

Clinical Decision Support (CDS) Content and Health Level 7 (HL7)-compliant Knowledge Artifacts (KNARTs)

Neurosurgery: Radiculopathy (Lumbar / Thoracic) Clinical Content White Paper

Department of Veterans Affairs (VA)



**Knowledge Based Systems (KBS)
Office of Informatics and Information Governance (OIIG)
Clinical Decision Support (CDS)**

Clinical Decision Support (CDS) Content and Health Level 7 (HL7)-compliant Knowledge Artifacts (KNARTs): Neurosurgery: Radiculopathy (Lumbar /Thoracic) Clinical Content White Paper

by Department of Veterans Affairs (VA), , , and

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Abstract

Table 1. Relevant KNART Information

KNART Name	Associated CLIN
Radiculopathy (Lumbar/Thoracic) - Order Set	CLIN0004AB
Radiculopathy (Lumbar/Thoracic) - Documentation Template	CLIN0005AC
Radiculopathy (Lumbar/Thoracic) - Composite/ Consult Request	N/A

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Introduction

The VA is committed to improving the ability of clinicians to provide care for patients while increasing quality, safety, and efficiency. Recognizing the importance of standardizing clinical knowledge in support of this goal, VA is implementing the HL7 Knowledge Artifact Specification for a wide range of VA clinical use cases. Knowledge Artifacts, referred to as KNARTs, enable the structuring and encoding of clinical knowledge so the knowledge can be integrated with electronic health records to enable clinical decision support.

The purpose of this Clinical Content White Paper is to capture the clinical context and intent of KNART use cases in sufficient detail to provide the KNART authoring team with the clinical source material to construct the corresponding knowledge artifacts using the HL7 Knowledge Artifact Specification. This paper has been developed using material from a variety of sources: VA artifacts, clinical practice guidelines, evidence in the body of medical literature, and clinical expertise. After reviewing these sources, the material has been synthesized and harmonized under the guidance of VA subject matter experts to reflect clinical intent for this use case.

Unless otherwise noted, items within this white paper (e.g., documentation template fields, orderable items, etc.) are chosen to reflect the clinical intent at the time of creation. To provide an exhaustive list of all possible items and their variations is beyond the scope of this work.

Conventions Used

Conventions used within the knowledge artifact descriptions include:

- <obtain>: Indicates a prompt to obtain the information listed.
 - If possible, the requested information should be obtained from the underlying system(s). Otherwise, prompting the user for information may be required.
 - The technical and clinical notes associated with a section should be consulted for specific constraints on the information (e.g., time-frame, patient interview, etc.).
 - Default values: unless otherwise noted, <obtain> indicates to obtain the one most recent observation. It is recognized that this default time-frame value may be altered by future implementations.
- [...]: Square brackets enclose explanatory text that indicates some action on the part of the user, or general guidance to the clinical or technical teams. Examples include, but are not limited to:
 - [Begin ...], [End ...]: Indicate the start and end of specific areas to clearly delineate them for technical purposes.
 - [Activate ...]: Initiate another knowledge artifact or knowledge artifact section.
 - [Section Prompt: ...]: If this section is applicable, then the following prompt should be displayed to the user.
 - [Section Selection Behavior: ...]: Indicates technical constraints or considerations for the selection of items within the section.
 - [Attach: ...]: Indicates that the specified item should be attached to the documentation template if available.
 - [Link: ...]: Indicates that, rather than attaching, a link to the item should be included in the documentation template.
 - [Clinical Comments: ...]: Indicates clinical rationale or guidance.
 - [Technical Note: ...]: Indicates technical considerations or notes.
 - [If ...]: Indicates the beginning of a conditional section.
 - [Else, ...]: Indicates the beginning of the alternative branch of a conditional section.
 - [End if ...]: Indicates the end of a conditional section.
- Check boxes: Indicates items that should be selected based upon the section selection behavior.

Chapter 1. Radiculopathy (Lumbar/Thoracic)

Clinical Context

The Neurosurgery Radiculopathy (Lumbar/Thoracic) KNART set is intended for referring providers (Primary Care, Pain Clinic, Anesthesiologist, Physical Therapist and sometimes Emergency Department Physicians) performing an initial workup for adult outpatients with symptoms prior to receiving a Neurosurgery Consultation. Diagnostic and treatment modalities for treatment include magnetic resonance imaging (MRI), Computerized Tomography (CT) Myelogram, medication, physical therapy, acupuncture, steroid injections and pain clinic visits. The provider should also consider both a mental health evaluation and a substance abuse evaluation (alcohol, smoking, opioids/narcotics) where appropriate. The clinical context for this consultation includes only routine, non-urgent referrals to neurosurgery. Spinal surgery is performed by orthopedic surgeons as well, but since orthopedic surgery was not involved in development of this knowledge artifact it should be reviewed by orthopedic surgery before it is used in the context of consults to orthopedic surgery.

Table 1.1. Clinical Context Domains

Target User	Provider in Primary Care, Emergency Medicine, Anesthesiology, Pain Clinic, Physical Therapy
Patient	Adult outpatient being referred to Neurosurgery for Radiculopathy (Lumbar/Thoracic)
Priority	Routine/Non-urgent
Specialty	Primary Care
Location	Outpatient

Knowledge Artifacts

This section describes the CDS knowledge artifacts that are specific to Neurosurgery Radiculopathy (Lumbar/Thoracic) and is intended for users caring for adult patients who may require a Neurosurgery referral for surgery. Target clinical users include Primary Care physicians, Emergency Department physicians, Physical Therapist, Pain Clinic or Anesthesiologist. Patient cohort includes adult outpatients being referred to Neurosurgery.

The intent of these artifacts is to ensure a minimum workup is initiated prior to a Neurosurgery Consultation. Specific constraints for these artifacts are that:

- They apply to adult outpatients being considered for Neurosurgery referral.
- All imaging studies and treatment modalities are documented and appropriate results are accessible for Neurosurgery consultation.

Three knowledge artifacts that define this clinical use case. These artifacts are the Consult Request, the Documentation Template and the Order Set and are described in detail in the following sections.

- Consult Request
 - This is a high-level, encompassing artifact.
 - It relies upon the documentation template and order set artifacts.
- Documentation Template

- This is a template used to document the information provided by the referring provider.
- It includes logic for appropriate display of documentation sections.
- Order Set
 - This is the set of orderable items associated with the consult request.
 - It includes logic for appropriate display of the order set.

Chapter 2. Composite

[Begin Composite.]

Knowledge Narrative

[See Clinical Context in Chapter 1.]

