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

Publication date May 2018
Copyright © 2018 B3 Group, Inc.
Copyright © 2018 Cognitive Medical Systems, Inc.

Abstract

Table 1. Relevant KNART Information

<table>
<thead>
<tr>
<th>KNART Name</th>
<th>Associated CLIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiculopathy (Lumbar/Thoracic) - Order Set</td>
<td>CLIN0004AB</td>
</tr>
<tr>
<td>Radiculopathy (Lumbar/Thoracic) - Documentation Template</td>
<td>CLIN0005AC</td>
</tr>
<tr>
<td>Radiculopathy (Lumbar/Thoracic) - Composite/Consult Request</td>
<td>N/A</td>
</tr>
</tbody>
</table>

B3 Group, Inc.

NOTICE OF GOVERNMENT COPYRIGHT LICENSE AND UNLIMITED RIGHTS LICENSE

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License.

You may obtain a copy of the License at http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Portions of this content are derivative works from content produced by Cognitive Medical Systems, Inc. licensed under the Apache License, Version 2.0.

Additional portions of this content are derivative works from content contributed by Motive Medical Intelligence Inc., under Creative Commons Attribution-ShareAlike 4.0.

Contributions from 2013-2018 were performed either by US Government employees, or under US Veterans Health Administration contracts.

US Veterans Health Administration contributions by government employees are work of the U.S. Government and are not subject to copyright protection in the United States. Portions contributed by government employees are USGovWork (17USC §105). Not subject to copyright.

See: https://www.usa.gov/government-works

Contribution by contractors to the US Veterans Health Administration during this period are contractually contributed under the Apache License, Version 2.0 and US Government sponsorship is acknowledged under Contract VA118-16-D-1008, Task Order VA11817F10080007.

Cognitive Medical Systems, Inc.

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License.

You may obtain a copy of the License at http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

This and related content produced by Cognitive Medical Systems, Inc. licensed under the Apache License, Version 2.0 is available at: https://bitbucket.org/cogmedsys/hl7-kas-examples

Additional portions of this content are derivative works from content contributed by Motive Medical Intelligence Inc., under Creative Commons Attribution-ShareAlike 4.0. https://bitbucket.org/cogmedsys/kas-source-material

Contributions from 2013-2018 were performed either by US Government employees, or under US Veterans Health Administration contracts.
US Veterans Health Administration contributions by government employees are work of the U.S. Government and are not subject to copyright protection in the United States. Portions contributed by government employees are USGovWork (17USC §105). Not subject to copyright. See: https://www.usa.gov/government-works

Contribution by contractors to the US Veterans Health Administration during this period are contractually contributed under the Apache License, Version 2.0 and US Government sponsorship is acknowledged under Contract VA118-16-D-1008-0007.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA Subject Matter Expert (SME) Panel</td>
<td>vii</td>
</tr>
<tr>
<td>Introduction</td>
<td>viii</td>
</tr>
<tr>
<td>Conventions Used</td>
<td>ix</td>
</tr>
<tr>
<td>1. Radiculopathy (Lumbar/Thoracic)</td>
<td>1</td>
</tr>
<tr>
<td>Clinical Context</td>
<td>1</td>
</tr>
<tr>
<td>Knowledge Artifacts</td>
<td>1</td>
</tr>
<tr>
<td>2. Composite</td>
<td>3</td>
</tr>
<tr>
<td>Knowledge Narrative</td>
<td>3</td>
</tr>
<tr>
<td>Consult and Referrals</td>
<td>3</td>
</tr>
<tr>
<td>3. Documentation Template</td>
<td>4</td>
</tr>
<tr>
<td>Knowledge Narrative</td>
<td>4</td>
</tr>
<tr>
<td>Chief Complaint</td>
<td>4</td>
</tr>
<tr>
<td>Prior Conservative Therapies</td>
<td>5</td>
</tr>
<tr>
<td>Medical History</td>
<td>5</td>
</tr>
<tr>
<td>Surgical History</td>
<td>6</td>
</tr>
<tr>
<td>Social History</td>
<td>6</td>
</tr>
<tr>
<td>Imaging History</td>
<td>7</td>
</tr>
<tr>
<td>Medications</td>
<td>7</td>
</tr>
<tr>
<td>Surgical Candidacy</td>
<td>7</td>
</tr>
<tr>
<td>4. Order Set</td>
<td>9</td>
</tr>
<tr>
<td>Knowledge Narrative</td>
<td>9</td>
</tr>
<tr>
<td>Medications</td>
<td>9</td>
</tr>
<tr>
<td>Procedures</td>
<td>10</td>
</tr>
<tr>
<td>Imaging</td>
<td>10</td>
</tr>
<tr>
<td>Additional Consults</td>
<td>10</td>
</tr>
<tr>
<td>Patient Education</td>
<td>11</td>
</tr>
<tr>
<td>Bibliography/Evidence</td>
<td>12</td>
</tr>
<tr>
<td>A. Appendix: Existing Sample VA Artifacts</td>
<td>13</td>
</tr>
<tr>
<td>5. Acronyms</td>
<td>30</td>
</tr>
</tbody>
</table>
List of Figures

