Neurocognitive Assessment: A UK Perspective

Dr Stuart Mitchell
Head AMS UK CAA

Dr Michael O’Brien
Specialist Adviser Neurology
UK CAA

Dr Sallie Baxendale
Psychologist
University College London
Disclosure statements

- I am not a neurologist
- I am not a psychologist
- I am not a commercial pilot

- I work for the UK Civil Aviation Authority and make decisions about pilots’ fitness to fly

- I have nothing to disclose financially.
- The views expressed are mine and should not be considered to represent the formal views/policy of the UK CAA
What constitutes an Aeromedical Assessment?

- **Functional ability**
  - Vision
  - Speech/Hearing
  - Fitness, Strength dexterity and coordination
  - Systems: CVS, Resp, Gastro
  - Mental state
  - *Cognitive performance*

- **Prospective risk of incapacitation**
  - System failure
    - Subsystem failure
  - Time-based
    - Acute
      - Sub-acute/Chronic
How do we think of or test cognitive performance?

- Rely on the pilot (self-assessment)
- Every day before/at work/flight
  - Colleagues
  - Family & friends
- Simulator or other ‘work-based’ tests
- Periodic Aero-medical Examination
  - What do you do?
- Medical investigation / diagnosis of a clinical condition

NB Bayesian probability
(Cognitive) Performance

- Population variance
- Individual diurnal and situational variability
- Degeneration/disease
(Cognitive) Performance

- Impaired
- Languishing
- Good performance
- Peak performance

Experience?

Age?
Why Assess pilot (cognitive) performance?

- Neurological and Psychological conditions can lead to impaired function in multiple domains
  - This poses a risk to flight safety
Why Assess pilot (cognitive) performance

- Neurological and Psychological conditions can lead to impaired function in multiple domains
  - This poses a risk to flight safety

- The risk can be recognised by
  - identification of the condition (pilot, physician, AME, specialist)
  - the effect on pilot performance (crew, trainer, company, aircraft)

- The risk can be mitigated by
  - Removing it - grounding the pilot
  - limiting the risk by limiting operations
  - Monitoring for deterioration
  - Early recognition prior
Testing Pilot Competence: Total Systems Approach

- Initial Assessment
- In-Training
- Completion of Training
- In service
Testing Pilot Competence: Initial (Aptitude) Assessment
Testing Pilot Competence: Initial Aptitude Assessment
Self-assessment?
Testing Pilot Competence: Training

- Initial Aptitude Assessment (Airline/Flight School)

- In-Training
  - Examinations (CPL(7), ATPL(7))
    - Memory
    - Cognitive skills
    - Decision-making
    - Time-pressure
  - Flying skills

- Completion of Training
  - Skills test
  - Multi-crew Cooperation Course (MCC)
  - Type Rating (Theory and Practical)
What is a Pass?
Testing Pilot Competence: In Service

- Initial Aptitude Assessment (Airline/Flight School)
- In-Training
- Completion of Training
- In service
  - Licensing Proficiency Checks (LPC)  6-monthly / Annual
  - Operator Proficiency Checks (OPC)  6-monthly / Annual
- Further Type ratings  As/when
Proficiency Checks: EU Aircrew Regulation

Subpart A General
  Content of Test
  Conduct of Test
  Specific Issues re MPL

Subpart B Specific Requirements for Aeroplane Category
  Pass Mark
  Flight Test Tolerance
  Content

Subpart C Specific Requirements for Helicopters
Subpart D Specific Requirements for Powered Lift Aircraft
Subpart E Specific Requirements for Airships
Appendix 9

Training, skill test and proficiency check for MPL, ATPL, type and class ratings, and proficiency check for IRs

A. General

1. An applicant for a skill test shall have received instruction on the same class or type of aircraft to be used in the test.

2. Failure to achieve a pass in all sections of the test in two attempts will require further training.

3. There is no limit to the number of skill tests that may be attempted.

CONTENT OF THE TRAINING, SKILL TEST/PROFICIENCY CHECK

4. Unless otherwise determined in the operational suitability data established in accordance with Part-21, the syllabus of flight instruction shall comply with this Appendix. The syllabus may be reduced to give credit for previous experience on similar aircraft types, as determined in the operational suitability data established in accordance with Part-21.

