

1	Clinical Practice Guideline:	X-Ray Guidelines
2		
3	Date of Implementation:	March 13, 2003
4		
5	Contact:	Clinical Care Management
6		Clinical Quality Management
7		

9 **INDICATIONS for RADIOGRAPHIC EXAMINATION**

10 **Summary**

11 Radiography is a valuable and important tool in the evaluation of patients with
 12 musculoskeletal disorders. While exposure to use of ionizing radiation for diagnostic
 13 purposes poses both risks and benefits, its use should be tailored as much as feasible to
 14 situations where it is capable of producing diagnostically or therapeutically significant
 15 information for clinicians. Scientific evidence clearly supports the medical necessity of
 16 radiographic examination when the information received from the exam is essential to
 17 ascertain the safety and appropriateness of planned treatment interventions. Periodic and
 18 systematic review of literature and practices provides benefit to patients, practitioners and
 19 payers regarding best practices use of radiography. American Specialty Health Affiliates
 20 (ASHA) Clinical Management consistently applies the current body of knowledge to the
 21 decisions made regarding quality improvement initiatives, verification of medical
 22 necessity, and the credentialing and re-credentialing of providers for its networks. A
 23 recent review of the most current body of clinical knowledge by a professional expert
 24 consensus panel and a panel of doctors representing professional societies and academic
 25 institutions provided information to ASHA regarding the relative risks and benefits of
 26 performing an examination that requires exposure to ionizing radiation.

27
 28 Performing manual therapy has been shown to provide significant benefit to patients with
 29 certain types and severity of mechanical disorders of the osseous articulations of the
 30 body. However, manual therapy can also cause harm if the procedure is performed in a
 31 manner or location contraindicated by underlying pathology or structural anomaly.
 32 Performing manual medicine procedures to the articular structures of the body requires a
 33 clear understanding of the biomechanics of the affected and related structures. Often,
 34 these mechanical characteristics of the patient's presenting symptoms can be assessed
 35 through history and physical examination alone. However, in some cases, it will be
 36 essential and medically necessary for the physician to have a radiographic examination
 37 performed in addition to diagnostic history and physical examination in order to fully
 38 understand the risks and benefits of high load manual procedures to the osseous
 39 structures of the body. The number of views taken to adequately assess the osseous
 40 structures will be dictated by the various indications identified via the history and
 41 physical examination (and on occasion laboratory examination). This Clinical Practice

1 Guideline provides a description of those evaluation factors that may indicate such a need
2 for obtaining plain film radiographs.

3 4 **RADIOLOGICAL SAFETY**

5 **Summary**

6 Current evidence indicates the reality of cellular and tissue level damage caused by
7 radiation. Radiation has long been known to cause increased risk of neoplasia and birth
8 defects. While it is still unclear whether there is a threshold dose below which the risk of
9 ionizing radiation approaches negligible levels, expert opinion and government regulation
10 affirms that clinicians should strive for exposures that are “As Low As Reasonably
11 Attainable” (ALARA). This effort includes the use of appropriate technology (digital
12 imaging, high speed screens, etc.), minimum necessary views, and appropriate
13 assessment of “medical necessity” for imaging in the first place. ASHA clinical
14 committees have adopted the summation in BEIR VII, Phase II Panel report which states,
15 “The committee concludes that the assumption that any stimulatory hormetic effects from
16 low dose of ionizing radiation will have a significant health benefit to humans that
17 exceeds potential detrimental effects from the radiation exposure is unwarranted at this
18 time”. There is potential risk of harm caused by radiation received during the radiological
19 exam; however, there are well established benefits to obtaining the clinical information
20 provided by the radiograph.

21
22 A major objective of the initial triage should be to determine the presence of clinical
23 indicators (“red-flags”) for conditions that may be both:

- 24 • A contraindication to the initiation of a trial of manual therapies, and
- 25 • Properly assessed by a radiographic study.

26
27 In the absence of such clinical indicators, simple decisions based on separation into
28 articular versus non-articular disorders and on the duration of the patient complaint
29 (acute, sub-acute, or chronic) are favored by the most recent expert consensus statements.
30 Proper patient selection involves balancing the established benefits of the clinical
31 information obtainable from a radiograph with the potential for harm.

32 33 **GUIDELINE AND RATIONALE**

34 The diagnostic procedure(s) necessary to ensure appropriate care for each patient must be
35 based upon recognition of key indicators from the patient’s history and physical
36 examination. These guidelines are designed to assist you in the imaging decision process.

