GUIDELINES FOR SPINAL SCREENING IN SCHOOLS

MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES

dhss

SEPTEMBER 2004

ACKNOWLEDGEMENTS

This manual was reviewed and revised with assistance from the following orthopedic physicians who care for adolescents with scoliosis:

George Bassett, M.D., St. John's Mercy Medical Center
Keith Bridwell, M.D., Washington University of School of Medicine
Matthew Barrett Dobbs, M.D., Washington University of School of Medicine
Roger P. Jackson, M.D
Howard Place, M.D., St. Louis University Medical Center
Nigel J. Price, M.D., Children's Mercy Hospital
Robert W. Gaines, M.D., Columbia Ortho Group, LLP
Howard Place, M.D., Saint Louis University Orthopaedics

FOREWORD

Many states have established and/or mandated school screening programs for scoliosis. Initial interest in spinal screening in schools originated in St. Louis city schools under the direction of local orthopedic physicians. Their pilot program proved successful, and they sought support for a statewide effort. Funding was made available for development of training materials, and instructional manual for implementation to train school and community health nurses. The program quickly gained recognition as an important prevention program.

While there has been controversy nationally regarding the cost-effectiveness of school screening for scoliosis, most physician groups continue to support the principle of school screening. Private health care providers do not often see adolescents for preventive health visits, and specific inspection of the back is often not included. The American Academy of Pediatrics advocates spinal screening as part of a preventive health visit at 12, 14, and 16 years of age. Orthopedic physicians in Missouri continue to recommend that local school districts and local health departments conduct periodic screenings to complement the screenings done by private health care providers. Currently, approximately 84 percent of Missouri schools provide this screening on a voluntary basis.

This revision of the guidelines for spinal screening reflects the most recent professional advice from practicing orthopedic specialists serving adolescents, the Scoliosis Research Society, and the American Academy of Orthopaedic Surgeons.

TABLE OF CONTENTS

I. INTRODUCTION

A. Purpose

The purpose of these guidelines is to assist in the organization and implementation of a spinal screening program in the school setting. Currently there is no known way to prevent scoliosis or kyphosis. The goal of a school screening program is to provide students in the high-risk age group (ages 10-14 years) the opportunity for early detection of significant spinal asymmetry. Through early detection, observation for the possible progression of a curvature can be provided by a health care professional and more definitive treatment instituted when indicated.

B. Background Information

1. Spinal Asymmetry

Scoliosis and kyphosis are examples of spinal asymmetry. However, not all types of asymmetry are significant, and it is helpful to consider whether the asymmetry is flexible or fixed.

a. Flexible vs. Fixed

Asymmetry is a lack of proportion or symmetry between the right and left sides of the body. Asymmetry can be flexible or fixed. Flexible asymmetry may be due to common postural variations resulting from a high degree of flexibility in the spine or differences in muscle development as seen in a pitcher or tennis player. Flexible asymmetry does not persist as the student assumes flexed positions in the screening procedure. Students with fixed spinal deformities manifest a persistent asymmetry that is identifiable in all positions in the screening procedure. Students who exhibit asymmetry (prominence of the thoracic and/or lumbar areas) when in a flexed position, are at risk of having a fixed deformity, and require further evaluation.

b. Types of Fixed Asymmetry

1) Scoliosis: Scoliosis is defined as one or more lateral curvatures of the spine. Normally, the spine curves from front to back. In scoliosis, the spine also bends from side to side. These structural changes usually display a hump or elevation on the back caused by the rotation of the spine. When present, these abnormal lateral curves may progress during the adolescent period of rapid growth. It is these curves that need to be detected early.

There are several types of scoliosis:

- Congenital (children less than three years of age);
- Juvenile (children between 3 and 10 years of age, uncommon);
- Idiopathic Adolescent (after 10 years of age, most common type); and
- Neuromuscular (occurs in individuals with underlying neuromuscular disorders such as cerebral palsy, muscular dystrophy, spina bifida, etc.).

2) Kyphosis: Kyphosis is an abnormal backward protrusion of the spine. This is more commonly called "roundback" and can be caused be a variety of diseases and conditions. This abnormality can be detected by viewing the student from the side during the forward bend test for scoliosis.

2. What causes scoliosis and kyphosis?
   About 85 percent of the cases of scoliosis are placed in a category known as idiopathic scoliosis. This simply means a curvature of the spine for which the cause is not known. In the remaining 15 percent of occurrence, scoliosis can be attributed to some 35 diseases processes. For instance, spina bifida, cerebral palsy, and muscular dystrophy are fairly common causes of scoliosis.

   For kyphosis, the cause of most is also unknown. Some cases result from inherited vertebral deformities or muscle weakening problems.

3. Who has scoliosis and kyphosis?
   An estimated one million Americans have a significant degree of scoliosis. The condition begins in childhood and progresses most rapidly during the growth spurt of adolescence. From surveys conducted in a number of states, results show that approximately 4 to 15 percent of children in the 10 to 14 year-old ranges have some indication that warrants further examination. When seen by health care professionals, only about one-tenth percent to 2 percent of the children have a significant problem that requires treatment. In most screening programs, the detection of some degree of scoliosis is about equal in girls and boys. Significant degrees of curvature occur more frequently in girls who make up 80 percent of the population requiring treatment. Right thoracic curves are the most common. There is a tendency for scoliosis to occur in families, so the potential is high for siblings and other relatives to have or develop scoliosis. When a student is detected with a significant curve, the rest of the family should be assessed.

4. How are these conditions found?
   Current recommendations from the American Academy of Orthopedic Surgeons states that at least once during the period of high risk (age 10 to 14, or 4^{th} to 9^{th} grade) students should be examined by a properly trained and competent screener. Recommended groups are girls in 6^{th} to 8^{th} grade; and boys, 9^{th} grade. Students with deviations meeting established criteria are referred for a professional evaluation. When a specialist can evaluate students with positive findings during school screenings (rescreen), over-referrals may be avoided. Students with questionable findings should be observed over time and advised to seek a professional evaluation if and when they meet the referral criteria. School screening programs have been invaluable in finding children with significant spinal deformity. Those with progressive conditions have been treated early and the curvature arrested, often avoiding costly surgery. It is important that the screener be competent in detecting those indications that warrant a referral for more costly examinations. Inappropriate referrals can lead to a lack of credibility in a program, and are the reason for criticism of school screening programs.

Personnel easily trained in spinal screening techniques can perform the initial mass screening, which includes a 30-second visual inspection of the student's spine from several angles. This is a cost-effective and efficient way to reach the population at risk.

Private care providers also may find scoliosis and kyphosis on routine physical examination. However, experience has shown that this population does not routinely see a health care provider, but is seen on an episodic basic for illness or injury. Spinal screening usually is not included in this exam.

