On-Line Table: Summary of the ideal contents of CT and MRI reports of the lumbar spine based on the preferences of clinicians and radiologists[a]

	CT (Clinicians, Radiologists)	MRI (Clinicians, Radiologists)
Technique description (moderate)	67%, 50%	60%, 54%
Study quality (especially if suboptimal)	83%, 38%	89%, 58%
Clinical history:		N/A
Normal study	88%, 75%	
Abnormal study	89%, 83%	
Presence or absence of prior imaging for comparison:		N/A
Normal study	80%, 75%	
Abnormal study	100%, 100%	
Description of findings if:		N/A
Normal (moderate/detailed)	71%, 63%	
Abnormal (moderate/detailed)	96%, 91%	
Pertinent negative findings	89%, 92%	N/A
Disk herniation should be qualitatively described	56%, 64%	N/A
Incidental renal mass should be quantitatively described	N/A	61%, 85%
Indications for MRI if the CT is:		N/A
Normal	59%, 42%	
Abnormal	82%, 85%	
Radiologist's impression when the CT is:		N/A
Normal	72%, 71%	
Abnormal	96%, 92%	
Recommendations for further work-up of an incidental finding (renal mass in this case)	N/A	68%, 76%

[a] Percentage of subjects in favor of these is provided.

Appendix A: Questionnaire utilized for data collection

CT/MRI Spine Report Questionnaire

Part I We are surveying physicians from a wide variety of backgrounds. Please answer the following questions regarding your work.

Specialty: _____ Years in practice: _____

How often do you refer patients for:

CT spine?	_____ patients per month
MRI spine?	_____ patients per month
X-ray spine?	_____ patients per month

Part II There are 3 mock clinical scenarios. There are six sample reports (labeled A to F) for each scenario, varying in style and level of content. After reading each report, please indicate your level of satisfaction by circling the appropriate number.

Case 1:

	Poor		Satisfactory		Excellent
(A)	1	2	3	4	5
(B)	1	2	3	4	5
(C)	1	2	3	4	5
(D)	1	2	3	4	5
(E)	1	2	3	4	5
(F)	1	2	3	4	5

Case 2:

	Poor		Satisfactory		Excellent
(A)	1	2	3	4	5
(B)	1	2	3	4	5
(C)	1	2	3	4	5
(D)	1	2	3	4	5
(E)	1	2	3	4	5
(F)	1	2	3	4	5

Case 3:

	Poor		Satisfactory		Excellent
(A)	1	2	3	4	5
(B)	1	2	3	4	5
(C)	1	2	3	4	5
(D)	1	2	3	4	5
(E)	1	2	3	4	5
(F)	1	2	3	4	5

Case Scenarios

<table>
<tr><th colspan="2">Case 1: A patient complaining of chronic low back pain with a normal CT scan.</th></tr>
<tr><td><u>1A: Limited Content – Prose</u>

There is no significant central canal stenosis or foramen narrowing in the lumbar spine.</td><td><u>1C: Moderate Content – Prose</u>

The patient has a history of chronic low back pain.

Axial images were acquired from L1 to S1. There is no previous for comparison.

There is no significant central canal stenosis or foramen narrowing in the lumbar spine.</td></tr>
<tr><td><u>1B: Limited Content - Itemized</u>

L1-2: Normal

L2-3: Normal

L3-4: Normal

L4-5: Normal

L5-S1: Normal</td><td><u>1D: Moderate Content – Itemized</u>

History: Chronic Low Back Pain

Technique: Axial images were acquired from L1 to S1.

There is no previous for comparison.

Findings: L1-2: Normal
L2-3: Normal
L3-4: Normal
L4-5: Normal
L5-S1: Normal

Impression:

1) Normal exam.</td></tr>
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Case 1: A patient complaining of chronic low back pain with a normal CT scan (continued).

1E: Detailed Content – Prose

The patient has a history of chronic low back pain.