Lumbar radiculopathy is a highly prevalent problem that can significantly and negatively impact a person's quality of life in terms of functional impairment, chronic pain, disability, absenteeism, and other parameters. Referring physicians, most commonly primary care physicians and mid-level providers, often respond to the frustration of a patient with lumbar radiculopathy by ordering advanced imaging tests and prematurely referring patients to subspecialists before exhausting the full array of conservative treatment modalities that are within their scope of practice. Implementation of an evidence-based approach consistent with the recommendations of authoritative professional societies, such as the American Association of Neurological Surgeons and the Congress of Neurological Surgeons, can optimize resource allocation and facilitate use of appropriate treatment modalities based on clinical presentation.

Consult and Referrals

[Begin Consult and Referrals.]

[Technical Note: The following list provides the basic components of the consult request. This is the high-level, encompassing artifact, and must be combined with the documentation template and order set to form a fully functional knowledge artifact. The information for the consult request can be obtained as part of the composite or within the corresponding order set component in the consult section. If obtained within the composite, this information should pre-populate the respective order set component.]

[Section Prompt: To request a neurosurgery consult for evaluation of lumbar or thoracic radiculopathy, please provide the following information.]

- Reason for Consult: Evaluate patient with lumbar/thoracic radiculopathy for surgery
- Consult Specialty: Neurosurgery
- Priority: Routine
- <obtain> Referring Physician
- <obtain> Referring Physician Contact Information

[Activate Documentation Template.]

[End Consult and Referrals.]

[End Composite.]

Chapter 3. Documentation Template

[Begin Documentation Template.]

Knowledge Narrative

[See Clinical Context in Chapter 1.]

[Section Prompt: This documentation template should be completed by the provider requesting neurosurgical evaluation for a patient with lumbar/thoracic radiculopathy.]

Chief Complaint

[Begin Chief Complaint section.]

[Section Prompt: Chief Complaint.]

[Section Selection Behavior: Select at least one.]

- ☐ Pain
- ☐ Numbness
- ☐ Weakness
- ☐ Other <obtain>

[Section Prompt: Location of symptoms.]

[Section Selection Behavior: Select at least one.]

- ☐ Low Back
- ☐ Left Leg
- ☐ Right Leg
- ☐ Other <obtain> location

[Section Prompt: If pain is not a chief complaint, then skip to Duration of Symptoms.]

[Section Prompt: Please provide details regarding the character of the pain (e.g., burning, shooting, aching, electric, jabbing, etc.).]

- ☐ Burning
- ☐ Shooting/Electric
- ☐ A

<obtain> Details

[Section Prompt: Duration of Symptoms.]

[Section Selection Behavior: Select only one.]

- ☐ Acute (Less than 2 weeks)
- ☐ Subacute (Greater than or equal to 2 weeks and less than or equal to 3 months)

- ☐ Chronic (Greater than 3 months)

[End Chief Complaint section.]

Prior Conservative Therapies

[Begin Prior Conservative Therapies section.]

[Section Prompt: Which conservative therapies have been tried?]

Medications. [Subsection Prompt: Medications.]

[Section Selection Behavior: Select any. Optional.]

[Technical Note: Details for this subsection include: name of medication, dose, date started, and date ended.]

- ☐ Nonsteroidal anti-inflammatory drugs (NSAIDs) <obtain> Details
- ☐ Opioids <obtain> Details
- ☐ Antiepileptics <obtain> Details
- ☐ Tricyclic antidepressants <obtain> Details
- ☐ Muscle relaxants <obtain> Details
- ☐ Other, <obtain> Details
- ☐ None

Other Therapies. [Subsection Prompt: Other Therapies.]

[Section Selection Behavior: Select any. Optional.]

[Technical Note: Details for this subsection include: therapy summary, date started, date ended, number of times and outcome.]

- ☐ Physical Therapy <obtain> Details
- ☐ Acupuncture <obtain> Details
- ☐ Spinal Manipulation <obtain> Details
- ☐ Cognitive behavioral therapy <obtain> Details
- ☐ Pain clinic <obtain> Details
- ☐ Selective nerve root blocks <obtain> Details
- ☐ Epidural steroid injections <obtain> Details
- ☐ Other <obtain> Details

[End Prior Conservative Therapies section.]

Medical History

[Begin Medical History section.]

[Section Prompt: Applicable Medical History.]

[Section Selection Behavior: Select any. Optional.]

[Technical Note: Details for this section include: summary, consult date, consult results, current status.]

- ☐ Other chronic pain <obtain> Details
- ☐ Posttraumatic stress disorder <obtain> Details
- ☐ Anxiety <obtain> Details
- ☐ Depression <obtain> Details
- ☐ Other mental health conditions <obtain> Details
- ☐ Oncological conditions <obtain> Details
- ☐ Obesity <obtain> Body Mass Index (BMI)
- ☐ Cardiovascular conditions <obtain> Details
- ☐ Other relevant medical history <obtain> Details

[Technical Note: Provide link to full medical history.]

[End Medical History section.]

Surgical History

[Begin Surgical History section.]

[Section Prompt: Applicable Surgical History.]

[Section Selection Behavior: Select any. Optional.]

[Technical Note: Details for this section include: surgical summary and surgery date.]

- ☐ Spinal surgery <obtain> Details
- ☐ Other prior surgeries <obtain> Details

[Technical Note: Provide link to full surgical history.]

[End Surgical History section.]

Social History

[Begin Social History section.]

[Section Prompt: Social History.]

[Section Selection Behavior: Select any. Optional.]

[Technical Note: Details for this section include: summary, current status, applicable dates.]

- ☐ Alcohol use/abuse <obtain> Details
- ☐ Rehabilitation or detoxification <obtain> Details
- ☐ Current or former tobacco user <obtain> Details <obtain> pack years
- [Technical Note: Provide link to Tobacco Assessment and Cessation Counseling KNART.]

- ☐ Cocaine use/abuse <obtain> Details
- ☐ Other substance use/abuse <obtain> Details
- ☐ Homeless <obtain> Details
- [Technical Note: Provide link to Homelessness Documentation Template KNART.]
- ☐ Unstable home environment <obtain> Details
- ☐ Home environment conducive to healing <obtain> Details
- ☐ Geographically remote (40+mile drive to medical care) <obtain> Details

[End Social History section.]

Imaging History

[Begin Imaging History section.]

[Section Prompt: Imaging History.]

[Section Prompt: The most recent imaging studies in each category should be included.]

[Technical Note: Result text should be attached automatically if available for the Lumbar/Thoracic Spine MRI interpretation field.]