A.1. Neurosurgery Consults ........................................................................................... 13
A.2. Service Prerequisites, Neurosurgery Consult for Cervical/Thoracic Myelopathy .......... 14
A.3. Neurosurgery Consult ........................................................................................... 14
A.4. Consult Request Dialog Box from Requesting Clinical Provider to Consultant .......... 15
A.5. Neurosurgery Consult Order .................................................................................. 16
A.6. Neurosurgery Consult Order .................................................................................. 16
A.7. Neurosurgery Consult ........................................................................................... 17
A.8. Neurosurgery Spine Consults ................................................................................ 18
A.9. Cervical/Thoracic Radiculopathy ........................................................................... 19
A.10. MRI Orders ........................................................................................................... 20
A.11. Myelogram Consult .............................................................................................. 21
A.12. Service Prerequisites for Imaging Myelogram Consult ............................................. 21
A.13. Reason for Request Myelogram ............................................................................ 22
A.14. Reason for Request Imaging Myelogram Consult .................................................... 23
A.15. Reason for Request Short Stay Unit ...................................................................... 24
A.16. Order Consult Myelogram .................................................................................... 25
A.17. Short Stay Orders .................................................................................................. 26
A.18. Short Stay Care Unit Consult ................................................................................ 27
A.19. Service Prerequisite Questions ............................................................................. 27
A.22. Neurosurgery Consult Lumbar/Thoracic Spine (image 3) ....................................... 29
A.23. Neurosurgery Consult Lumbar/Thoracic Spine (image 4) ....................................... 29
# List of Tables

1. Relevant KNART Information ..................................................................................... ii
1.1. Clinical Context Domains ......................................................................................... 1
# VA Subject Matter Expert (SME) Panel

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Project Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>David (Cory) Adamson, MD</td>
<td>Physician, 1670 Clairmont Rd, Atlanta, GA 30033</td>
<td>SME, Primary</td>
</tr>
<tr>
<td>Jacob Rachlin, MD</td>
<td>Chief of Neurosurgery, VA Boston Health Care System, 1400 VFW Parkway, Boston, MA 02132</td>
<td>SME, Secondary</td>
</tr>
<tr>
<td>Joseph King, MD</td>
<td>Physician, Surgical Service, VA New England/Connecticut Healthcare System, 950 Campbell Ave, West Haven, CT 06516</td>
<td>SME</td>
</tr>
</tbody>
</table>
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

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

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

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
• ☐ Aching

<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)
• □ Chonic (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
• ☐ 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

Knowledge Narrative

[See Clinical Context in Chapter 1.]

Medications

[Begin Medications section.]