5. Except in the case of skill tests for the issue of an ATPL, when so defined in the operational suitability data established in accordance with Part-21 for the specific type, credit may be given for skill test items common to other types or variants where the pilot is qualified.

CONDUCT OF THE TEST/CHECK

6. The examiner may choose between different skill test or proficiency check scenarios containing simulated relevant operations developed and approved by the competent authority. Full flight simulators and other training devices, when available, shall be used, as established in this Part.
## Flying Skill / Accuracy

4. The following limits shall apply, corrected to make allowance for turbulent conditions and the handling qualities and performance of the aeroplane used:

<table>
<thead>
<tr>
<th>Category</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
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<tr>
<td>Generally</td>
<td>± 100 feet</td>
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<tr>
<td>Starting a go-around at decision height</td>
<td>+ 50 feet/– 0 feet</td>
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<tr>
<td>Minimum descent height/altitude</td>
<td>+ 50 feet/– 0 feet</td>
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<tr>
<td><strong>Tracking</strong></td>
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<tr>
<td>on radio aids</td>
<td>± 5°</td>
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<tr>
<td>Precision approach</td>
<td>half scale deflection, azimuth and glide path</td>
</tr>
<tr>
<td><strong>Heading</strong></td>
<td></td>
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<tr>
<td>all engines operating</td>
<td>± 5°</td>
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<tr>
<td>with simulated engine failure</td>
<td>± 10°</td>
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<tr>
<td><strong>Speed</strong></td>
<td></td>
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<tr>
<td>all engines operating</td>
<td>± 5 knots</td>
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<tr>
<td>with simulated engine failure</td>
<td>+ 10 knots/– 5 knots</td>
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</tbody>
</table>
## Licensing Proficiency Checks / Exercises

### Table: Practical Training

<table>
<thead>
<tr>
<th>Maneuver / Procedures</th>
<th>O/T/D</th>
<th>F/T/D</th>
<th>I/F/S</th>
<th>A</th>
<th>Instrutor Initials When Training Completed</th>
<th>Chld Initials When Test Completed</th>
<th>Examiner Initials When Test Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3 Crosswind take-off</td>
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<td>2.4 Take-off at</td>
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<td>maximum take-off weight (actual or simulated maximum take-off weight)</td>
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<tr>
<td>2.5 Take-offs with</td>
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<tr>
<td>simulated engine</td>
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<td>failure</td>
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<tr>
<td>2.5.1* Shortly after reaching V2 (in aircrafts which are not certificated as transport category or commuter category aircraft, the engine failure shall not be simulated until reaching a minimum height of 500 ft above runway and, in aircrafts having the same performance as a transport category aircraft regarding take-off mass and density altitude, the instructor may simulate the engine failure shortly after reaching V2)</td>
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<tr>
<td>2.5.2* Between V1 and V2</td>
<td>P</td>
<td>X</td>
<td>M</td>
<td>FIS Only</td>
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</tbody>
</table>

### Section 1

1. Flight preparation
   1.1 Performing calculation
   1.2 Aeroplane exterior visual inspection - location of each item and purpose of inspection
   1.3 Cockpit inspection
   1.4 Use of checklist prior to starting engines, starting procedures, radio and navigation equipment check, selection and setting of navigation and communication frequencies
   1.5 Taxiing in compliance with air traffic control or increments of
## Emergency Procedures

- 3 from 9

<table>
<thead>
<tr>
<th>Maneuver/Procedure</th>
<th>OTD</th>
<th>FID</th>
<th>FIG</th>
<th>A</th>
<th>Instructor initials when training completed</th>
<th>Examiner initials when test completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6.1 Fire drills, e.g., engine, APU, cabin, cargo compartment, flight deck, wing and electrical fires including evacuation</td>
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<tr>
<td>3.6.2 Smoke control and removal</td>
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<td>3.6.3 Engine failure, shutdown and restart at a safe height</td>
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<td>3.6.4 Fuel dumping (simulated)</td>
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<tr>
<td>3.6.5 Wind shear at take-off/landing</td>
<td>P</td>
<td>X</td>
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<tr>
<td>3.6.6 Simulated cabin pressure failure/emergency descent</td>
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<td>3.6.7 Incapacitation of flight crew member</td>
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<tr>
<td>3.6.8 Other emergency procedures as outlined in the appropriate Aeroplane Flight Manual</td>
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<tr>
<td>3.6.9 ACAS event</td>
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</tbody>
</table>

