Psychiatric aeromedical retrieval

By Dr Minh Le Cong

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Introduction/Background:

Psychiatric aeromedical retrieval is , in my opinion as an aeromedical physician, one of the most challenging aspects of the role. Having travelled and presented on the topic in New Zealand, the United Kingdom and communicated with colleagues in North America, I find that Australia is one of the only countries on the planet that has a significant ongoing requirement for aeromedical interhospital transfer of patients with a psychiatric primary diagnosis. Canada is the runner up nation in terms of such a requirement and the vast distances and remote geography of both nations bears similarities in remote health care provision and the need for aeromedical services.

Of course I'm referring to civilian health care and aeromedical organisations. In the military across the world, all armed forces have had to deal with psychiatric "casualties" from active conflicts and often requiring air transport back home or to a treating facility out of operational theatre. So there is a long history in the military dating back to World War 2 of learning how to manage psychiatric patients requiring aeromedical transfer, often internationally.

It may surprise the reader that little crossover , learning and experience has been passed from the military sector into civilian aeromedical practice. In fact there is very little published literature nor research from civilian aeromedical industry on what constitutes best practice for psychiatric aeromedical retrieval. Whilst military published research exists on the topic, wide variation of guidelines and sparse actual research from the civilian sector has provided limited evidence based nor scientific guidance for clinicians.

As I have said before, as only two nations on Earth seem to have a significant requirement for psychiatric aeromedical retrieval per annum for their populations, there is little global interest in the wider medical community as to how to best approach this aspect of aeromedical care. So what has occurred is a mish mash of clinical guidelines from psychiatry, emergency medicine and critical care,

utilising hospital based research and experience with little in the way of direct input from aeromedical providers themselves, until the last 10 years.

What this book outlines is a current best practice approach that I have learnt, modified and researched over last 10 years as a flight doctor in far North Australia. It is an overview of various research papers, guidelines and lectures that I have written and delivered over the last decade.

Scope of psychiatric aeromedical retrieval in Australia:

Annually, in my state of Queensland which has a similar surface area(6th largest subnational entity in the world) to Sudan , 100-150 psychiatric aeromedical retrievals are conducted, averaging 2-3 per week. Similar rates occur in the larger states across Australia and overall 300-400 of these retrievals occur every year , nationally. To compare this with other nations, take New Zealand, which as far as I know, has documented one aeromedical retrieval over a 10 yr period. The geography of many nations means that distances to psychiatric hospitals are much less and road transport is often the predominate mode of transfer. Military psychiatric air medical transfers occur commonly during times of active conflict. For example in 2003, between January to October, British psychiatric casualty evacuations back to UK from Iraq conflict totalled 178.

Fixed wing aeromedical retrieval is the dominant mode of transport in rural and remote Australia due to the distances involved. For psychiatric aeromedical missions, typically they will occur from a regional or rural hospital to a coastal or tertiary level hospital. Primary psychiatric aeromedical retrievals do occur, whereby the acutely unwell patient is actually not at a health facility staffed by a medical practitioner. Often remote clinics are only staffed by resident nurses and they may be calling for retrieval of an acutely unwell patient with psychiatric presentation, either well known to them or a completely unknown case. Furthermore, what starts out as a call for help in the Outback, may well turn out to be a primarily psychiatric reason for the call. For example, a car crash may in fact have been a deliberate suicide attempt and responding to it not only involves prehospital trauma care but a psychiatric aspect to the aeromedical retrieval.

Legal and Ethical aspects :

Whilst legal and ethical aspects of assessing and treating an involuntary psychiatric patient in a hospital setting are well proscribed and taught, the same does not apply for the prehospital nor aeromedical setting. Firstly civil aviation laws come into effect when aeromedical transfers are required, principally the notion of safe and undisturbed conduct of the operation of the aircraft. This aviation law common internationally, overrides any mental health laws/acts, by insisting that a captain of an aircraft, licensed to carry passengers must ensure the safe operation of the flight and may refuse boarding of any passenger deemed to pose a significant risk to such safe operation. Furthermore, an aircraft captain is empowered to request assistance from fellow passengers to maintain safety of the flight operation, including applying restraint measures deemed necessary to do so.