[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.]
Order Set

[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


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**

<table>
<thead>
<tr>
<th>Cervical/Thoracic Myelopathy:</th>
<th>Quick Orders:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urgency Criteria:</strong></td>
<td></td>
</tr>
<tr>
<td>1) Acute or rapidly progressing weakness should be considered urgent</td>
<td>&lt;&lt;MRI&gt;&gt;&gt;</td>
</tr>
<tr>
<td>A) Order diagnostic tests and consult</td>
<td>&lt;&lt;Myelogram&gt;&gt;...</td>
</tr>
<tr>
<td>B) Page on call Neurosurgery Resident</td>
<td>&lt;&lt;Neurosurgery Consult&gt;&gt;</td>
</tr>
<tr>
<td>2) Pain or sensory changes do not require an urgent consult</td>
<td>&lt;&lt;Neurosurgery E-Consult&gt;&gt;</td>
</tr>
<tr>
<td><strong>Required Tests:</strong></td>
<td></td>
</tr>
<tr>
<td>...MRI or CT Myelogram within 6 months</td>
<td></td>
</tr>
<tr>
<td>...positive for cervical or thoracic central canal stenosis</td>
<td></td>
</tr>
<tr>
<td>...Ensure that outside studies come with patient</td>
<td></td>
</tr>
</tbody>
</table>

**Providers Note:**
To be a surgical candidate for an elective spine procedure BMI must be < 30.
Appendix: Existing Sample VA Artifacts

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

EXCEPT FOR SITUATIONS INVOLVING ACUTE ONSET WEAKNESS, PLEASE HAVE PATIENTS OPTIMIZE CONSERVATIVE THERAPIES (PHYSICAL THERAPY, NSAID REVIEW OF CLINICAL PRACTICE GUIDELINES MAY BE HELPFUL.

Thank you!
The Neurosurgery Team.

Figure A.3. Neurosurgery Consult

Choose from the following options:
- [ ] Required Pre-requisite Tests have been completed. ...
- [ ] Required Pre-requisite Tests have not been completed. ...

*Indicates a Required Field
Figure A.4. Consult Request Dialog Box from Requesting Clinical Provider to Consultant
Figure A.5. Neurosurgery Consult Order

![Image of Neurosurgery Consult Order](image1.png)

Figure A.6. Neurosurgery Consult Order

![Image of Neurosurgery Consult Order](image2.png)
Appendix: Existing Sample VA Artifacts

Figure A.7. Neurosurgery Consult

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.
### Figure A.8. Neurosurgery Spine Consults

<table>
<thead>
<tr>
<th>Spine - Consults:</th>
<th>Cranial:</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;&lt;Traumatic Fractures/deformities&gt;&gt;...</td>
<td>&lt;&lt;AVM/ANEURYSM&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Spondylolisthesis/Subluxation&gt;&gt;...</td>
<td>&lt;&lt;Cerebral Manifestation&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Degenerative&gt;&gt;...</td>
<td>&lt;&lt;Tetradural Neuroma&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Neoplastic Spine&gt;&gt;...</td>
<td>&lt;&lt;Intracranial Mass&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Cervical/Thoracic Radiculopathy&gt;&gt;...</td>
<td>&lt;&lt;Normal Pressure Hydrocephalus&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Cervical/Thoracic Myelopathy&gt;&gt;...</td>
<td></td>
</tr>
<tr>
<td>&lt;&lt;Lumbar Radiculopathy&gt;&gt;...</td>
<td></td>
</tr>
<tr>
<td>&lt;&lt;Lumbar Neurategic Claudication&gt;&gt;...</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Plastic Surgery:</th>
<th>Carotid Stenosis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;&lt;Carpal Tunnel Syndrome&gt;&gt;...</td>
<td>Refer to Vascular Surgery</td>
</tr>
<tr>
<td>&lt;&lt;Ulnar Neuropathy&gt;&gt;...</td>
<td>or Neurology:</td>
</tr>
<tr>
<td></td>
<td>Vascular Surgery...</td>
</tr>
<tr>
<td></td>
<td>Neurology...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Only:</th>
<th>PADRECC OPTIONS: ONLY for PADRECC PROVIDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;&lt;Neck Pain&gt;&gt;...</td>
<td>&lt;&lt;DBS for Parkinsons Disease&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Low Back Pain&gt;&gt;...</td>
<td>&lt;&lt;DBS for Essential Tumor&gt;&gt;...</td>
</tr>
<tr>
<td>&lt;&lt;Frequently Asked Questions&gt;&gt;...</td>
<td>&lt;&lt;Thoratomy&gt;&gt;...</td>
</tr>
</tbody>
</table>

| <<Clinical Practice Guidelines>>...|
Appendix: Existing Sample VA Artifacts

Figure A.9. Cervical/Thoracic Radiculopathy

### Urgency Criteria:
1. Acute or rapidly progressing weakness should be considered urgent.
   
   A) Order diagnostic tests and consult.