Parents may also notice that their child has one shoulder higher than the other, the rib cage humps on one side, or hemlines are uneven on skirts and pants due to the prominent hip resulting from a lateral curvature. They are more likely to overlook kyphosis as merely bad posture.

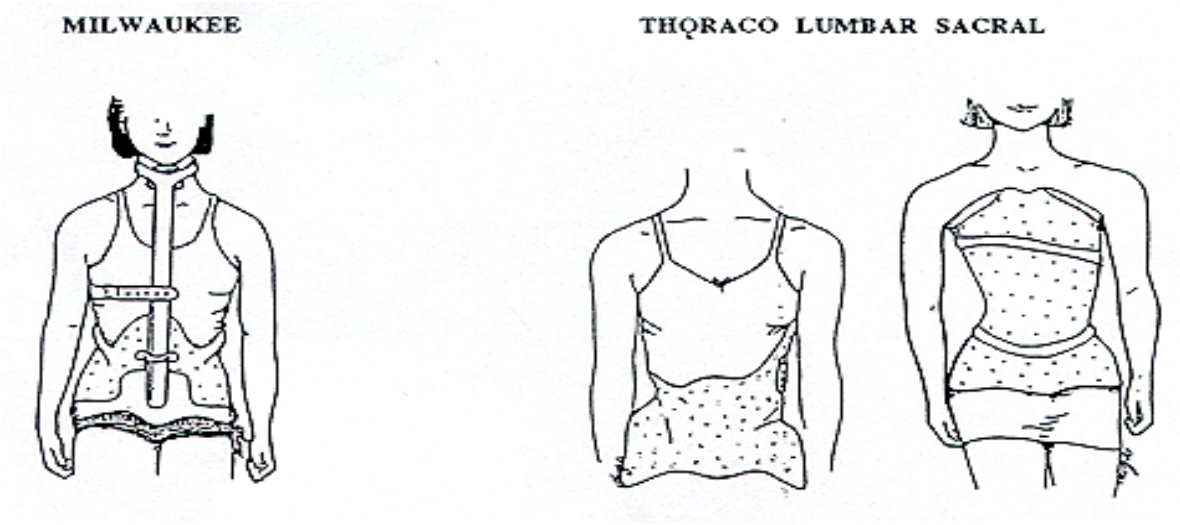
5. How are scoliosis and kyphosis treated?
   There are three approaches to the treatment of scoliosis and kyphosis: observation, bracing, and surgery. The selection of treatment depends on the child's age, skeletal maturity, and how severe the condition is at the time treatment begins.

   a. Observation
      Observation is the appropriate treatment for mild curvatures. A baseline standing X-ray may be obtained in order to measure the degree of curvature. The child is often seen every three to six months to monitor the progress of the curve with objective measurements, which may include periodic X-ray. Exercise programs, by themselves, vitamins, nutrition, spinal manipulation, or X-ray treatments do not prevent progression of scoliosis.

   b. Bracing
      Bracing the spinal column in some way usually treats curvatures that have advanced enough to require treatment but are not yet severe. Bracing appears to arrest the progression of the curve during the course of treatment. Curvatures between 20 to 30 degrees are most amenable to bracing, and are most useful in children who have not completed their skeletal growth. Braces may partially correct the existing curvature, but the indication for bracing is to halt the further progression of the deformity. Some individuals may only require night bracing. Patients are usually encouraged to remove their brace for participating in sports activities.

      The braces most often used are the Milwaukee Brace and The Thoraco-Lumbar Sacral Orthosis (TLSO). There are a variety of TLSO available, including the Boston Brace and the Charleston Bending Brace (for night time wear). Newer, lightweight and more cosmetically acceptable braces are being developed. The type of brace used depends primarily on the location of the curvature. New consideration is being given to the prescribed time to be spent in a brace. All

bracing treatment is individualized. A brace is generally prescribed full time during the remaining growth of the spine, but it depends on the patient and the severity, flexibility, and location of the curve. Long-term studies have shown that curvatures may progress into adulthood. Of utmost importance is the prevention of severe curves that will require extensive surgery to correct.



c. Surgery

Surgery is the treatment for severe scoliosis and kyphosis. This expensive, extensive procedure, which is not always successful, can often be prevented by early detection programs. The most common surgical technique involves a spinal fusion with the insertion of steel rods along the spinal column and bone grafting. Patients no longer face a long period of casting, bracing, or inactivity. They are usually ambulatory in days and discharged within a week of surgery. The patients can gradually resume routine activities and return to school.

The goals of surgical treatment are:

- Prevent curvature progression;
- Reduce deformity;
- Protect the cardiopulmonary system and spinal cord;
- Provide stability and balance; and
- Minimize later back pain.

In the past, exercise regimes and electrical stimulation were promoted to treat certain types of curvatures, but studies have shown they were not effective.

6. Wearing the Brace

Once a brace is chosen and fitted, the student must become accustomed to wearing it. The orthosis, which is designed to stop or slow the progression of a spinal deformity, will not be successful if it is not used properly. The brace usually must be worn full time for adequate treatment. When the student begins wearing the

brace, it seems uncomfortable and confining. It is especially important during the first week of wearing that the student has the support of parents, the school nurse, and a friend. It takes from one to two weeks for the student to feel comfortable. For the first week, the student gradually increases the time spent wearing the brace so that by the seventh day, the brace is worn twenty-three hours a day, unless otherwise recommended. The student's schedule can be adjusted to establish the best time to be out of the brace.

While the student is wearing the brace, a specific exercise program may be prescribed. The purpose of the program is:

- To assist the brace in arresting the progression of the curve;
- To strengthen the trunk muscles that are not used because of the brace;
- To maintain flexibility, and in addition;
- The physician may prescribe exercises such as flattening the lower back, sit-ups, and leg lifts are strengthening exercises. Flexibility is improved by stretching the hamstrings and pectoralis major muscles.

The length of time a brace will be worn depends on the bone maturity of the student, which differs among adolescents. The physician evaluates the student's progress, and when the curve holds well and growth is complete, the physician may begin to allow the student more time out of the brace. The brace treatment regimen must be understood by the student, parents, and school nurse. Again, the brace is usually worn full-time during treatment. Noncompliance with this rule may be due to misunderstanding of the treatment, poor brace fit, or emotional burdens placed on the student by other students or teachers. The student needs much support, especially during the early stages of treatment.

