Introduction to upper limb orthoses

For support workers - December 2023

Developed on behalf of the British Association of Prosthetists and Orthotists

Contents

- Upper limb orthoses classifications
- Types
- Examples of upper limb orthoses

Classification of upper limb orthoses

UPPER LIMB ORTHOSES

- shoulder-elbow-wrist-hand orthosis
- elbow orthosis
- hand orthosis
- shoulder orthosis
- wrist-hand orthosis
- thumb orthosis
- elbow-wrist-hand orthosis
- wrist orthosis
- finger orthosis

ISO (2020) ISO 8549-3. Prosthetics and Orthotic Vocabulary Part 3. https://www.iso.org/obp/ui/#iso:std:iso:8549:-3:ed-2:v1:en

4 types of upper limb orthoses

1. Static	• Immobilise one or more joints • Used for fractures and nerve injuries in post surgical phase
2. Dynamic or functional	• Allow a prescribed amount of movement across one or more joints • Include a spring or elastic to encourage rotation about a joint • Assist weak muscles • Provide corrective moment of force
3. Progressive	• Include non-elastic components to apply a force across a joint to hold it at the end of range of motion • Used to improve range of motion
4. Serial	• Static splints or casts that are recast or remade at a different angle over time • Achieve similar goals as progressive devices

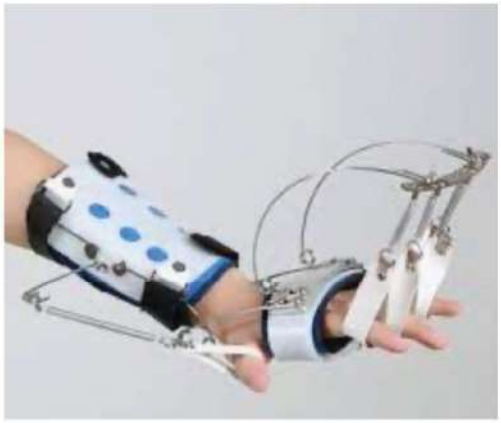
Basic upper limb orthotic products

- Narrow range of materials
- Single axis joints
- Lowest cost

Image: Orthoproactive 2022,
https://www.orthoproactive.com/upper-extremity-orthoses

Image: Promedics UK 2022,
https://www.promedics.co.uk/products/jura-wrist-brace

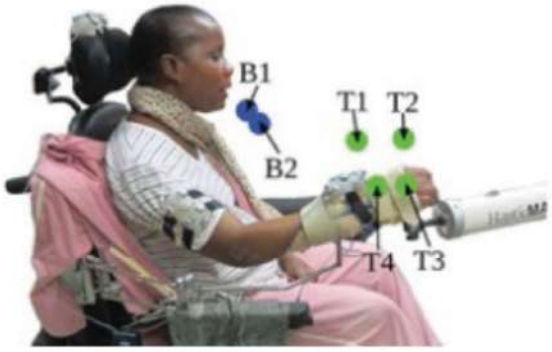
Intermediate upper limb orthotic products



- Wider range of materials
- Polycentric joints
- Body powered
- Resistance to movement – friction, pneumatics or hydraulics
- Mid cost

Image: Medi Global Assistance Device, http://medi-rehatek.com/e_productshow/?44-Dynamic-Extension-Hand-Wrist-Orthosis-44.html

Advanced upper limb orthotic products



- Wide range of materials + 3D printing
- Additional smart controls or materials
- Battery powered
- Most expensive

Image: EMBS 2022 https://www.embs.org/tnsre/articles/semiparametric-identification-of-human-arm-dynamics-for-flexible-control-of-a-functional-electrical-stimulation-neuroprosthesis/

Examples of upper limb orthoses

Wrist strap

Function	Compression of the wrist joint
Indications	Mild wrist injury
Contraindications	None
Device	Can be prefabricated or custom made with soft materials

Wrist hand orthosis

Function	Keeps the wrist in the resting position *(30 degrees extension)*
Indications	Pain on movement Mild to moderate wrist injuries Wrist arthritis Wrist drop *(radial nerve palsy)*
Contraindications	None
Device	Can be prefabricated or custom made

Wrist hand orthosis with thumb spica

Function	Keeps the wrist in the resting position *(30 degrees extension)* Keeps the thumb in fixed extension
Indications	Pain on movement Mild to moderate wrist and thumb injuries Wrist and thumb arthritis
Contraindications	None
Device	Can be prefabricated or custom made with thermoplastics, cast or blocked leather or polypropyline

Wrist hand finger orthoses

Function	Keeps the wrist, hand and fingers in the resting hand position
Indications	Significant pain on movement Contracture management Postoperative temporary use
Contraindications	None
Device	Can be prefabricated or custom made with thermoplastics, cast or blocked leather or polypropyline

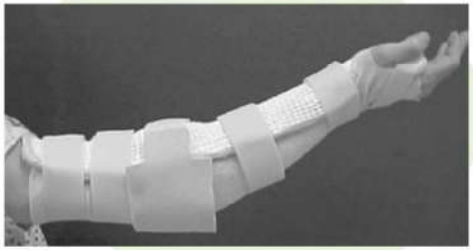
Wrist hand finger orthoses

Function	Compression of the upper forearm
Indications	Mild epicondylitis *(medial or lateral)*
Contraindications	Elbow instability Significant oedema Distal oedema
Device	Prefabricated

Elbow sleeve

Function	Compression of the tissues around the elbow
Indications	Minor elbow injuries for temporary use Minor elbow pain or oedema
Contraindications	Elbow instability Significant oedema Distal oedema
Device	Prefabricated

Elbow immobiliser



Function	3 point pressure system to prevent or reduce elbow flexion and pronation
Indications	Burns Care Postoperative care
Contraindications	Significant oedema
Device	Prefabricated or custom made using low temperature thermoplastic

Shoulder orthosis

Function	Resists dislocation forces of reduced shoulder disarticulation
Indications	Proprioceptive feedback to remind client of dislocation risk *(limited evidence of efficacy)*
Contraindications	Recovery phase of reduced dislocated shoulder Shoulder tendinitis
Device	Prefabricated

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References

- Howell (2019) Principles and components of upper limb orthoses. In: Atlas of Orthoses and Assistive Devices (Fifth Edition). Elsevier, Philadelphia. Chapter 12.

- ISO (2020) ISO 8549-3. Prosthetics and Orthotic Vocabulary Part 3

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