*An aircraft may not be used.*
Testing Pilot Competence: In Service

- Initial Aptitude Assessment (Airline/Flight School)

- In-Training

- Completion of Training

- In service

- Medical Assessment following injury or disease
  - Clinical Assessment
  - Neuropsychological testing and/or?
  - SIM assessment
EU PART MED.B.0.60

MED.B.060 Psychology

(a) Applicants shall have no established psychological deficiencies, which are likely to interfere with the safe exercise of the privileges of the applicable licence(s).

(b) A psychological evaluation may be required as part of, or complementary to, a specialist psychiatric or neurological examination.

AMC1 MED.B.060 Psychology

(a) Where there is suspicion or established evidence that an applicant has a psychological disorder, the applicant should be referred for psychological opinion and advice.

(b) Established evidence should be verifiable information from an identifiable source which evokes doubts concerning the mental fitness or personality of a particular individual. Sources for this information can be accidents or incidents, problems in training or proficiency checks, delinquency or knowledge relevant to the safe exercise of the privileges of the applicable licence.

(c) The psychological evaluation may include a collection of biographical data, the administration of aptitude as well as personality tests and psychological interview.

(d) The psychologist should submit a written report to the AME, AeMC or licensing authority as appropriate, detailing his/her opinion and recommendation.
(a) Applicants shall have no established medical history or clinical diagnosis of any neurological condition which is likely to interfere with the safe exercise of the privileges of the applicable licence(s).

(b) Applicants with an established history or clinical diagnosis of:

(1) epilepsy;

(2) recurring episodes of disturbance of consciousness of uncertain cause;

shall be assessed as unfit.

(c) Applicants with an established history or clinical diagnosis of:

(1) epilepsy without recurrence after age 5;

(2) epilepsy without recurrence and off all treatment for more than 10 years;

(3) epileptiform EEG abnormalities and focal slow waves;

(4) progressive or non-progressive disease of the nervous system;

(5) a single episode of disturbance of consciousness of uncertain cause;

(6) loss of consciousness after head injury;

(7) penetrating brain injury;

(8) spinal or peripheral nerve injury;

shall undergo further evaluation before a fit assessment can be considered.

Applicants for a Class 1 medical certificate shall be referred to the licensing authority. Fitness of Class 2 applicants shall be assessed in consultation with the licensing authority.
AMC

Acceptable Means of Compliance

AMC1 MED.B.065 Neurology

(a) Epilepsy

(1) A diagnosis of epilepsy is disqualifying, unless there is unequivocal evidence of a syndrome of benign childhood epilepsy associated with a very low risk of recurrence, and unless the applicant has been free of recurrence and off treatment for more than 10 years. One or more convulsive episodes after the age of 5 are disqualifying. In the case of an acute symptomatic seizure, which is considered to have a very low risk of recurrence, a fit assessment may be considered after neurological review.

(2) An applicant may be assessed as fit by the licensing authority with a multi-pilot limitation if:
   (i) there is a history of a single afebrile epileptiform seizure;
   (ii) there has been no recurrence after at least 10 years off treatment;
   (iii) there is no evidence of continuing predisposition to epilepsy.

(b) Conditions with a high propensity for cerebral dysfunction

An applicant with a condition with a high propensity for cerebral dysfunction should be assessed as unfit. A fit assessment may be considered after full evaluation.

(c) Clinical EEG abnormalities

(1) Electroencephalography is required when indicated by the applicant’s history or on clinical grounds.

(2) Epileptiform paroxysmal EEG abnormalities and focal slow waves should be disqualifying.

(d) Neurological disease

Any stationary or progressive disease of the nervous system which has caused or is likely to cause a significant disability is disqualifying. However, in case of minor functional losses associated with stationary disease, a fit assessment may be considered after full evaluation.

(e) Episodic disturbance of consciousness

In the case of a single episode of disturbance of consciousness, which can be satisfactorily explained, a fit assessment may be considered, but a recurrence should be disqualifying.