Axial images were acquired from L1 to S1. Sagittal and coronal reformats were provided. There is no previous for comparison.

Alignment of the lumbar spine is satisfactory. Bone density is intact and no destructive osseous lesions are seen. Vertebral body heights are maintained.

There is no significant central canal stenosis or foramen narrowing in the lumbar spine. The disk spaces are normal. There is no facet joint arthropathy or ligamentum flavum thickening.

Limited examination of the retroperitoneum is unremarkable.

Impression: Normal exam. The quality of this CT study is good. However, an MRI could be performed if there clinical concern for intrinsic cord, cauda equina, leptomeningeal, or marrow disease.

1F: Detailed Content – Itemized

History: Chronic Low Back Pain

Technique: Axial images were acquired from L1 to S1. Sagittal and coronal reformats were provided.

There is no previous for comparison.

Findings:

Alignment: Satisfactory

Bones: Normal density; no destructive lesions seen; vertebral body heights normal

L1-2: Normal; no disk disease, facet arthropathy or ligamentum flavum thickening.

L2-3: Normal; no disk disease, facet arthropathy or ligamentum flavum thickening.

L3-4: Normal; no disk disease, facet arthropathy or ligamentum flavum thickening.

L4-5: Normal; no disk disease, facet arthropathy or ligamentum flavum thickening.

L5-S1: Normal; no disk disease, facet arthropathy or ligamentum flavum thickening.

Retroperitoneum: Limited exam; unremarkable

Impression:

1) Normal exam. The quality of this CT study is good. However, an MRI could be performed if there clinical concern for intrinsic cord, cauda equina, leptomeningeal, or marrow disease.

Case 2: A patient complaining of chronic low back pain with new right sciatica with related CT findings.

2A: Limited Content – Prose

At L4-5, there is facet disease and ligamentum flavum thickening causing mild bilateral neural foraminal narrowing and mild central canal narrowing.

At L5-S1, there is a disk herniation impinging the right S1 nerve root.

There is no significant central canal stenosis or foramen narrowing at the other lumbar levels.

2B: Limited Content – Itemized

L1-2: Normal

L2-3: Normal

L3-4: Normal

L4-5: Facet disease and ligamentum flavum thickening causing mild bilateral neural foraminal narrowing and mild central canal narrowing.

L5-S1: Disk herniation impinging right S1 nerve root.

2C: Moderate Content – Prose

The patient has a history of chronic low back pain and new right sciatica.

Axial images were acquired from L1 to S1. There is a previous CT from May 2, 2003.

At L4-5, there is moderate facet disease and mild ligamentum flavum thickening causing mild bilateral neural foraminal narrowing and mild central canal narrowing.

At L5-S1, there is a new large right parasagittal disk herniation impinging the right S1 nerve root in the lateral recess.

There is no significant central canal stenosis or foramen narrowing at the other lumbar levels.

Impression: Degenerative changes at L4-5 causing mild bilateral neural foraminal narrowing and mild central canal narrowing. New large disk herniation at L5-S1 impinging the right S1 nerve root.

2D: Moderate Content – Itemized

History: Chronic low back pain and new right sciatica
Technique: Axial images were acquired from L1 to S1. Prior CT from May 2, 2003.

Findings:
- L1-2: Normal
- L2-3: Normal
- L3-4: Normal
- L4-5: Moderate facet disease and mild ligamentum flavum thickening causing mild bilateral neural foraminal narrowing and mild central canal narrowing.
- L5-S1: New large right parasagittal disk herniation impinging right S1 nerve root in the right lateral recess.

Impression:
1) Degenerative changes at L4-5 causing mild bilateral neural foraminal narrowing and mild central canal narrowing.
2) New large disk herniation at L5-S1 impinging the right S1 nerve root.

Case 2: A patient complaining of chronic low back pain with new right sciatica with related CT findings (continued).

2E: Detailed Content – Prose

The patient has a history of chronic low back pain and new right sciatica.

