

BRACE EVALUATION AND CRITIQUE

CHECKOUT OF THE BOSTON BRACE

Purpose of the Checkout:

The purpose of the checkout is to review the brace design, fit and function. Brace checkout should be done when the brace is first delivered, when the patient returns for the first in-brace X-ray, and on subsequent return visits. The initial brace checkout should be done with the brace blueprint available for reference, and subsequent visits should include comparison to the most recent X-ray. The orthotist, physical therapist, nurse and physician should all be competent in brace checkout.

Patient standing

Watch the patient apply the brace and correct any errors. A clue as to the real frequency of brace wear can be noted by the ease with which the patient applies and removes the brace.

POSTURE

Sagittal Plane

Examine the patient standing with the brace on, viewed from the side.

Hips and Knees: Does the patient stand with hips and knees flexed? (Common with a new brace which diminishes lumbar lordosis). This suggests the need for hip flexor stretching and postural awareness. If one knee or hip is flexed, the contracture may be asymmetric or there may be a leg length discrepancy.

Thoracic Spine: Does the patient stand with the thoracic spine above the brace extended in hypokyphosis or lordosis? This too is common with a new brace and suggests the need for hip flexor stretching, postural awareness and perhaps prokyphotic exercises for the thoracic spine.

Coronal Plane

Examine the patient standing with the brace on, viewed from the front or back.

Patient Tilt: Is the patient listing to one side or standing with one knee flexed? If so, this may be due to a leg length difference. Reexamine the X-ray and the patient. A shoe lift to compensate for the leg length may be needed. If the leg lengths are equal and the patient still lists to one side, then see Brace tilt below.

Brace Tilt: Is the brace tilted to one side? This may mean that a trochanter pad is needed, or an existing trochanter pad is inappropriate. It may also mean that the brace is too extensive or not extensive enough. (For example, a thoraco-lumbar rather than a thoracic brace is needed, or a thoraco-lumbar rather than a lumbar brace is needed)

Trim Lines (Standing)

Examine each of the trim lines in sequence. In each case, consider why the trim line is located as it is, and whether that part of the brace is fulfilling its particular function.

Anterior Superior

Does the anterior superior trim line (top of the abdominal apron) just cover the xyphoid process and rib margins? Does it allow easy breathing and lateral bending? Does it still control the abdominal contents?

Anterior Inferior

Does the anterior inferior trim line cover the ASIS's by at least two finger breadths? Does the center just cover the pubis? If the trim lines appear too high, check to see that the brace is properly applied, and not simply riding too high. The curves should flow freely, with no sharp points.

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Posterior Superior

Do the posterior superior trim lines appropriately achieve control of sagittal plane flexion / extension?

The standard posterior superior trim lines should end at the level of the T8 vertebra and should allow free movement of the inferior scapular margin. A common problem noted with the standard posterior superior trim line, especially in a new brace, is worsening of the hypokyphosis of the thoracic spine above the posterior superior margin of the brace. This problem is addressed above under patient standing posture.

If a prokyphosis extension of the posterior superior trim lines was used, check that they are contoured to contact the patient.

Posterior Inferior

Are there bulges of buttock tissue beneath the posterior inferior margins (too high) or excessive brace protruding from the buttock contour (too low)?

Posterior Opening

Is the posterior opening centered on the back? Are the margins parallel and is the opening approximately the width of the 5th lumbar vertebra? Check that the lumbar pad is contacting the paraspinal muscle mass and that the pressure is appropriate.

Lateral Inferior

Trochanter Pad / Extension Is the trochanter pad on the correct side (on the side toward which L5 is tilted, beneath the concavity of the lumbosacral curve)? Check that the trochanter is covered and that pressure beneath the pad is appropriate.

Opposite the Trochanter Extension Is the opposite side trimmed 1 cm above the proximal limit of the greater trochanter? Ask the patient to rotate the lower extremity and check for impingement.

