# Electronic Annex 1aAssessing for emergence from a minimally conscious state

The US Aspen Work Group (2002) defined emergence from a minimally conscious state (MCS) as reliable and consistent functional interactive communication or the functional use of objects. To facilitate consistent reporting, they proposed that the patient should demonstrate at least one of the following, which should also be sustained over time:

* **Functional object use:** the appropriate use of at least two different objects on two consecutive evaluations.
* **Functional interactive communication:** correct yes/no responses to 6/6 basic situational questions on two consecutive evaluations.

Patients who have sustained a severe brain injury are likely to have a range of ongoing impairments. The operational definitions from the Aspen work group (2002) may be problematic for those who have:

* no or limited motor control
* purposeful movement masked by muscle weakness, apraxia, contractures or position
* specific language deficits (aphasia or apraxia), especially in the presence of motor impairment
* significant cognitive impairment, eg agnosia, reduced attention and/or memory or executive dysfunction resulting in perseverative responses
* visual and/or hearing impairments
* ongoing confusion.

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

Assessment should be carried out in the patient’s first language.

The Guideline Development Group (GDG) therefore propose a slightly extended set of parameters on which to assess for emergence:

1. functional use of objects
2. functional communication using yes/no questions using a range of methods
3. discriminatory choice making.

## Functional use of objects

The patient demonstrates appropriate use of at least two different objects on 2/2 consecutive occasions. The patient does not need to complete the task independently, but needs to show an attempt at using the item appropriately and purposefully. The patient may use the object in response to a verbal command or tactile cue.

For example, a therapist may raise the patient’s arm at the elbow and see if they can complete the movement to demonstrate object use.

Automatic use of an object does not necessarily indicate emergence; there must be some evidence of cognitive intent/engagement. Structured opportunity should be created to establish purposeful functional use of objects.

### Familiar functional items

When selecting which objects to use, consider assessment findings and multidisciplinary team (MDT) knowledge of the patient including: range of purposeful motor movements; the best way to facilitate function and applicable use of adapted equipment. Where possible use items familiar to the patient and relevant to their specific interests.

Examples of items demonstrating functional use:

* attempts to write or draw using a pen, pencil or keyboard
* attempts to use a game joystick in a simple game or attempts to use a remote control to change TV or music
* attempts to groom hair using a comb or hairbrush
* attempts to wash face using a face flannel
* attempts to clean teeth using a tooth brush
* demonstrates feeding using cutlery
* demonstrates drinking using a cup.

Ensure the patient is in an optimal position and can maintain the position when engaged in a functional task. (See physical management guidelines, [Annex 3b](http://www.rcplondon.ac.uk/pdoc%29))

You may need to support their arm or cue/initiate the movement and see if they continue. Record any facilitation.

Consider using objects that are moved in different directions (providing the patient has the potential motor function), eg a toothbrush and a pen rather than a toothbrush and a cup. If a patient has limited movement this will give you some information about whether they recognise how the object should be used.

Try to assess in context, eg provide bowl of warm water with a flannel, sit at the basin to use a toothbrush and provide the additional cue of the smell of toothpaste. Reduce potential distractions. To indicate functional use, a patient would need to for example, bring the toothbrush to their mouth and start moving it.

Be aware of other neurological impairments such as agnosia and/or apraxia – people may have difficulty identifying an object and may use an object incorrectly, ie using a toothbrush to comb their hair. Setting up the environment and using functional situations in context may help.

## Functional communication

All clinicians assessing for the return of functional communication need to be aware of the following issues:

* Patients with global aphasia risk being misdiagnosed as MCS.1,2
* Following brain injury, patients may have ongoing difficulties with yes/no accuracy, even once they have emerged.3,4
* Cognitive impairments such as attention and memory may affect the ability to remember a question in order to answer it.
* Consistency is defined as accuracy of response rather than attempts to respond but patients with language and/or cognitive impairment may not be able to respond accurately. Clinicians should be alert to patients who respond in a timely way but inaccurately. If this pattern of behaviour is consistent, it could indicate an underlying language impairment.5 Nevertheless, to demonstrate that a patient has emerged into consciousness, they need to be able to respond not only consistently but correctly. Try to assess these patients in other ways to establish a consistent accurate response. Try using a range of supporting materials to reduce the linguistic and cognitive load, for example pictures, written words, gesture, symbols etc.