- <obtain> Lumbar/Thoracic Spine MRI Interpretation
- [Link Images: Lumbar/Thoracic Spine MRI.]

[Technical Note: Result text should be attached automatically if available for the Lumbar/Thoracic Spine CT Myelogram Interpretation field.]

- <obtain> Lumbar/Thoracic Spine CT Myelogram Interpretation
- [Link Images: Lumbar/Thoracic Spine CT Myelogram.]

[Technical Note: Result text should be attached automatically if available for the Lumbar/Thoracic Spine CT Interpretation field.]

- <obtain> Lumbar/Thoracic Spine CT Interpretation
- [Link Images: Lumbar/Thoracic Spine CT.]

[End Imaging History section.]

Medications

[Begin Medications section.]

- <obtain> Current pain medication list
- <obtain> Current anticoagulation and antiplatelet list

[End Medications section.]

Surgical Candidacy

[Begin Surgical Candidacy section.]

[Section Prompt: Does patient want to be considered for surgery?]

- ☐ Yes
- ☐ No <obtain> Reason for neurosurgical consult

[End Surgical Candidacy section.]

[End Documentation Template.]

Chapter 4. Order Set

[Begin Order Set.]

Knowledge Narrative

[See Clinical Context in Chapter 1.]

Medications

[Begin Medications section.]

[Technical Note: Please provide a link to the VA/DoD Clinical Practice Guideline for management of Low Back Pain. <https://www.healthquality.va.gov/guidelines/pain/lbp/index.asp>.]

[Section Prompt: Based upon clinical judgment and if not otherwise contraindicated, consider initiating a new order for one or more of the following medications prior to the neurosurgery consultation.]

[Section Prompt: NSAIDs.]

[Section Prompt: NSAIDs increase the risk of serious gastrointestinal adverse events including bleeding, ulceration, and perforation of the stomach or intestines, which can be fatal. The prevailing recommendations in consensus-based clinical guidelines recommend that NSAID/Cyclo-oxygenase-2 (COX-2) should be avoided in Chronic Kidney Disease (CKD).]

[Technical Note: Provide link to <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3417055/#R6/link>]

[Section Selection Behavior: Select only one. Optional.]

- ☐ Ibuprofen 400 mg tablet oral every 6 hours as needed for back pain; may increase dose frequency to one tablet every 4 hours 100 tablets 2 refills
- ☐ Naproxen sodium 550 mg tablet oral every 12 hours as needed for back pain 100 tablets 2 refills

[Section Prompt: Other Analgesics.]

[Section Selection Behavior: Select only one. Optional.]

- ☐ Acetaminophen 325 mg tablet oral two tablets every 6 hours as needed for back pain; may increase dose frequency to two tablets every 4 hours; do not take more than 10 tablets per day 100 tablets 2 refills

[Section Prompt: Glucocorticoids, Oral. (For acute pain only)]

[Section Selection Behavior: Select only one. Optional.]

- ☐ Methylprednisolone 4 mg tablet oral by taper:
 - take 6 tablets at once on day 1
 - On day 2 take one tablet before breakfast, one after lunch, one after dinner, and two at bedtime
 - On day 3 take one tablet before breakfast, one after lunch, one after dinner, and one at bedtime
 - On day 4 take one tablet before breakfast, one after lunch, and one at bedtime
 - On day 5 take one tablet before breakfast and one at bedtime
 - On day 6 take one tablet before breakfast

- 21 tablets 0 refills

[Section Prompt: Other Medications]

[Technical Note: Provide a link to institutional pharmacy orders]

[End Medications section.]

Procedures

[Begin Procedures section.]

[Section Prompt: Consider ordering the following procedures in conjunction with the neurosurgery consult.]

[Section Selection Behavior: Select any or none. Optional.]

- ☐ Epidural glucocorticoid injection under fluoroscopic or CT guidance per interventionist (series of three)
- ☐ Lumbar support brace for subacute lower back pain
- ☐ Lumbosacral corset for lumbar spinal stenosis to improve walking distance
- ☐ Spinal manipulation to provide symptomatic relief in patients with lumbar disc herniation and radiculopathy

[End Procedures section.]

Imaging

[Begin Imaging section.]

[Section Prompt: Consider ordering one of the following imaging studies in conjunction with the neurosurgery consult.]

[Section Selection Behavior: Select only one. Optional.]

- ☐ X-ray lumbar/thoracic spine anteroposterior (AP) and lateral, flexion and extension views
- ☐ MRI lumbar spine without intravenous (IV) contrast (consider for persistent, severe, or progressive low back pain; failed conservative management; candidate for surgical intervention)
- ☐ MRI lumbar spine with and without IV contrast (consider for new, severe, or progressive low back pain WITH RED FLAGS SUCH AS CANCER HISTORY; prior lumbar surgery; candidate for surgical intervention)
- ☐ CT MYELOGRAM lumbar spine (consider for persistent, severe, or progressive low back pain; failed conservative management; candidate for surgical intervention; MRI contraindicated)
- ☐ CT MYELOGRAM lumbar spine with IV contrast (consider for persistent, severe, or progressive low back pain WITH RED FLAGS SUCH AS CANCER HISTORY; candidate for surgical intervention; MRI contraindicated)

[End Imaging section.]

Additional Consults

[Begin Additional Consults section.]

[Section Prompt: Consider ordering from the following consults in conjunction with the neurosurgery consult.]

[Section Selection Behavior: Select any or none. Optional.]

- ☐ Consult physical therapy to evaluate for conservative therapy for lumbar thoracic radiculopathy (e.g., structured exercise, electrical stimulation, acupuncture, exercise instruction)
- ☐ Consult psychiatry to evaluate for depression and other psychological factors that may affect the patient's perception of pain and ability to manage pain
- ☐ Consult social services to evaluate social factors (e.g., joblessness, homelessness, financial concerns) that may affect patient's ability to adhere to conservative treatment
- ☐ Consult pain management to address modalities for treating chronic pain
- ☐ Consult chiropractor for spinal manipulation
- ☐ Consult acupuncture

[End Additional Consults section.]

Patient Education

[Begin Patient Education section.]

[Section Prompt: Consider ordering patient education in conjunction with the neurosurgery consult.]

[Section Selection Behavior: Select any or none. Optional.]

- ☐ Lumbar/thoracic radiculopathy education (level-appropriate materials on natural progression, conservative management, and procedural management)

[End Patient Education section.]

[End Order Set.]

