

Neuropsychological assessment: Principles, pearls and perils

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Neuropsychological assessment is the backbone of clinical practice for many practitioners in the field of neuropsychology. In this article, we highlight some principles, pearls and perils that may be worth keeping in mind.

In clinical settings, assessment can be defined as the systematic collection, organisation and interpretation of information about an individual, their condition and their circumstances. There are many facets to a neuropsychological assessment, and in this article we have had to be selective in our coverage. We have chosen below the main practical facets that are relevant to adult neuropsychology practice (with apologies in advance to our paediatric colleagues). For more detailed discussion of these and related issues, the reader is referred to texts such as Lezak et al. (2012), Hebben and Milberg (2009) and Pepping (2015), and to the review article by Vakil (2012).

1. The referral request

How a referral request for neuropsychological assessment is dealt with will often depend on local factors. Although a good referral will pose the questions to be answered, there may be a detective process involved in figuring out the key questions to be answered in the referral, bearing in mind that the questions posed by the referrer may not be the important ones from the perspective of the patient or their family. For inpatient referrals, you may wish to design your own referral form that encourages specific questions to be asked. Before accepting a referral, ask 'How will the outcome of a neuropsychological interview and assessment affect the management of the patient?' If the answer is 'not much', or 'not at all', think twice as to whether it is fair or meaningful to ask the patient to take part in an assessment. The main reasons for referral include the following requests:

- **Assist in diagnosis of neurological or neuropsychiatric conditions** – e.g. is this organic? Is there a major psychiatric condition present? Is this a primary degenerative dementia? What type of dementia is it? Is this transient global amnesia? Is this transient epileptic amnesia?
- **Document strengths and weaknesses with a view to advising on adjustment in the community** – Can this person go back to work? Go back to studies? Drive a car? Live independently?
- **Advise family and care staff** on how best to manage and interact with patient.
- **Help in planning of neuropsychological management and rehabilitation** – e.g. which memory compensation strategies are best for this patient? Which psychological factors do remedial therapists need to take into account when they carry out rehabilitation with this patient?
- **Provide evidence to inform a decision as to surgical intervention** – will brain surgery result in benefits or any major adverse side-effects? Is this person suitable for deep brain stimulation? Will a shunt for hydrocephalus improve the patient's cognitive functioning?
- **Evaluate the effects of treatment** – What has been the effects of the drug treatment /rehabilitation programme/surgical intervention?
- **Document natural recovery of function or progression of disease**, often with a view to offering a prognosis.
- **Provide information in the context of forensic neuropsychology** – e.g. criminal and compensation cases.

PEARL 1: If a doctor refers a patient and says the patient is ‘confused’, it may say as much about confusion in the doctor’s mind as in the patient’s!

PERIL 1: Especially in medico-legal settings, do not be tempted to answer a question that is outside your area of expertise, as this can land you in trouble (e.g. a patient has a disabling migraine following a subarachnoid haemorrhage. The migraine affects concentration and memory. You are asked to state whether the subarachnoid haemorrhage caused the migraine).

2. Before the appointment

Before a patient is seen, it is useful for them to be given written documentation that summarises key items of information such as why they are being seen for neuropsychological assessment, what the assessment will involve in terms of content and duration, what will be done with the neuropsychological information that is gathered and a number to ring if they have any queries. If this information is on a relevant website, then they could also be directed to that site, but remember that all patients will not have access to a computer, so a piece of documentation to accompany the appointment letter is desirable.

Prior to the appointment, the practitioner should gather key bits of information that may help guide the assessment, such as past medical reports, brain scan findings, etc.

Neuropsychological assessment may be informed by a range of data sets – as well as the more usual clinical interview and neuropsychological testing; it may be useful to gather information from family and friends and from staff, and in some cases to obtain behavioural observations, symptom diaries, etc.

Some neuropsychology services include written informed consent for the neuropsychological assessment, and whether this happens will depend on local factors. Where it is strongly suspected prior to the assessment that

factors such as cognitive effort/malingering may play a role, and as a routine for all medico-legal assessments, it may be useful to ask the patient to sign a form which indicates that cognitive effort will be assessed, that variability on cognitive effort can be detected, and that it is not in the best interests of the patient for such variability to be present.

