

Spinal Orthoses

March 2025

Neurosurgery Education
and Outreach Network **NE**  **N**

NEON Statement

The Neurosurgery Education and Outreach Network (NEON) is comprised of Neurosurgery Nurse Educators, Advanced Practice Practitioners, Clinical Nurse Specialists and Directors from each of the 13 neurosurgery centres.

The mandate of the NEON is to plan and implement neurosurgery system-wide improvements, through education and outreach, to address gaps in skills and knowledge, and improve access and patient flow between neurosurgery and non-neurosurgery centres.

Disclosure Statement

The Neurosurgery Education and Outreach Network (NEON) has no financial interest or affiliation concerning material discussed in this presentation.

This presentation provides direction for how to provide care to patients with Spinal Orthoses to ensure consistency within and across organizations. It was developed by a sub-group of clinical neurosurgical nurses and neurosurgical educators for health care professionals (HCPs) across Ontario. This presentation is not meant to be exhaustive, and its contents are recommended, but not mandated for use. HCPs should use their clinical judgment and utilize other assessment parameters if determined necessary.

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Learning Objectives

- The learner will be able to:
 - Explain what a spinal orthosis is.
 - Describe the indications for a spinal orthosis.
 - Learn and understand nursing interventions for patients with spinal orthoses, which includes application, removal and management of some common spinal orthoses.

Spinal Orthoses

- A spinal orthosis may be used as a post-operative support, to aid in pain relief and healing, to help maintain the stability of a spine fracture, and be used to treat a variety of spinal disorders.
- All spinal orthotic devices need a most responsible practitioner (MRP) order indicating direction for use and specifying when the patient should wear it.
- Follow MRP orders regarding application, removal, and wear schedule (e.g., may remove spinal orthosis when patient laying down). If MRP orders not provided, please contact the MRP.
- When an orthosis is used to protect the spine during healing of a fracture or postoperatively after a surgical fusion, it is generally worn anywhere from 6 to 12 weeks.

Objective of Spinal Orthoses

- Orthoses are designed to limit some or all movements of the spine:
 - Flexion
 - Extension
 - Lateral bending
 - Rotation

Spinal Orthoses Indication

- Prescribed to:
 - Realign the spine
 - Immobilize the spine
 - Limit mobility
 - Support weakened areas of the spine

Getting out of bed with brace



While lying flat in bed, patient bends both legs by sliding their heels towards their buttocks. Patient pushes with heels and logrolls onto side.



Patient swings legs over the edge of bed. Patient uses their arm and elbow to sit up.



Sit up position with a brace on.

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Please note: Photo depicts a HALO DEVICE, which is NOT addressed in the "Spinal Orthoses" document. For HALO DEVICE education, please refer to NEON's document, "Care and Management of a Patient with a Halo Device."

Types of Spinal Orthoses

- Numerous designs of spinal orthoses are available, providing different degrees of support to different segments of the spine.
- Orthoses are named according to the body segments involved and the planes of movement restricted.

Orthoses In This Presentation

- Head Cervicothoracic Orthosis (**HCO**)
 - E.g.: Semirigid Minerva Orthosis
- Cervical-Thoracic Orthosis (**CTO**)
 - E.g.: The Sternal Occipital Mandibular Immobilizer (**SOMI**)
- Cervical-Thoracic-Lumbro-Sacral Orthosis (**CTLSO**)
 - E.g.: Milwaukee Orthosis
- Thoracolumbosacral Orthosis (**TLSO**)
 - E.g.: Jewett Brace

*** Note: Soft and Rigid Collars, as well as the Halo Device, will NOT be covered in this presentation. To review those topics, please refer to [Resources - Critical Care Services Ontario](#)

Cervical-Thoracic Orthosis (CTO)

- A type of neck and upper body orthosis designed to limit movement and support the cervical and high thoracic spine.
- Provide greater restriction of neck motion than collars do.
 - E.g.: The Sternal Occipital Mandibular Immobilizer (SOMI)

Cervical-Thoracic Orthosis (CTO)



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Photo used with permission from Aspen. Retrieved from [Aspen® CTO](#)



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Sternal Occipital Mandibular Immobilizer (SOMI)

**A SOMI is an example of a CTO

- Indications
 - Atlantoaxial instability caused by rheumatoid arthritis.
 - Neural arch fractures of C2, because flexion causes instability.
- Contraindications
 - The SOMI controls extension less effectively than do other orthoses.
 - Flexion and extension control at C3-T1; better served with a Minerva.