This may at times lead to refusal of a psychiatric patient to undertake even a dedicated aeromedical flight transfer. Doctors, nurses or paramedics not aware of this legal aspect may find themselves in unexpected debate /conflict with pilots when such refusals are enforced and contingencies need to be expected and planned for if this situation arises. A common example in Australia are night time

flights and in poor weather. Traditionally night time flights for psychiatric aeromedical retrieval have been deemed higher risk as emergency landing options are fewer in the dark, although in my opinion, this higher risk perception has never been proven to exist and current Australian aeromedical practice has evolved to a point whereby high risk flights can be safely conducted regardless of the time of day.

Whilst voluntary patients undergo aeromedical transfers commonly (most notably international repatriations), this textbook will only address the issue of patients under the involuntary section of the relevant local mental health act. By definition such involuntary patients are lacking capacity to provide informed consent for assessment and treatment of a known or suspected psychiatric condition. However this does not necessarily mandate that they are never consulted on medical/health related choices nor interventions. For example, an involuntary patient should be requested to take oral medication initially rather than forced injection of a sedative medication. Herein lies the legal and ethical principle of minimal restraint or minimally restrictive measures. In the aeromedical setting a balance needs to be struck between optimising safe operation of the aircraft versus this principle of minimal restraint for an involuntary patient. It is not as simple as saying that a patient should be rendered unresponsive in a medically induced coma with a tracheal tube required to maintain a secure airway, but that steps need to be taken to try to minimise the restraint, physical and chemical measures, applied.

Ideally the involuntary patient should not require aeromedical transfer for their assessment and treatment but current mental health laws in Australia require only an authorised mental health service /facility is the legally acceptable location for involuntary assessment and management to take place. This has meant transfer to such a location and given the large distances often encountered, aeromedical transfers have been the predominant mode utilised. In recent years some jurisdictions have realised the risks and actual harms that involuntary patients have been subjected to as a result of this aeromedical transfer process, due to the prolonged restraint measures applied to facilitate the transfer. This has led to a shift in strategy and law to allowing remote mental health assessments via telecommunications and the lifting of involuntary status by a psychiatrist, remotely. However in Australia, the majority of rural hospitals are unable to adequately provide inpatient psychiatric care for involuntary patients due to lack of appropriate staffing or secure ward infrastructure. This means psychiatric aeromedical transfers will still be required for the foreseeable future.

Preflight assessment/planning:

The main objective of preflight assessment is to determine the likely risk that the psychiatric patient will experience significant agitation during aeromedical retrieval and thereby possibly disrupt safe operation of the aircraft. This risk assessment is essential as it will help plan mitigation strategies, staffing and handover requirements.

There exist no validated psychiatric aeromedical risk assessment tools. Several aeromedical services in Australia and Canada utilise a risk assessment tool based on question items from psychiatric literature but these essentially remain a best estimate. They serve as a guide rather than a truly accurate predictive tool.

The following is a series of questions that I have found to be useful in my psychiatric aeromedical experience and can offer them as a guide to undertaking a standard risk assessment:

Questions	Yes	No
Prior history of violence?		
Intoxicated state currently?		
Fear of flying?		
Requiring sedative medication in last 24hrs?		

(Any YES response indicates an increased risk of agitation during aeromedical retrieval. 2 or more YES responses should be regarded as HIGH RISK)

HIGH RISK assessed psychiatric aeromedical retrievals should be planned with a full medical team of at least 2 providers with capabilities for general anaesthesia, procedural sedation and mechanical ventilation. Handover of the patient should occur at the referring facility in the event that procedural sedation or intubation be required. The need for police escorts should be considered depending on local mental health legislation.