PEARL 2: If the patient has had a major acute insult, such as a severe traumatic brain injury, stroke or encephalitis, try and find a summary or the original medical notes to ascertain what the patient was like in the acute stage of the illness, or if these are not available obtain relevant information from an informant who was present in the acute stages.

PERIL 2: Patients use the internet and social media such as Facebook and Twitter. If you have a social media presence, remember that this may be used by the patient even prior to your seeing them, and you may find yourself in embarrassing situations or facing ethical dilemmas (cf. Grajales et al., 2014).

3. The clinical interview

A typical clinical interview will – in addition to gathering background demographic information on educational and occupational history, and past cognitive strengths and weaknesses – assemble evidence relating to cognitive functioning, changes in mood, motivation, temperament and personality, and everyday adjustment in work, family, social, leisure, community and domestic settings. A key aim of the clinical interview is to shed light on additional ‘secondary factors’ that could impact on symptoms or test scores, such as fatigue, pain, sleep, cultural factors, and alcohol/drug intake (Arnett, 2013). Information is usually sought regarding the onset, duration, progression, severity and variability of specific symptoms that are present as well as, for some symptoms, what makes them better or worse.

The value of the clinical interview may vary, depending on factors such as the nature of the referral, but in many diagnostic settings it can be critical. The clinical interview may provide an opportunity to tease apart simulation, lack of motivation, exaggeration of symptoms and factitious disorder (desire to assume a sick role). The way the interview is carried out should be sensitive to the condition and circumstances of the patient, including factors relating to culture, language proficiency and education.

Findings from the clinical interview with the patient and the family may conflict with the results for the neuropsychological assessment. Such conflict may be due to problems in reliability of a particular set of data, but in general we have found that a well-conducted clinical interview may have greater weight, if only because the time periods and behaviours that are sampled are often more extensive than those involved in the testing. Interviewing the patient and key informants separately is usually the best strategy, after gaining permission from the patient. If the patient arrives alone and you consider it would have been helpful if they had been accompanied, ask for permission to ring someone such as the spouse for collateral information. Some clinicians like to ask the patient why they think they have been referred, but we tend not to use that approach, as their knowledge of the reason for referral may depend on a range of factors. We would simply start the appointment by giving a brief explanation as to why they are being seen. There are specific reasons why the clinical interview is particularly important, including:

- obtaining a sample of the person's behaviour – language skills, insight, motivation, memory, reasoning, emotion, inappropriate behaviour, mannerisms – and eliciting information that is not easily testable, e.g. empathy, insight, humour appreciation;
- helping you to decide what tests to give;
- helping you to decide what problems to address in a final counselling session or in any therapeutic efforts;

- building up rapport and trust with the patient;
- helping you to highlight associations/dissociations between test performance and everyday adjustment;
- providing a semi-therapeutic experience – the patient and carer may have at last found a sympathetic voice to listen to their concerns (we generally have more time and more expertise to listen to concerns compared to our medical colleagues); and
- bringing to light secondary factors that may influence symptoms and test performance.

PEARL 3: Ask the patient about which healthcare professionals and which investigations/treatments they have experienced in the previous few months, and note how fluent and accurate their recollection is – this may give strong clues as to the integrity of aspects of their memory functioning.

PERIL 3: Be wary – secondary factors can contribute to symptoms and low test scores.

4. Neuropsychological testing

The number and type of neuropsychological tests that are administered will depend on a wide range of factors, but should primarily be dictated by the key referral questions to be answered and the characteristics, needs and tolerance of the patient. Stage of injury/illness will also be a key factor. Repeated testing may be best with tests that have parallel forms, and will need to take into account practice effects and 'reliable change' indices. In most cases, it will be useful to cover these five main domains of cognitive functioning – memory, attention/speed of processing, executive functioning, language and visuospatial/visuoperceptual processing. Within these domains, it may be useful to capture domains which may dissociate in performance. Thus, in the case of memory functioning, it will usually be helpful to assess verbal and nonverbal memory, immediate and delayed retention, and recall and recognition memory. Executive func-