Sternal Occipital Mandibular Immobilizer (SOMI)

- Components
 - Chest plate.
 - Mandibular support.
 - Occipital support.
 - A separate headband is included as an auxiliary support when the mandibular support is removed (e.g., for eating, shaving, etc.).
- Advantages
 - No posterior post - can be used while patient is supine.
 - Light weight for application and removal.
 - Controls flexion effectively at C1–C3.



SOMI Brace

Application Instructions

- Brace Application
 1. ALWAYS apply brace while patient is lying flat on their back.
 2. Apply the chest plate over the shoulders.
 3. Attach the mandibular support to the chest plate.
 4. Occipital support is then attached to the chest plate (slide on sideways underneath the neck).
 5. Snap the mandibular and occipital supports together.
 6. Sit patient up.
 7. Shoulder straps must be criss-crossed in the back and then attached to the hooks on the front of the chest plate.

SOMI Brace

Removal Instructions

- Brace Removal
 - MRP ORDER REQUIRED – brace is usually always worn.
 - To remove the brace, reverse the application instructions.
 - The headband or mandibular support must always be in place.
 - The headband can be worn for eating instead of the mandibular support.
 - The mandibular support should be worn so that the head is looking forward, not up or down.

SOMI Brace

Care Instructions

- Follow a skin care and hygiene routine.
- Areas likely to develop irritation should be padded to minimize friction.
- Use a t-shirt, soft clothes, adhesive band-aids, or thin foam to act as a barrier between the skin and brace.
- A front button shirt is easier to wear over the brace to allow easier removal and application of the mandibular support.

Cervical Thoracolumbosacral Orthosis (CTL SO)

- Restricts flexion (head down), extension (head back), and rotation (head side to side) of the cervical spine (c-spine).
- Restricts flexion (bending forward), lateral flexion (bending side to side), extension (bending backwards), and rotation (twisting) of the thoracolumbar spine.
- Proper adjustment (elongation) relieves weight on the c-spine by providing support and distributing the load more evenly across the spine.
- Indications for a CTL SO Brace:
 - Thoracic Fractures T1-T6.
 - Kyphosis, scoliosis, and osteoporosis.



Cervical Thoracolumbosacral Orthosis (CTLSO)

- Basic components:
 - Chest plate.
 - Anterior and posterior uprights.
 - Mandibular support.
 - Occipital support.



Photos used with permission from Aspen. Retrieved from [Vista II CTLSO - Standard](#)

Cervical Thoracolumbosacral Orthosis (CTLISO)

- The Milwaukee brace is the most common example of a CTLISO. It is a custom-fitted brace.
- Consists of a two-piece clamshell design.
- Consists of a customized pelvic girdle and a metal structure that extends to the neck.
- Use:
 - To stabilize the head and neck as well as the spine after surgery or in the event of a spinal fracture to promote healing and decrease pain.
 - To treat curves high in the upper back, such as kyphosis (hunchback).



Thoracolumbosacral Orthosis (TLSO)

- Thoracolumbosacral Orthoses Include:
 - The clamshell thermoplastic body jacket.
 - The thoracolumbar extension orthosis or Jewett brace.
- These appliances apply three-point bending forces at the upper thorax and pelvis and at the midportion of the orthoses across the thoracolumbar junction.

Thoracolumbosacral Orthosis (TLSO)

- This class of orthosis is best suited for restricting thoracolumbar and lumbar gross-body motion, but poorly controls low lumbar and sacral segments.
- Molded appliances are particularly useful for thoracolumbar junction trauma in which the total contact feature helps to control trunk lateral flexion (side to side movement of body) and trunk rotation (twisting).