Skin care is essential while wearing a brace, especially in total contact braces. At first, reddened areas may appear under the tight fitting parts of the brace. When the brace is removed, the red areas should disappear within a half hour. If they do not disappear, the brace may need adjustment. Brown areas may appear over the hip areas where the girdle rests. To avoid skin breakdown, toughen the area with rubbing alcohol, followed by corn starch. Oily or greasy products tend to break down skin and should be avoided. If open sores appear, contact the physician. Tee shirts or long men's undershirts may be worn under the brace to absorb perspiration and prevent direct contact with the skin if they can be smooth fitting and without lumpy areas. Brace liners are available. Because of skin care, and in some cases, exercises, the student may need more time to dress in the morning.

Initially, some problems may arise while wearing the brace, and the patient will need to make adjustments. Those who wear the Milwaukee brace may find trouble initially tilting their head down because of the neck ring. Because of this temporary difficulty in tilting the head down, the student may need to elevate his/her book during reading or may want to use a clip board. During meals, the food and plate can be elevated to avoid spilling on the way to the mouth. Placing the student's chair further away from the table is another method of adjustment to

ease the awkwardness caused by the brace. Family support is essential in these adjustments.

The physician and the student's functional level always decide the level of activity in the brace. The physician should inform the school as to the type of restricted activity needed. Some districts have prepared forms for activity restrictions and adaptive physical education. Students may be instructed to remove their brace during PE. Students wearing a brace are not considered invalids and should not be treated as such. They can participate in many activities and should be encouraged to do so. The family, teachers, peers and school nurse should support the child by encouraging activity so the student will not take on an "invalid role."

The mental adjustments a student has to make cannot be overlooked. At first, the student will feel self-conscious and ill at ease because he/she looks different from others. If the student understands that he/she is not sick or handicapped, the misgivings may be relieved. Understanding the deformity will help the student to convey information about it to curious peers. Individuals will invariably ask questions about the brace, and may think the student has had an accident. Encourage the student to explain simply that their spine isn't straight, and the brace is helping to straighten it. The student's acceptance of the brace helps others to accept it as well. There are several books in the popular literature about adolescents with scoliosis that may be helpful to the student.

7. Surgery

   Students requiring surgery no longer need to be absent from school for an extended period of time. If it is known that the student will miss considerable time, the nurse should assure an application for homebound instruction is processed in a timely manner, prior to surgery, so the student begins receiving instruction as soon as his/her condition allows. Following surgery, the student is often braced and ambulatory in a few days, and gradually returned to normal activities. The student may require some modification in the schedule and/or facility during their recovery period, and may need the advocacy of the nurse to accommodate those needs. A Section 504 Plan can be written to address any modifications such as:

   - Allowing the student to leave class early to allow more time for passage;
   - Issuing two sets of books (one set to be left at home);
   - Rest periods during the day; and
   - Allowing the student to stand or change positions during class.

II. ESTABLISHING A NEW SCHOOL SPINAL SCREENING PROGRAM

The motivation to establish a spinal screening program in a school where it is not currently available often comes from someone's personal experience with scoliosis. The individual becomes aware that the condition can be found in its earliest stages through an inexpensive, cost-effective screening program. Thirty seconds, the time required for an individual screen, can make a difference in someone's life.

Careful planning leads to successful programs. Spinal screening programs are cooperative efforts on the part of the school administration, Board of Education and the School Health Advisory Committee, when available. The proposed project should also be discussed with local health care providers who will be receiving referrals from the program. Their reactions, suggestions, as well as support are important to the success of the program. Procedures need to be discussed and plans for the referral process should be shared with all the physicians serving the area.

A. Planning

The coordinator of the spinal screening program may wish to form a committee to do the planning. Committee members might include the school administrator, school nurse, physical education teacher, parent, student, a local physician, and an orthopedic specialist, if available. It is important to have a broad base of support for the program. The physical education teacher, the nurse, or other designated individual should be assigned to do the actual screening.

The task of this committee is to integrate the spinal screening program into the total school health program, and to establish the objectives of the program. A time line should be established, considering the following:

1. Public Relations
   - Notification of health care providers;
   - Notification of parents; and
   - Notification of local media, if appropriate.
2. Education
   - Students;
   - Parents; and
   - Civic organizations.
3. Screening
   - Training of personnel;
   - Initial screening dates (early in school year to allow time for follow-up); and
   - Plan for secondary rescreening (same day or within two weeks).
4. Referrals
   - Personal contact when possible, followed by letter with details;
   - Development of referral resource information; and
   - Follow up on referrals not completed within six weeks.

B. Implementation
After planning is complete, individuals need to be identified to coordinate the implementation of the spinal screening program.

C. Training
Almost any interested individual can be trained to do the visual inspection required for the initial mass screening. This might include volunteers, teachers, physical education teachers, and nurses.

Personnel assigned to do the screening should attend formal training. In metropolitan areas, orthopedic physicians often provide workshops upon request. School nurse organizations offer training when the need is indicated. Audiovisual materials for professional use are available through Missouri Department of Health, and Senior Services, Audio-Visual Unit, PO Box 570, Jefferson City, MO, 65102 (573-751-6048), www.dhss.mo.gov/resources

D. Screening Protocol
The grades to be screened must be selected. Current recommendations suggest that screening girls in grades six and eight or nine, and boys, once, in the eighth or ninth grade, will identify those with significant spinal deviations that have not been previously identified. Students at high risk also need to be screened periodically, and include:

- Students with questionable results on previous screening "watch list;"
- Students with parents or siblings diagnosed with scoliosis; and
- Students with neuromuscular conditions.

E. Scheduling
All extra-curricular activities in a school need to be coordinated with the building administrator and teaching staff in order to minimize disruption in the instructional schedule, facilitate the screening process, and utilize the facilities available. Physical education classes, since students are changing clothes anyway, are often an ideal setting. Locker rooms provide some privacy not available in classrooms.

F. Documentation
Forms need to be developed to record negative (pass) and positive (fail) results of screening, and students identified for rescreening. If a school nurse is not available, arrangements might be made with the local community health nurse to rescreen students and to make referral decisions. Personnel will need to be identified to record the results of the screening in the student's record.

G. Program Evaluation
At the end of the first year, the committee should evaluate their efforts by looking at the number screened, referred, completed referrals and the percentage of confirmed findings. The average percentage referred is 2 to 3 percent of the population screened. An acceptable standard for completed referrals is 75 percent or more.

If time and resources do not permit this level of follow-up, the committee should reassess the program. If there are a high percentage (more than a third) of referrals returned as "no problem," the program coordinator should seek consultation on ways to further refine the criteria for referral. When possible, invite an experienced screener to assist with rescreening, such as a local physician. Following the screening program, a final report should be completed and shared with the general public in order to generate interest and support for continuing the spinal screening program.