37
38 Plain film radiography is the most widely used skeletal imaging method. The primary
39 value of plain films is to show pathologies of bone or joint structures, especially if there
40 is a question of a possible fracture, demineralization, or other bone-weakening disease. A
41 normal x-ray **does not always** rule out skeletal pathology. Pathology can only be ruled

1 out through the appropriate assessment of red flags identified through careful history and
 2 physical examination combined with appropriate diagnostic triage.

3
 4 Recent literature reviews conclude there is insufficient evidence for using x-rays for
 5 biomechanical analysis, including but not limited to the detection and characterization of
 6 subluxation, except for scoliosis evaluation or intersegmental instability when correlated
 7 with evidence obtained through careful history and physical examination.

8
 9 Plain film radiographs should not be used as a screening procedure without clinical
 10 indications. If prior imaging of the area in question has been performed at another
 11 facility, all reasonable attempts should be made to obtain the results of those studies prior
 12 to considering further studies.

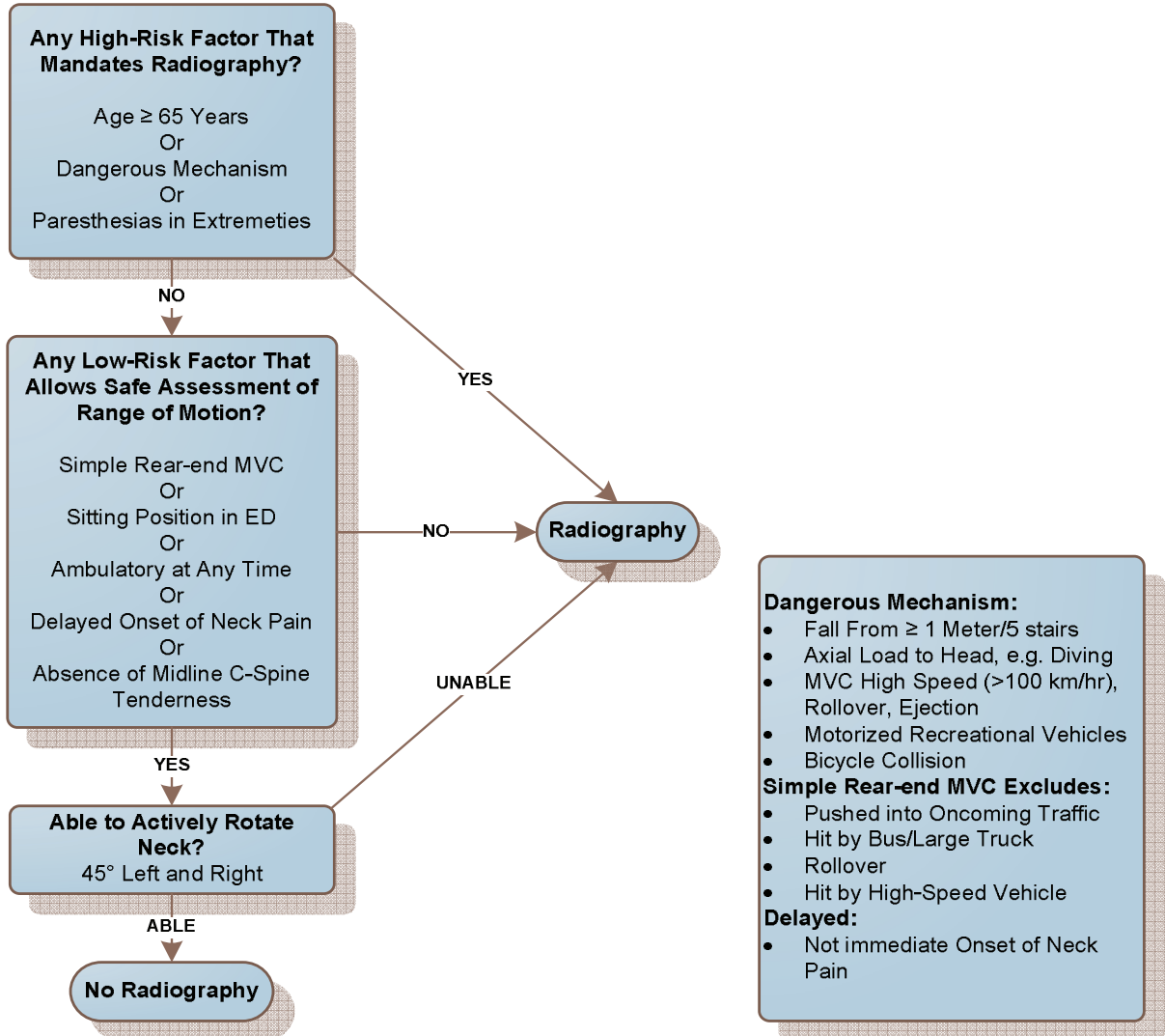
13
 14 The following discussion of clinical indicators may help inform the decision to obtain
 15 plain film radiographs, however, the clinical presentation as a whole must be considered.