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Thoracolumbosacral Orthosis (TLSO)

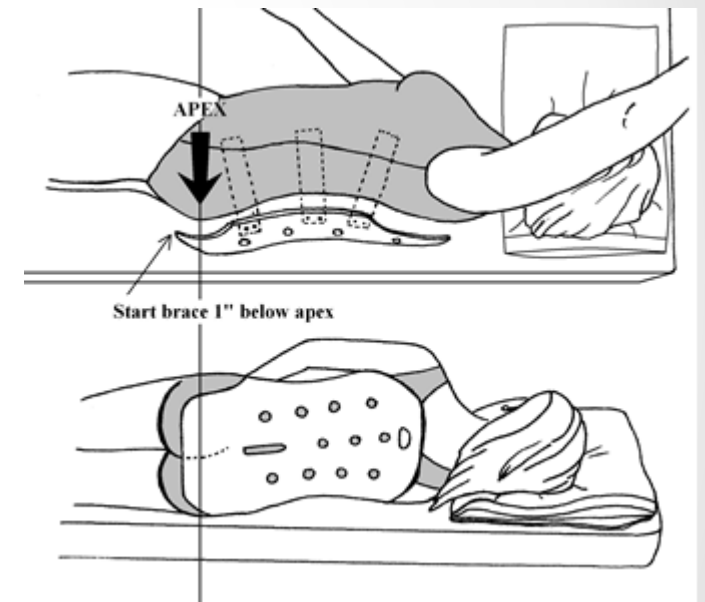
- Indications:
 - For fractures between T6 and L3.
 - Provide support and immobilization of the thoracic and lumbar regions following various surgical procedures/traumatic injuries.
 - Help in treatment of post-operative thoracic/lumbar fusion, laminectomy or discectomy, compression fractures, degenerative disc disease, osteoporosis, single column spinal instability immobilization, and facet syndrome.



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TLSO (Clam Shell) Application Instructions

1. Ideally the orthosis should be worn on top of a T-shirt, nightshirt, or long undershirt to allow for ventilation.
2. Log roll the patient to their preferred side.
3. Put on back section of the orthosis first, by sliding edge of orthosis and hook and loop straps under the patient's side.
4. The bottom of the orthosis should be about one inch below the midpoint of the bum and the mid-line of the orthosis should be slightly more toward the side that the patient is lying on (approximately 1" beyond the spine).

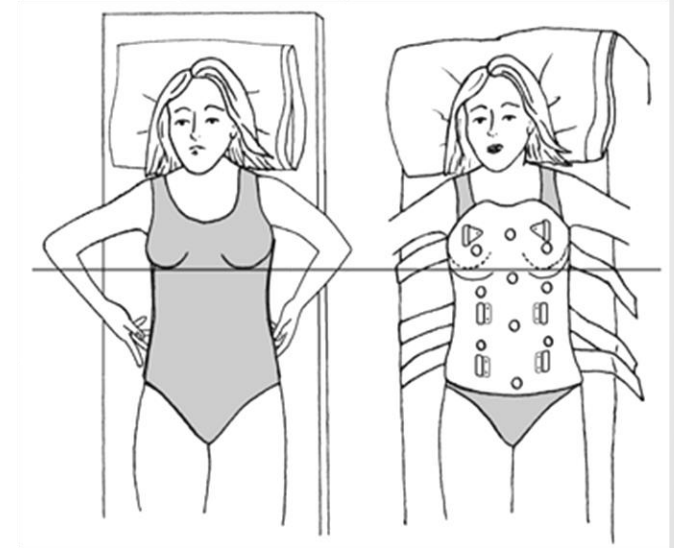


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TLSO (Clam Shell)

Application Instructions

5. Roll patient flat onto their back, making sure that the shoulders and hips are square. At this point, the orthosis may need to be pulled so that the orthosis is lying centred on the back.
6. Feel the sides to make sure that the orthosis comes up equally on either side of the body. Never lift the hips AT ANY TIME.

