Functional Bracing for Humeral Fractures – What, Why, How

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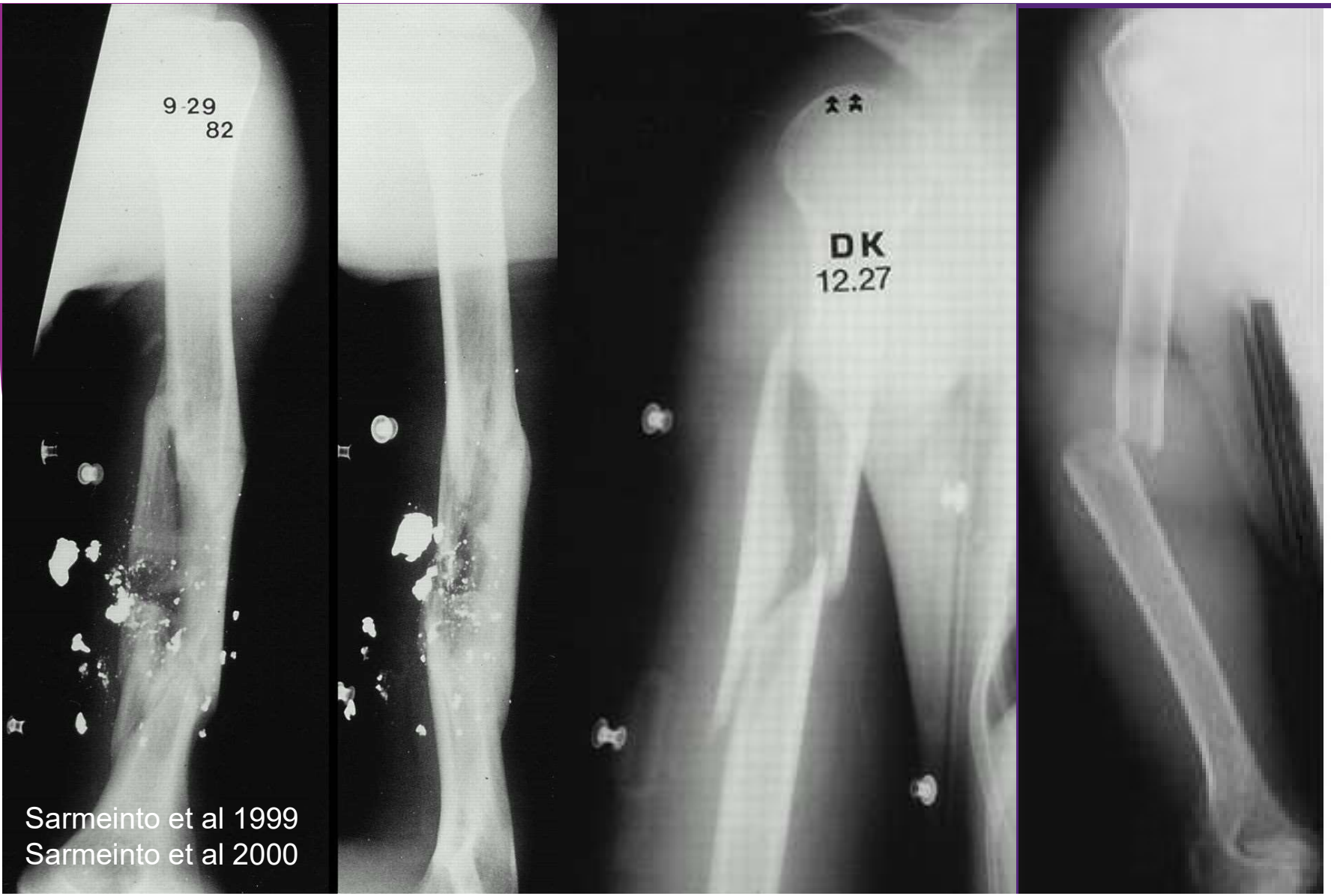
Acknowledgement