STANDARD PREFLIGHT PREPARATION:

- All patients should be informed of the reasons for aeromedical transfer and what to expect in terms of restraint measures. They should be given opportunity to ask any questions and express any concerns about the flight and care involved.
- Identify and treat any easily reversible causes of agitation
  -pain
  -hunger/thirst (but try to keep fasted for at least 6 hrs prior to flight, 2hrs for clear fluids)
  -empty bladder/bowels with adequate toileting
  -check glucose
  -nicotine addiction (offer nicotine replacement early such as 21mg patch at least 4 hrs prior to flight)
  -drug withdrawal (offer adequate sedation. See below)
- Oral sedation should be offered regularly in preparation for flight, regardless of risk assessment. The higher the risk assessment the higher the requirement for regular adequate oral sedation . Australian aeromedical research indicates the current best oral sedation is a combination of olanzapine 10mg and diazepam 10mg for average adult patient. This should be repeated as needed up to maximum 30mg olanzapine in 24hrs with no ceiling for oral diazepam in a 24hr period. Oral sedation should be offered within 4 hrs of flight.
- Intravenous access should be inserted prior to flight, ideally one on each arm . Extension tubing to the IV access is a useful aid to be secured and flushed for patency.

- The main aim of preflight preparation is to have a calm, cooperative patient who is aware of what will happen and what is expected. Equally the retrieval team(including pilot of aircraft) and referring hospital staff must be aware of what will happen and what is expected of them.

Parenteral Sedation:

After 12 years of undertaking psychiatric aeromedical retrievals, researching and communicating with colleagues from across the globe, it is my current opinion that there are only 2 parenteral sedative options for acutely agitated patient refusing or not adequately responding to oral sedation.

FIRST LINE OPTION : DROPERIDOL

10mg IV/IM, repeated every 10min as needed up to maximum 30mg/24hr dose.

5mg dosing can be used for smaller adults or those with renal/liver impairment.

Hypotension is a common side effect and can be managed with IV isotonic fluid loading or vasopressors. Prolonged QT is a reported effect but rarely requires treatment nor leads to adverse events.

ALTERNATIVES TO DROPERIDOL : Haloperidol in the same dosing can be used but has slower onset of action. Olanzapine IM (has been used safely IV off licence in several studies) in same dosing can be used as well.

SECOND LINE OPTION : KETAMINE

(This should be regarded as procedural sedation, where the procedure is the safe aeromedical transfer of the patient)

3-4mg/kg IM if no IV access obtained . Once sedated sufficiently, then gain IV or IO access as priority.

1mg/kg IV slow bolus for rapid sedation

Maintenance sedation with ketamine infusion if required : initial rate 2mg/kg/hr titrating up to 4mg/kg/hr

Hypertension and tachycardia are common but often short lived . Hallucinations may occur and may be treated with above droperidol dosing or IV diazepam 2-5mg. Involuntary movements may be witnessed and these are typically not related to a seizure.

MINIMUM MONITORING FOR RETRIEVAL PROCEDURAL SEDATION:

- Cardiac monitoring
- Oxygen saturation
- Intermittent blood pressure monitoring
- Non invasive capnography for ketamine sedation
- Validated sedation assessment scale such as the Sedation Assessment tool with aim to maintain patient in 0 to -1 range

score	Responsiveness	Speech
+3	combative, violent, out of control	continual loud outbursts
+2	very anxious and agitated	loud outbursts
+1	anxious/restless	normal / talkative
0	awake and calm/cooperative	normal
-1	asleep but rouses if name called	slurring or prominent slowing
-2	responds to physical stimulation	few recognisable words
-3	no response to stimulation	nil

Calver et al. EMA (2011) 23, 732-740

CAVEATS WITH PARENTERAL SEDATION:

- Intoxicated patients are high risk for adverse sedation complications. Consider other management options and if chemical restraint is still required, consider reducing initial dosing as well as being prepared to emergently secure airway with rapid sequence induction of anaesthesia and tracheal tube intubation.
- High sedation risk patients should be considered for general anaesthesia and cuffed tracheal tube intubation . These include : poisoning/overdose, Comorbid respiratory illness (acute or chronic), failed trial of adequate parenteral sedation

Timing and staffing of psychiatric aeromedical retrieval :

Ideally psychiatric aeromedical retrieval should be avoided if possible but when it is required as often as it does in remote Australia or Canada, the issue of optimal timing is controversial and there is no well researched process as to how to make this retrieval decision for each case apart from experience on the job and the available resources at the time.