Axial images were acquired from L1 to S1. Sagittal and coronal reformats were provided. There is a previous CT from May 2, 2003.

Alignment of the lumbar spine is satisfactory. Bone density is intact and no destructive osseous lesions are seen. Vertebral body heights are maintained.

At L4-5, there is moderate facet disease and mild ligamentum flavum thickening causing mild bilateral neural foraminal narrowing and mild central canal narrowing. No nerve impingement is seen.

At L5-S1, there is a new 8mm right parasagittal disk herniation impinging the right S1 nerve root in the lateral recess.

At the other lumbar levels, there is no significant central canal stenosis or foramen narrowing in the lumbar spine.

Limited examination of the retroperitoneum is unremarkable.

Impression: Degenerative changes at L4-5 causing mild bilateral neural foraminal narrowing and mild central canal narrowing. New 8mm disk herniation at L5-S1 impinging the right S1 nerve root. This is well demonstrated on CT, and an MRI is not indicated to evaluate the herniation further. If there is radiculopathy in this distribution, symptomatic management with epidural steroid injection could be considered. A neurosurgical consultation should be considered.

2F: Detailed Content – Itemized

History: Chronic low back pain and new right sciatica

Technique: Axial images from L1 to S1 with sagittal and coronal reformats. Prior CT from May 2, 2003.

Findings:

Alignment: Satisfactory

Bones: Normal density; no destructive lesions; vertebral body heights normal.

L1-2: No disk disease, facet arthropathy or ligamentum flavum thickening.
L2-3: No disk disease, facet arthropathy or ligamentum flavum thickening.
L3-4: No disk disease, facet arthropathy or ligamentum flavum thickening.
L4-5: Moderate facet disease and mild ligamentum flavum thickening causing mild bilateral neural foraminal narrowing and mild central canal narrowing. No nerve impingement.
L5-S1: New 8mm right parasagittal disk herniation impinging right S1 nerve root in the right lateral recess.

Retroperitoneum: Limited exam; unremarkable

Impression:

1) Degenerative changes at L4-5 causing mild bilateral neural foraminal narrowing and mild central canal narrowing.

2) New 8mm disk herniation at L5-S1 impinging the right S1 nerve root. This is well demonstrated on CT, and an MRI is not indicated to evaluate the herniation further.
If there is radiculopathy in this distribution, symptomatic management with epidural steroid injection could be considered. A neurosurgical consultation should be considered.

Case 3: A patient complaining of new low back pain after a fall with related and incidental MRI findings.

3A: Limited Content – Prose

There is an acute, moderate compression fracture at L4. There is no significant central canal stenosis or foramen narrowing.

There is no significant degenerative change.

There is a small cystic right kidney lesion.

3C: Moderate Content – Prose

The patient has a history of new low back pain after a fall.

MR lumbar spine disk protocol was acquired.
There is a previous x-ray from June 7, 2008.

There is a new moderate compression fracture at L4. There is marrow edema. There is no retropulsion, and no significant central canal stenosis or foramen narrowing.

There is no significant degenerative change.

There is a small cystic right kidney lesion.

Impression: Acute compression fracture at L4, likely benign. There is no significant central canal stenosis or foramen narrowing related to this. There is no significant degenerative change. There is a small cystic right kidney lesion, likely benign.

3B: Limited Content – Itemized

Bones: Acute moderate compression fracture at L4 with no significant central canal stenosis.

L1-2: Normal
L2-3: Normal
L3-4: Normal
L4-5: Normal
L5-S1: Normal

Retroperitoneum: small cystic right kidney lesion.

3D: Moderate Content – Itemized

History: New low back pain after a fall.
Technique: MR lumbar spine disc protocol.
Previous x-ray from June 7, 2008.

Findings:
Bones: New moderate compression fracture at L4. There is marrow edema. There is no retropulsion, and no significant central canal stenosis.