Sarmeinto et al 1999
Sarmeinto et al 2000

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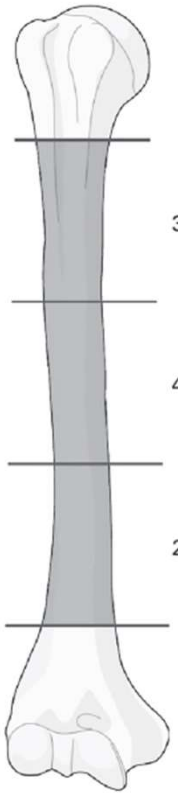
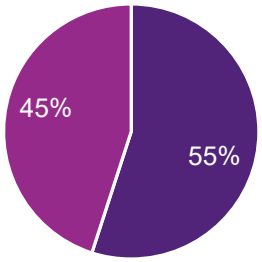
Humeral Shaft Fractures



	Mean age (years)	Male:female ratio
30%	63	35:65
48%	59	46:54
22%	40	55:45

Oliver et al 2020
Fox et al 2022

Sex %



■ Female ■ Male

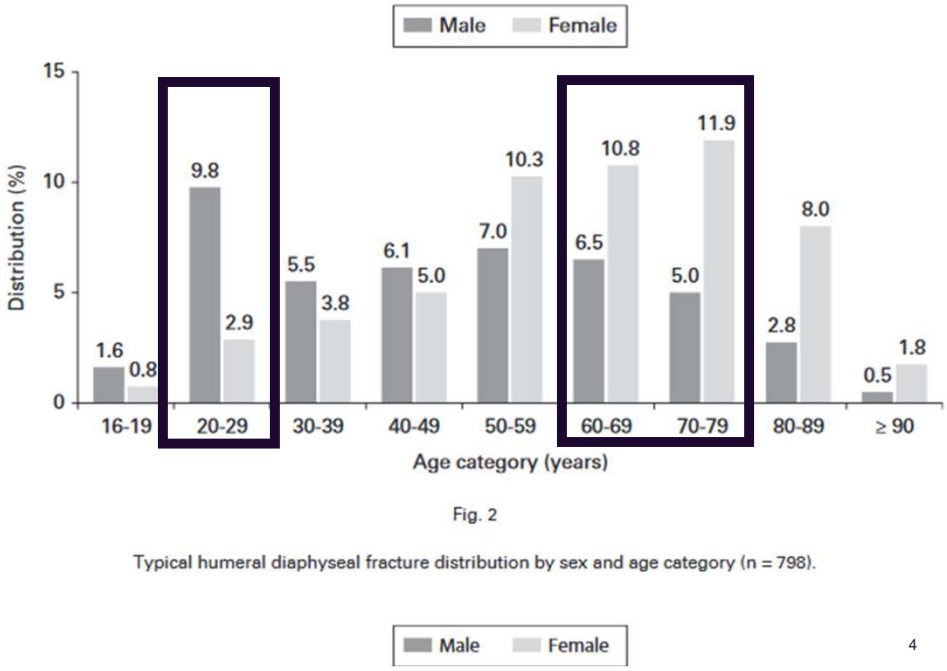
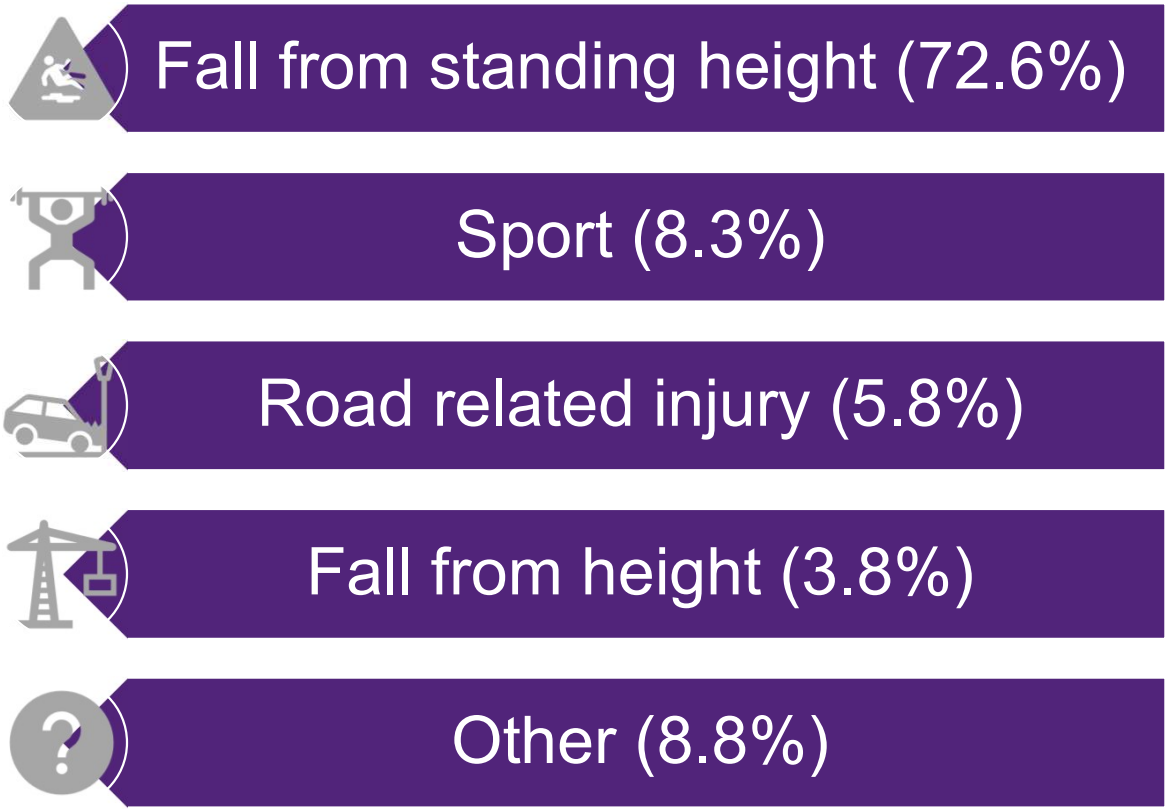