tion in particular is prone to fractionation, with some frontal lesioned patients passing standard executive function tests but perhaps failing on particular tests of problem solving or social cognition. While individual subtests of the Wechsler scales may be worth giving, depending on the domains being sampled, the concept of IQ may have little utility in many forms of neuropsychological assessment (Lezak, 1988), and a number of recently developed neuropsychological batteries eschew the concept of IQ. Where mood may be an issue, formal assessment of anxiety and depression is often of value. Some form of reading or vocabulary test may provide a useful indicator of premorbid levels of cognitive functioning, but it needs to be remembered that a person may obtain a high score on such tests as a result of being proficient at reading or crosswords, and that conversely a poor score may coexist with high levels of premorbid cognitive functioning. Clinical observations during testing may often be revealing, and if a patient does unexpectedly badly on a particular test it is worth getting a debrief of their experience of the test in case anxiety or particular strategy use was behind the poor performance.

A couple of tips that we have found useful in clinical testing is to have Post-it tape strips on the testing table as reminders of questions to ask, tests to give, etc during the assessment, and to use a four-way countdown timer that permits separate countdown intervals for tests with different time delays (e.g. Hygiplas timer available from Amazon).

PEARL 4: If a patient follows the news, integrity of memory can be gauged by asking about famous personalities who have died in the past 1–2 years ('Can you tell me anything about X? What is this person doing these days?').

PERIL 4: Tests with a drawing component are particularly susceptible to the effects of anxiety and premorbid variability, and may result in false-positive low test scores.

5. The neuropsychological report

Interpretation of the range of data sets from a neuropsychological assessment requires skill and expertise, especially in relation to consideration of factors such as base rate of some abnormal test scores (Iverson, 2012). Formats of neuropsychological reports will vary a great deal, often depending on local considerations, but one format that we have found useful consists of a three page report. The front page includes a précis of the key sets of information, and this is based on the premise that most consultants and other referrers are too busy to read a lengthy report. This précis has four sections – clinical history; summary of findings; opinion; and recommendations. Page two of the report provides more detail and more in the way of background information. It also has four sections – premorbid functioning and background information; symptom profile and everyday adjustment; clinical observations; and neuropsychological findings. Where key information was gathered in respect of the clinical condition in question, such as nature of epileptic seizures or characteristics of a head injury such as duration of post-traumatic amnesia, a further section may be added. Page three of the report has a table of test scores that is primarily intended for neuropsychologists or behavioural neurologists/neuropsychiatrists who may receive a copy of the report, and this table is divided into cognitive domains, with each test labelled, as well as two further columns: raw score; and statistic score and comments. We find it helpful to have a colour and starred system, with impaired scores in red colour, and a system of 1 to 3 stars, for mild, moderate and marked impairments respectively.

PEARL 5: Ask yourself – could I justify the content and tone of my report in a legal or professional regulatory setting?

PERIL 5: Absence of evidence is not evidence of absence, and this may apply to domains such as the assessment of executive function and accelerated long-term forgetting.

6. Feedback to the patient

Feedback to the patient is seen by many neuropsychologists as a key component of the neuropsychological assessment, at least for some patients, and is considered to be semi-therapeutic in nature (Gorske and Smith, 2009). As a matter of routine, we provide patients with a copy of the neuropsychological report (excluding table of test scores), with a copy to the referrer and to the GP. In some instances, it may be more appropriate to provide the patient with a short summary, in lay language, rather than a copy of the original report. In most cases, it may be useful to provide face-to-face or telephone feedback to the patient. In some instances where the results are quite obvious and where offering the patient another appointment may not be feasible, broad feedback may be provided after the testing session. The purpose and content of a feedback session will vary from patient to patient, but it will often be helpful to summarise the findings in words that the patient understands, to offer advice and recommendations on the basis of the findings and to answer any queries that the patient may have after they have received a copy of the report.

The feedback session also offers an opportunity to provide advice, support and encouragement to patients and their families who may have had to deal with particularly stressful times. As well as showing compassion to the patient and family, it may sometimes be useful to offer praise for the resilience they have shown, and the 3 Ps they have displayed (Patience, Perseverance and being Positive).

PEARL 6: Have a glass of water and a box of tissues handy, in case patients get upset by parts of the feedback.

