Scoliosis

Diagnosis/Condition: Scoliosis, Idiopathic
      Curvature of the Spine, Unspecified
      Curvature of the Spine, Scoliosis
      Curvature of the Spine, Acquired
      Curvature of the Spine, Congenital
      Deformity

Discipline: DC, ND
ICD-9 Codes: 737.30; 737.40; 737.43; 737.9; 754.0
ICD-10 Codes: M41.20, M43.8X9, M41.10, M41.50
Origination Date: 2005
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Next Review Date: 07/2016

Scoliosis is defined as a lateral deviation from the normal vertical line of the spine which, when measured by X-ray, is greater than 10 degrees. Scoliosis includes a range of conditions that are usually classified by type including idiopathic (the focus of this pathway), congenital (due to vertebral anomalies such as hemivertebra) and secondary to other conditions. Idiopathic scoliosis is defined by the presence of lateral deformity of the spine, with otherwise normal vertebral bodies and without coexisting diagnoses. It affects 2-3% of the school-aged population. Scoliosis can impact the quality of life with limited activity, pain, reduced respiratory function, or diminished self-esteem. The most common form is adolescent idiopathic scoliosis.

Routine screening of adolescents for idiopathic scoliosis in the past has been done by visual inspection of the spine to look for asymmetry of the shoulders, scapulae, and hips. However, the US Preventive Services Task Force (USPSTF) now recommends against the routine screening of asymptomatic adolescents for idiopathic scoliosis due to moderate harms, including unnecessary brace wearing and unnecessary referral for specialty care as a result of screening. As a result, the USPSTF concluded that the harms of screening adolescents for idiopathic scoliosis exceed the potential benefits.

The evidence for non-operative management of adolescent idiopathic scoliosis (AIS) is limited, however early intervention with conservative treatment like physiotherapy and bracing may help prevent surgery. Current evidence based recommendations for manual therapies are based on expert consensus. Evidence for exercise interventions is more robust, but there is a lack of high quality evidence in that regard.

Subjective Findings and History
- Onset of the disease is typically during the period of rapid growth at adolescence.
- Family history of scoliosis or other neuromuscular condition, congenital disease, or connective tissue disorder.
- Two clear risk factors are remaining growth potential and female gender.

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Scoliosis Pathway Clinical Pathway
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• Females are eight times more likely to progress to a curve magnitude that requires treatment.
• Patients may complain of thoracic or lumbar pain or stiffness and cervical complaints secondarily.
• Patients (or parents) may note asymmetries such as uneven spinal musculature, a high shoulder, iliac crest, rib hump, scapula uneven, arms hang unevenly
• Clothes do not “hang right” (e.g. uneven hemlines)

Objective Findings
• Physical examination
  o Asymmetries (plumb line), shoulder height, scapular, uneven waistline, rib hump, anterior iliac spine levels, head alignment, anterior chest for pectus excavatum
  o Evaluate presence of thoracic and lumbor curves upon full thoracic and lumbar flexion
  o Pain location and change in sitting, standing, prone
  o Height measurement, every 3-4 months for growth spurt if not full skeletal maturity (sitting height measures truncal growth rates, a better indicator)
  o Other skeletal deformities
  o Skin assessment, café au lait spots; connective tissue disorders, inflammatory or rheumatic joint signs
• Radiologic
  o AP full spine (14x36) weight bearing, if indicated, to grade curve and assess curve progression
    ▪ Cobb angle method: quantifying degree of scoliosis angle on AP, note level of apex and side of convexity and vertebral rotation of apical vertebra
  o Pelvic view if skeletal maturity is to be assessed.
    ▪ Risser sign: growth marker on ilium ossification, grade 1-4 using Tanner stages
  o Rule out skeletal or vertebral deformities
  o Lateral bending views to determine curve flexibility, if indicated
• Neurologic to rule out other causes, or conditions
• Metabolic if necessary to rule out disorders or conditions; run lab work
• Orthopedic routine, to rule out disc problems, other spinal or extra spinal conditions