(f) Head injury

An applicant with a head injury which was severe enough to cause loss of consciousness or is associated with penetrating brain injury should be reviewed by a consultant neurologist. A fit assessment may be considered if there has been a full recovery and the risk of epilepsy is sufficiently low.
Medical Problems that involve cognitive impairment

<table>
<thead>
<tr>
<th>Neurological</th>
<th>Psychological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downs &amp; other Congenital syndromes</td>
<td>Attention Deficit disorder(s)</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>Autism spectrum disorders</td>
</tr>
<tr>
<td>Huntingdon’s &amp; Neuromuscular diseases</td>
<td>Schizophrenia, Psychoses and Bipolar disorders</td>
</tr>
<tr>
<td>Alzheimers disease &amp; Dementia</td>
<td>Alzheimers disease &amp; Dementia</td>
</tr>
<tr>
<td>Stroke, TIA and haemorrhage</td>
<td>OCD</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>Mood disorders &amp; Depression</td>
</tr>
<tr>
<td>Parkinson’s Disease</td>
<td>Alcohol &amp; Drug misuse</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>Medication</td>
</tr>
<tr>
<td>Medication</td>
<td></td>
</tr>
</tbody>
</table>
Aeromedical Assessment

- Pilot or AME informs of unfitness
- UK CAA provides (some) guidance on assessment and decision-making criteria for various conditions linked to the EU regulations
  - Algorithms/flowcharts
  - Standard report formats/specifications
  - For the most part conditions must be referred to the CAA
- Specialist report from the treating physician is a minimum
  - Copies of investigations performed
  - May include cog tests that have been done clinically
- Where there is a question of possible decrement in cognitive performance, the pilot must pass a simulator check before returning to flying and at appropriate intervals thereafter
When to Test & Follow

- At Diagnosis / Anticipation of Cognitive Impairment
  - Parkinson’s disease
  - Multiple sclerosis
  - Minimal cognitive impairment → dementia
  - HIV & Medication
  - Pilots taking antidepressants or other psychoactive substances that might impair performance

- Monitoring of clinical recovery
  - Head injury
  - Neuro-vascular insult
    - Sub-arachnoid Haemorrhage
    - Carotid/vertebral artery dissection
    - (Stroke/TIA)
Prospective Disease and Post-diagnosis risk

Risk vs Time Pre diagnosis

Risk vs Time Post Event/Diagnosis

Diagnosis & Disease Surveillance

Intervention & Recurrence Surveillance
Parkinsons Disease

- Average age of onset is 60 yrs
- Time course variable but slow
- Most medications used to treat Parkinson’s disease are unacceptable for certification due to their side-effects
  - Mild/early disease Amantadine and selegiline are acceptable in UK.
- Return to flying will be with an multi-pilot (OML) limitation and subject to a satisfactory simulator check.
- Due to the progressive nature of the disease there must be an adequate process in place for regular clinical and functional (SIM) review. (Usually 6 monthly)
- Cognitive impairment generally occurs in the more advanced stages
Multiple Sclerosis

- 0.1% prevalence
- Onset can occur at any time in adult life (peak 20-40)
- Usually presents and recurs with sub-acute symptoms of sensory & motor function impairment
- Disqualifying during flare and/or remission requiring steroids
- Class 1 Initial certification generally not possible / ill advised

- For revalidation/renewal, assessment after full remission has been achieved for a minimum of six months
  - 6-monthly annual by CAA Consultant Advisor in Neurology
  - Report from pilot’s own neurologist should be made available
  - six monthly simulator check
  - ophthalmology review as required
  - score of 2 or less on the Kurtzke Expanded Disability Status Scale.
Head Injury
# UK CAA Head Injury Certification Guidance

*The presence of any criterion listed in the severest category determines the category to be used for certificatory assessment*