Fig. 2

Typical humeral diaphyseal fracture distribution by sex and age category (n = 798).

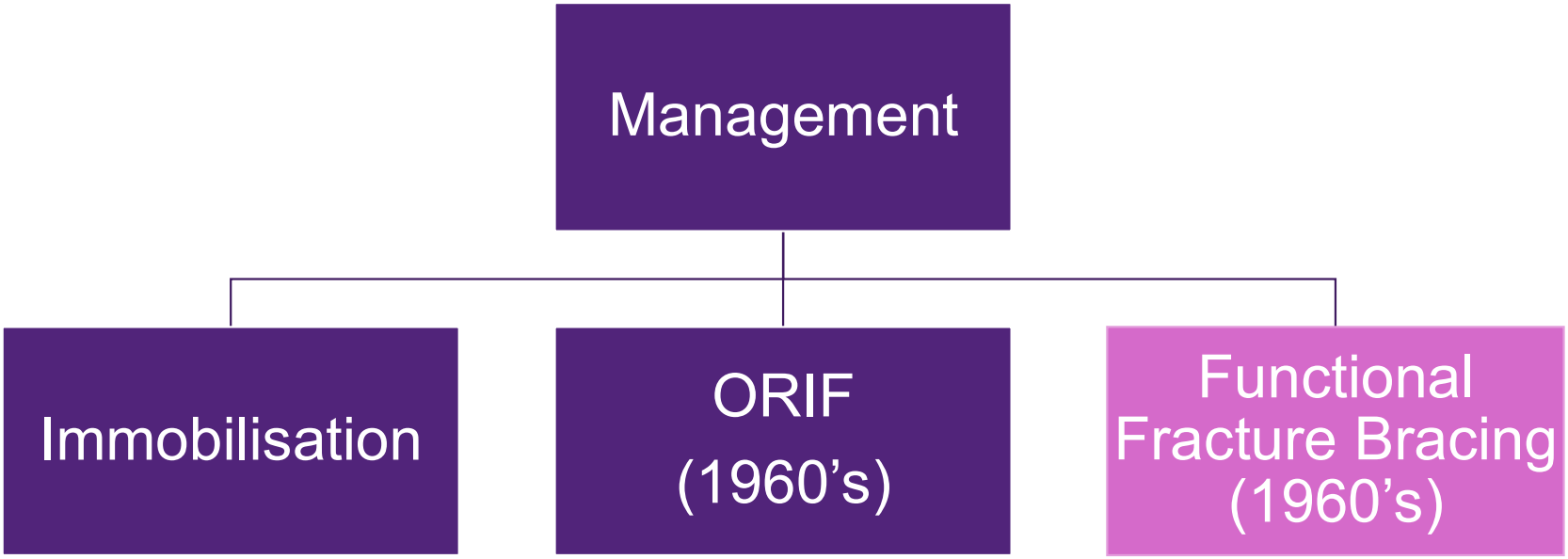
Male Female

Mechanisms:



Oliver et al 2020

Fracture management approach



Sarmiento et al 2000

Functional Humeral Bracing

What is it?