### In the following examples:

* Tasks should not rely on sensory modalities for which there is evidence that the primary pathways are not intact.
* The patient can respond in any way they are able, eg speech, writing, gesture, pointing or eye pointing to items, using a switch or augmentative and alternative communication (AAC) system.
* Present instructions/cards/objects within patients known visual field and/or normal presentation of gaze, ie not necessarily in midline.
* The current criteria for emergence require a patient to give 6/6 correct responses on two consecutive occasions.

#### Yes/no questions

Use the simplest and most relevant questions and stimuli.

Ensure items are randomised and counterbalanced (half correct and half incorrect)6

Consider whether to use auditory and/or visual stimuli depending on each patient.

If a patient does have visual impairment, present objects in a range of modalities so the patient can see, hear and feel them.

For example, jingle a set of keys or blow a whistle then place it in their hand. Ensure that the additional sensory information is appropriate and useful for the individual.

Table 1 shows examples of types of yes/no questions but this is not exhaustive and other questions can be used if they are more appropriate.

**Table 1 Examples of yes/no questions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Biographical questions** | **Situational questions** | **Everyday sounds** | **Objects** |
| Is your name John? (yes) | Are you in bed? (correct) | Is this a dog? (correct) | Is this a pen? (correct) |
| Is your mum called Susan? (no) | Am I pointing to the ceiling? (incorrect) | Is this a doorbell? (incorrect) | Is this a watch? (incorrect) |
| Do you live in Manchester? (yes) | Are you in hospital? (correct) | Is this a car? (correct) | Is this a cup? (correct) |
| Is your mum called Karen? (yes) | Are you a chair? (incorrect) | Is this a dog? (incorrect) | Is this a pen? (incorrect) |
| Is your name Simon? (no) | Are you at home? (incorrect) | Is this a car? (incorrect) | Is this a cup? (incorrect) |
| Do you live in Brighton? (no) | Am I pointing to the ceiling? (correct) | Is this a doorbell? (correct) | Is this a watch? (correct) |

## Choice making

### Discriminatory choice making from two items

* Use the simplest and most relevant pictures and everyday objects.
* Use paired items that are phonologically, semantically and visually distant, ie do not use a cat versus dog as these are semantically and visually similar. Do not use cat versus cap or bat, as these are phonologically similar.
* If you use written words, make sure they look different so use ‘dog’ and ‘strawberry’ rather than ‘dog’ and ‘log’, or ‘dog’ and ‘door’.
* Consult the clinical team to ensure items are presented optimally for the patient, ie vertically versus horizontally.
* If the patient attempts to respond in a timely way, but is inaccurate, try using colours. If they are more accurate with blocks of colour it could be that visual impairment is impacting on response. Avoid combinations that are more affected by colour blindnesss, ie red/green, blue/yellow.

Hold two objects / pictures / written words up in front of the patient and ask them to show you one (eg ‘look at the cat,’ ‘point to the toothbrush’).

Repeat to a total of six trials ensuring the target varies between left and right or up and down. This is to check that correct answers are not due to response bias, for example the patient always looks to the left.

### Durability of response

If a patient is able to use objects or indicate functional communication on two consecutive occasions, but there is still marked variability in responses over time, the behaviour is not truly consistent. Consistent behaviour should be sustainable in a range of contexts. This criteria needs to be met before a patient can be considered to have emerged from PDOC.

### Verification of emergence

If an individual demonstrates behaviours that indicate emergence, this should be verified by another person reproducing the same responses. This can be achieved by carrying out joint assessments, independent verification or by filming assessments and asking another person to watch and score.

A template for recording evidence of emergence is provided in the next section.

### Template for to record emergence from PDOC

To demonstrate that they have emerged an individual should be able to **either:**

1. Demonstrate functional use of objects
* Appropriately uses at least two objects on two consecutive occasions.

**OR**

1. Correctly answer yes/no questions
* Consistently gives six correct responses to six yes/no questions on 2 consecutive occasions. Eg ‘Is your name X…?’ ‘Is this a cup?’