<table>
<thead>
<tr>
<th>Classification</th>
<th>Criteria</th>
<th>Aircrew Medical Category</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Minimal        | • Any concussive or mild head injury symptoms which have recovered within 48hrs  
• No loss of consciousness (LOC)  
• No post traumatic amnesia (PTA)  
• No neurological deficit  
• No seizure               | Class 1, 2 & LAPL  
Unfit 7 days         | Medical report from attending doctor  
OR  
AME clinical assessment (if not seen by A+E or GP) |
| Mild           | • Any concussive or mild head injury symptoms for greater than 48hrs  
• Initial Glasgow Coma Score (GCS) 12-15  
• LOC less than 30 minutes  
• PTA less than 30 minutes  
• No neurological deficit  
• No skull fracture (if scan performed)  
• No brain contusion (if scan performed)  
• No seizure               | Class 1, 2 & LAPL  
Unfit for 6 weeks after resolution of any symptoms | Medical report from attending doctor including investigations  
AND  
AME clinical assessment after resolution of symptoms |
| Moderate        | • Initial GCS 9-12  
• LOC 30 mins to 24 hours  
• PTA 30 mins to 24 hours  
• No neurological deficit  
• Skull fracture  
• No brain contusion on CT/MRI  
• No seizure               | Class 1  
Unfit 6 months after resolution of any symptoms  
Then OML for 2 years | Medical report from attending specialist including investigations.  
CT/MRI mandatory before recertification  
AND  
AME clinical assessment after resolution of symptoms |
|                | • Initial GCS less than 9  
• LOC more than 24 hours  
• PTA more than 24 hours  
• Focal neurological deficit  
• Brain contusion on MRI  
• Intracranial haemorrhage on CT/MRI  
• Depressed skull fracture               | Class 1  
Unfit 3 years after resolution or stable, non-disabling symptoms  
Then OML long-term  
Class 2  
Unfit for 1 year after resolution of symptoms or demonstration of stable, non-disabling symptoms  
Then OSL for 2 years | Medical report from attending specialist including investigations.  
CT/MRI mandatory before recertification  
Class 1: satisfactory simulator check  
Class 2: LAPL satisfactory Medical Flight Test  
AND  
AME clinical assessment |
| Severe          | • Penetrating brain injury  
• Significant parenchymal damage  
• Disabling neurological deficit               | Class 1 & 2  
Unfit long-term  
LAPL  
Unfit 1 year after resolution of symptoms or demonstration of stable, non-disabling symptoms  
Then OSL/OPL long-term | Medical report from attending specialist including investigations.  
CT/MRI mandatory before recertification  
AND  
Satisfactory Medical Flight Test  
AND  
AME clinical assessment |
Aeromedical certification for HIV+ applicants

UK CAA Guidance on Aeromedical Certification for HIV Positive Applicants

Following diagnosis or on declaration of HIV infection, the pilot should be declared unfit or certificate issue deferred until reports have been obtained from the reviews described in (a) to (e) below. These can be used to assess functional fitness and the prospective incapacitation risk.

(a) HIV Specialist Review - An accredited specialist in Genitourinary/HIV medicine should undertake this review. The report submitted should include:

- a history of infection
- current symptoms
- stability of the condition
- history of AIDS defining opportunistic infections or associated illnesses
- CD4+ T cell counts and viral load measurements
- Medication and start dates (describing side-effects if any)
- Results of co-infection testing (including Hep B/C, CMV, Toxoplasmosis and in at risk cases, tuberculosis)
- FBC, U&Es, LFTs, fasting glucose and lipids.

(b) Neurology Review
Assessment should be undertaken to look for neurological sequela either of HIV positivity or therapy by an HIV specialist or consultant neurologist.

(c) Neuropsychological Review
The pilot should undertake a baseline neuropsychological assessment. The tests should assess timed psychomotor tasks and memory tasks which require attention, learning and active monitoring or retrieval of information. These baseline tests may be used as a future comparator.

(d) Psychiatry Review (if clinically indicated)
Assessment should be undertaken by a consultant psychiatrist with particular attention paid to the psychiatric symptoms and signs related to HIV seropositivity and or Anti Retroviral Therapy (ART). There is evidence in the immediate post diagnosis phase of a higher risk of developing a depressive illness. Some medication may also have side-effects such as mood changes and/or depressive illness. An initial assessment of these conditions can be made by the treating HIV specialist with a further assessment by a
Aeromedical Certification Assessment

Pilots whose condition is stable, asymptomatic, with an acceptable CD4+ count and viral load (assessed using data from CASCADE Collaboration/EuroSIDA), with acceptable co-infection serology and therefore an acceptable risk of disease progression may be considered for a Class 1 with an Operational Multi-pilot Limitation. These applicants should be referred to the AMS. Class 2 applicants who are similarly well and have an acceptable risk of disease progression can be considered in consultation with the AMS.