- Plastic sleeve to compress tissues
- **Soft tissue to act as a “splinting”**
- **Elbow movement is essential**
- **No Manipulation of the fracture prior to brace fitting**

Sarmiento et al 2000

Kapil 2017

Considerations of Management options

Surgical versus Non-surgical management of humeral shaft fractures: A systematic review and meta-analysis of randomised trials – Oliver et al 2023

292 Patients

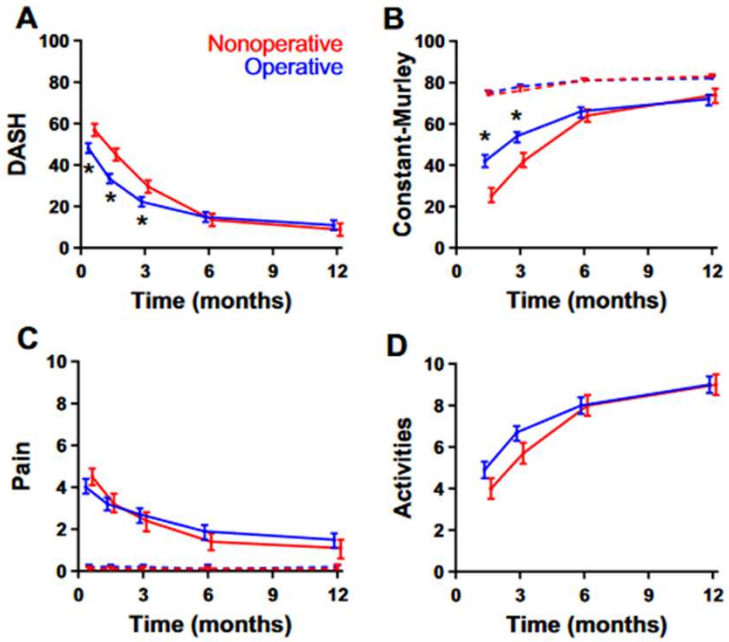
Short Term:

- Superior surgical fixation for functional outcomes (DASH)
- Pooled analysis of pain scale – no differences

Long Term:

Past 6 months – no differences between surgical and conservative groups

HUMMER Study – Hartog et al 2022



Den Hartog et al 2022

Oliver et al 2023

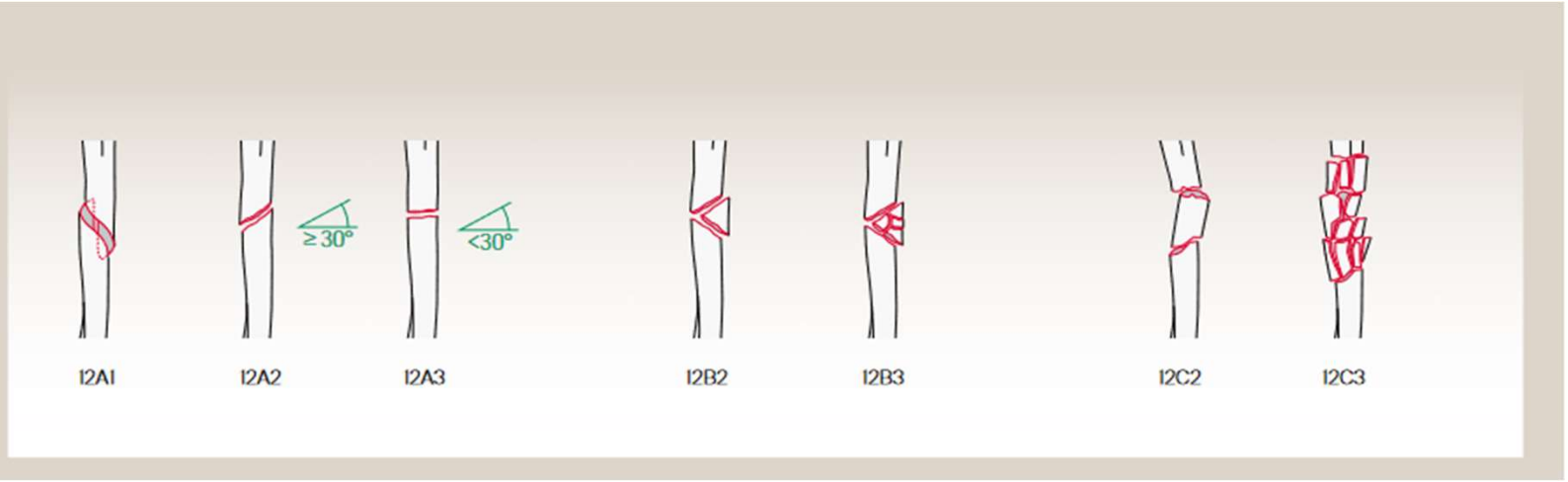
Adverse outcomes

Infection	• Surgery 4.3% • Conservative 0.7%
Radial Nerve Palsy	• Surgery 17.4% • Conservative 0.7%
Non-union rate	• Surgery (8.3% • Conservative (15.7%)
Re-intervention	• Surgery (1.4%) • Conservative (19.3%)

Oliver at al 2023

What about Fracture Type?

Fracture Classification	Mean time to clinical consolidation	Mean time to radiological consolidation
Type A	8 weeks	25 weeks
Type B	12 weeks	27 weeks
Type C	11 weeks	27 weeks



12 Diaphyseal segment

12A **Simple**
12A1* Spiral
12A2* Oblique (≥ 30°)
12A3* Transverse (< 30°)

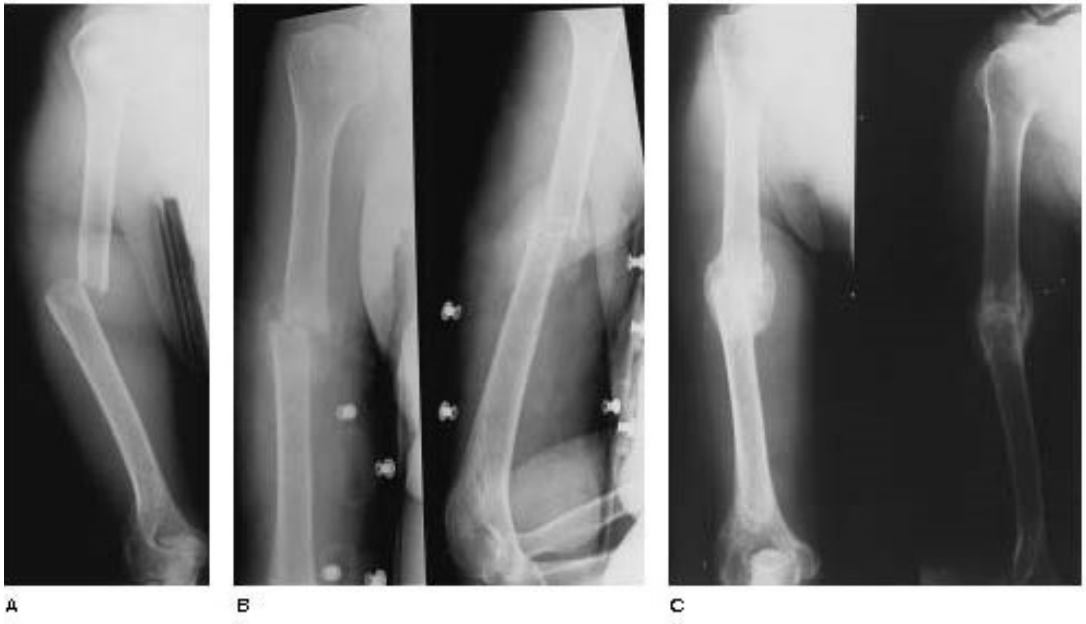
12B **Wedge**
12B2* Intact wedge
12B3* Fragmentary wedge

12C **Multifragmentary**
12C2* Intact segmental
12C3* Fragmentary segmental

* Qualifications:
12A and 12B: a Proximal 1/3, b Middle 1/3, c Distal 1/3
12C: i Proximal diaphyseal-metaphyseal, j Pure diaphyseal, k Distal diaphyseal-metaphyseal

Koch et al 2002

What about fracture angulation or displacement?