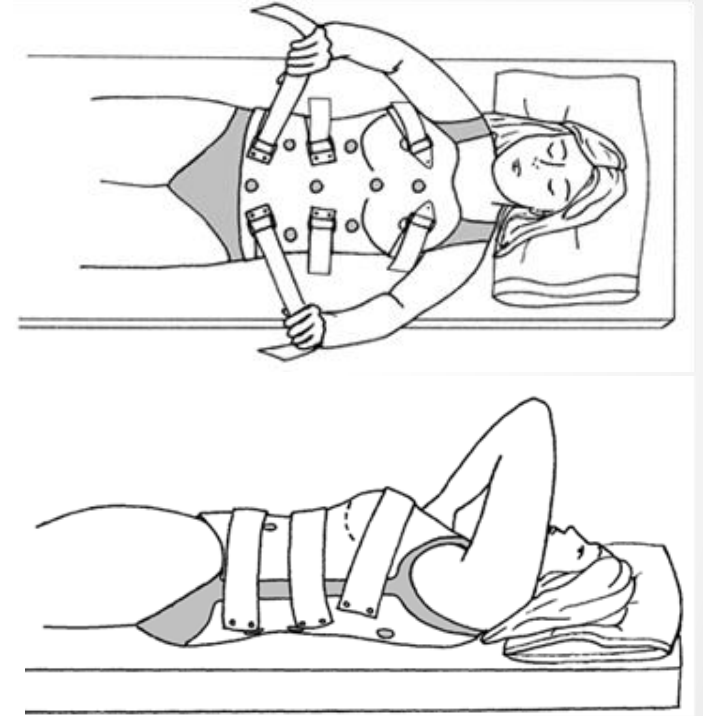


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TLSO (Clam Shell)

Application Instructions

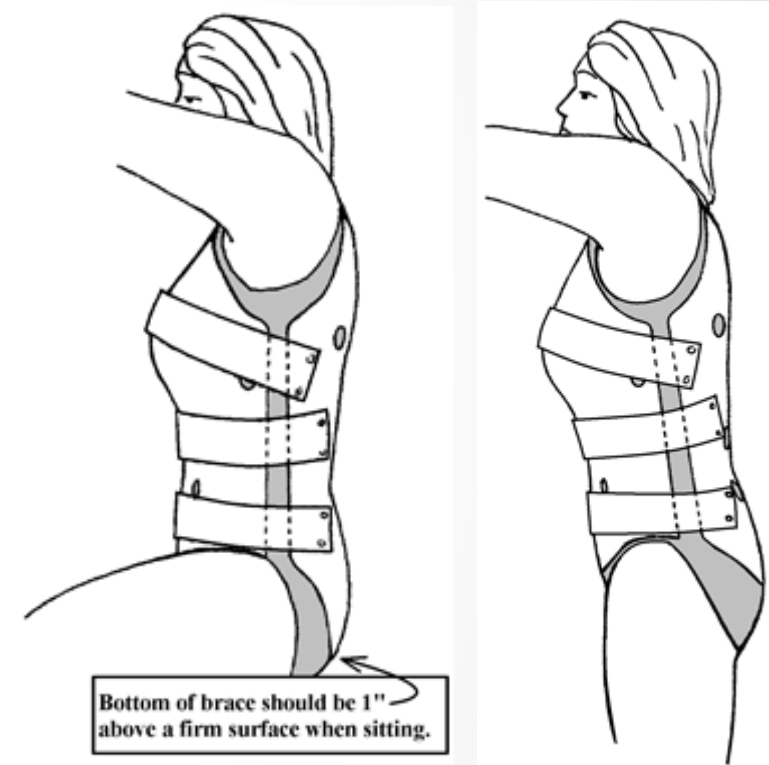
7. Next place the front section of the orthosis on the patient. This section should be placed low enough so that the abdomen is covered as much as possible. This may mean that the chest section is lower than normal, but it will move up once the orthosis is tightened.
8. The straps should be fastened from the bottom up, loosely at first, and then pulled tight. The patient should be able to breathe normally.



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TLSO (Clam Shell) Application Instructions

- How it should look:
 - When wearing the orthosis in sitting position, it should sit on top of the thighs, and the back of the orthosis should be about 1" above the seat of a firm chair.
 - In standing, the back section should end at the height of the curve in the buttocks, and the midline should be within 1" of either side of the spine. If it is not there, it should be reapplied.
 - Depending on the specific TLSO (Clam Shell), there may be a gap between the front and the back section or some may overlap. Follow the orthotist/orthotics technician's instructions for proper fit.