In a perfect world, there would be an immediately available aircraft and dedicated retrieval team for each and every request for a psychiatric aeromedical transfer. In the real world, there are always competing interests between the aviation assets, retrieval team logistics/staffing, the referring health staff capabilities/capacities and the mental legislation requirements of an involuntary patient requiring acute assessment and treatment.

Inevitably given limited resources there will be a delay in psychiatric aeromedical retrieval and the referring health staff with the actual patient must be prepared for this , at least for the next 24hrs and sometimes longer. The psychiatric retrieval should not be regarded as the only essential step in the care of the acutely agitated mental health patient in a remote location. This fixation on the transfer of the psychiatric patient has often lead to ill preparedness for the eventual aeromedical flight on the part of the patient as well as the retrieval staff involved. It is rare that a psychiatric aeromedical retrieval will be regarded and tasked as a time critical intervention and all parties involved must accept this reality. It does not mean in any way that care of the patient should be delayed or reduced, whilst waiting for such a transfer to occur. In fact remote telecommunications technologies currently allow for significant and meaningful input to be provided by specialist psychiatric staff, including remote assessment under new mental health legislation in some Australian states. This may in fact avoid the need for any psychiatric retrieval to occur at all.

It should be borne in mind that aviation law considerations will override any mental health laws and that a pilot has final say in the decision to carry any passengers on a flight, even a dedicated aeromedical mission. Traditionally aeromedical pilots in Australia have been taught to avoid night flights for psychiatric retrievals and a number of reasons have been described to rationalise this attitude i.e increased agitation at night, less emergency landing options. Delaying a psychiatric retrieval till daylight, may exarcebate the agitation of the patient and does pose issues of staffing fatigue and appropriate nursing of a potentially sedated patient in a facility with inadequate resources. Tragically in remote Australia this situation of confounding factors has led to deaths of involuntary patients from oversedation whilst awaiting aeromedical retrieval . Needless to say, this situation should be avoided at all costs.

In my opinion, all alternative options including road transfers should be considered, before tasking a psychiatric aeromedical retrieval. If air transfer is chosen as the most appropriate option, then the next available aircraft should be tasked, regardless of time of day, with a full retrieval team capable of managing the highest level of risk and agitation of the involuntary patient. It is not uncommon in many aeromedical services that solo flight nurse or paramedics are tasked to such psychiatric aeromedical transfers. Ideally this should be not be the standard of care in my opinion and a two person retrieval team should be the default standard. In addition, the retrieval team should have full capability to provide procedural sedation, intubation and mechanical ventilation if required.

FIRST HANDOVER

All HIGH RISK assessed cases should be handed over to the retrieval team at the referring facility i.e at the clinic/hospital where patient is currently being treated for their acute agitation. Aircraft tarmac handovers are often considered/performed in order to save time for a given aeromedical shift but this carries risks that need to be considered. It is not unheard of that patients have refused to board aircraft when tarmac handovers have been attempted and this can lead to a tricky situation of how to best handle the situation, outside a health facility. If there is any doubt as to the level of agitation of the patient, then a facility handover should be planned for.

The following elements are important to an adequate handover of the psychiatric aeromedical retrieval patient:

- Identification and introduction of health staff involved in handover , including introduction to patient of the retrieval team and their roles/aims.
- Handover of relevant health records /documents of current care including medications administered and effects noted. Mental health legal documents should be checked and accompany the involuntary patient.
- Complete a general assessment of the patient with respect to basic physical status and then their mental state.
- Take time to explain to patient what is goal of aeromedical transfer and what is to be expected of them. Give opportunity for questions to be asked.
- Oral sedation should be offered if there is any doubt as to agitation level of patient. This is an important assessment aspect often neglected as it will indicate level of cooperation to be expected.
- Depending on local service protocols, mechanical restraints may be required for all psychiatric aeromedical retrievals. In my opinion they are an important safety element and provide a key extra layer of safety for unexpected agitation during flight. They should be placed at handover time, once patient is on the aircraft stretcher, after all other handover actions completed. Patient explanation of the role of the restraints is required
- IV access should be checked for patency and secured for risk of accidental dislodgement. An extension line connected to an IV access can be secured to allow administration of medications from a short distance. This is useful during landing/takeoff phases of flight when getting out of seat is risky. Ideally if patient is predicted to be at risk of increased agitation during flight then adequate long lasting oral sedation would have been provided or a maintenance procedural sedation technique such as ketamine infusion would have been started and titrated to effect.
- Ensure patient has an empty bladder/bowel by allowing toileting prior to flight. In sedated patients this may require a bed pan or even insertion of a bladder catheter.
- Prepare and clearly label extra medications that may need to be given during the flight.
- Discuss an emergency plan with team members including pilot as to what actions to be taken if unexpected agitation during flight. If not undertaken already, ketamine procedural sedation would be one plan. Ultimately rapid sequence induction of general anaesthesia and tracheal intubation is a last resort plan.
- Loading onto aircraft : This is an important step to plan for as will depend on how cooperative the patient is and their sedation level. Obviously its ideal for the patient to willingly walk

onboard and sit down on the transport stretcher. However if patient is highly agitated and requiring procedural sedation then a stretcher loading will have to occur in whatever manner is standard for the retrieval team and their service aircraft. If ketamine sedation has been required then its my advice to start a maintenance infusion well before its time to load the patient onto aircraft. During these phases of the retrieval, its difficult if not impossible to actually reach the patient to administer IV medications and so its critical to ensure adequate sedation level is maintained for loading onto aircraft. I often give an extra IV dose of droperidol or ketamine in preparation for the loading as it can be stimulating for the patient with all the physical handling/movement that may be required from stretcher to stretcher and into the aircraft. Simple verbal explanation and reassurance to even the sedated patient can help reduce anxiety and agitation .

Aeromedical considerations

Unique aspects of aeromedical environment need to be considered and planned for in psychiatric transfers. It is not uncommon that a calm and cooperative patient on the ground, can experience unexpected agitation during flight. As well the worst case scenario of a highly aggressive and violent passenger on board an aircraft at altitude is well documented reality and every year in commercial aviation, an agitated passenger will attempt to open the exit doors. How this is best managed is unknown in the aeromedical setting given small cabin space and relatively easy access to the cockpit and emergency exit doors. The best strategy so far described is prevention and risk mitigation. Having a calm and cooperative patient before takeoff is the absolute minimum standard to avoid worsening or unexpected agitation during flight. However the retrieval team must be prepared to manage any level of agitation, unexpected or otherwise for the entire retrieval duration.

1. Noise : common aeromedical aircraft such as turboprop engine models, have ambient cabin noise levels of over 80dB (comparable to loud music concert). This can be highly stimulating to the psychiatric patient, let alone any other patient! Noise protection measures should be offered, in particular to the sedated patient . Disposable ear plugs or headset are commonly available options. Verbal communication between retrieval staff and patient is difficult in such a noisy environment and may contribute to anxiety and worsening agitation, especially if mechanical restraints prevent them from manual signalling for help/distress. A dedicated headset with intercom communications is an option to address this issue for the patient and if a spare headset is available, it should be considered for the patient. The patient may have their own music on a portable device/phone and this should be considered as another measure to help reduce flight anxiety for them. When ketamine sedation is used, noise cam trigger hallucinations and worsen agitation. It has led to phenomenon of unexpected agitation during flight or on engine startup. If this occurs in a previously calm patient on ketamine infusion, then the best action is to administer a sedative such as benzodiazepine, droperidol or propofol. This is to reduce frontal lobe brain activity that causes the hallucinations. Noise protection must be ensured.
2. Claustrophobia/fear of flying : this is more common that one might think. One American study suggests up to 7% of aeromedical patients have never flown prior. The key to dealing with this

issue is early identification of the problem. Many are too embarrassed to admit their phobias and will only admit to them on direct questioning so this must be done in an open and non judgemental manner. Some will be managed completely with regular verbal reassurance from the retrieval staff during the flight. Others will require extra sedative medication. Ideally long acting oral medication is offered well in advance of the flight and extra oral doses are available during flight. A combination of verbal reassurance/communication and oral sedative medication will manage most phobias related to aeromedical retrievals.