PERIL 6: Check that the feedback which you give does not conflict with the feedback the patient has received/ may receive from other health professionals.

7. Special considerations

We conclude by offering a few tips with regards to more specific considerations that may arise in neuropsychological assessment.

d) **Cognitive effort** – The term ‘cognitive effort’ is often used as a euphemism for ‘malingering’. Issues relating to cognitive effort may be evident from discrepancies in the clinical presentation, such as contrast between test performance and everyday adjustment or brain imaging findings, but it may also be signalled by inconsistencies or atypical features in the behaviour of the patient during the consultation or by unusual patterns in test scores (e.g. recognition worse than recall, backward digit span better than forward span). A diagnosis of poor cognitive effort should not be made on the basis of a single test score, but on the basis of a number of test scores and also corroborative evidence from other sources. While the routine use of formal tests of cognitive effort may only be necessary in medico-legal cases, it is worth noting that standard tests can function as ‘embedded’ measures of cognitive effort. Thus, unexpectedly reduced forward digit span or chance performance on recognition memory tests may be evident on standard tests. Generally, tests of cognitive effort are easy to perform, although on the surface may appear not to be so, and may involve a recognition memory testing format. Some neurological conditions, such as those with major frontal lobe pathology, as well as psychiatric conditions with a high level of anxiety, may be associated with failures in cognitive effort tests. It is important to note that failure in cognitive effort tests may mean that one can only realistically conclude that other low test scores are difficult to interpret, and that an inference of deliberate simulation needs additional corroborative evidence. How to feed back to a patient who has failed cognitive effort tests requires some care, and guidelines have been offered by Carone et al. (2010).

- e) **Cross-cultural neuropsychological assessment:** A referral may request assessment of a patient whose language, culture and education is quite different from that of the native population, and this may add complexities to the neuropsychological assessment. In such cases, evidence from a reliable informant may be all the more critical. While there are translations of some tests, such as the Addenbrooke's Cognitive Examination and the Montreal Cognitive Assessment, relevant norms may be limited. In general, nonverbal tests with a recognition format may yield more reliable data than other tests. Thus, some WAIS Performance subtests and nonverbal recognition memory tests may be useful in certain cases. It is important to note, however, that cultural specificity may extend to some nonverbal tests, due to differences in objects in relevant environments. This can be seen on tests such as those that include silhouettes as stimuli.
- f) **Assessment of those with sensory loss:** Patients who are deaf or blind represent major challenges, and one is invariably relying on tests that sample the modality which is unimpaired. Information from informants may be key in such contexts. It will be important to document the severity and duration of the sensory loss in question, and any co-morbid medical or psychiatric conditions. Some test batteries have been specially designed to deal with particular types of sensory loss (Hill-Briggs et al., 2007).
- g) **Assessment of minimally conscious patients:** Assessment of minimally conscious patients represents a major challenge even to experienced neuropsychologists. Observations by staff and family members may be a key source of information. There are dedicated scales for such assessments such as the Wessex Head Injury Matrix. For formal cognitive testing, there may be reliance on residual motor responses, such as eye movements, for Yes-No responses, together with alphanumeric displays for

creating words where letters are selected on the basis of eye-movements (cf. Wilson et al., 2011).

- h) **Cognitive screening tests:** A wide range of cognitive screening tests are available, and the Wechsler Memory Scale IV now comes with its own inbuilt cognitive screening battery. While these tests may be invaluable in some settings, most suffer from limitations such as the absence of nonverbal or recognition memory testing, limited assessment of executive function, little allowance for cognitive effort testing, limited ranges of scores such that ceiling or floor effects may be apparent, variability in terms of detailed norms and indices relating to validity and reliability, and the absence of parallel forms. In addition, the tests are often administered by a wide range of staff, with variable training in neuropsychological assessment, and so scores derived from such batteries need to be accorded a wider range of confidence limits.
- i) **Capacity Assessment:** Neuropsychologists are often called upon to carry out assessments relating to capacity. Issues to keep in mind are: the need for precision about the actual capacity question being asked; the fact that capacity can be decision, time and context specific; the need to ensure that the four main components of capacity are covered – understanding, communication, retention and reasoning; the need to obtain information from a variety of sources, including family and staff; and the importance of observations in relevant everyday settings. There are a wide variety of resources available to help in capacity assessments, including supplements to the Mental Capacity Act and dedicated assessment tools for particular types of capacity assessment.
- j) **Assessment for rehabilitation:** Neuropsychological testing for diagnostic purposes will invariably involve a different approach than assessment for rehabilitation. In the case of the latter, there may be greater reliance on observations in more naturalistic settings,

