

Would you fly with this pilot/cabin crew (HIV)

Dr Anthony Evans
Chief, Aviation
Medicine Section
ICAO, Montreal

Dr Claude Thibeault
Medical Advisor
IATA, Montreal



Acknowledgements

- Dr Ewan Hutchison (UK)
- Dr Ries Simons (Netherlands)
- Dr Teresa Bassey (Nigeria)

Plan

- Case history no. 1
- ICAO SARPS
 - Issues/Discussion re. pilot
 - Issues/Discussion re. cabin crew
- Case history no.2
 - Issues/Discussion re. pilot
 - Issues/Discussion re. cabin crew

Case 1

Male, age 41, training captain B737, national airline,
10,000 hours.

- September 1998: reported ill
 - fatigue, respiratory tract infection and anemia
- October 1998: Pneumonia (pneumocystis) and HIV +
 - Antibiotics
 - White blood cells 'far too low'

Case 1

- November 1998: HIV-medication started (HAART)
(Highly Active AntiRetroviral Therapy = three or more anti-HIV drugs)
 - Full “recovery” asymptomatic
 - No side-effects of medication
- January 2000: wants to return to flying duties, part-time

Who would return him to flying?

- Yes?
- No?
 - If not, why not?

PROPOSED ICAO SARPs (applicable November 2009)

6.3.2.20 Applicants who are seropositive for human immunodeficiency virus (HIV) shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed as not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

Note 1.— Early diagnosis and active management of HIV disease with antiretroviral therapy reduces morbidity and improves prognosis and thus increases the likelihood of a fit assessment.

Note 2.— Guidance on the assessment of applicants who are seropositive for human immunodeficiency virus (HIV) is contained in the Manual of Civil Aviation Medicine (Doc 8984).

Issues/Discussion

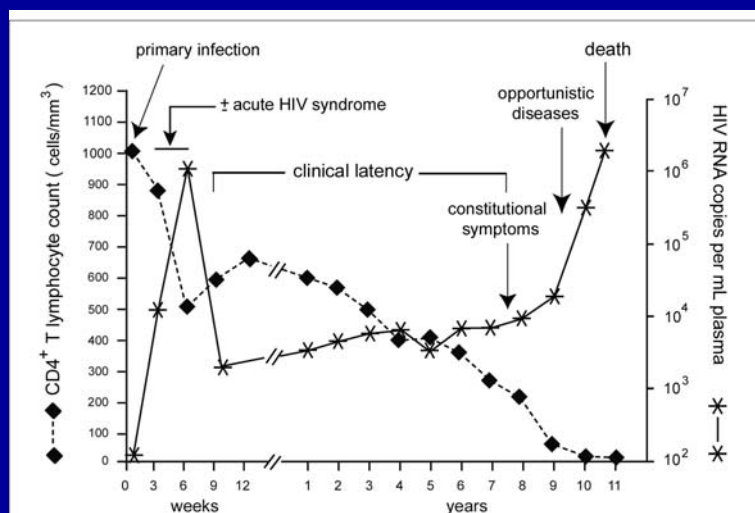


Fig. 1. Typical course of human immunodeficiency virus (HIV) infection.
Adapted from Pantaleo et al., NEJM 328: 327-35, 1993

Issues/Discussion

- Latency period
- General examination
- Neurological Assessment
 - Cognitive Function Testing
- Psychiatric Assessment
- Cardiological Assessment
- Monitoring by blood tests
- Risk of Progression
- Protocol

Issues/Discussion

- Latency period
 - Asymptomatic
 - 10 years (untreated)
 - 20% develop AIDS defining illness within 5 years (untreated)
 - Longer with HAART
 - Post 'acute retroviral syndrome'

General assessment

- CNS, cardiological, psychiatric assessment – see later
- Respiratory
- Renal
- Hepatic
- Metabolic
- Infection

Neurological Assessment

- Latency of years (except early meningitis)
- Neurological examination
 - Esp. extrapyramidal signs, ocular disorders, primitive reflexes
- Cognitive function testing (see next slide)
 - Cognitive decline can predate CD4+ T cell decline
 - Need assessment of cognitive function
- HIV associated dementia (HAD)
 - Very low CD4+
 - Very responsive to ART
 - Risk mitigated by CD4+ monitoring (and ART)