16 17 **Red Flag Indicators from History and Physical Examination**

18 **1. Fracture, Dislocation, Ligamentous Incompetence:**

- 19 • Recent injury or trauma (at any age) sufficient to cause fracture such as MVA,
 20 blunt trauma, or fall, especially from height. A reasonable attempt should be made
 21 to obtain previous studies/reports if prior imaging was performed in the
 22 emergency center;
- 23 • Age over 70 accompanied by historical factors or physical examination findings
 24 that would raise suspicion of fracture;
- 25 • History of osteoporosis or any known disease that could lead to bone loss and
 26 minor trauma such as lifting, accompanied by localized bone pain;
- 27 • History of repetitive trauma sufficient to cause fracture (e.g., patients participating
 28 in contact sports, gymnasts, and/or laborers who perform heavy repetitive lifting);
- 29 • Prolonged oral corticosteroid use accompanied by historical factors and physical
 30 examination findings that would raise suspicion for fracture;
- 31 • Suspicion or known history of spondylolisthesis for which symptoms suggest
 32 spinal stenosis with progressive neurologic deficits; and
- 33 • History of alcohol or drug abuse where the abused substances may result in loss
 34 of consciousness or poor recollection of activities or actions that could include
 35 trauma sufficient to cause fracture **and** symptoms or clinical presentation
 36 suggestive of fracture.
- 37 • Failure to improve with treatment when accompanied by historical factors or
 38 physical examination findings that would raise suspicion of fracture or other
 39 suspected skeletal pathology.

- 1 • When cervical spine injury is a concern the following considerations for
- 2 determining the need for radiographic assessment may be helpful and sensitive for
- 3 detecting clinically important injuries.
- 4 ○ Canadian C-Spine Rule:



- 6
- 7
- 8 ○ The Nexus guidelines suggest a low probability of injury to the cervical
- 9 spine if the patient meets all five of the following criteria:
- 10 • they do not have tenderness at the posterior midline of the cervical
- 11 spine,
- 12 • they have no focal neurological deficit,
- 13 • they have a normal level of alertness,

- they have no evidence of intoxication, and
- they do not have a clinically apparent, painful injury that might distract them from the pain of cervical-spine injury.

2. Neoplasia: Cancer/Malignancy/Tumor

- History of malignancy with suspicious physical examination findings (e.g., acute localized bone pain);
- Age over 50 or under 20 with unexplained localized bone pain;
- Non-mechanical pain (e.g., severe ongoing pain, especially at night, that is unrelenting and is unrelieved by rest or position);
- Severely restricted lumbar flexion that is not improving when correlated with other factors from history and physical examination;
- The presence of a palpable mass;
- Unexplained weight loss (i.e., unintentional weight loss of 4.5 Kg or 10 lbs. or greater over preceding six (6) months);
- Symptoms of urinary tract infection, HIV, or other risk factors that may be red flags for tumor; and
- Failure to improve with treatment when accompanied by historical factors or physical examination findings that would raise suspicion for cancer/malignancy/tumor/pathological fracture.

Consider coordinating appropriate co-management actions when red flags are present for cancer/malignancy/tumor/pathological fracture. Radiography has limitations when red flags are present for these conditions, and other tests as well as co-management must be considered when suspicion for these conditions arises.