III. SPINAL SCREENING PROCEDURES

A. Prescreening Education

Before the screening program occurs, the physical education teacher, classroom teacher, or nurse should meet with the students to discuss scoliosis and kyphosis in order to explain the purpose and procedure for screening. This prescreening education is an important part of the program. Students need to know what is expected of them in the screening process. It is helpful to demonstrate to the students exactly what you expect of them and why. Overhead transparencies and posters are useful in this orientation, as is a video depicting an actual screening situation. At this time, girls can be instructed on clothing to be worn for the screening, and assured that privacy will be provided at the screening site. When possible, information about spinal screening should be incorporated into the comprehensive health education program.

B. Preparation for Screening

1. Recording

Class rosters, or printouts can be used for recording results of the initial mass screening, marking them "pass" or "fail," or forms can be used as checklists for specific observations. If screening lists are prepared, it is helpful to list boys and girls separately. To save time, students can write their name on a piece of paper to hand to the examiner, who can record "pass" or "fail" and any specific observations on the slip. These can be alphabetized at the end of the screening, separating out those who need to be rescreened. This facilitates recording by clerks. Whenever possible, use another experienced screener to do the rescreening. Often, a local health care provider will come to the school and do rescreening. This reduces the number of over-referrals.

2. Facility

Privacy is an important aspect when selecting the location for screening. A gymnasium or locker room usually has ample space and allows privacy for both boys and girls. If the area is too large or too open, dividers or screens may be necessary. Rows of lockers provide natural screens. The shower or washroom facilities can be used as a place where the student can change from street clothes to screening attire. Screening during a unit on swimming is especially convenient as all students are in swimsuits.

Accessibility should also be considered. There should be a plan for traffic in and out of the screening area and a place for waiting outside. There should be enough space for the student to bend over, with six or more feet distance to the screener. Masking tape on the floor helps the student to know where to stand, and gives some positive direction, as the student may be nervous. The only equipment needed is the screener's chair and a desk or table for recording purposes.

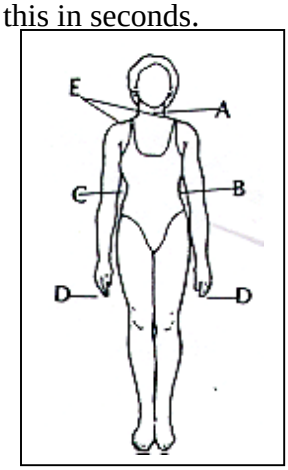
Since students will be partially undressed, room temperature should be comfortable. Lighting should be adequate and even, avoiding shadows. If the wall behind the

student is white, cream or beige, consider a colored backdrop (green, blue, or orange) behind the student to make observations easier. The floor should be level.

3. Clothing
   Students should be barebacked when possible. Boys should strip to the waist. Girls may wear halters or swim suits. Since separate screening with privacy is provided, a bra is acceptable attire for girls.

C. Initial Screening Procedure
The procedure involves viewing the student from six positions, as follows:

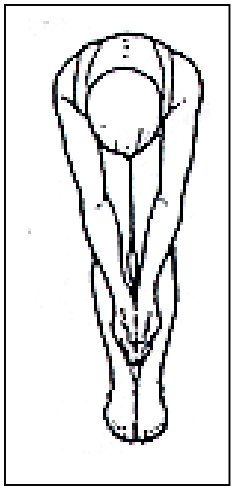
Position 1
After introductions, the student stands facing the screener. The student should be relaxed, have feet together, weight even. The hands should hang loosely at the side with the student looking straight ahead. Telling the student to "drop your shoulders" rather than "relax" can be more effective in getting the students into proper position. Hair should be pulled back and out of the way to expose the shoulders and thoracic area. While the student is in this position, carefully observe their posture and look for any asymmetry. Experience will enable the screener to do this in seconds.



Posture checklist

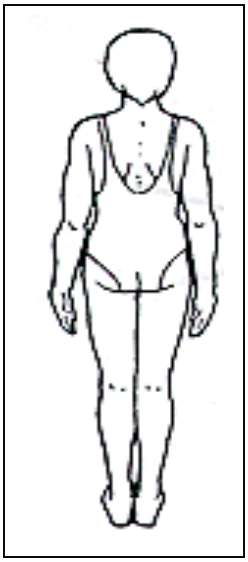
Point A	Head centered over pelvis
Point B	Symmetry of waist creases
Point C	Arm to body spaces
Point D	Arm length
Point E	Shoulder elevation

Factors that alter posture should be taken into account during the screening. These include weight distribution, pelvic tilt and lateral flexion in the spine. When the weight is taken off one leg, a resultant "scoliosis" appears. Similarly, some curvatures are due to a leg-length inequality. The screener might check these students in a sitting position. These curves can often be corrected with a lift in the shoe worn on the shorter leg. Tilting the pelvis changes the posture by increasing or decreasing lumbar lordosis. The kyphosis normally seen in the thoracic spine may also be affected by this pelvic tilt. Abdominal tone will affect pelvic tilt.

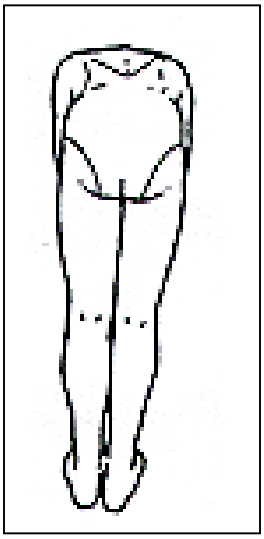


Position 2
After observing the student standing from the front view, ask the student to extend arms in front, with elbows straight and palms facing, tuck the chin to the chest and slowly bend at the waist. Stop the bend when the upper back is visible. Observe the thoracic area for symmetry on both sides. Ask the student to slowly bend lower until the lumbar area is visible. The arms should be hanging down,

hands together, palms facing, with knees remaining straight. Observe the lower back in the lumbar region and make sure the muscle mass of the hips are even. An asymmetry located in the thoracic spine is best seen in this position. Any asymmetry noted should be recorded as "fail" and student rescreened and/or measured. Children should easily bend to within four inches of the floor. Failure to do so may represent lack of effort or a problem. Again, observe for abnormalities in posture.



Position 3
Next, ask the student to turn around so that the back is to the examiner. The student stands as before, feet together, arms at the side, body weight even, and most importantly, relaxed. Hair should be pulled forward to expose the shoulders and upper back Again, observe for shoulder elevation, scapular prominence, asymmetrical waist creases and unequal arm to body spaces. Mark the record if recording specific observations.