Bibliography/Evidence

- American Association of Neurological Surgeons/Congress of Neurological Surgeons. *Guideline update for the performance of fusion procedures for degenerative disease of the lumbar spine*. J Neurosurg Spine. 2014. 21. 1. 1-139.
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- U.S. National Library of Medicine. *NAPROSYN- naproxen tablet; EC-NAPROSYN- naproxen tablet, delayed release; NAPROSYN- naproxen suspension; ANAPROX- naproxen sodium tablet; ANAPROX DS- naproxen sodium tablet [Genentech, Inc.]*. Revised March 2016. DailyMed website <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=68848217-03c9-4377-9be6-6f567e629129>.
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Appendix A. Appendix: Existing Sample VA Artifacts

Note that the following VA artifacts address both cervical and lumbar/thoracic radiculopathy, and both are presented to demonstrate exemplar workflows for referrals to neurosurgery in the VA.

Figure A.1. Neurosurgery Consults

Neurosurgery Done

Cervical/Thoracic Myelopathy:

Urgency Criteria:

1) Acute or rapidly progressing weakness should be considered urgent.

A) Order diagnostic tests and consult.

B) Page on-call Neurosurgery Resident.

2) Pain or sensory changes do not require an urgent consult.

Required Tests:

...MRI or CT Myelogram within 6 months, positive for cervical or thoracic central canal stenosis.

...Ensure that outside studies come with patient.

Quick Orders:

<<MRI>>...

<<Myelogram>>...

<< Neurosurgery Consult >>

<< Neurosurgery E-Consult >>

PROVIDERS NOTE:

To be a surgical candidate for an elective spine procedure BMI must be < 30.

Figure A.2. Service Prerequisites, Neurosurgery Consult for Cervical /Thoracic Myelopathy

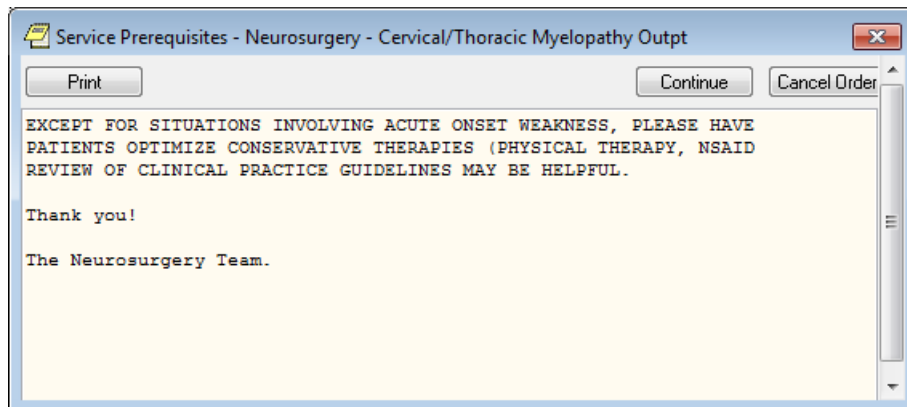


Figure A.3. Neurosurgery Consult

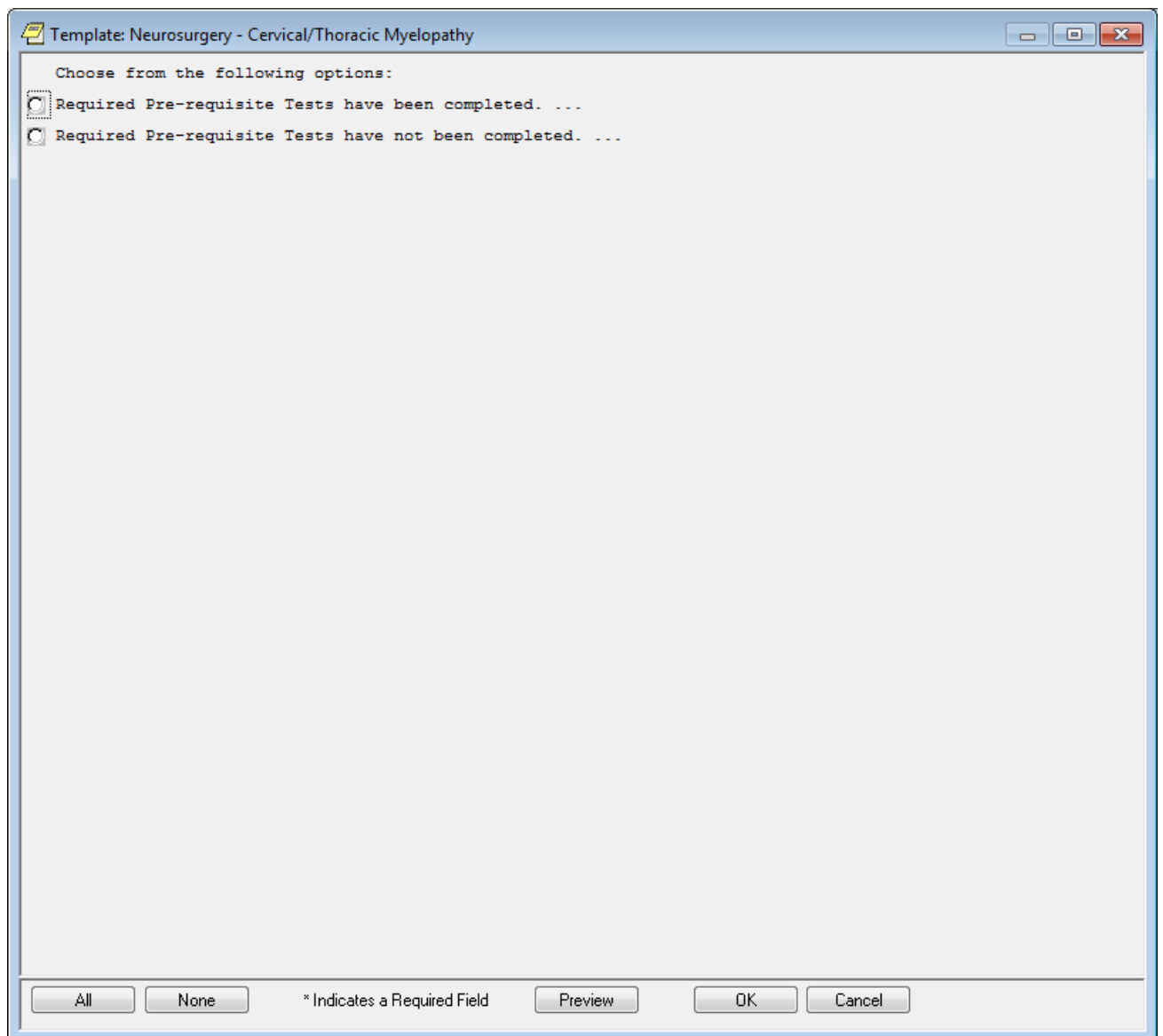


Figure A.4. Consult Request Dialog Box from Requesting Clinical Provider to Consultant

Template: Neurosurgery - Cervical/Thoracic Myelopathy

Required Pre-requisite Tests have been completed.
Would you please provide your Recommendations

☐ and return to PCP for therapy.