Published surgical guidelines suggest:

- **>20°AP angulation**
- **>30° varus valgus**
- **> 15° rotation**
- **> 3cm shortening**

- **Cohort study (2016) – management with functional brace – end results:**
- **More than 5 degrees Varus and 30 degrees AP**
- **No differences in patient reported outcomes**
- **DASH**
- **Shoulder AROM**
- **SF-12**

Sarmiento and Latta 1999

Shield et al 2015

Shield et al 2016

Cost analysis of Sarmiento Brace vs Operative

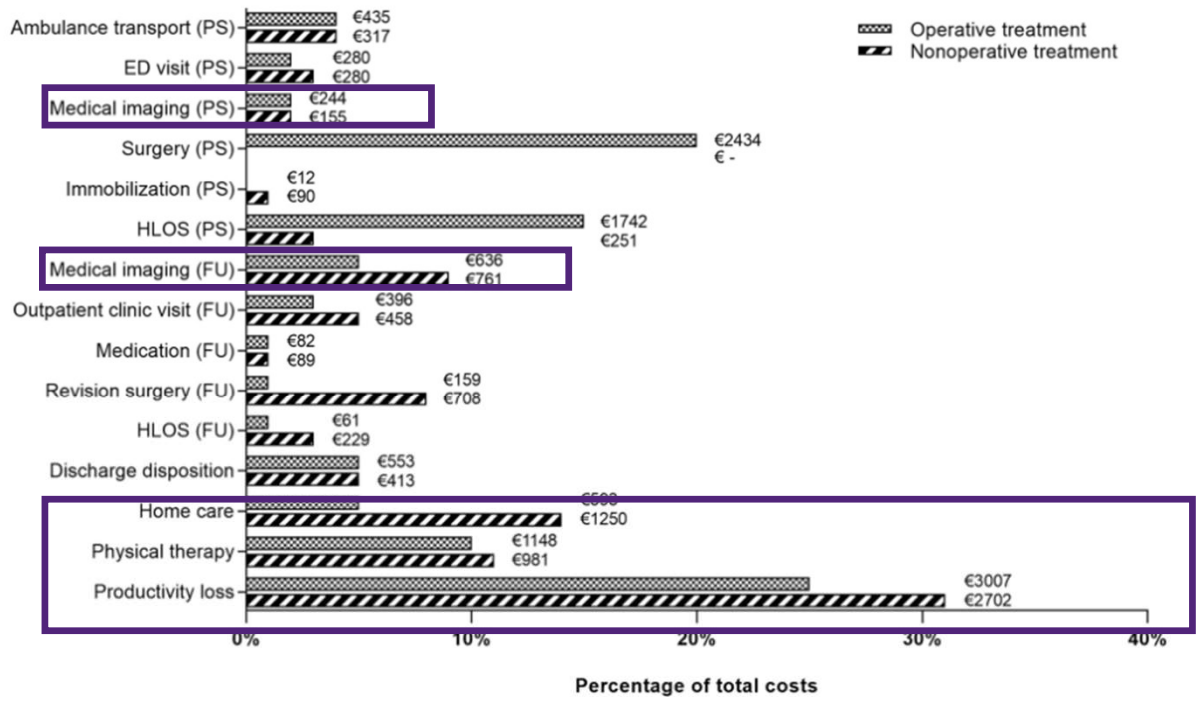


Fig. 1 The relative contribution of various cost categories. The exchange rate was €1.00 = US$1.21 [31]. Only cost categories representing more than 1% of the total costs are shown. *ED* Emergency department, *FU* Follow-up, *HLOS* Hospital length of stay, *PS* Primary stay