Medication

As a guide the following are generally acceptable medications providing the applicant has no ongoing side-effects and their FBC, LFTs, lipids and fasting glucose are acceptable:

- Other medication will be considered on an individual basis assuming they are appropriately licensed and there is sufficient data on their safety available.

Certificate holders should be declared unfit whilst initiating, modifying or discontinuing ART and may be reassessed after a period of 2 months, although in some cases it may be at least 6 months before recertification, by means of a report from their treating HIV specialist, to include recent CD4+ counts and viral loads and confirmation of an absence of ongoing side-effects from medication or symptoms related to HIV seropositivity.

Follow Up

| 3 Monthly | Viral loads and CD4+ count (can be submitted as part of a 6 monthly report from HIV specialist to include neurology review, if applicant remains stable with no symptoms related to infection or treatment) |
| 6 Monthly | Report with neurology review - see (b) above If on ART, blood results should include LFTs and FBC |
| 12 Monthly | If on ART, blood results should include lipids and fasting glucose |
|           | Cognitive Function Assessments (can be Licence Proficiency Check or Medical Flight Test with a Flight Examiner where risk of disease progression is low). Impaired performance will require further neuropsychological assessment to be compared with baseline testing and any deficits will require that the pilot is declared unfit. |
|           | Further co-infection testing will be required as clinically indicated, and those with positive tests need to be referred to the AMS in the case of Class 1 certificate holders or assessed in consultation with the AMS in the case of Class 2 certificate holders. |
|           | New symptoms or results outside acceptable limits are likely to lead to an unfit assessment and should be referred to/assessed in consultation with the AMS in accordance with the class of certificate held. |
How do you measure decrement in performance and what does it mean?
Neuropsychological Assessment
(This is what my psychology colleagues tell me)

Neuropsychological assessment can have two elements

- Formal assessment of individual cognitive domains by psychometric tests
- Observations of performance and behaviour in real life settings (i.e. Sim)
Cognitive tests → Real-World Performance

Cognitive/Intelligence/Personality tests
- Cattell Culture Fair.
- Kohs block.
- Multidimensional Aptitude Battery II.
- Leiter International Performance Scale.
- Miller Analogies Test.
- Otis-Lennon School Ability Test.
- Raven's Progressive Matrices.
- Etc
- Etc
Key Domains of Neuropsychometric testing

Cognitive
- Memory
- Attention
- Executive Function
- Psychomotor speed
- Personality / Motivation
- Passivity and Impulsivity
- Emotional and social cognition
- Verbal reasoning.
- Numerical reasoning
- Logical reasoning
- Checking/comparison
- Situational Judgement
- Task-specific tests e.g. target tracking

Behavioural Assessment:
- Questioning / exposure to work or other
- Match demand to cognitive capacity
- True-life scenarios to assess impact
Neuropsychological Assessment

Cognitive Tests:
- Are deliberately artificial - Measure specific cognitive processes
- May ‘block’ other routes/strategies
- Good diagnostic tool for examining the processes and structures that have been affected by neurological/psychological disorder

- Impairments detected by specific tests may not represent real world implications
  - Other cognitive functions and experience may compensate
    → So often only a global impairment likely to have a demonstrable effect
  → So neurocognitive tests should not in themselves be relied upon to make fit/unfit decisions

Behavioural Assessment:
- Are often less objective and the ‘meaning’ is subject to interpretation
Medical Flight/Sim Tests

- What test do you choose
  - GFT/skills test
  - Sim/aircraft LPC/OPC
  - ‘medical’ element
- High face validity and very ‘near-world’ reality

- Standardisation
  - Simulator Spec/Performance
  - Specification of test
  - Examiner competency / experience / bias
  - Not necessarily by operator

- Does sub-optimal sim performance reflect cognitive problem? vs training or lack of experience or were the affected domains not assessed?
Cost Implications?

- Neuropsych Testing
  - Clinical
  - Online

- SIM Testing
  - Rental vs company

- Who pays?
Current UK Approach-Summary

- ‘Total System’ Approach to Training and in-service’
  - Sim checks are the test of choice

- Medical assessment following illness or injury
  - Reports
    - AME
    - Consulting physicians
  - Investigations
  - Clinical tests
    - Cognitive assessment (if performed for clinical reasons)

- Medical Flight/Sim Test prior to RTW and for surveillance

→ in the UK we only specify more where we have a higher ‘suspicion’
Can we do better?