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TLSO (Clam Shell) Removal Instructions

- How to remove:
 - Have patient lay down flat on their back. Undo hook and loop straps. Remove front section first. Log roll patient to most comfortable side. Slide out back section.
- When to wear orthosis (follow MRP orders specific to patient):
 - The orthosis is typically applied and removed while the patient is flat in bed. The orthosis is typically worn whenever the patient is sitting up or standing.
 - MRP should order activity level, which should include HOB restrictions.

TLSO (Clam Shell) Care Instructions

- Shower/Bathing:
 - Some orthoses may be worn in a shower/bath. Not all orthoses are waterproof; check manufacturer's instructions and MRP orders. After a shower or bath, remove the orthosis, towel dry and let air dry for a short time (15- 30 minutes).
- Care & Cleaning:
 - It is recommended to wash the orthosis at least once a week with mild soap and water, using a washcloth or sponge. The soap residue must be rinsed off completely. After cleaning, towel dry the orthosis, let stand and air dry for a short time (15- 30 minutes).

Jewett Hyperextension Thoracolumbosacral Orthosis (Jewett TLSO)

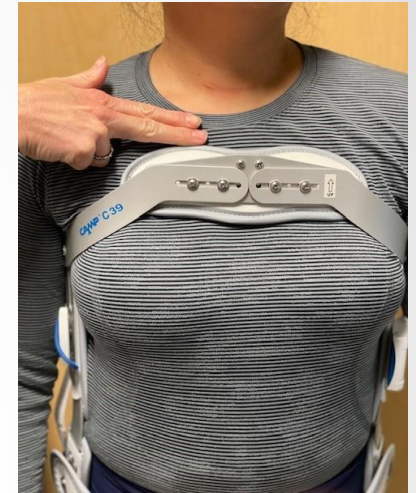
- Indications:
 - Particularly useful for compression fractures (e.g., thoracic and upper lumbar spine compression fractures) and post-surgical recovery, where restricting flexion can protect the healing vertebrae.
 - Prevents excessive flexion while allowing some extension and lateral motion. E.g., kyphosis management.
- When to wear(follow MRP orders specific to patient):
 - The orthosis is typically applied and removed while the patient is flat in bed. The orthosis is typically worn whenever the patient is sitting up or standing.
 - MRP should order activity level, which should include HOB restrictions.

Jewett Hyperextension Thoracolumbosacral Orthosis (Jewett TLSO)

- Components:
 - It is prefabricated and consists of an anterior and a lateral frame to which pads are attached laterally and at the sternal and suprapubic areas.
 - The Jewett uses a 3-point pressure system to control flexion of the spine:
 - Sternal region
 - Suprapubic region
 - Dorsolumbar region



Photos:
Left: Used with permission from TruLife.
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Jewett TLSO

Application Instructions

1. Ideally, the orthosis should be worn on top of a T-shirt.
2. Have patient lay down on the bed, position the sternal pad two fingers below the sternal notch and the suprapubic pad should sit just above the pubic bone. Then roll the patient onto their side, maintaining spinal neutral alignment (may consider putting a pillow between knees to help maintain neutral alignment).
3. Put the dorsolumbar pad and strap behind the back and slide the metal or plastic clasp under their side.
4. Roll patient onto back and ensure the Jewett is centred with the sternal pad resting two fingers below the sternal notch.

