is more difficult to predict.
- Please let your doctor know what level of information you would like to know. It is normal to feel scared, anxious or overwhelmed when discussing surgery. There are some risks your doctor will have to tell you about, but it is OK to let them know what level of detail you would prefer. You may also like to have a family member present if possible.
- Some of the risks your doctor will discuss include:
  - Damage to a nerve root which can cause weakness or numbness (1% risk)
  - Worsening of bowel/bladder/sexual function
  - Recurrence of symptoms after surgery (5% risk). This can happen days, months or years after surgery
  - Infection- 4% risk of superficial/wound infection, 1% risk of deep/spinal infection.
  - A tear to the protective lining around the spinal cord known as the "dura" (10% overall risk) which can cause headaches. This sometimes needs further surgery to repair (less than 0.05%)
  - Bleeding
  - Clots in the legs that can travel to the lungs, known as a deep vein thrombosis (DVT) or pulmonary embolus (PE) (risk approx. 1/700)

Rare risks

- Further damage to the cauda equina resulting in paralysis or new/worsened bowel/bladder/sexual dysfunction
- Stroke, heart attack or other anaesthetic related problems. The level of these risks will be dependent on your pre-existing medical conditions
- Death- extremely rare, less than 1/10'000 cases

- For more specific information on surgical options please visit the following resource: https://spinesurgeons.ac.uk/resources/Documents/Booklets/(FINAL)%2001820-22%20BASS%20Cauda%20Equina%20Syndrome%20Surgical%20Options.pdf

Your doctor/surgeon will also discuss the specific surgical plan in your case with you. Please make sure to ask them any questions you have

- Please make sure to tell your doctor if you have any allergies or take any medications that thin your blood. They may also want to know when you last had something to eat or drink. It is also helpful to tell them if you have had any serious issues with anaesthetics in the past, or have personal/religious objections to any specific treatments

What happens after surgery?

- Many people are able to go home a day or two after surgery.
- It is normal to still have some pain after the surgery. There will be pain from the surgery itself, and the nerves are also swollen and irritated after being compressed. This can take weeks or sometimes months to settle. Sometimes the pain does not totally go away.
- The doctor/surgeon will see you the morning after surgery and if you have a tube in the bladder it may be removed depending on the severity of your symptoms before surgery.
- If you have ongoing problems passing water at this stage, then you may require review by a specialist nurse or rehab team. They may need to teach you how to pass a tube into the bladder yourself- a process known as intermittent self-catheterisation (ISC). Some people may also require training for management of their bowel.
- If needed you will be seen and assessed by a physiotherapist, who will make sure you are able to walk and balance safely. They will provide walking supports as needed. If necessary you may be linked in for community physiotherapy services.
- A small proportion of patients may require a longer stay in hospital, or be referred to a local rehab unit or the national rehabilitation unit (NRH).
- You will need to have your wound reviewed 2 weeks after your surgery and any stitches/clips taken out. This can normally be done by your own GP.
- Your team will advise you if/when you will need to be seen again in an outpatient clinic. This will depend on your symptoms before surgery. Most people will be seen approximately 6 weeks after their surgery.
- https://spinesurgeons.ac.uk/resources/Documents/Booklets/(FINAL)%2001820-22%20BASS%20Cauda%20Equina%20Syndrome%20Surgical%20Options.pdf for more comprehensive information

What else do I need to know?

- Unfortunately, despite surgery, some patients will experience ongoing issues with pain, bowel, bladder and sexual function. Even though surgery takes pressure off the nerves they are still damaged by the initial compression. How much this damage recovers can vary from person to person. If you have ongoing problems with managing your bowel or bladder, please reach out to your doctor/surgeon/GP as there are services available to help.
- If you have ongoing issues with sexual function, please make sure to discuss this with your GP. This is an important consequence of CES that people can find it difficult to talk to their doctor about.
- Some patients also suffer with changes to their mood, including depression and anxiety. If this is something you experience please reach out to your GP or surgical team for further support.
- Driving - Most people will be able to return to driving shortly (within 4-6 weeks) after the surgery, once you feel safe to do so. You must be able to comfortably perform an emergency stop. If you have some ongoing deficits you may require additional supports to do so. Please make sure to check with your doctor/surgeon before you go home when it is safe for you to drive.
- Return to work - This will depend on the type of work you do, the nature and severity of your symptoms before surgery and the level of recovery. Your doctor/surgeon will likely advise you to avoid strenuous activity or heavy lifting for up to 6 weeks after surgery. People who work at lighter duties or desk jobs will be able to return sooner. Your doctor will be able to provide you with certificates for your workplace/school etc as needed.