Mild neurocognitive impairment in asymptomatic HIV positive

- Research equivocal
 - Some studies show decrement, others not
- Non-progressive (can improve on re-test)
- Not predictive of HAD
- Abnormalities found in:
 - Timed psychomotor tasks
 - Memory
 - Vigilance
 - Learning
 - Active monitoring

Tests used

- Trail Making
 - Connect a series of stimuli e.g. numbers (numerals or words) and letters in specified order as quickly as possible
 - Tests
 - Attention
 - Concentration
 - Resistance to distraction
 - Cognitive flexibility

Tests used

- Digit symbol substitution
 - Example:
 - Nine symbols corresponding with nine digits.
 - Three rows of digits with empty spaces below them.
 - The subject is asked to fill in as many corresponding symbols as possible in 90 seconds
 - Tests
 - Attention
 - Perceptual speed
 - Motor speed
 - Visual scanning and memory

Digit symbol substitution

- 1  4 9 5 8 7 2 6 3
- 2     X X X Etc...
- 3 
- 4 
- 5 
- 6 
- 7 
- 8 
- 9 

Tests used

- Grooved pegboard test
 - Timed manipulative dexterity test
 - 25 holes with randomly positioned slots
 - Pegs with a key along one side must be rotated to match the hole before they can be inserted
 - Tests
 - Complex visual-motor coordination



Grooved pegboard test

Tests

- Reaction time

Summary of psychological tests

- Attention
- Concentration
- Resistance to distraction
- Visual scanning and memory
- Perceptual speed
- Motor speed
- Coordination
- Reaction time
- Cognitive flexibility



Simulator

- Attention
 - Variety of displays
 - Prioritization
- Concentration
 - 2 x 4 hour (+ 1 hour brief) sessions every 6 months
 - Ensure pilot under assessment is second pilot to be tested
- Resistance to distraction
 - Many opportunities for distraction (radio calls, caution and warning messages, navigation identification)

Simulator

- Visual scanning

- Instrument scan

- Altimeter
 - Aircraft attitude
 - Airspeed
 - Compass
 - Vertical speed



Simulator

- Memory

- Long-term:

- Order of undertaking start-up & push-back routines;
 - Start-up memory checks;
 - Where to find deferred defect items
 - Emergency actions (engine failure, depressurization etc)

- Medium term:

- “After point X [in 3 minutes time] descend to FL 120)”
 - “After reaching 7,000 feet and turn right on to 270 degrees”

- Short term:

- “Heading 270, then call 126.825”
 - “Call 127.275 with flight level, heading and airspeed”

Simulator

- Perceptual speed, motor speed, coordination, reaction time
 - Manual flying tasks in general, especially following engine failure
 - Engine failure before V1
 - HP – decide if above or below V1; identify EF, which one, apply correct rudder, select reverse
 - Engine failure after V1
 - HP – identify EF; which one, apply correct rudder; call for “full power”; adjust climb angle; correct bank; follow emergency turn; call for appropriate emergency actions

Simulator

- Cognitive flexibility
 - Line oriented flight training (LOFT)
 - Expose pilot to unplanned (but realistic) scenarios e.g.
 - Closed destination runway
 - Emergency for which there is no adequate checklist
 - Emergency that demands assimilation of information from a variety of sources (instruments, displays, manual, aircraft computer, air traffic control, company)
 - Ensure second pilot does not provide much support – play role of inexperienced co-pilot

Summary – cognitive function testing

- Office testing
 - Provides accurately measurable performance
 - Not validated against flying task
- Simulator testing
 - Performance not measurable to same degree
 - Highly valid task
 - Should be main arbiter in case of equivocal office testing
- Combination of both should enable operationally significant deterioration of performance to be detected

Medical Department/Flight Department liaison

- Regulatory authority medical officer
- Flight operations inspectorate
- Airline medical adviser
- Airline flight department

- Close liaison needed to develop national/regional policy
 - In particular, medical officers responsible for setting policy need to *understand the pilot's environment*

Cardiological

- Dyslipidaemia
 - Raised cholesterol, low HDL, raised triglycerides
 - Insulin resistance, hyperglycaemia
- Cardiological review may be necessary

Psychiatric

- Pre-HAART (1993)
 - 17% US military experienced serious suicidal ideation on notification
 - 10% major mood disorder
 - 5% psychoactive substance disorder
- Knowledge of seropositivity *per se* may justify temporary suspension
- Assessment should search for depression, other mood disorder, use of psychoactive substances

Indications for antiretroviral therapy (Panel on Clinical Practices for Treatment of HIV Infection, 2004, USA)