☐ start treatment and return to PCP for follow up and maintenance.

☐ start treatment, monitor for effect and when on stable therapy return to PCP.

☐ and treat as long as necessary (or indefinitely).

1) Description of symptoms and Physical Exam findings: *

2) MRI Results:*

Date and place images done: *

3) Is patient interested in surgical intervention: * ☐ Yes ☐ No

Please enter any additional comments or information below:

* Indicates a Required Field

Preview OK Cancel

Figure A.5. Neurosurgery Consult Order

Order a Consult

Consult to Service/Specialty
Neurosurgery - Cervical/Thoracic Myelopathy Outpt
Neurosurgery - Cervical/Thoracic Myelopathy Outpt

Urgency: ROUTINE
Attention:
Clinically indicated date:
Patient will be seen as an: ☐ Inpatient ☒ Outpatient
Place of Consultation: CONSULTANT'S CHOICE
Provisional Diagnosis:
Lexicon

Reason for Request (not editable)
Required Pre-requisite Tests have been completed.
Would you please provide your Recommendations
start treatment, monitor for effect and when on stable therapy return to PCP.
1)Description of symptoms and Physical Exam findings: test
2) MRI Results: test
Date and place images done: test
3) Is patient interested in surgical intervention: Yes

Neurosurgery - Cervical/Thoracic Myelopathy Outpt Cons CONSULTANT'S CHOICE
Accept Order Quit

Figure A.6. Neurosurgery Consult Order

Order a Consult

Consult to Service/Specialty
Neurosurgery - Cervical/Thoracic Myelopathy Outpt
Neurosurgery - Cervical/Thoracic Myelopathy Outpt

Urgency: ROUTINE
Attention:
Clinically indicated date:
Patient will be seen as an: ☐ Inpatient ☒ Outpatient
Place of Consultation: CONSULTANT'S CHOICE
Provisional Diagnosis:
Lexicon

Reason for Request (not editable)
Required Pre-requisite Tests have not been completed.
If Tests have not been done a Neurosurgery Consult is not
appropriate. If you have questions please order a Non Visit
Consult and clearly explain issues.

Neurosurgery - Cervical/Thoracic Myelopathy Outpt Cons CONSULTANT'S CHOICE
Accept Order Quit

Figure A.7. Neurosurgery Consult

The image shows a screenshot of a software window titled "Neurosurgery" with a "Done" button in the top right corner. The window contains a form with the following sections:

- Emergent Consult:**
 - 1) Order consult and diagnostic tests.
 - 2) Page on-call Neurosurgery Resident.
- Routine Referral:**
 - 1) Order appropriate studies. (listed under each diagnosis)
 - 2) Order consult when studies completed.
- NOTE:**
 - It is essential that studies are completed prior to ordering a consult.
 - Studies should be no more than 5-6 months old at the time patient is seen in Neurosurgery Clinic.
 - Outside Imaging **MUST BE** sent to PVAMC Film Library.
- Consults...

Figure A.8. Neurosurgery Spine Consults

Neurosurgery

Done

Spine - Consults:

<<Traumatic fx/dislocations>>...

<<Spondylolisthesis/Subluxation>>...

<<Osteomyelitis>>...

<<Neoplastic Spine>>...

<<Cervical/Thoracic Radiculopathy>>...

<<Cervical/Thoracic Myelopathy>>...

<<Lumbar Radiculopathy>>...

<<Lumbar Neurogenic Claudication>>...

<< E Consults >>

NOTE: Studies must be done within 6 months of patient being seen in clinic.

Information Only:

<<Neck Pain>>...

<<Low Back Pain>>...

<<Frequently Asked Questions>>...

<<Clinical Practice Guidelines>>

Cranial:

<< AVM/ANEURYSM >>

<<Chiari Malformation>>...

<< Trigeminal Neuralgia >>

<<Intracranial Mass>>...

<<Normal Pressure Hydrocephalus>>...

Plastic Surgery:

<<Carpal Tunnel Syndrome>>...

<<Ulnar Neuropathy>>...

Carotid Stenosis:

Refer to Vascular Surgery or Neurology.

Vascular Surgery...

Neurology...

PADRECC OPTIONS: ONLY for PADRECC PROVIDERS

<< DBS for Parkinsons Disease >>

<< DBS for Essential Tumor >>

<< Thalamotomy >>

Figure A.9. Cervical/Thoracic Radiculopathy

The screenshot shows a software window titled "Neurosurgery" with a "Done" button in the top right corner. The window is divided into two main sections. The left section, titled "Cervical/Thoracic Radiculopathy:", contains two sub-sections: "Urgency Criteria:" and "Required Tests/Treatments:". The "Urgency Criteria:" section lists two numbered items, each with an "A)" and "B)" sub-item. The "Required Tests/Treatments:" section lists four numbered items. The right section, titled "Quick Orders:", contains three lines of text: "<<MRI>>...", "Myelogram Consult", and "<< Neurosurgery Consult >>" followed by "<< Neurosurgery E-Consult >>". Below these is a line for "Northwest Pain Consult Menu". At the bottom of the right section is a "PROVIDERS NOTE:" followed by a paragraph of text.

Cervical/Thoracic Radiculopathy:

Urgency Criteria:

- 1) Acute or rapidly progressing weakness should be considered urgent.
 - A) Order diagnostic tests and consult.
 - B) Page on-call Neurosurgery Resident.
- 2) Pain or sensory changes do not require an urgent consult.
 - A) Order diagnostic studies. AFTER completion of studies order consult.
 - B) Order Routine Consult.

Required Tests/Treatments:

- 1) MRI or CT Myelogram done within 6 months AND POSITIVE for nerve root compression OR Foraminal Stenosis which correlate with symptoms. IF HX Foraminal Stenosis which correlate with symptoms. IF HX previous surgery order MRI w/wO contrast.
- 2) Documented detailed Physical Exam to include Neurological findings.
- 3) Documented PT for 6 weeks.
- 4) If patient is NOT interested in surgical intervention, REFER TO Chronic Pain.