Supports for Cauda Equina Syndrome
It is normal to experience difficulties after you go home when living with Cauda Equina and its long-term complications. Many patients report the difficulty of living with a "silent disability", as the effect of CES are often not visible to others. It is also common for people to have difficulty talking about sensitive topics such as bowel, bladder and sexual function. It can feel very isolating at times, but there are supports groups available and many helpful resources you can access for free

Further Information on peer support and other resources available at:
https://spinalinjuries.ie/

Other additional resources:
For welfare and employment advice

https://www.citizensinformation.ie/en/

For more information about surgery options and risks/complications
https://spinesurgeons.ac.uk/patient-area

https://spinesurgeons.ac.uk/resources/Documents/Booklets/(FINAL)%2001820-22%20BASS%20Cauda%20Equina%20Syndrome%20Surgical%20Options.pdf

The National Rehabilitation Hospital
https://www.nrh.ie/

Patient Advocacy
https://advocacy.ie/

https://sageadvocacy.ie/

https://www.patientadvocacyservice.ie/

Crisis intervention/support
https://www.pieta.ie/how-we-can-help/helpline/

https://www.samaritans.org/ireland/samaritans-ireland/

Disabled driver/passenger scheme
https://www.citizensinformation.ie/en/travel-and-recreation/transport-and-disability/tax-relief-for-disabled-drivers-and-disabled-passengers/

APPENDIX IV: ABSTRACTS

CAUDA EQUINA SYNDROME - A SYSTEMATIC REVIEW OF EXISTING PATHWAYS INTERNATIONALLY AND A PROPOSAL FOR THE IRISH SYSTEM

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Background
Cauda Equina Syndrome (CES) is a clinical syndrome with correlating radiographic evidence of compression. Despite having a limited number of spinal centers offering urgent decompression services, the Irish system lacks a clear pathway of investigation and referral. Our aim is to create a pathway to provide clear, evidence based and consensus recommendations for the index reviewing healthcare provider, regardless of level of expertise, on need for and timing of MRI and appropriate onward referral to specialist services.

Methods
A systematic review of the literature was carried out in order to identify all previously published or proposed pathways internationally for CES. Included articles were reviewed and data extracted and collected in excel format. Data extracted included year of publication, author, time to MRI in pathway, inclusion or exclusion of post void residual measurement and specific cauda equina red flags used.

Results
Following removal of duplicates a total of 305 articles underwent title and abstract screening from which 7 were eventually included for data extraction. All included papers recommended urgent MRI with the presence of red flag findings. Red flags included in all papers were perianal/perineal/saddle sensory disturbance and bladder or bowel dysfunction of varying specifications. 6/7 papers included radicular/sciatic pain, 3/7 included new motor weakness, 3/7 included DRE findings, 2/7 included disturbance of sexual function. A proposal guideline was drafted and presented at the Irish Spine Society and Irish Orthopaedic Society meetings and feedback sought and enacted.

Discussion
While specific red flags used show minor variability, overall the current literature presents a consensus that in cases of suspected cauda equina syndrome MRI should be carried out on an urgent basis. Based on our review, we have drafted an evidence based pathway which we propose for application on a national basis within the Irish system.

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OUT OF HOURS REFERRALS FOR CAUDA EQUINA SYNDROME IN IRELAND: WHAT IS THE BEST PATHWAY?

Kelly M

Introduction:
Cauda equina syndrome (CES) is a surgical emergency that warrants emergent evaluation and treatment. MRI of the lumbar spine is mandated for diagnosis. Outside of normal working hours this represents a significant logistical challenge. We sought to investigate the outcomes for patients undergoing out of hours MRI for suspected CES in the National Spinal Injuries Unit (NSIU) including both internal and external referrals.

Methods:
Between January and July 2022, all Lumbosacral MRIs performed outside of 0900-1700, where the indication was suspected cauda equina syndrome were analysed. All MRIs performed over the weekend were included. Clinical data was maintained prospectively on an internal referral database. Internal referrals for MRI were made directly by emergency department physicians. External referrals were communicated via referring Orthopaedic Teams to the NSIU on call team and transferred by ambulance. The clinical outcome was recorded, as well as the time of surgery.

Results:
112 out of hours MRIs were performed. 32% were external referrals. 14% (n=16) of patients required surgical management. Internal referrals (emergency physicians) were as likely to undergo surgery as those assessed by two surgical teams (14.4% v 13.8%, P=0.4). 44% (n=7) of surgically managed patients underwent out of hours surgery. Of external referrals requiring surgery, 80% (n=4) underwent out of hours surgery – representing 11% of the external referrals overall.

Conclusions:
86% of patients undergoing out of hours MRI in the NSIU did not require surgery. Specialist referrals may be avoided by direct referral from appropriately trained emergency physicians for MRI. This is particularly relevant where inter hospital transfer is required for specialist assessment or for radiological investigation.

NOTES

HSE National
Central Repository

HSE National Clinical
Guideline for Cauda
Equina Syndrome