Assessment
Diagnostic classification of scoliosis
• Non-structural (mobile) scoliosis
  o Postural: resolves with forward bending or recumbancy and is self-limiting, or due to muscular imbalance
  o Compensatory: caused by leg length inequality, pelvic unleveling
  o Transient: radiculopathy (sciatic), inflammatory, traumatic, psychogenic
• Structural Scoliosis
  o Idiopathic (genetic): infantile (<3 yrs), juvenile (3-10 yrs), adolescent (10 yrs to skeletal maturity)
  o Congenital: vertebral deformity, extravertebral
Plan
• Non-structural Scoliosis: Postural, compensatory and transient scoliosis is managed by treating the underlying pathology (e.g. leg length inequality)

• Structural Scoliosis: Forms other than idiopathic should be ruled out and cared for appropriately.

• Adolescent idiopathic scoliosis: The primary goal of treatment is prevention of progression and preservation of pulmonary and cardiac function. Treatment options range from “watchful waiting” while monitoring for progression, to non-surgical interventions and, finally, surgical fusion. Treatment decision making is dependent on the age of the patient (skeletal maturity), the severity of the curvature and the likelihood of progression.

  o Risk factors for progression (younger age, higher curve generally means worse prognosis):
    • 50% risk of progression before menarche, < 20% after menarche
    • Curve greater than 30 degrees (even with skeletally mature)
    • Over 25% rotation of apical vertebra
    • Right vs. left curve apex
    • L5 is high in pelvis

  o Patients with idiopathic scoliosis who have not reached skeletal maturity should be evaluated for the risk of curve progression. Children with curves less than 20 degrees can be followed at 3-6 month intervals, non-radiographically. If progression is observed radiographs should be obtained to confirm and treatment instituted. Curves between 20-39 degrees should be assessed at 3-6 month intervals. Referral for orthotic treatment with a scoliosis brace should always be done if a curve reaches 30 degrees prior to skeletal maturity or in a progressive curve 25 degrees, or greater if 2 or more years of growth remain (premenarche), or other risk factors are present. In an adult with 45 degrees or more curvature and cardiopulmonary complications, a surgical consult should be obtained. For adults with less than 50 degrees and mechanical pain, conservative treatment is appropriate.

Conservative Management
Conservative management is dependent on:
  • Accurate diagnosis
  • Appropriate and timely non-radiographic clinical follow up
Radiographic confirmation of curvature status at 3-6 months, if progressive
- Monitoring treatment until spine is mature

- **Bracing**
  - Is only done when the patient has bone growth remaining, and
  - Is generally implemented in order to hold the curve and prevent it from progressing to the point where surgery is necessary
  - Can decrease risk of progression to a range requiring surgery with high compliance in patients likely to have curve progression
  - If there is progression of more than 5 degrees in one year if curve is above 15 degrees and at least one year of skeletal maturity remains

- Manipulation to control symptoms, optimize spinal flexibility and reduce concurrent functional curves
- Physiotherapy modalities are appropriate for pain control such as heat, ultrasound and electrical stimulation
- Exercises to retrain proprioceptive functions optimize muscle balance and strength and counter-stretch the curve daily

**Referral Criteria**
- Failure to achieve treatment goals of pain control or improved function
- Curve progression despite conservative interventions
- Surgical consultation for curves that are cosmetically unacceptable

**Resources for Clinicians**
*Scoliosis* is an open access online journal published by BioMed Central
http://www.scoliosisjournal.com/

Cochrane Collaboration.
http://www.cochrane.org/

**Resources for Patients**
The National Scoliosis Foundation (NSF) is a patient-led nonprofit organization dedicated since 1976 to helping children, parents, adults, and health-care providers to understand the complexities of spinal deformities such as scoliosis.
http://www.scoliosis.org/index.php

**The Evidence**
Scoliosis Research Society. Adolescent Idiopathic Scoliosis Treatment


Weiss, HR, Conservative Treatment of Idiopathic Scoliosis with Physiotherapy and Orthoses; Orthopade, 32(2) 146-156, 2003


Panzer, David M., Chiropractic Management of Scoliosis, Western States Chiropractic College, unpublished


**Clinical Pathway Feedback**

CHP desires to keep our clinical pathways customarily updated. If you wish to provide additional input, please click on the email address listed below and identify which clinical pathway you are referencing. Thank you for taking the time to give us your comments.

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