

**A prospective case series to investigate current practice in the physical management of people with a disorder of consciousness (DOC) and its impact on the pattern of limb and spinal deformities.**

**Rasheed Meeran**, Holy Cross Hospital, Haslemere

**Summary**

Three patients with a DOC were followed up for 12 months. Changes in response to physical management interventions on the limb joint range of movements, spinal deformity and spasticity were investigated.

**Aims & Objectives** of the prospective case series were to

- explore the pattern of deformities observed in people with a DOC
- document the type, duration and frequency of physical (spasticity and posture) management interventions provided to patients with a DOC
- monitor the time course of development of contractures longitudinally

**Background**

Advances in medical sciences and technology have allowed more severely impaired people to survive very severe brain injuries that result in a DOC. Management of DOC patients is multi-disciplinary in which physiotherapy has a significant role. Posture management is a 24-hour approach carried out mainly by physiotherapists, occupational therapists and nurses. Regular changes in posture may prevent many secondary complications (e.g. contractures, pressure ulcers), and improve comfort and safety. However, robust evidence supporting these claims is limited, and clinical practice has substantial variability.

*Method of measurement*

- all measurements were recorded by the same physiotherapist blinded to previous measurements
- standardised positions were used when measuring range of movement (ROM) and spinal deformity
- measurements were recorded at 0, 1, 3, 6 and 9 months, post admission.

ROM of hip, knee, ankle, shoulder, elbow and wrist was measured.

Increase in spasticity was measured in hip (adductors, flexors), knee flexors, ankle (plantar flexors, invertors), shoulder adductors, elbow flexors and wrist flexors using the Tardieu method (Gracies et al, 2010) or the modified Ashworth scale.

Spinal deformities were recorded using photographs with small bright stickers along the spine with photos taken from all angles as described by Porter et al (2007).

**Results**

Patient 1 (20 yrs old at admission, 114 days post injury) was an unrestrained driver who was involved in a road traffic accident (RTA) when she was 19. She had unstable type one diabetes mellitus and was dependent on a tracheostomy. She had occasional seizures which the medical team thought was related to issues with a ventriculoperitoneal (VP) shunt. Physical management intervention included 24-hr posture management:

Using a tilt in space standard wheelchair with a standard pressure relieving cushion. T roll, log roll and pillow support and turned every 3-4hrs in bed.

Splinting: fibreglass resting splints for both ankles and thermoplastic resting splint for left hand.

Patient 2, a 77- year-old long standing diabetic (160 days post injury), suffered a hypoxic brain injury post status epilepticus in January 2013. She was dependent on a tracheostomy, presented in a DOC

and was admitted in June 2013. Physical management intervention included 24-hr posture management:

Using a tilt in space standard wheelchair with a standard pressure relieving cushion. T roll and log roll with pillows support and turned every 3-4hrs in bed.

Splinting: fibreglass splint following botulinum toxin injections for right gastrocnemius and soleus, to manage loss of 30° dorsiflexion 6 months after admission.

Sadly patient 3 died five weeks after admission following cardiac arrest. The data presented here is of patient 1 and 2.

Other physical management interventions for patients 1 & 2 included stretching, tilt table standing, hydrotherapy or passive cycling sessions. On average both patients received 4 sessions of physiotherapy and occupational therapy a week.

Patient 1's ROM, spasticity and spinal deformity remained stable throughout the study period with no major deterioration/ improvement.

Patient 2's only deterioration was in the ankle dorsiflexion ROM where she lost 40° dorsiflexion in both ankles with no changes in the spinal posture and spasticity.

## Discussion

The physical management interventions provided are in line with the recommendations of the Royal College of Physicians' *Prolonged disorders of consciousness National clinical guidelines* (2013). The reason for the two patients' physical stability could be attributed to the intensive input they each received from experienced professionals (therapists with injection therapy, hydrotherapy, 24-hr posture management qualifications). This level of specialised input is not available in most hospitals or care homes managing patients with a DOC. In addition, the therapists, nurses and carers were highly trained in implementing splinting and 24-hr posture management. Although neither of the patients deteriorated from the time of admission, they were both admitted with loss of ROM (patient 1 – elbow 40° on both sides, ankle 40°, shoulder 90°; patient 2 – ankle dorsiflexion 40°). This is in line with the observations of Verplancke et al (2005) who noticed spasticity developing within 14 days after the brain injury in 88% of the population, and 20% of them developed contractures. Wheatley-Smith et al (2013) also observed contractures in 45% of patients admitted to their unit.

*2017 January update:* both patients are continuing to be resident at the hospital and are medically stable. Patient 1 had been stable and has been successfully decannulated. It is worth noting that this significant improvement has been achieved almost four and a half years after the injury. Being young when suffering a traumatic brain injury might have worked in her favour. Does this major improvement justify the level of input provided to these patients? What further improvement patient 1 will be able to make remains to be seen. The team at Holy Cross are also analysing retrospective data of twenty patients collected over ten years to investigate the effects of physical management programmes.

## References

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**Email:** [r.meeran@holycross.org.uk](mailto:r.meeran@holycross.org.uk)