- Safety in the skies is paramount, but it is important not to unnecessarily exclude competent pilots from pursuing their careers.
  - (Over)reliance on neuropsychological test scores in the assessment of fitness to fly runs this risk.

- If we specify more tests than the clinician…
  - Choose the test carefully? And beware of what ‘normative’ data you have and what it means

- The ability to ‘program’ the simulator (test) allows for a more ‘bespoke’ assessment.
  - Linked to the condition, Functional performance, & Behavioural performance

- NB In-Flight data monitoring may be a future tool for us
“Happiness is when what you think, what you say and what you do are in harmony”
Medication

Hypnotics

- Apart from temazepam, all other hypnotics, including *zolpidem*, *zopiclone* and “over the counter” preparations such as *diphenhydramine* and *promethazine* are disqualifying for EASA medical certification.

- Drowsiness or light-headedness the next day, confusion, ataxia and amnesia are possible side-effects so the medication should be started for the first time when it is certain licence privileges will not be exercised the following day.

- risk of dependency developing.

CNS stimulants

- *Modafinil* narcolepsy & sleep apnoea are disqualifying and so any applicant taking this medication is unfit for flying duties.
Medication

- **Smoking cessation medication**
  - *Nicotine replacement therapy* is acceptable.
  - *Varenicline* is a selective nicotine receptor partial agonist used for smoking cessation. Common side effects include drowsiness, dizziness and sleep disorder. Less commonly (1:1000 – 1:100) it can cause atrial fibrillation, palpitations, panic attacks, mood swings, incoordination, visual disturbance, myocardial infarction, anxiety, depression, irrational behaviour, psychosis and suicidal ideation. *Varenicline* is not compatible with aeromedical certification.
  - *Bupropion* is used for smoking cessation though its mode of action is unknown. Common side effects include anxiety, depression, dizziness and impaired concentration. Less commonly it can cause confusion and visual disturbance. Applicants are ‘unfit whilst taking this medication.”
Medication

- **Antidepressants**
  - The SSRIs *sertraline, citalopram* and *escitalopram* are the only antidepressants permitted for EASA medical certification – see the Depression (PDF) flow chart. *Citalopram* and *escitalopram* are associated with dose-dependent QT interval prolongation and should not be used in those with congenital long QT syndrome, known pre-existing QT interval prolongation or in combination with other medicines that prolong the QT interval. ECG measurements should be considered and electrolyte disturbances should be corrected before starting treatment. For *citalopram*, the maximum daily doses are: 40 mg for adults and 20 mg for patients older than 65 years. For *escitalopram*, the maximum daily doses are: 20 mg for adults and 10 mg for patients older than 65 years.
  - *St John’s Wort* can be purchased without prescription and is used for the treatment of depression though it is not licensed for this purpose. It interacts with other medicines and the quality and quantity of active ingredient in the various preparations available is variable. An applicant or certificate holder on this treatment should be assessed as unfit and follow the Depression (PDF) flow chart.
  - The SNRI *duloxetine* is not permitted as an antidepressant but is non-sedating and medical certification may be considered for those applicants using a lower dosage for neuropathic pain.
  - The half-life of *amitriptyline* is 18 to 24 hours and active metabolites have a longer half-life. Sedation occurs at all dose levels. It is not compatible with EASA medical certification even at the low doses used for treating neuropathic pain.
Medication

- Antiepileptics and Medications for Neuropathic Pain
  - Epilepsy is disqualifying so these drugs are incompatible with EASA medical certification. *Gabapentin*, *pregabalin* and *carbamazepine* prescribed for neuropathic pain and *valproate* for migraine prophylaxis are disqualifying for EASA medical certification because of the risk of unacceptable side effects.

- Antipsychotic drugs
  - *Antipsychotic drugs* are not usually compatible with EASA medical certification because the condition for which they are prescribed is likely to be disqualifying. However, low dose *sulpiride* (less than 400mg daily) is acceptable for the treatment of Tourette’s syndrome (unlicensed indication) provided a clinical report confirms treatment is successful without significant side-effects and a medical flight test gives a satisfactory result. The use of *clonazepam* for treating tics is disqualifying.