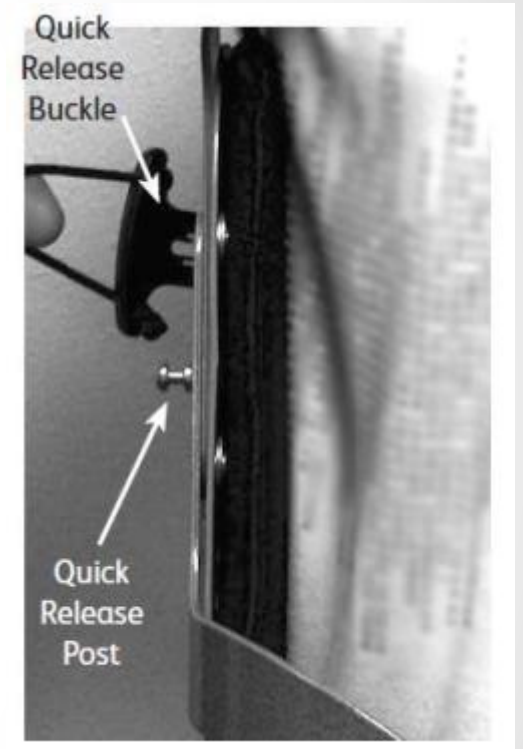


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Jewett TLSO

Application Instructions

5. To fasten the orthosis, hold it in place with one hand. With the other hand, use the thumb loop to pull the clasp forward tightly, and then in towards the abdomen, then down. This locks the clasp into the hook. Now turn the tab so that the back strap shortens, tightening the orthosis.
6. The orthosis should feel tight and look symmetrical.
7. Sometimes the attaching of the clasp pushes the Jewett to one side. If this happens, try to overcorrect for this before tightening the clasp.

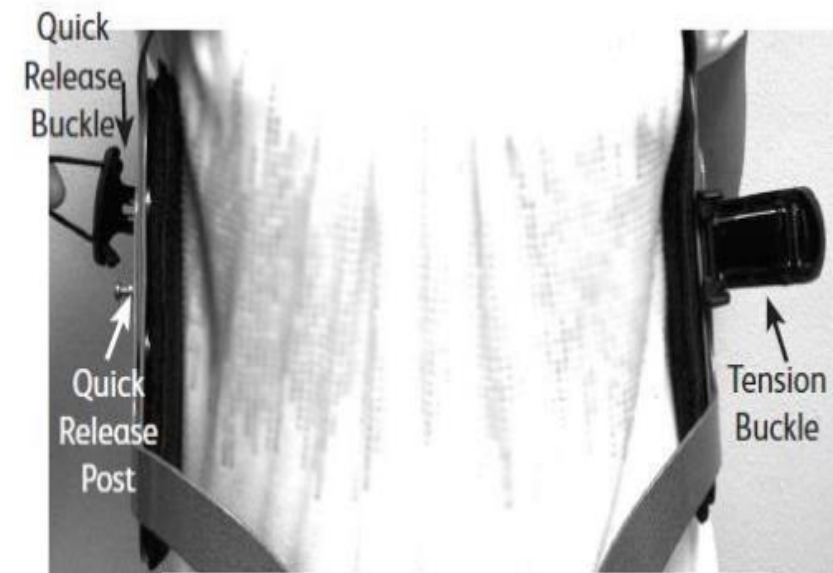


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Jewett TLSO

Application Instructions

8. For a proper fit, the sternal pad should rest on the sternum and the suprapubic pad should just touch the thigh when sitting. If the patient feels excessive pressure on the chest, the patient should straighten their posture, keeping the shoulders back and not leaning into the orthosis for support. The orthosis should act as a reminder that the patient is bending forward and compromising their back.



Jewett TLSO

Removal Instructions

1. Have patient lay down flat on their back.
2. Loosen the clasp.
3. Put one hand on the orthosis to hold it in place, then with the other hand, remove the clasp from the hook.
4. Have patient roll onto their side and pull plastic clasp out from under their side.
5. Take off the orthosis.

Jewett TLSO

Care Instructions

- Shower/Bathing:
 - The orthosis may be worn in the water. However, some institutions recommend sponge bathing while wearing the orthosis, as the metal can rust and pads can become moldy. Follow manufacturer's instructions and MRP orders.
 - After a shower or bath, remove the orthosis, towel dry, and let stand and air dry for a short time (15- 30 minutes). Recommend that the patient take a shower just before going to bed so that the orthosis may be cleaned and then dry overnight.
- Care & Cleaning:
 - Use mild soap, water, and a washcloth. After cleaning, towel dry and let stand for a short time (15-30 minutes).

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