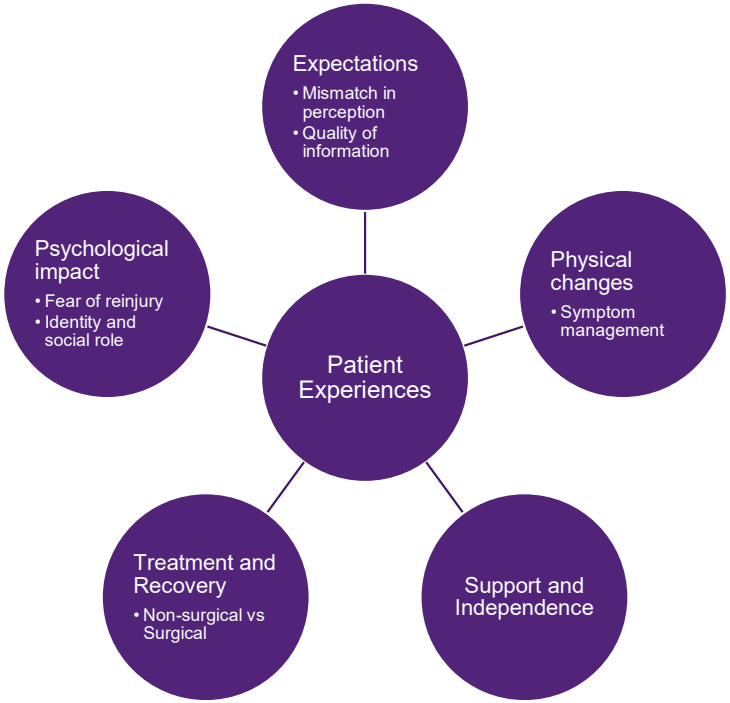
Total Costs:

Operative: $11,925

Non-Op: $8783

Van Bergen et al 2023

Patient Experiences

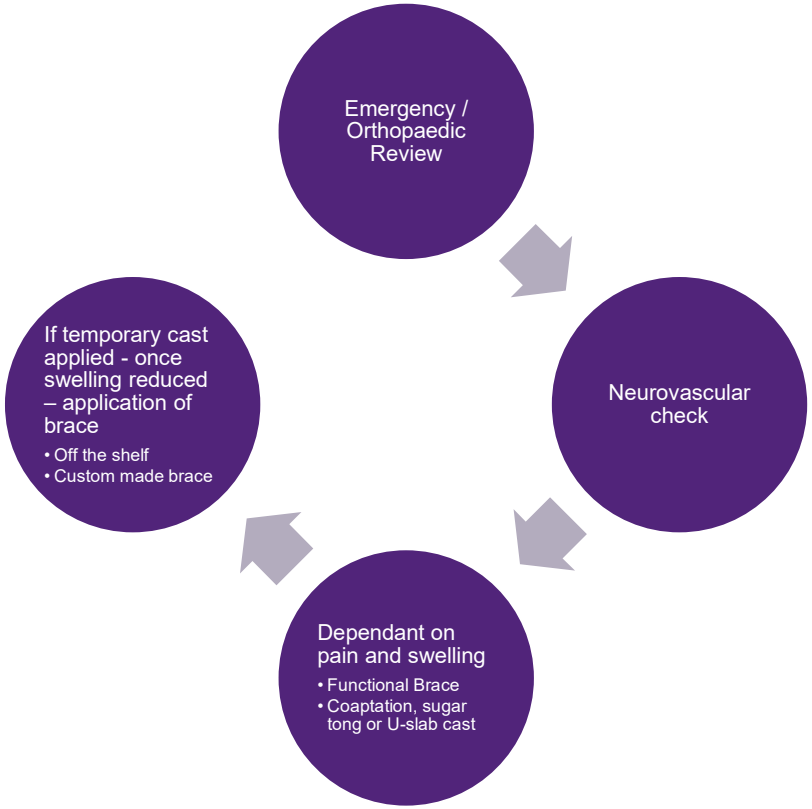


Karimi et al 2022

How?

1. Neurovascular assessment
2. Patient Sitting
3. Stockinette
4. Remove plaster or sling
5. Fit brace – Firm
6. Neurovascular Assessment
7. Education – exercises and management

When to initiate bracing?



Karimi et al 2022

When to move?

ASAP				
Fracture Alignment	Oedema Management	Joint restrictions	Muscle Atrophy	Pain Modulation

Other Considerations

Sitting

No pillows or support under the elbow

Sleeping

Upright sleeping in a recliner is encouraged

Movement

As tolerated within the brace

Brace is firm to compress the soft tissues

Education

Timeframes for recovery

Expectation to feel fracture movement within the brace

Clinical Implications

- Physiotherapy can have an immediate role in managing humeral shaft fractures.
- Brace – firm to compress soft tissues
- Education is crucial.
- Movement is a key component to functional bracing.

Questions?

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