Quick Orders:

<<MRI>>...
Myelogram Consult

<< Neurosurgery Consult >>
<< Neurosurgery E-Consult >>

Northwest Pain Consult Menu

PROVIDERS NOTE:

To be a surgical candidate for an elective spine procedure BMI must be < 30.

Figure A.10. MRI Orders

◀ ▶

MRI Orders

Done

EFFECTIVE: 1/20/2015
MRI is no longer a consult request and is a Radiology order.

PROVIDERS:
For ECU and Inpatients call x54272
After 10:30pm/weekends/or holidays
page the Radiology Resident at 18432

For ALL Outpatient scheduling
call x55126. Leave a message if
no answer.

URGENT/ASAP for outpatients is within 2 weeks.
URGENT/ASAP for inpatients is within 24 hours.

ROUTINE: next available appointment.

Quick Orders:

- ☐ LORAZEPAM 1MG PRE-MRI
Chem 7 (includes Creatinine/EGFR)
- ☐ MRI Contrast Guidelines

PLEASE COMPLETE the Clinical History in order to obtain a more clinically accurate interpretation.
Go to the Imaging order below.

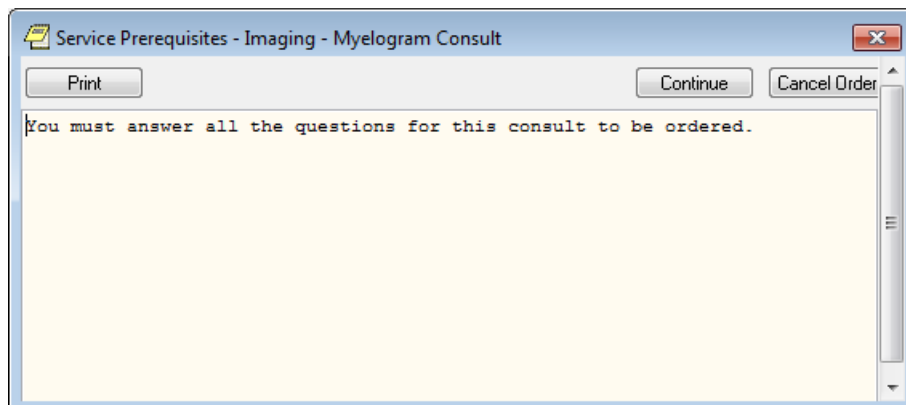
<< Imaging MRI Order >> << Click here

Figure A.11. Myelogram Consult



A screenshot of a software window titled "Myelogram Consult" with a "Done" button in the top right corner. The window is divided into two main sections. The left section, labeled "Myelogram Consult:", contains a "PROVIDERS NOTE:" which reads: "Please review your patient's history and medications prior to ordering this consult. A SSCU consult is also required. Imaging Service will order the CT Scan if consult is completed and accepted." The right section, labeled "Quick Orders:", lists three orders: "DIPHENHYDRAMINE 50MG 2 HRS BEFORE PROCEDURE", "PREDNISONE 50MG 12 HOURS AND 2 HOURS PRE-PROCEDL", and "METHYLPREDNISOLONE 40MG PO 12 AND 2 HOURS PRE-PR". Below these orders are two expandable sections: "<< Myelogram Consult and SSCU Consult >>" and "<< Myelogram Consult and SSCU Anticoag Consult >>". A horizontal line is visible below the second expandable section.

Figure A.12. Service Prerequisites for Imaging Myelogram Consult



A screenshot of a software window titled "Service Prerequisites - Imaging - Myelogram Consult" with a red "X" button in the top right corner. The window has a "Print" button on the left and "Continue" and "Cancel Order" buttons on the right. The main area contains a text box with the message: "You must answer all the questions for this consult to be ordered." Below this message is a large, empty yellow rectangular area, likely for displaying questions or answers.

Figure A.13. Reason for Request Myelogram

Reason for Request: Imaging - Myelogram Consult

Consult requested: Myelogram

1) Does patient have a previous history of contrast reaction, (even mild): * ☒ Yes ☐ No

If yes, prescribe:

1) Methylprednisilone 40mg (or 50mg prednisone) PO as 12hrs and 2hrs before the procedure.

2) Diphenhydramine (Benadryl) 50mg PO 2hrs before the procedure

2) Is Patient on Glucophage for diabetes: * ☐ Yes ☐ No

Rare risk of lactic acidosis following renal failure.

If yes, consider discontinuing it the morning of the procedure and for 48hrs following the procedure.

3) Is Patient on drugs that lower the seizure threshold: * ☐ Yes ☐ No

Tricyclic antidepressants: DISCONTINUE for two weeks before the myelogram.

These include Elavil, Endep, Etrafon, Limbitrol, Ludiomil, Norpramin, Pamelor, Sindquan, Surmontil, Tofranil, Triavil, Vivactil.

The following need to be stopped before the procedure (length to be determined by referring physician):

PHENOTHIAZINES (chlorpromazine, prochlorperazine, perphenazine, thioridazine).

ANTIPSYCHOTICS (thiothixene, haloperidol, droperidol).

CNS stimulants (methylphenidate, ephedrine, pseudoephedrine).

MAO INHIBITORS (tranlycypromine, procarbazine).

Others (lithium, reserpine, isoniazid).

4) I have read the above med lists and have reviewed the patient's current medications: * ☐ Yes ☐ No

5) Area: *

☐ C - SPINE

☐ L - SPINE

☐ T - SPINE

6) Reason for Request: *

* Indicates a Required Field

Preview OK Cancel

Figure A.14. Reason for Request Imaging Myelogram Consult

Reason for Request: Imaging - Myelogram Consult

Even mild: ☐ Yes ☐ No

If yes, prescribe:

- 1) Methylprednisilone 40mg (or 50mg prednisone) PO as 12hrs and 2hrs before the procedure.
- 2) Diphenhydramine (Benadryl) 50mg PO 2hrs before the procedure

2) Is Patient on Glucophage for diabetes: * ☐ Yes ☐ No

Rare risk of lactic acidosis following renal failure.
If yes, consider discontinuing it the morning of the procedure and for 48hrs following the procedure.

3) Is Patient on drugs that lower the seizure threshold: * ☐ Yes ☐ No

Tricyclic antidepressants: DISCONTINUE for two weeks before the myelogram.
These include Elavil, Endep, Etrafon, Limbitrol, Ludiomil, Norpramin, Pamelor, Sindquan, Surmontil, Tofranil, Triavil, Vivactil.