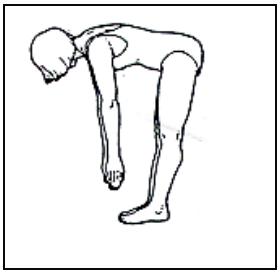


Position 4
Next, the student bends forward slowly at the waist, tucking the chin to the chest, arms down, palms facing. Have the student stop when the upper back is visible. Observe the thoracic area for symmetry of both sides. Ask the student to slowly bend lower and observe the muscle mass of the hips for symmetry of both sides. Any asymmetry should be recorded as "fail" and student rescreened or remeasured.

This forward bend is the most important position in the screening process. One way to assure the forward bend is symmetrical is to check whether the student's thumbs are equidistant from their big toes. Be sure to carefully observe for both thoracic and lumbar "humps" or elevation, and assure the spine is parallel to the ground.

Position 5
Next, the student stands with his/her side to the examiner. Check for an accentuated roundback or hump. From this view, the normal spine has an "S" curve.

Position 6
Next the student assumes a forward bend position and the screener checks for an exaggeration of the smooth arch of the thoracic spine and a flattening of the lumbar area. If such an exaggeration is present, mark record as "fail." Student should be rescreened before referral.



In newly organized screenings, it is helpful to rescreen all students that "fail." As screeners gain experience, and mark specific observations on the roster, rather than "pass/fail," it is easier to identify those that need to be rescreened. Students who need to be rescreened include those with:

- Any visible prominence in the thoracic and/or lumbar area when student is flexed at the waist (forward bend position) – **other deviations are usually insignificant**.
- Exaggerated hump of upper back (kyphosis) on flexion, viewed from the side
- Any student the screener is unsure of, or concerned about.

The whole screening process will take less than 30 seconds with experienced screeners.

The screener should also note additional observations that are pertinent to any health screening such as questionable bruises, scars, misalignment of arms or legs, abnormal thinness or obesity. The scoliosis screening time is a good time to weigh and measure adolescents that are not usually screened for nutritional problems. They have on very little in the way of clothing that might interfere with more accurate weights.

IV. RESCREENING

The rescreening is a repeat of the screening procedure, and should be done by the school or community health nurse. In some areas, physicians may volunteer their time to do the rescreening. Students should be viewed again in all six positions.

A. Kyphosis Rescreen
If, on forward bend, an increased thoracic kyphosis is again noted, as viewed from the side, the student should be referred for evaluation. There are no objective measurements for thoracic kyphosis available for school screening.

B. Scoliosis Rescreen
If, on forward bend, viewed from the front or back, an asymmetry or prominence in the thoracic or lumbar area is again noted, the student should be positioned where the prominence is most marked and the prominence should be objectively measured.

C. Measuring the Prominence
The recommended objective tool for measuring deviations is the scoliometer (inclinometer). It is used to measure the angle of rotation as evidenced by the amount of prominence in the thoracic or lumbar area. The scoliometer can be purchased

commercially and requires no maintenance or calibration. It works on the same principle as a carpenter's level. It is easy to use and to read.

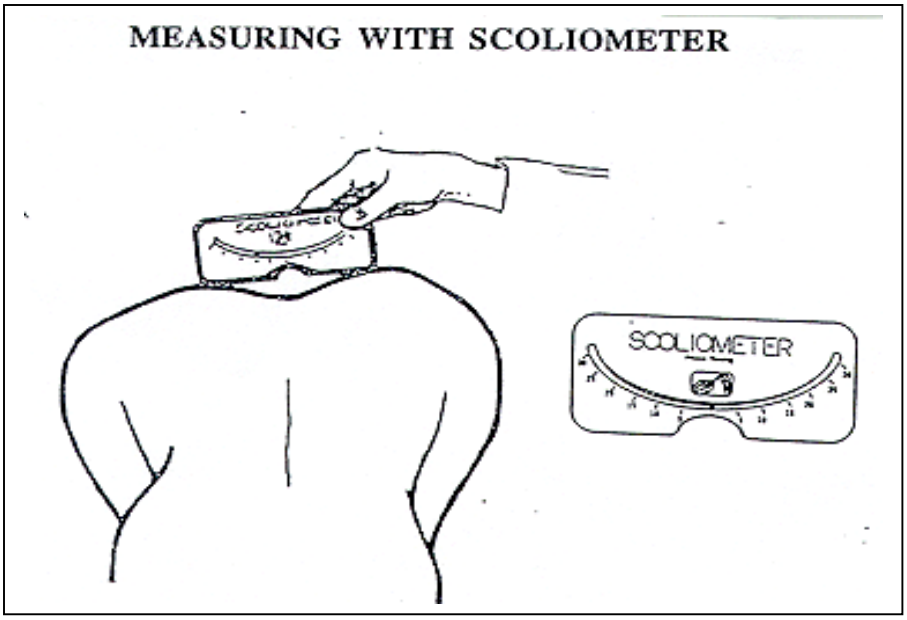
The student should be instructed to bend forward slowly, stopping when the shoulders are level with the hips. View student from the front and back, with eyes on the same level as the student's back, noting any rib elevation (thoracic) and/or asymmetry in the flank (low back) area.

Before measuring with the scoliometer, adjust the height of the student's bending position to the level where the deformity of the spine or elevation is most pronounced. This position will vary from one person to another, depending on the location of the curvature. For example, a curve low in the lumbar spine will require that the person bend further forward than a curve which is present in the thoracic or upper spine.

Place the scoliometer across the deformity at right angles to the body, with the "0" mark over the top of the spinal processes. Let the scoliometer rest gently on the skin; do not push down. Read the number of degrees of rotation.

If there is asymmetry in both the upper and lower back, each prominence should be measured (two readings) and recorded. The curves will almost always go in the opposite direction, with the one in the thoracic spine usually to the right and the one in the lumbar spine usually to the left.

Allow student to relax, and then remeasure to confirm the degree of rotation.



D. Referral Criteria for Scoliometer

The student should be referred if the degree of inclination is read as seven (7) degrees or more on both the first and second reading. Record the highest reading on the referral form. It is always desirable to discuss referral criteria with local providers. If a different criterion is used, it is helpful to put this in writing in the form of a protocol for screening.

The scoliometer is a useful device for monitoring students with questionable results when the measurements are taken by the same person. Changes in reading indicating progression can sometimes be used to motivate parents to follow through on referrals.

Most screening programs will identify students who deserve monitoring, but not qualify as a referral. These students might warrant checking in three to six months rather than waiting until the next screening. This list should include:

- Any student whose measurements fall short of the referral criteria but who has an observable prominence;
- Students with spinal or orthopedic variations present to the degree it raises concern; and
- Students with a family history of spinal deformity.