a diary record of key behaviours, and rating scales completed by the patient and key informants. Attainment of specific goals may represent key outcome measures. If formal neuropsychological testing is carried out, there may in some cases be benefits from using tests that were designed specifically with ecological validity in mind.

PEARL 7: Symptom exaggeration may be detected by asking for the presence of atypical but semi-plausible symptoms (e.g. when you wake up first thing in the morning do you sometimes see different colours shapes?).

PERIL 7: With an ethnic-minority patient, misleadingly low test scores may be the result of language, education cultural/environmental factors.

8. Measuring and promoting quality of neuropsychological assessments

In recent years, there have been increasing demands for clinicians and other healthcare professionals to show that they provide high quality care and aspire towards clinical excellence, and to demonstrate that they are doing all they can to ensure that improvements in quality of care are inbuilt goals of a clinical service (Kapur, 2009; Kapur and Wilson, 2010). The Care Quality Commission readily admits that when it inspects healthcare bodies it can only be selective in its inspection, and any inspection that does take place has many inbuilt constraints.

How can we measure the quality of a neuropsychological assessment? In some cases, such as diagnostic assessments, long-term follow up and audit may show if the diagnostic opinion in the report was correct, yet in this type of scenario such audit data is seldom gathered, even if it is feasible to do so. If one of the reasons for neuropsychological assessment is to predict outcome of surgery or outcome of rehabilitation, here again the evidence may be available, but it may take considerable time and much effort to gather

such outcome data and to ensure that it is reliable. Many cases of neuropsychological assessment do not readily fall into either of these two categories. We are then left with some form of professional guidelines, ideally evidence-based, or external expert opinion, to judge whether the various stages of the neuropsychological assessment were conducted to a high standard. Such external audit could form part of an accreditation process (Kapur, 2015). As well as external audit, consideration should also be given to self-monitoring in respect of factors that may result in errors in interpretation and diagnosis, and the fact that much of the bias that results in faulty clinical decision-making may be unconscious rather than conscious (Kapur, 2016).

How can we encourage high quality of neuropsychological assessments? Regular external peer review may be helpful, but even regular internal peer review may also be beneficial, whereby colleagues routinely sit in on each other's neuropsychological assessments and check subsequent neuropsychological reports. In the USA, a form of pay-by-quality-of-performance has been introduced in some areas of clinical medicine, termed Physician Quality Reporting System (PQRS) – fee-for-service models are being replaced by fee-for-value models (Kamal et al., 2015). There are attempts to try and introduce a similar PQRS scheme for neuropsychologists in the USA (Most, 2013), and it is only prudent that we in the UK examine such a trend. This is all the more important since in fields such as surgery the UK government has encouraged outcome measures for individual surgeons to be readily available to the public.

PEARL 8: Carry out regular audits, with external expert input, of both the processes and outcomes in your work.

PERIL 8: Selective feedback from patients and colleagues as to the quality of your work may be subject to a number of biases.

9. Conclusions

In summary, neuropsychological assessment remains a key tool in the management of patients with neurological and neuropsychiatric conditions. Where possible, reliance should be placed on evidence-based guidelines for all of the steps and conditions described above. One of us (NK) has developed 'Smart Papers' to help in neuropsychological assessment, with this requirement in mind¹. Advances in biological measurement may mean that in the years to come diagnostic assessments may have less of a role for some forms of primary degenerative dementia, and so in future the role of neuropsychological assessment in rehabilitation and in predicting and evaluating treatment outcome may become more prominent.

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¹ A workshop on applying Smart Papers in neuropsychological assessment was run by Narinder Kapur at University College London on Tuesday 5 July 2016. Further details from the first author of this article or at www.cogassist.com.