Patient sitting

Examine the patient seated on a firm, flat chair, with the hips flexed at 90 degrees. The brace should not ride up or displace.

Trim Lines (Sitting)**Anterior Inferior**

Check that there is room for the sartorius muscle (lateral corner of the thigh) and that the brace does not cut off circulation to the legs. The pubis should be covered in the sitting position, and the brace should not impinge on the bone.

Posterior Inferior

Is the brace as low as possible, while still leaving a 1-2 cm. space above the chair?

Checking the brace against the blueprint

Examine the brace on the patient while referring to the blueprint. Consider each component of the brace blueprint and make sure that the finished brace embodies your blueprint design.

Pads and Relief Areas:**Trochanter Pad**

Is the trochanter pad on the correct side? Does it keep the brace balanced? Is the opposite trochanter free to move?

Lumbar Pad

Is the lumbar pad pressure located appropriately contacting the paraspinal muscles with the upper margin of the pad at the null point? Is there adequate relief opposite the lumbar pad?

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Thoracic Pad

Does the upper margin of the thoracic pad contact the appropriate rib and does the trim line correspond to the angle of the ribs? Is there adequate relief opposite the pad?

Axillary Extension

Does the axillary extension provide pressure, yet not impinge on breast tissue or scapulae? Has the patient learned to not extend posteriorly over the proximal margin of the brace?

Rotational Force Couples

Examine each of the following for rotational control and demonstrate areas of pressure and relief:

1. Pelvis
2. Lumbar Spine
3. Thoracic Spine

Sagittal Plane

Consider whether the brace does an adequate job of contorting or at least not exacerbating deformities in the sagittal plane.

Lumbar Lordosis

There should be control of lumbar lordosis, so as to make the paraspinal muscles accessible to the lumbar

pressure pad and control pelvic rotation.

Thoracic Hypokyphosis

Is the thoracic hypokyphosis helped or worsened? What design features promote this?

CHECKING THE BRACE OFF THE PATIENT

Remove the brace in order to check the patient's skin and the brace. The condition of the brace gives a clue as to how much it is used.

Brace

Brace Lining

Are the Lining and edges of the pads smooth, even, and free of glue? Is the Lining beaten down anywhere suggesting areas of excessive pressure? Check for loose edges.

Pads

Do the pad edges flow into the surrounding brace? Are the pads loose?

General

Are the straps long enough? Are there any rough edges?

Patient:

With the brace removed, check the skin.

Skin Condition

Is there excessive redness or breakdown? If irritation is present, check the brace lining. Check pelvic control if irritation is excessive over the iliac crests. Excessive motion will often cause such irritation.

Location of Skin Pressure Areas

Check the areas of hyperemic skin against the blueprint. Is the pressure located where pressure is desired?

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How often should the patient be seen in follow-up?

Follow-up schedules must often be tailored to the individual needs of a patient, but our standard regimen tries to achieve a balance between excessively frequent visits which may cost too much time from school and family, and too widely-spaced visits during which the brace may no longer fit or be adjusted properly or the patient easily lose enthusiasm for wearing the brace. When in doubt, the patient should be seen frequently. Once adapted to brace use, most patients should be seen every 3 months. Although little may appear to occur with these visits, it seems necessary to frequently validate the patient's efforts in brace usage and encourage or realistically assess their progress. If given a more remote follow-up appointment and told to 'come back sooner if there is a problem', patients rarely seem to come back for compliance and psychosocial problems, poor fit, skin irritation, etc. Yet when given an appointment for every 3 months, these issues are noted earlier and dealt with somewhat more effectively.

How often should there be radiographs?

In the past, radiographs were taken every 3 months. We now try to make each radiograph count, and would like to think that there are no 'routine' radiographs, rather each radiograph is taken to answer a specific question, or help with a specific decision. Many of our patients whose brace treatment is proceeding routinely receive only one radiograph each year.

Typical schedule