V. REFERRAL PROCESS

Those students who meet the criteria after secondary screening should be referred for medical evaluation. Parents should be notified in person when possible. The thought of a spinal deformity is disturbing to both the student and the family. A personal contact by the nurse discussing the screening procedure and results can help reduce apprehension in parents. It is helpful to show the parents findings such as the “hump” when bending forward. The nurse should also inform the parents about the referral criteria used and the need for a medical evaluation. Parents should understand that a referral does not constitute a diagnosis of scoliosis or kyphosis, but simply indicates the need for further evaluation.

After the personal contact, a referral form can be sent to the parents which encourages a medical evaluation for their child. A form for the parents to take to their health care provider is important. Sometimes, these can be combined. After the medical evaluation, the form may be returned to the school if the parent has signed a Release of Information statement on the form.

It is extremely important for the nurse to follow through on referrals as time is a factor in the progression of a curve. Six weeks is a reasonable length of time in which to expect a response to a referral. Some referrals letters are written to elicit a reply from the parent regarding their understanding of the referral and/or identify possible barriers to care.

VI. REFERRAL SOURCES

Referral and follow-up is more than sending out a letter stating the student failed the screening; it important to do whatever is possible to assure the professional examination takes place. Nurses who manage the spinal screening program must be aware of the ethical responsibility involved in follow-up of possible problems and the cost of over-referral.

If a family does not have a family physician, or requests assistance regarding a referral source, the nurse should be able to provide such assistance. Shriner's Hospitals or local children's hospitals will have specialists on staff to provide evaluations. Nurses working in community settings like schools should maintain referral resource files that keep track of providers, costs, eligibility, etc.

VII. INTERVENTIONS/HEALTH COUNSELING

Nurses find it helpful to identify the "human response" to the diagnosis and/or treatment of scoliosis in order to provide appropriate nursing interventions. An awareness of adolescent growth and development is important in understanding and identifying the adolescent's response to the possibility of a physical deviation.

Adolescence is a time of uncertainty, discovery, and challenge. Peer approval is of utmost importance. Self identity is often lacking, and the body image is critical. There is a great need for privacy. Adolescents are also wrestling with questions involving expectations of others and responses they are supposed to make in specific situations. The trials of growing up are not made easier when a potential deformity is discovered. Understanding this period of life and empathizing with the student helps in the referral process and can result in eliciting the student's cooperation.

Understanding the family's reaction is also helpful. There may be feelings of guilt, anger, apprehension, worry, or stress. Many questions are asked. Why us? How could we have missed this? Did our genes cause this? Is it a permanent deformity? How will we pay for the treatment? This creates stress in the family that adds to the student's anxiety. These issues should be considered during counseling.

Once a diagnosis of a spinal deformity requiring brace treatment is made, the beginning of a very long, tedious treatment program begins. The last thing parents want to see is their son or daughter in a brace, possibly confined in steel uprights and a body girdle. Parents and other family members are key persons involved in the treatment program. They provide most of the support that the student will need during his/her treatment. If there is a good relationship between the parents and the student, then the brace treatment will be successful. Parents need to be firm but empathetic toward the adolescent.

Parents, as well as the student, need someone to rely on for support and for answers to their questions. Parent/patient support networks can be effective. The young patient will have many medical questions. Is this brace made just for me? How will I cope with wearing the brace? What will my friends say? In what activities can I be involved? The school nurse

and the nurse in the doctor's office can answer these questions and can give great support to the student. The nurse should also know answers to concerns regarding skin care, activities, clothing, exercises, and proper general hygiene for the patient and the brace. The school nurse may be the key person in the community for educating the patient regarding brace problems, as well as assisting the patient in wearing the brace. Some students may require an individualized health plan (See Suggested Nursing Diagnoses).

VIII. PROGRAM MANAGEMENT

A. Documentation

All findings, positive and negative, should be recorded on the student's cumulative health record. For the positive findings, additional referral information, and results of medical evaluations are recorded.

B. Tracking Referrals

As part of the spinal screening program management, the coordinator should utilize some type of worksheet to indicate which students have been referred, the contacts made, and the status of the referral. A tickler system is helpful in stimulating contact periodically, by phone or mail, to inquire regarding the results of a professional evaluation, or barriers to obtaining the evaluation.

C. Program Evaluation

Screening programs should be evaluated yearly, with particular attention to reasons for incomplete referral, so those problems can be addressed. This might require more public awareness of spinal deviations, developing referral sources, communications with health care providers, etc. On average, about 2-3 percent of students screened might need referred. An acceptable standard for completed referrals is 75 percent or more. If this level of follow-up is not attainable, the program should be redesigned.

It is important to be aware of the percentage of confirmed spinal deviations in order to validate the screener's competency and adequacy of referral criteria.

APPENDIX

RESOURCE INFORMATION

Scoliometer – can be purchased from:

OSI Scoliometer
Orthopedic Systems, Inc.
1897 National Avenue
Hayward, CA 94545-1794
(415) 785-1020 – to obtain current purchase/shipping costs

This device is also found in various school health supply catalogs

Parent/Student Education Materials websites

The material on these websites is not screened or reviewed for accuracy. Parents and students should be cautioned to check out information with their physician.

www.scoliosis.org
National Scoliosis Foundation – education, information, resources

www.scoliosis-assoc.org
volunteer organization, non-medical group, support group information, newsletter, articles by patients, PenPals

www.kidshealth.org

www.vh.org/pediatrict/provider/orthopedic/AIS
Virtual Children's Hospital, education geared for children and adolescents

www.spineuniverse.com
patient education, steps in diagnosis

Professional Education

www.srs.org
Scoliosis Research Society-background information on scoliosis/kyphosis
This is the only peer-reviewed for accuracy site.

www.ncbi.nlm.nih.gov/
JAMA report, population-based study on school scoliosis screenings

http://cpmcnet.columbia.edu
Guide to Clinical Preventive Services, musculo-skeletal disorders
Report on effectiveness of scoliosis screening

www.aaos.org
www.orthoinfo.org
www.arthroscopy.com
American Academy of Orthopedic Surgeons, includes patient education links
Position Statement on School Screenings.

Suggested Nursing Diagnoses Associated with Scoliosis/Kyphosis

Alteration in comfort related to (RT) brace, surgery, treatment

Anxiety RT new diagnosis of scoliosis/kyphosis requiring long-term treatment

Impaired physical mobility RT restricted movement secondary to brace

Ineffective individual coping RT uncertainty of prognosis

Potential/alteration in activity RT insufficient knowledge of, i.e., condition, treatment, exercises, environmental hazards, care of appliances, follow-up care, community resources, etc.

Potential/altered growth and development RT diagnosis of scoliosis/kyphosis

Potential/body image disturbance RT, i.e., use of therapeutic device, activity restrictions, change in activities, preoccupation with problem, denial of problem, etc.