The following need to be stopped before the procedure (length to be determined by referring physician):
PHENOTHIAZINES (chlorpromazine, prochlorperazine, perphenazine, thioridazine).
ANTIPSYCHOTICS (thiothixene, haloperidol, droperidol).
CNS stimulants (methylphenidate, ephedrine, pseudoephedrine).
MAO INHIBITORS (tranylcypromine, procarbazine).
Others (lithium, reserpine, isoniazid).

4) I have read the above med lists and have reviewed the patient's current medications: * ☐ Yes ☐ No

5) Area: *

☐ C - SPINE
☐ L - SPINE
☐ T - SPINE

6) Reason for Request: *

Please enter your pager and phone number where you can be reached in the event there is a critical finding.

Pager: *
Phone: *

* Indicates a Required Field

Preview OK Cancel

Figure A.15. Reason for Request Short Stay Unit

Reason for Request: Short Stay Care Unit

Consult requested: SSCU - Post Myelogram

Admit patient to SSCU:

Requested date: Service:

1) Injection time was at:

2) Record VS in CPRS and on SSCU flow sheet upon arrival to unit.

3) Monitor VS every 15 minutes X 2, then every hour X 2 and at discharge.

4) Diet:

- ☐ Clear liquids
- ☐ Nothing per mouth
- ☐ No diet restrictions
- ☐ Regular diet, force fluids
- ☐ As tolerated
- ☐ Other -

5) Activity: *

- ☐ No restrictions
- ☐ Bedrest
- ☐ Bedrest with bathroom privileges
- ☐ Elevate HOB 30 degrees or more

6) Call MD for persistent Nausea and Vomiting.

7) Discharge home after 3.5 hours post injection. VS @ baseline and discharge criteria is met per SSCU Operating policy.

8) Review and send written Discharge instructions with patient. Encourage slow movements for 24 hours.

Please enter any additional comments or information below:

* Indicates a Required Field

Preview OK Cancel

Figure A.16. Order Consult Myelogram

The screenshot shows a software window titled "Order a Consult" with a standard Windows-style title bar (minimize, maximize, close buttons). The window is divided into several sections:

- Consult to Service/Specialty:** A list box containing "Imaging - Myelogram Consult", which is currently selected and highlighted in blue.
- Urgency:** A dropdown menu set to "ROUTINE".
- Attention:** An empty dropdown menu.
- Clinically indicated date:** A text field with a calendar icon (three dots).
- Patient will be seen as an:** Two radio buttons: "Inpatient" (unselected) and "Outpatient" (selected).
- Place of Consultation:** A dropdown menu set to "CONSULTANT'S CHOICE".
- Provisional Diagnosis:** A text field with a "Lexicon" button next to it.
- Reason for Request (not editable):** A large text area with a yellow background containing the following text:

```
Consult requested: Myelogram  
  
1) Does patient have a previous history of contrast reaction,  
   (even mild):Yes  
  
2) Is Patient on Glucophage for diabetes: Yes  
  
3) Is Patient on drugs that lower the seizure threshold: Yes
```
- Summary:** A text field at the bottom left showing "Imaging - Myelogram Consult Cons CONSULTANT'S CHOICE".
- Buttons:** "Accept Order" and "Quit" buttons are located at the bottom right.

Figure A.17. Short Stay Orders

Reason for Request: Short Stay Care Unit

Consult requested: SSCU - Post Myelogram

Admit patient to SSCU:

Requested date: Service:

1) Injection time was at:

2) Record VS in CPRS and on SSCU flow sheet upon arrival to unit.

3) Monitor VS every 15 minutes X 2, then every hour X 2 and at discharge.

4) Diet:

- ☐ Clear liquids
- ☐ Nothing per mouth
- ☐ No diet restrictions
- ☐ Regular diet, force fluids
- ☐ As tolerated
- ☐ Other -

5) Activity: *

- ☐ No restrictions
- ☐ Bedrest
- ☐ Bedrest with bathroom privileges
- ☐ Elevate HOB 30 degrees or more

6) Call MD for persistent Nausea and Vomiting.

7) Discharge home after 3.5 hours post injection. VS @ baseline and discharge criteria is met per SSCU Operating policy.

8) Review and send written Discharge instructions with patient. Encourage slow movements for 24 hours.

Please enter any additional comments or information below:

* Indicates a Required Field

Preview OK Cancel

Figure A.18. Short Stay Care Unit Consult

The 'Order a Consult' window displays the following information:

- Consult to Service/Specialty:** Short Stay Care Unit
- Urgency:** ROUTINE
- Attention:** (empty dropdown)
- Clinically indicated date:** (empty date field)
- Patient will be seen as an:** ☐ Inpatient ☒ Outpatient
- Place of Consultation:** CONSULTANT'S CHOICE
- Provisional Dx (REQUIRED):** (empty text field with a Lexicon button)
- Reason for Request:**
 - Consult requested: SSCU - Post Myelogram
 - Admit patient to SSCU:
 - Requested date: Mar 14, 2017
 - Service: CARDIOLOGY
 - 1) Injection time was at: Mar 14, 2017
 - 2) Record VS in CPRS and on SSCU flow sheet upon arrival to unit.
 - 3) Monitor VS every 15 minutes X 2, then every hour X 2 and at discharge.
 - 4) Diet: Clear liquids
- Short Stay Care Unit Cons:** CONSULTANT'S CHOICE
- Buttons:** Accept Order, Quit

Figure A.19. Service Prerequisite Questions

The 'Service Prerequisites - Imaging - Myelogram Consult' window displays the following information:

- Buttons:** Print, Continue, Cancel Order
- Text:** You must answer all the questions for this consult to be ordered.
- Area:** A large empty text area for entering prerequisite answers.

Figure A.20. Neurosurgery Consult Lumbar/Thoracic Spine (image 1)

Template: NEUROSURGERY LUMBAR/THORACIC SPINE OUTPT - WLA

☒ <<--- CLICK HERE TO START CONSULT REQUEST

.....

ZZTEST, A PATIENT GRACE 4399 77 Y/O FEMALE
SERVICE CONNECTED & - NONE FOUND
RATED DISABILITIES - NONE FOUND
.

.....

NEUROSURGERY LUMBAR/THORACIC SPINE
For urgent request, please page the service: [Pager info link](#)

If clinically appropriate, this consult may be responded to using chart review (E-Consult).

