Electronic annex 1a
Parameters for evaluation of reliable and consistent responses in patients emerging from MCS

The US Aspen Work Group proposed that emergence from a minimally conscious state (MCS) is characterised by reliable and consistent demonstration of functional interactive communication or functional use of objects. To facilitate consistent reporting of findings among clinicians and investigators working with patients in MCS, they proposed that the following parameters should be used for demonstrating response reliability and consistency:

- The patient should demonstrate at least one of the following, which should also be sustained over time:
  - functional interactive communication:
    - correct yes/no responses to 6/6 basic situational questions on 2 consecutive evaluations
    and/or
  - functional object use:
    - generally appropriate use of at least two different objects on 2 consecutive evaluations. (This criterion may be satisfied by behaviors such as bringing a comb to the head or a pencil to a sheet of paper.)

These operational definitions may still be problematic for certain groups of patients including those who:
- have no motor control
- have specific language deficits
- are blind and/or deaf
- are fully aware but confused.

Such individuals may be fully aware, but unable to respond consistently.

In addition there may be issues if the patient's first language is not the same as the language of the service providers or assessors.

The GDG therefore proposed a slightly extended set of parameters on which to test the individual's consistency of response including:

1 functional use of objects
2 consistent discriminatory choice-making
3 functional communication using:
   a basic situational questions *or*
   b autobiographical questions.

It also proposed the use of standardised sets of biographical and situational questions that are suitable for translation into different languages.

More detailed guidance on the operationalisation of these is given in the table below.

Operational evaluation of parameters for demonstrating a consistent response

Patients should demonstrate a consistent response in at least one of the following four types:

Types of response	Functional/communication tasks
1 Functional use of objects	Demonstrates generally appropriate use of at least 2 different objects on 2/2 consecutive evaluations (with or without instruction): 1 Attempts to write using a pen, pencil or keyboard 2 Attempts to groom hair using a comb or hairbrush 3 Attempts to wash face using a face flannel 4 Attempts to clean teeth using a toothbrush 5 Attempts to feed him/herself using cutlery (Culturally appropriate alternatives may be used.)

In the following examples:

- Evaluation should include pre-evaluation of the primary neurological pathways (visual/auditory/somatosensory and motor).
- Questions/tasks should not rely on sensory modalities for which there is evidence that the primary pathways are not intact (see Section 2, main guideline, for more details).
- Instructions should be given in a way that maximises comprehension – eg in the patient's first language or using a 'total communication approach' if aphasia is suspected.
- Matching and yes/no responses may be given by any means accessible to the patient, eg verbal/written/gesture/card selection/computer switch, so long as the response is consistent and reliable.
- Correct answers should include a mixture of 'yes' and 'no' answers in random order.
- All evaluations are assessed as 'limited trials' – the patient must answer or select correctly to each one of the 6 questions asked (ie 6 out of 6 trials – not 6 in a row out of 100 trials).

2 Consistent discriminatory choice-making	1 Consistently indicates the correct choice from 2 pictures (at least 3 different picture pairs) on 6/6 trials on 2 consecutive occasions, eg:
	
	  • *Which of these is your mother?* (vs another relative)
	  • *Which is a cat?* (vs another animal)
	
	Or
	
	Two consistently matched paired objects (at least 3 different pairs) on 6/6 trials on 2 consecutive occasions. Paired objects may be:
	
	  • two related objects (eg a cup and saucer)
	  • word/picture or colour/letter pairs
	  • sound/sound, or sound/picture pairs.

3	Functional communication (biographical questions)	Gives correct yes/no responses to 6/6 autobiographical questions on 2 consecutive evaluations.
	For evidence of awareness of self.	1 *Is your name X [correct name]?* 2 *Is your name Y [incorrect name]?* 3 *Are you a woman?* 4 *Are you a man?* 5 *Do you live in [London]?* 6 *Are you married? [or 'in a civil partnership?' as appropriate]*
4	Functional communication (situational questions)*	Gives correct yes/no responses to 6/6 basic situational questions on 2 consecutive evaluations:
	For evidence of awareness of the environment.	1 *Are you in bed?* 2 *Are you in a chair?* 3 *Are you in hospital?* 4 *Are you at home?* 5 *Am I pointing to the ceiling?* 6 *Am I pointing to the floor?*

*When assessing awareness using forced choice questions, the presentation must be counterbalanced – half the questions correct and half incorrect. Visual information should be presented in both left and right visual fields on each trial to prevent response bias in the event of a visual field deficit (McMillan TM. Neuropsychological assessment after extremely severe head injury in a case of life or death. *Brain inj* 1997;11:483–90.). Questions may need to be adapted to allow for visual/hearing deficits and may be given in verbal/written form.

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