Potential for impaired skin integrity RT mechanical irritation of brace

Potential for non-compliance RT chronicity and complexity of treatment regimen

Potential/self concept disturbance RT diagnosis and treatment of scoliosis/kyphosis

Situational low self esteem RT negative feelings about self in response to diagnosis and treatment of scoliosis/kyphosis

SPINAL CURVATURE SCREENING NOTICE TO PARENTS

On _____, we will be doing Spinal Screening at _____
Girls in the _____ grade(s) and boys in the _____ grade will be screened during their Physical Education class period.

Abnormal spinal curvature is usually first noticed at the beginning of the adolescent growth spurt. Often early detection and appropriate treatment can prevent progression of the curve.

The screening procedure takes about 30 seconds, but does require the student to remove his/her shirt or blouse in order that the spine can be visually observed by the school nurse, the public health nurse, or other allied health professional who has been trained in the screening procedure. Girls may be screened wearing swimsuits, halter tops or a bra. Privacy is provided for these individual screenings.

If a deviation from normal is suspected, you will be notified and requested to take your child to a physician for professional evaluation.

If you prefer not to have your child screened for spinal curvature, please contact the school.

_____
School nurse

_____
Principal

SAMPLE

(School District Letterhead)

Dear Parents:

In the next few weeks, the (name of school district) is going to conduct a spinal screening program to detect students with a possible curvature of the spine (scoliosis). According to statistics, seven to ten children in every one hundred may develop scoliosis, and one to three will require evaluation by a health professional. Some children develop a condition called kyphosis, an abnormal hump in the upper back. If the conditions are detected early, and appropriately treated, progressive spinal deformity can be prevented.

The procedure for screening is a simple one in which the screener (trained volunteer, nurse, physical education teacher, or physical therapist) looks at the child's back in a standing position and in a forward bending position. This will be done during the physical education class of all ____ grade girls and ____ grade boys. Students will be rechecked by a nurse or physician before a referral for further evaluation is made.

If your child is currently under active treatment for a spinal condition, or if you would rather not have your child screened, please notify:
_____ at _____

If your child has a suspected curvature, you will be notified by phone and/or letter and asked to take your child to your family physician, clinic pediatrician or to an orthopedic surgeon for further evaluation.

QUESTIONS AND ANSWERS ABOUT SCOLIOSIS/KYPHOSIS

Q What is scoliosis?
A It is a lateral (sideways) curvature of the spine.

Q What is kyphosis?
A Exaggerated hump of the upper back

Q Is scoliosis/kyphosis a disease?
A Not in the sense you may be thinking. You don't catch it, and it doesn't develop because of anything you did or failed to do. It is usually discovered during the early teenage years, at the time of normally increased growth.

Q How is it noticed?
A Scoliosis usually presents as a difference or asymmetry in the trunk or waist creases. Sometimes the first indication that something is wrong is an awareness that clothing doesn't fit properly.

Q Is scoliosis very common?
A In the U.S. and Canada approximately 10,000 growing children are currently under treatment for scoliosis. Usually the condition is so mild that treatment is not necessary.

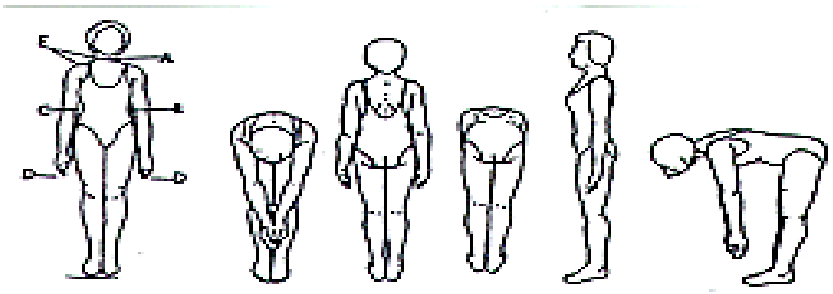
Q Are there different types of scoliosis?
A Eighty-five percent of the time the condition falls into the category of IDIOPATHIC SCOLIOSIS, which means it is not due to another disease. Fifteen percent of the time, the scoliosis is caused by something else. Because there are different types and different causes, it is important that the reason for the scoliosis be diagnosed by a doctor. He will want to be certain that it is not a symptom of something more serious.

Q Can scoliosis happen to anybody?
A For some reason nobody understands, significant scoliosis is about eight times more common in girls than it is in boys. If the curvature is in the upper part of the back, the chances are about nine times as great that the curvature will be to the right. If the curvature is in the lower part of the back, there are the same chances it will curve to the left. We don't know why, but it does.

Q Is scoliosis/kyphosis hereditary?
A There is a tendency for it to run in families. When a case of scoliosis/kyphosis is diagnosed, it's a good idea to have the back of any sisters or brothers checked.

Q Can scoliosis/kyphosis be cured?
A No, however, if treatment is indicated, the curve can usually be controlled by treatment methods available.

Q What does screening involve?
A Viewing the student in six positions, as in the diagrams below:



SAMPLE

Name_____

Grade/Room____ Date_____

MARK ONLY POSITIVE FINDINGS

Shoulders_____

Scapula_____

Waist creases_____

Hip_____

Prominence_Thoracic_____Lumbar___

Exaggerated Hump_____

Other Concerns_____

NEGATIVE (Pass) **POSITIVE** (Fail)

Name_____

Grade/Room____ Date_____

MARK ONLY POSITIVE FINDINGS

Shoulders_____

Scapula_____

Waist creases_____

Hip_____

Prominence_Thoracic_____Lumbar___

Exaggerated Hump_____

Other Concerns_____

NEGATIVE (Pass) **POSITIVE** (Fail)

Name_____

Grade/Room____ Date_____

MARK ONLY POSITIVE FINDINGS

Shoulders_____

Scapula_____

Waist creases_____

Hip_____

Prominence_Thoracic_____Lumbar___

Exaggerated Hump_____

Other Concerns_____

NEGATIVE (Pass) **POSITIVE** (Fail)

Name_____

Grade/Room____ Date_____

MARK ONLY POSITIVE FINDINGS

Shoulders_____

Scapula_____

Waist creases_____

Hip_____

Prominence_Thoracic_____Lumbar___

Exaggerated Hump_____

Other Concerns_____

NEGATIVE (Pass) **POSITIVE** (Fail)

SAMPLE (Referral)

(District Letterhead)

Dear Parent:

As you know, we discovered a possible problem in your child when doing our spinal screening. We suggest you have your health care provider do a professional evaluation of your student's back.

It is important to us that this evaluation takes place to confirm or rule out a possible spinal deviation. Would you please let me know if there is any problem in obtaining this evaluation?