3. Infection

- Non-mechanical pain (e.g., severe ongoing pain, especially at night, that is unrelenting and is unrelieved by rest or position);
- Symptoms of urinary tract infection, IV drug abuse, HIV, or other risk factors that may be red flags for infection;
- Constitutional symptoms such as recent fever of unknown origin greater than 101°, chills, localized bone pain, and lymphadenopathy raising suspicion for osteomyelitis;
- Intermittent fever of unknown origin with focal pain and/or deformity;
- Mono-articular inflammatory joint pain that does not have a clear explanation of origin;
- Severely restricted lumbar flexion that is not improving when correlated with other factors from history and physical examination; and
- Failure to improve with treatment when accompanied by historical factors or physical examination findings that would raise suspicion for infection.

1 Consider coordinating appropriate co-management actions when red flags are present for
 2 infection. Radiography has limitations when red flags are present for infection, and other
 3 tests as well as co-management must be considered when suspicion for infection arises.
 4

5 **4. Miscellaneous Scenarios**

- 6 • Active or inactive spondylolysis and spondylolisthesis must be considered in
 7 patients under the age of 20 presenting with recurrent spinal pain accompanied by
 8 other key historical factors (participating in sports that cause the patient to
 9 perform repetitive hyperextension of the lumbar spine such as gymnastics,
 10 wrestling, diving, and weight lifting). Special testing (SPECT scan or MRI) may
 11 be indicated in patients with suspected spondylolysis and spondylolisthesis when
 12 historical and physical examination findings warrant the need;
- 13 • Recurring pain of unknown origin with no indication by history, treatment, or
 14 examination findings of a mechanical basis for the recurring pain and no films or
 15 reliable reports are available. A reasonable attempt should be made to obtain
 16 previous studies/reports if prior imaging was performed within two (2) years;
- 17 • Previous history of surgery, fracture, or x-ray abnormality in the area of complaint
 18 as reported by the patient but no films or reliable reports are available. A
 19 reasonable attempt should be made to obtain previous studies/reports if prior
 20 imaging was performed within two (2) years; and
- 21 • Presence of historical factors or physical examination findings that would raise
 22 suspicion for traumatic inflammatory or degenerative spinal instability sufficient
 23 to be a contraindication to manual manipulative treatment. This is especially a
 24 concern at the Atlas-Axis articulation.
 25

26 **Indicators of Various Conditions or Factors Requiring Clinical Correlation and** 27 **Possible Co-management**

- 28 • Signs indicating cauda equina syndrome such as saddle dysesthesia (found in 75%
 29 of patients with cauda equina syndrome), urinary frequency, incontinence, or
 30 possible neurological deficit require urgent surgical consultation. Plain film
 31 radiographs are no longer considered as an initial imaging procedure;
- 32 • Focal Neurological Deficit (absent deep tendon reflexes, gross muscle weakness,
 33 and/or measurable atrophy of an extremity) suggestive of compressive lesions to
 34 the spinal cord or nerve roots **if** bony stenosis due to severe degenerative disease
 35 of segmental listhesis is suspected. Other causes of neurologic deficit, such as
 36 cord tumor or herniated nucleus pulposus are more effectively evaluated with
 37 advanced imaging modalities such as MRI;
- 38 • Neck pain with radicular symptoms may lower the threshold for plain film
 39 imaging. Correlation with clinical findings is recommended;
- 40 • History including complaint of dizziness or impaired consciousness of unknown
 41 origin;
- 42 • Dysphagia;

- 1 • Poorly controlled diabetes may be associated with bone loss and DISH;
- 2 • Poorly controlled Hypertension may be associated with increased risk of
- 3 aneurism;
- 4 • Clinical suspicion of and/or positive lab findings for ankylosing spondylitis;
- 5 • Suspicion of or confirmed presence of inflammatory arthritis that may
- 6 contraindicate manipulation/mobilization;
- 7 • Symptoms and signs that suggest back pain from non-spinal causes such as
- 8 subclinical pyelonephritis, kidney stones, or dissecting aneurysm;
- 9 • Prolonged drug and/or alcohol abuse;
- 10 • Immunosuppression; and
- 11 • In children, hip pain with limping or refusal to bear weight.

12 **Full Spine Radiography**

- 14 • Full spine x-rays should not be used as a routine screening procedure for scoliosis
- 15 or any other global spinal postural dysfunction;
- 16 • Full spine (14 x 36) films should not be utilized as a substitute for sectional
- 17 views;
- 18 • Full spine (14 x 36) films are appropriate only for a scoliosis study of the
- 19 appropriate patient when, upon inspection, the patient appears to have a
- 20 significant scoliosis with a rib hump present and Adam's position confirms a
- 21 structural problem;
- 22 • Full spine (14 x 36) films are rarely indicated for patients who have reached
- 23 skeletal maturity; and
- 24 • Multiple sectional studies (e.g., cervical spine AP/Lat and lumbar spine AP/Lat on
- 25 the same patient) to obtain a full spine view should only be performed when
- 26 indications are noted for each region.

