Diagnosis and management of prolonged disorders of consciousness

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Clinical assessment, diagnosis and monitoring of patients with PDOC

• Detailed clinical assessment
• Structured clinical assessment tools
• Role of imaging and electrophysiology,
• Evidence for interventional programmes, including medication and sensory stimulation.
• Long-term evaluation and monitoring
Care pathway for patients with PDOC

Phase I: Hospital ward
Multi-disciplinary rehabilitation

Phase II: Specialist PDOC neurorehabilitation service
In-patient admission for assessment / management of PDOC in designated centre (usually 2-4 months)

Phase III: Active PDOC monitoring
Active management + on-going assessment
In a specialist nursing home or equivalent environment
Usually for up to 1 year post injury

Phase IV: Long term care
Long term care and support
under NHS continuing care
In specialist nursing home (or own home)

Phase V: End of life care
Specialist support for end of life palliative care
Joint between Specialist DOC and palliative care

If DOC continues – involvement of specialist neurorehab team:
After 3 days: Assessment for interim advice
After 2 weeks: Review and evaluation to eliminate treatable causes
After 4 weeks: Referral to specialist neurorehabilitation team for PDOC management

'Vervolving door' policy if showing signs of change

Acute care
ITU
Neurosurgical/orthopaedic

Hospital
Community

Acute Injury / illness

Annual review of PDOC status
Until formally diagnosed as in permanent VS/MCS by a consultant PDOC Expert Physician

Annual review by CCG includes:
• Any change in responsiveness
• Ceiling of treatment
• Formal discussion of best interests

Annual follow-up
by telephone
Update of PDOC register
Phase 1
• Early referral for specialist disability management
Phase 2
• Specialist evaluation
• Development of a management programme
Phase 3
• Review and monitoring
Phase 4
• Long term specialist nursing care
Phase 5
• End of life care
Best interests decision making
Family involvement
Diagnostic assessment

• **Causation;** what evidence is there relating to the reasons for the prolonged unawareness?

• **Primary neurological pathways;** is there evidence that they are sufficiently intact to allow evidence of awareness to be detected?

• **Awareness/responsiveness;** what is the behavioural evidence concerning level of awareness?
Causation

• Nature of the injury
  • Location
  • Extent
  • Reversibility

• Additional causes
  • Medication
  • Complications
  • Another disorder
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Location

• Widespread damage to both cerebral hemispheres

AND

• the basal ganglia bilaterally

Caution

• Locked in syndrome
Causation

• Nature of the injury
  • Location
  • Extent
  • Reversibility

• Additional causes
  • Medication
  • Another disorder
  • Complications
Investigation

Imaging

• brain imaging - nature, extent and location of brain damage.
• to assess fluctuating or deteriorating patient – syndrome of the trephined, hydrocephalus
• to determine the extent and location of brain damage for clinical decision-making, or to aid in giving a prognosis.
Other investigations

EEG

Evoked potentials

Nerve conduction studies
Primary neurological pathways

- OB: olfactory bulb
- OC: olfactory cortex
- LGN: lateral geniculate nucleus
- PVC: primary visual cortex
- 1: cochlear nucleus
- 2: superior olivary
- 3: nucleus of lateral lemniscus
- 4: inferior colliculus
- 5: medial geniculate nucleus
- 6: primary auditory cortex
- SN: solitary nucleus
- T: thalamus
- GC: gustatory cortex
- PSC: primary somatosensory cortex

- Cranial nerve I
- Cranial nerve II
- Spinal cord & cranial nerves
- Cranial nerves VII, IX, X
Primary neurological pathways

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Diagram showing cranial nerve II, spinal cord & cranial nerves, and visual pathways V1 to V4.
Other investigations

EEG

Evoked potentials

Nerve conduction studies
Arousal/responsiveness

Three types of behaviours

• Spontaneous – no external stimuli
• To normal incidental stimuli
• To structured, planned stimuli
Arousal/responsiveness

- Auditory function
- Visual function
- Motor function
- Oromotor/verbal function
- Communication
- Arousal
Optimising conditions for response

• Excellent physical care
• Sleep and rest
• Appropriate seating
• Quiet room
• Arousal
**PHYSICAL MANAGEMENT FOR PEOPLE IN A DoC**

**Acute:** maintain joint, muscle and skin integrity to enable ongoing positioning in bed and wheelchair
- Record range of movement at key joints (hips, knees, ankles, shoulders, elbows, wrists) and impact on personal care. *1 or *2
- Implement global physical management regime with postural support in sitting and lying. Provide bed positioning and seating guidelines and orthotics instructions to be viewed readily
- Consider need for focal interventions (e.g. orthotics or botulinum toxin injection).

**Bed positioning**
- Aim to achieve mid line positioning in side lying and supine while maintaining skin integrity

**Sitting**
- Aim to achieve mid line positioning with 90 degrees at hips and knees while maintaining skin integrity

**Focal interventions**
- Consider focal interventions when progressive loss of range is likely or occurring at a joint or is already impacting on function or care (see below)*1
Optimising conditions for response

• Excellent physical care
• Sleep and rest
• Appropriate seating
• Quiet room
• Arousal
Advanced imaging

• Further work is required to understand the relationship between these and the formal clinical evaluation tests.

• Practical issues
  • Transport
  • Positioning
  • Metal work
Sensory stimulation

- Use of stimulation to drive neuroplasticity
- Cochrane review [2004]
  - 3 relatively low quality controlled studies of coma arousal programmes
  - ‘no reliable evidence to support or rule out, the effectiveness of multisensory programmes for patients in coma or vegetative state’
- Padilla et al. [2016]
  - short term multi-modal sensory stimulation (1-2 weeks) can help to improve arousal and clinical outcomes for people in coma or VS following TBI - especially if stimuli are associated with the person’s past experiences and preferences.
- Controlled stimulation, but
  - Avoid overstimulation and fatigue
  - Pleasant
  - Everyday care, stretches, taste
Neurostimulation

• Pharmacological
  • Dopaminergic drugs (Levodopa, Amantadine and Bromocriptine),
  • Gaba-ergic drugs (eg Zolpidem),
  • SSRI, SNRI, (eg sertraline, methylphenidate).

• Physiological
  • tDCS
  • TMS
  • DBS
Repeat evaluation

Key time-points:
• At 6 months post injury
• At 12 months post injury
• Annually

Assessment
• structured interviews with family members, carers and treating professionals
• mapped on to CRS-R (and/or WHIM)

The prognosis for recovery of MCS-minus (MCS-) is generally similar to VS.
The timing for assessment for a diagnosis of permanent MCS+ will depend on
• the nature and severity of the injury,
• any observed trajectory to improved responsiveness on serial testing.
Permanent VS/MCS should only be diagnosed by a PODOC specialist, based on serial assessment of the CRS-R over 6 months.
Best interests discussions should not, however, be delayed until VS/MCS is diagnosed as ‘chronic’ or ‘permanent’, but should take place whenever a treatment decision is made.
Late assessment – out-reach

- Confirmation of nature and extent of original brain damage,
- Medication review
- Exclusion of remediable causes
- Clinical assessment of primary sensory pathways.
- Assessment of awareness / responsiveness
  - Ideally 6 CRS-R (and/or WHIM) scores) carried out by the nursing staff or local rehabilitation team
  - Or a structured interview with family and care-staff to complete the CRS-R base on reported behaviours identified over the previous month.
Thank you for listening