Please complete the bottom of this form and return to me in the next few days.

Sincerely,

Nurse

* *

_____ I understand the recommendation for an examination and have made an appointment with

_____ on _____.

_____ I still have questions. Please call me.

_____ I am willing to do this, but would like some information about possible financial assistance.

_____ My child has already been evaluated for this problem by _____.

_____

Signature Date

SAMPLE (Referral)

(District Letterhead)

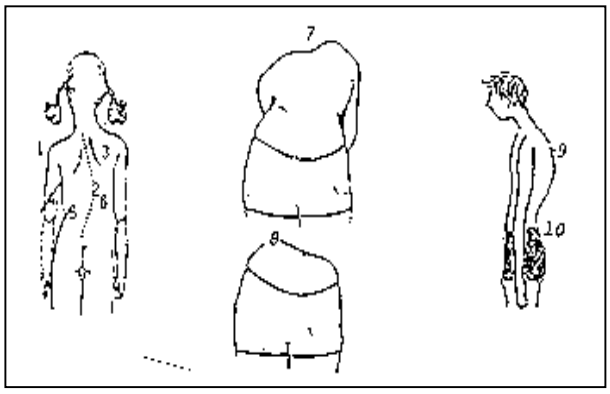
REGARDING: SPINAL SCREENING

Name of Student _____ School _____ Grade _____ Room _____

The following observations were made when your child was screened in our spinal screening program. It is important to watch for any progression of these findings.

OBSERVATIONS

	R	L
1. Shoulder higher	___	___
2. Obvious spinal curvature	___	___
3. Prominent should blades	___	___
4. Greater arm to body space	___	___
5. Waist creases uneven	___	___
6. One hip higher		
7. Prominence on side of upper back when bending over	___	___
8. Prominence on side of lower back when bending over	___	___
9. Increased roundback	___	___
10. Increased swayback	___	___



1. ____ Our records show similar findings during previous screenings.
2. ____ We suggest you bring these findings to the doctor's attention at the time of your next visit (within six months).
3. ____ Consult your family physician for further evaluation. This follow-up with a physician is extremely important. If you have had a recent evaluation, please send this form to your physician and ask that it be completed and forwarded to the school nurse. (Please sign the Release of Information section.)
4. ____ It was noted in our health records that your child has been seen by your health care provider for this condition. We would appreciate having the most recent report from your physician to help us in planning for your child. Please call your school nurse if you have questions or if you do not have a family physician.

Following an examination, please have your physician complete this form and return it to our office.

(See Other Side)

PHYSICIAN'S FINDINGS AND RECOMMENDATIONS

I have examined _____ (Student) on _____ (Date)

Standing (14 x 17 anterior-posterior x-ray entire spine) shows:

_____

Need for further evaluation	YES	NO	(please circle)

Treatment recommended:

No abnormality found:

Comments

EXAMINER'S SIGNATURE AND DEGREE	EXAMINATION DATE

ADDRESS OF EXAMINER (INCLUDING CITY, STATE AND ZIP)

SCHOOL NURSE: PLEASE COMPLETE THE FOLLOWING:

SCHOOL NURSE'S NAME	SCHOOL NAME

SCHOOL NURSE'S ADDRESS (INCLUDING CITY, STATE AND ZIP)	PHONE NUMBER (INCLUDE AREA CODE)

RELEASE OF INFORMATION FORM

To the physician:

Please provide the school nurse with the results of <u>this</u> evaluation in order to complete school records and to advise the school of any follow up/adaptation needed.

_____ Signature of Parent/Guardian

_____ Date

SAMPLE

MEDICAL RECOMMENDATIONS FOR
TEMPORARY EXCUSE/ADAPTED PHYSICAL EDUCATION

Name_____School District _____

Address_____Grade _____School Year_____

Dear Doctor:

We have received a request that your patient be excused from physical activities while at school. The state law requires all students regardless of disability to be enrolled in physical education and if the student cannot participate in regular class activities, he/she must be provided with an adapted program which will promote the health and fitness of the student in a safe and prudent manner.

Will you help us to properly place this student by providing the information requested below:

Nature of disability and reason for restriction_____

_____

Duration of restricted program_____Next appointment date_____

FUNCTIONAL RESTRICTIONS: Student's condition is such that the intensity and type of activity should be limited. He/she may be capable of participating to the extent of:

_____ unrestricted physical activity.
_____ no competitive sports; in other activities, should stop short of excessive fatigue or undue stress.
_____ no contact sports; other activity allowed.
_____ moderate exercise with all running, jumping, and gymnastics excluded.
_____ minimal activity; training in coordination only simple nonstrenuous activity (e.g., archery, ping pong).
_____ recommended using the following activities_____

_____.

MUSCULOSKELETAL RESTRICTIONS:

_____ avoid activities involving upper extremities.
_____ avoid activities involving neck, back or abdomen.
_____ avoid activities involving the lower extremities.

Additional comments:_____

_____

Date_____Signature_____
Physician

SAMPLE: Tracking Form

REFERRAL TRACKING FORM – SPINAL SCREENING

Student	Grade/ Room	Date Referred	Date Parent Contact	Code	Results of Professional Examination (see code)				Report on File Date	Reason for Incomplete (see code)
					Negative (no abn)	Positive finding	Recommended treatment for positive findings (see code)	Date Exam		

CODES

CONTACT
(L) Letter
(TC) Phone
(OV) Office visit

RECOMMENDED TREATMENT FOR POSITIVE EXAM
(O) Observation
(B) Brace
(S) Surgery

INCOMPLETE REFERRAL
(LTF) lost to follow-up/moved
(F) can't afford/not eligible for aid
(P) parent refusal/unconcerned /no response

SPINAL SCREENING PROGRAM
ANNUAL REPORT

SAMPLE: Statistical Report
(for internal use)
Building Summary Report_____ **School Year _____**
District Summary Report_____

Building/District_____Form completed by_____ Date_____

					RESULTS OF PROFESSIONAL EXAMINATION OF REFERRED STUDENTS								
	SCREENED		RE-SCREENED		Diagnosis					Recommended Treatment			
Grade	Total Number of Students	No Problem Found	No Referral At This Time	Referred For Professional Examination	Normal (No Abnormality)	Other Problem (Including Kyphosis)		Scoliosis		Observation	Bracing	Surgery	None or Unknown
						F	M	F	M				
Girls													
Boys													
Special Needs													
TOTAL													

MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES

DIVISION OF COMMUNITY HEALTH
Section for Community Health Systems and Support
Healthy Communities and Schools Unit

PO Box 570
Jefferson City, MO 65102-0570
(573) 751-6213