**OR**

1. Demonstrate consistent discriminatory choice making
* Consistently indicates correct picture/object identification from a choice of two items 6/6 times on two consecutive occasions.

**To complete this assessment, please choose ONE of the above options** most appropriate for the individual.

*Some patients may still not be able to demonstrate consistent responses due to poor motor function, sensory, cognitive or communication impairments.*

**Two** identical assessments should be completed within **72 hours**.

Choose ONE of the options from Table 2.

You will need to adapt stimuli used for each individual but you should use the same ones on the two consecutive occasions when assessment is carried out.

**Table 2 Assessments for emergence from PDOC**

|  |  |  |
| --- | --- | --- |
|  | **Assessment 1****Date:** | **Assessment 2****Date:** |
| Record method of responses: eg voice/ gesture with head or eyes or limb / switch (ECU):  |
| 1. **Functional use of an object**
 |
| **Please circle:** | **Please tick item used:** | **Please tick item used:** |
| Attempts to write using a pen or pencil |  |  |
| Attempts to groom hair using a comb or hairbrush |  |  |
| Attempts to wash face using a face flannel |  |  |
| Attempts to clean teeth using a toothbrush |  |  |
| Attempts to feed him/herself using cutlery |  |  |
| Other (give details) |  |  |

|  |
| --- |
| 1. **Choice making**
 |
| Use x6 pictures presented in pairs. Please write name of pictures/objects below |
| ‘Look at the \_\_\_\_\_’ or ‘Show me the\_\_\_\_\_’ | **Correct response?** | **Correct response?** |
| 1. |  | /6 |  | /6 |
| 2. |  |  |
| 3. |  |  |
| 4. |  |  |
| 5. |  |  |
| 6. |  |  |
| 1. **Functional communication – autobiographical questions**
 |
|  | **Correct/incorrect?** | **Correct/incorrect?** |
| Is your name XXX? (yes) |  | /6 |  | /6 |
| Is your mum called XXX? (no) |  |  |
| Do you live in Manchester? (yes) |  |  |
| Is your mum called XXX? (yes) |  |  |
| Is your name XXX? (no) |  |  |
| Do you live in Brighton? (no) |  |  |
| 1. **Functional communication – situational questions**
 |
|  | **Correct/incorrect?** | **Correct/incorrect?** |
| Are you in bed? |  | /6 |  | /6 |
| Are you in a chair? |  |  |
| Are you in hospital  |  |  |
| Are you at home? |  |  |
| Am I pointing to the ceiling? |  |  |
| 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 and presented in both left and right visual fields on each trial to prevent response bias.6

**Assessment outcome. Please tick as appropriate:**

|  |  |
| --- | --- |
| MCS |  |
| Emerged  |  |

If emerged, please also document this in the medical notes section of the patient notes.

**Assessor name:**

**Signature: Date:**

**Emergence needs to be verified by another person.**

**Name of person verifying emergence:**

**Signature: Date:**

## References

1. Majerus S, Bruno MA, Schnakers C, Giacino JT and Laureys S. The problem of aphasia in the assessment of consciousness in brain-damaged patients. *Prog Brain Res* 2009;177:49–61.
2. Schnakers C, Bessou H, Rudi-Fessen I *et al*. Impact of Aphasia on consciousness assessment: A cross sectional study. *Neurorehabil Neural Repair* 2015;29:41–47.
3. Nakase-Richardson R, Yablon SA, Sherer M, Evans CC and Nick TG. Serial yes/no reliability after traumatic brain injury: implications regarding the operational criteria for emergence from the minimally conscious state. *J Neurol Neurosurg Psychiat* 2008;79:216–8.
4. Nakase-Richardson R, Yablon SA, Sherer M, Evans CC and Nick TG. Emergence from Minimmally Conscious State: Insights from evaluation of post traumatic confusion. *Neurology* 2009;73:1120–6.
5. Pundole A and Crawford S. The assessment of language and the emergence from disorders of consciousness. *Neuropsychol Rehabil* 2018;28:1285–94.
6. McMillan T. Neuropsychological assessment after extremely severe head injury in a case of life or death. *Brain Injury* 1997;11:483–90.