27 **Stress Radiography**

28 Stress radiography, when indicated, should not be performed until acute instability has
 29 been ruled out by clinical evaluation and there remains a question about whether
 30 undetected ligamentous instability exists. The neutral lateral projection should be
 31 evaluated and the patient carefully examined before these exposures are taken. If severe
 32 instability is suspected, advanced imaging studies (MRI or CT) may be indicated prior to
 33 obtaining stress views.
 34

35
 36 *Flexion-extension stress study of the cervical spine.* This study should only be performed
 37 in a fully alert and cooperative patient. Contraindications to these studies include
 38 vertebrobasilar ischemia, postural vertigo, fracture-dislocations, odontoid lesions, and
 39 significant neurological deficits. This study is indicated in the diagnosis of latent
 40 instability of the upper cervical spine to diagnose laxity or damage of the transverse
 41 ligament of the atlas caused by trauma or pathology affecting the ligament. The diagnosis

1 is based on an abnormally wide space (greater than 3 mm in adults and 5 mm in children)
2 between the posteroinferior margin of the anterior arch of the atlas and the anterior
3 surface of the odontoid process. The most frequent causes include trauma,
4 occipitalization, Down's syndrome, pharyngeal infections, inflammatory arthropathies
5 (e.g., rheumatoid, ankylosing, psoriatic forms), and Reiter's syndrome. A minimum
6 interspace is 1 mm in children and adults. A decreased space is to be expected with
7 advancing age due to degenerative joint disease of the atlantodental joint.

8
9 *Cervical lateral bending views* are not generally used in the radiographic community and
10 are considered to be of limited value.

11
12 *Stress radiography of the thoracic and lumbar spine.* Stress studies of the thoraco-lumbar
13 spine are not supported by the current scientific literature except in limited
14 circumstances. Lateral bending studies may be indicated to assess the flexibility of a
15 potentially progressive scoliosis. These studies are done bilaterally with the patient
16 supine, but the evaluation is primarily made from the radiograph taken when the patient
17 is bending toward the side of convexity.

18
19 Flexion–extension views of the lumbar spine may be considered appropriate in the
20 assessment of an unstable spondylolisthesis. The clinical implications usually include
21 failure to respond to conservative treatment and the need for consideration of surgical
22 options. Routine use of flexion-extension views in the presence of spondylolisthesis is
23 not supported.

24 **Standard Radiographic Views and Minimal Radiographic Series**

25 Only standard projections are generally considered reasonable or necessary. Opposing
26 views are considered to be the minimal projections needed when choosing to image any
27 area. Single plane views are generally considered insufficient. Supplemental views such
28 as oblique and spot views should be obtained only when clinically indicated or when
29 abnormal findings are found on an initial study. A Davis series (A-P open mouth, A-P
30 lower cervical, lateral, oblique, and flexion and extension views) is only appropriate
31 when history and physical examination findings such as those that may be present
32 following a significant whiplash trauma justify the need for the additional views that are
33 included in this study.

34 **Comparative, Post-Treatment, and/or X-Rays to Monitor Patient Progress**

35
36 Follow-up studies and/or exit films are not necessary unless specific indications are
37 observed. The practitioner must have a clear clinical rationale to explain the benefit and
38 necessity of the repeat x-ray series considering the known health risks associated with the
39 additional radiation exposure. Indications may include monitoring healing of a fracture,
40 monitoring aggressive bone/joint diseases (e.g., various inflammatory arthritic disorders),
41 or a potentially progressive idiopathic scoliosis. Scoliosis monitoring should be
42

1 performed in accordance with national guidelines. If prior imaging has been performed at
 2 another facility for a patient presenting with a condition including indicators for imaging,
 3 then all reasonable attempts must be made to obtain the results of those studies prior to
 4 repeating the study.

5
 6 In conclusion, diagnostic procedure(s) necessary to ensure appropriate care for each
 7 patient must be based upon recognition of key indicators through careful assessment of
 8 the patient's history and physical examination and documented in the patient record.

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