***Please note: Your consult WILL BE DENIED if this patient does not have relevant imaging within 1 year of your consult request. All outside images MUST be uploaded into our Vista Imaging/IMPAX system before submitting your request. This helps us screen patients and determine whether or not they would benefit from surgical intervention ***

☐ Spinal Stenosis (PM&RS evaluation required prior to neurosurgical evaluation)
☐ Herniated disc (lumbar or thoracic)
(PM&RS evaluation required prior to neurosurgical evaluation)
☐ Lumbar Spondylolisthesis (PM&RS evaluation required prior to neurosurgical evaluation)

All None * Indicates a Required Field Preview OK Cancel

Figure A.21. Neurosurgery Consult Lumbar/Thoracic Spine (image 2)

Template: NEUROSURGERY LUMBAR/THORACIC SPINE OUTPT - WLA

☒ <<--- CLICK HERE TO START CONSULT REQUEST

.....

ZZTEST, A PATIENT GRACE 4399 77 Y/O FEMALE
SERVICE CONNECTED & - NONE FOUND
RATED DISABILITIES - NONE FOUND
.

.....

NEUROSURGERY LUMBAR/THORACIC SPINE
For urgent request, please page the service: [Pager info link](#)

If clinically appropriate, this consult may be responded to using chart review (E-Consult).

***Please note: Your consult WILL BE DENIED if this patient does not have relevant imaging within 1 year of your consult request. All outside images MUST be uploaded into our Vista Imaging/IMPAX system before submitting your request. This helps us screen patients and determine whether or not they would benefit from surgical intervention ***

☒ Spinal Stenosis (PM&RS evaluation required prior to neurosurgical evaluation)
☐ <---CLICK HERE TO CONTINUE
ALL are generally required to warrant neurosurgery:
1. Has an MRI without contrast (or a CT myelogram if contraindicated) been completed within 1 year of this consult request? * ☐ Yes ☐ No
2. Has this patient had an epidural steroid injection? * ☐ Yes ☐ No
- If yes, please provide the date:
- If no, please consult interventional pain management prior to consulting neurosurgery (consults/procedure order menu-->WLA consults -->pain consults WLA-->interventional pain clinic)
3. Patient agrees to surgical treatment if appropriate. * ☐ Yes ☐ No
- If no, please do not refer this patient to our clinic (consult PM&RS instead for conservative management)

Additional history and rationale for request:
.

☐ Herniated disc (lumbar or thoracic)

All None * Indicates a Required Field Preview OK Cancel

Figure A.22. Neurosurgery Consult Lumbar/Thoracic Spine (image 3)

Template: NEUROSURGERY LUMBAR/THORACIC SPINE OUTPT - WLA

NEUROSURGERY LUMBAR/THORACIC SPINE

For urgent request, please page the service: [Pager info link](#)

If clinically appropriate, this consult may be responded to using chart review (E-Consult).

***Please note: Your consult WILL BE DENIED if this patient does not have relevant imaging within 1 year of your consult request. All outside images MUST be uploaded into our Vista Imaging/IMPAX system before submitting your request. This helps us screen patients and determine whether or not they would benefit from surgical intervention ***

☐ Spinal Stenosis (PM&RS evaluation required prior to neurosurgical evaluation)

☒ Herniated disc (lumbar or thoracic)
(PM&RS evaluation required prior to neurosurgical evaluation)

☐ <====CLICK HERE TO CONTINUE

ALL are generally required to warrant neurosurgery:

1. Has an MRI without contrast (or a CT myelogram if contraindicated) been completed within 1 year of this consult request? * ☐ Yes ☐ No
2. Has this patient had an epidural steroid injection? * ☐ Yes ☐ No
 - If yes, please provide the date:
 - If no, please consult interventional pain management prior to consulting neurosurgery (consults/procedure order menu--> WLA consults --> pain consults WLA--> interventional pain clinic)
3. Patient agrees to surgical treatment if appropriate. * ☐ Yes ☐ No
 - If no, please do not refer this patient to our clinic (consult PM&RS instead for conservative management)
4. Does this patient have radiculopathy in a specific dermatomal distribution? * ☐ Yes ☐ No

Additional history and rationale for request:
*

☐ Lumbar Spondylolisthesis (PM&RS evaluation required prior to neurosurgical evaluation)

* Indicates a Required Field

Figure A.23. Neurosurgery Consult Lumbar/Thoracic Spine (image 4)

Template: NEUROSURGERY LUMBAR/THORACIC SPINE OUTPT - WLA

NEUROSURGERY LUMBAR/THORACIC SPINE

For urgent request, please page the service: [Pager info link](#)

If clinically appropriate, this consult may be responded to using chart review (E-Consult).

***Please note: Your consult WILL BE DENIED if this patient does not have relevant imaging within 1 year of your consult request. All outside images MUST be uploaded into our Vista Imaging/IMPAX system before submitting your request. This helps us screen patients and determine whether or not they would benefit from surgical intervention ***

☐ Spinal Stenosis (PM&RS evaluation required prior to neurosurgical evaluation)

☐ Herniated disc (lumbar or thoracic)
(PM&RS evaluation required prior to neurosurgical evaluation)

☒ Lumbar Spondylolisthesis (PM&RS evaluation required prior to neurosurgical evaluation)

☐ <====CLICK HERE TO CONTINUE

ALL are generally required to warrant neurosurgery:

1. Has an MRI without contrast (or a CT myelogram if contraindicated) been completed within 1 year of this consult request? * ☐ Yes ☐ No
2. History of mechanical back pain- pain in the back and possibly down the leg with flexion, extension, getting up out of a chair, rolling over in bed. * ☐ Yes ☐ No
3. X-rays showing motion at a lumbar interspace with flexion and extension. * ☐ Yes ☐ No
 - If no, please order lumbar spine flexion/extension x-rays to determine the degree of spondylolisthesis
4. Patient agrees to surgical treatment if appropriate. * ☐ Yes ☐ No
 - If no, please do not refer this patient to our clinic (consult PM&RS instead for conservative management)

Additional history and rationale for request:
*

* Indicates a Required Field

Chapter 5. Acronyms

Acronym	Definition
BMI	Body Mass Index
CDS	Clinical Decision Support
CKD	Chronic Kidney Disease
COX-2	Cyclo-oxygenase-2
CT	Computed Tomography
HL7	Health Level 7
IV	Intravenous
KBS	Knowledge Based Systems
KNART	Knowledge Artifact
MRI	Magnetic Resonance Imaging
NSAID	Nonsteroidal Anti-inflammatory Drug
OIIG	Office of Informatics and Information Governance
SME	Subject Matter Expert
SSCU	Short stay care unit
TO	Task Order
VA	Department of Veteran Affairs