### Quick Orders:
- Myelogram 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 HK Foraminal Stenosis which correlate with symptoms, IF HK previous surgery order MRI W/ W/O contrast.

### Providers Note:
To be a surgical candidate for an elective spine procedure BMI must be < 30.

- Northwest Pain Consult Menu
Figure A.10. MRI Orders

**Effective: 1/20/2015**

MRI is no longer a consult request and is a Radiology order.

Providers:
For ECU and Inpatients call x54272
After 10:30am/weekends/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 Contact Guidelines

PLEASE COMPLETE the Clinical History in order to obtain a more clinically accurate interpretation.
Go to the Imaging order below.
Appendix: Existing
Sample VA Artifacts

Figure A.11. Myelogram Consult

Myelogram Consult:

Quick Orders:
- DIPHENHYDRAMINE 50MG 2 HRS BEFORE PROCEDURE
- PREDNISONE 50MG 12 HOURS AND 2 HOURS PRE PROCEDURE
- Methylprednisolone 40MG PO 12 AND 2 HOURS PRE PROCEDURE

PROVIDERS NOTE:
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.

Figure A.12. Service Prerequisites for Imaging Myelogram Consult

You must answer all the questions for this consult to be ordered.
Figure A.13. Reason for Request Myelogram

1) Does patient have a previous history of contrast reaction, (even mild): [ ] Yes [ ] No
   If yes, prescriber:
   1) Methylprednisolone 40mg (or 20mg prednisone) PO at 12hrs and
      2hrs before the procedure.
   2) Hydralazine (Nifedipine) 50mg PO 2hrs before the procedure.

2) Is patient on diuretics 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, Biltral, Limbitrol, Ludenail,
   Neurontin, Pamelor, Sindram, Sarmentil, Tofranil, Tryptil,
   Vistaril.

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

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
Figure A.14. Reason for Request Imaging Myelogram Consult

- If yes, prescribe:
  1) Methylprednisolone 40mg (or 60mg prednisone) PO as 12hrs and 12hrs 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, Eltraflex, Limbitrol, Ludormil, Norpramin, Pamelor, Sinequan, Seromil, Tofranil, Trivilin, Vistaril.

- The following need to be stopped before the procedure (length to be determined by referring physician):
  - PRENTERAINES (chlorpromazine, prochlorperazine, perphenazine, thioridazine).
  - ANTI-PHYCHOTICS (thiochlor, haloperidol, droperidol).
  - CNS stimulants (methylphenidate, ephedrine, pseudoephedrine).
  - NO INHIBITORS (tranylcypromine, procainamide).
  - Others (Lithium, reserpine, isosulind).

- 4) Have you 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
Figure A.15. Reason for Request Short Stay Unit

Consult requested: SSCU - Post Myelogram

Admit patient to SSCU:
Requested date: [ ] Service: [ ]

1) Injection time was at: [ ]

2) Record V/S in CDRS and on SSCU flow sheet upon arrival to unit.

3) Monitor V/S 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 3.6 hours post injection. V/S & 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:
Figure A.16. Order Consult Myelogram

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
Figure A.17. Short Stay Orders

Consult requested: SSCU - Post Myelogram
Admit patient to SSCU:
Requested date: [ ] Service: [ ]
1) Injection time was at: [ ]
2) Record VS in CDRS 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:
Figure A.18. Short Stay Care Unit Consult

Admit patient to SCCU:
Requested date: Mar 14, 2017  Service: CARDIOLOGY

1) Injection time was at Mar 14, 2017
2) Record VS in CDRS and on SCCU 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

Figure A.19. Service Prerequisite Questions
Appendix: Existing Sample VA Artifacts

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

Figure A.21. Neurosurgery Consult Lumbar/Thoracic Spine (image 2)
Appendix: Existing Sample VA Artifacts

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

Figure A.23. Neurosurgery Consult Lumbar/Thoracic Spine (image 4)
# Chapter 5. Acronyms

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