- 1. Antiretroviral therapy is recommended for all patients with history of an AIDS-defining illness or severe symptoms of HIV infection regardless of CD4+ T cell count.
- 2. Antiretroviral therapy is also recommended for asymptomatic patients with < 200 CD4+ T cells/ μ L.
- 3. Asymptomatic patients with CD4+ T cell counts of 201-350 cells/ μ L should be offered treatment.
- 4. For asymptomatic patients with CD4+ T cells of >350 / μ L and plasma HIV RNA $>100,000$ copies/mL most experienced clinicians defer therapy but some clinicians may consider initiating treatment.
- 5. Therapy should be deferred for patients with CD4+ T cell counts of >350 cells/ μ L and plasma HIV RNA $< 100,000$ copies/mL.

Monitoring – blood tests

- CD4+ T cell count
 - Measure of disease status
 - Assess risk of opportunistic infection and cognitive decline
 - Subject to substantial variability (up to 30%, 2 std. deviations) decreased with stress, infection
 - Diurnal variation (sample at same time, when acclimatized)
 - Trends are important - sudden changes need confirming
 - Decline of 75/ μ L/year significant, when count <500 / μ L

Monitoring – blood tests

- HIV Viral load (plasma HIV RNA)
 - Indicator of magnitude of active HIV replication
 - Predicts rate of progression (invalid first six months)
 - Stable after 6-9 months
 - Immunisations, infections cause increases
 - <5,000 copies /ml = non-progression
 - Increase by >20,000 copies/ml/year = significant risk of progression to AIDS

Quantitative risk of progression

- Concerted Action on Seroconversion to AIDS and Death in Europe (CASCADE)
http://www.ctu.mrc.ac.uk/cascade/publications_and_presentations.asp
- EuroSIDA trial
<http://www.cphiv.dk/EuroSIDA/tabid/59/Default.aspx>
- Antiretroviral Therapy (ART) Cohort Collaboration (site has risk calculator)
<http://www.art-cohort-collaboration.org/>

Rate of progression – to AIDS defining disease, or death

- ~ 1% per annum after commencing HAART (Western Europe/Australia) in most favourable groups
- Provides opportunity to certificate, suggest multi-crew operation only with adequate follow-up

Protocol

- Each case considered on individual basis
- 3-monthly
 - CD4+ T cell count, viral load
 - Consider for certification if:
 - CD4+T \geq 350 cells/ μ L , viral load < 500 copies/mL, CDC Category A (Asymptomatic)
 - Individuals having parameters worse than this may still be considered – national protocol need to be developed
- 6-monthly
 - General, neurological, psychiatric assessments + neurocognitive testing
- Simulator checks
 - Airline training department should be aware of aspects to consider at each routine check (briefing sheet in pilot's personal training file)
 - For initial check on return to operations after diagnosis, and any time clinical or neurological assessment gives cause for concern, individual briefing to be given to training captain by the medical officer/airline adviser

Case 2

Male, age 50

- February 2005: reported ill
 - skin disease of foot, unknown origin
- March '05: Kaposi sarcoma and HIV+
 - Appropriate treatment

Case 2

- August 2005: part-time ground duties
 - Foot recovered and stress related symptoms resolved
 - No antiviral medication
- January 2006: return to flying duties, part-time

Case 2

- June 2006: reported ill
 - viral infection
- July 2006: start of antiviral medication (HAART)
 - Side effects: dizzy, nausea, feeling depressed

Case 2

- November 2006: HIV markers “normal”
 - Depression : treatment started

? Fit to fly as pilot

? Fit to fly as cabin crew

Cabin crew medical requirement:

- ICAO:
- JAR.OPS: good health, no sudden incapacitation
- FAA:

HIV in cabin crew

Fitness to fly

- Effects of disease
- Effects of treatment
- Limitations?
 - Part time
 - Vaccinations
 - Prophylaxis (malaria)

HIV in cabin crew

Suggested protocol

- Fitness to fly: decision by medical officer (in consultation with treating physician)
- Limitations depending on CD4 count
- Vaccination: no yellow fever if CD4 count < 200
- Malaria: normal prophylaxis
- Antibiotics if CD4 count < 200
- Monitoring by medical officer and treating physician

Would you fly with this pilot/cabin crew (HIV)

Dr Anthony Evans
Chief, Aviation
Medicine Section
ICAO, Montreal

Dr Claude Thibeault
Medical Advisor
IATA, Montreal