L1-2: Normal
L2-3: Normal
L3-4: Normal
L4-5: Normal
L5-S1: Normal

Retroperitoneum: small cystic right kidney lesion.

Impression:
1) Acute compression fracture at L4, likely benign. There is no significant central canal stenosis or foramen narrowing related to this.
2) There is no significant degenerative change.
3) Small cystic right kidney lesion, likely benign.

Case 3: A patient complaining of new low back pain after a fall with related and incidental MRI findings (continued).

3E: Detailed Content – Prose

The patient has a history of new low back pain after a fall.

Sagittal T1, sagittal FIR, axial T1 and axial T2 images of the lumbar spine were acquired. There is a previous x-ray from June 7, 2008.

There is a new moderate compression fracture at L4. There is low T1 and high T2 marrow signal compatible with edema. There is no retropulsion, and no significant central canal stenosis or foramen narrowing.

Alignment is satisfactory. Distal spinal cord and conus appear unremarkable.

There is no significant degenerative change.

There is a 12 mm well defined right kidney lesion with high T2 signal. This is likely a cyst.

Impression: Acute compression fracture at L4, likely benign. There is no significant central canal stenosis or foramen narrowing related to this. If there is severe pain referable to this fracture, vertebroplasty could be considered. There is no significant degenerative change. There is a 12 mm cystic right kidney lesion, likely benign. An US could be performed to confirm.

3F: Detailed Content – Itemized

History: New low back pain after a fall.

Technique: Sagittal T1, sagittal FIR, axial T1 and axial T2 images of the lumbar spine. Previous x-ray from June 7, 2008.

Findings:
Bones: New moderate compression fracture at L4. There is low T1 and high T2 marrow signal compatible with edema. There is no retropulsion, and no significant central canal stenosis.

Alignment: Satisfactory
Cord: Unremarkable distal cord and conus

L1-2: Normal
L2-3: Normal
L3-4: Normal
L4-5: Normal
L5-S1: Normal

Retroperitoneum: 12 mm well-defined right kidney lesion with high T2 signal. This is likely a cyst.

Impression:
1) Acute compression fracture at L4, likely benign. There is no significant central canal stenosis or foramen narrowing related to this. If there is severe pain referable to this fracture, vertebroplasty could be considered.
2) There is no significant degenerative change.
3) There is a 12 mm cystic right kidney lesion, likely benign. An US could be performed to confirm.

Part III For each case, there are specific questions regarding the content of the reports. Please circle your response.

Case 1:

1.	Should the clinical history be included?	yes no
2.	Which CT technique description is appropriate?	none moderate detailed
3.	Should the absence of prior imaging be noted?	yes no
4.	To what level should the CT findings be described?	limited moderate/detailed
5.	Should the radiologist give an "Impression" when the exam is normal?	yes no
6.	Should CT scan quality be described?	yes no
7.	Should the radiologist provide MRI indications when the CT is normal?	yes no

Case 2:

8.	Should the clinical history be included?	yes no
9.	Should the comparison study be noted?	yes no
10.	To which degree should the findings be described?	limited moderate detailed
11.	How should the size of the disk herniation be described?	qualitative quantitative
12.	Are pertinent negatives useful?	yes no
13.	Should the radiologist give an "Impression" when the exam is abnormal?	yes no
14.	Should the radiologist provide MRI indications when the CT is abnormal?	yes no
15.	Should the radiologist recommend epidural steroid injection for radiculopathy?	yes no
16.	Should the radiologist provide a recommendation for specialist referral?	yes no

Case 3:

17.	Which MRI technique description is appropriate?	none moderate detailed
18.	Should MRI scan quality be described?	yes no
19.	To what level should the MRI findings be described?	limited moderate detailed
20.	How should the size of the renal lesion be described?	qualitative quantitative
21.	Should the radiologist recommend vertebroplasty for the fracture?	yes no
22.	Should the radiologist provide a recommendation for the work-up of the renal lesion?	yes no

23. Any additional comments?