3. Air sickness/Motion Sickness : This is common and some sedative medications may induce emesis i.e ketamine. Therefore preventative measures should be considered and provided if the patient has well known motion sickness. It is why I consider droperidol is first line sedative as it is also an excellent antiemetic for motion sickness. Olanzapine works similarly. Ondansetron is not as effective for motion sickness with promethazine being superior in comparative studies. Anticholinergic agents like hyoscine are most effective but carry risks of worsening agitation. Minimising oral intake is sensible in preparation for flight to reduce vomiting risk. Solid foods should be avoided up to 6hrs from flight and clear fluids up to 2 hrs from flight.
4. Nicotine rage : This is a well documented phenomenon during commercial air travel in nicotine addicted persons. In aeromedical retrieval it has led to cases of unexpected agitation midway through a flight . Prevention is the key to managing this condition and a smoking history in the preflight planning phase of the aeromedical retrieval should give some warning as to the risk. Significant addiction is likely if a person is smoking 20 or more cigarettes per day and will likely start to experience significant withdrawal symptoms after only 1 hr without nicotine. Rapidly acting nicotine chewing gum or spray may provide acute relief inflight but ideally long acting nicotine replacement patch thereapy should have been started at least 4 hrs prior to flight.
5. Cabin pressure considerations: Altitude and cabin pressure issues can affect risk of agitation due to relative hypoxia and ear pain during descent phase. Patients who report past flying experiences of nausea, headache and/or ear pain should be noted as higher risk for recurrence. In particular patients with active upper respiratory infections, ear/sinus disease, respiratory illness/condition predisposing to hypoxia, should have active preventive measures to try to reduce impact of reduced cabin pressure during flight and on descent from altitude. The pilot may be requested to adopt a “sea-level” cabin pressure or a flight profile that slows the rate of descent from cruise phase, reducing risk of ear pain. Supplemental oxygen may be required for some patients experiencing symptoms of hypoxia. It should be noted that some pilots are taught that one emergency action if an agitated passenger starts to disrupt the flight is to “dump the cabin” pressure, inducing a state of rapid depressurisation in the hope that the acute hypoxia at altitude will subdue the agitated person. If a retrieval team is on board caring for the patient, this should only be a measure of last resort as it potentially renders the team at risk of hypoxia too! The idea is that the pilot can don their emergency oxygen mask to avoid being subdued themselves! One well reported case of this being done on a commercial flight over remote Canada, led to a tragic outcome. The agitated passenger tried to open the main exit door several times but failed. In desperation the pilots performed the emergency depressurisation maneuver. This failed to subdue the passenger but allowed him to open the door and jump to his death . It should be noted that normal cabin pressurisation induces a large pressure differential between the cabin and outside environment at cruising altitudes typical of commercial flight i.e 18000ft+. This makes opening the cabin main door, almost impossible for average person as the internal pressure is forcing the inward opening door against its seal at up to a thousand pounds of force to overcome. Once the cabin is depressurised though to equalise with outside, then opening the door is as easy as on the

ground. A common aeromedical aircraft model the BeechCraft Super King Air has a pressure differential locking mechanism that makes opening the door inflight increasingly difficult as the pressure differential increases between the inside cabin and the outside air.

6. Police/security escorts : In many jurisdictions, the local mental health laws give provisions for request for police assistance to transport involuntary psychiatric patients. Certainly forensic psychiatric transfers will have police escorts or be entirely undertaken by the police themselves without medical escort. You should seek to establish an agreed local process to facilitate the request for police escort for a psychiatric aeromedical transfer. As well the pilot and police need to be aware of what expected role such an escort will have during flight. Aspects such as carriage of a firearm/non lethal device (TASER) need to be considered and agreed upon between aviation and the police. The medical staff on retrieval team need to have an agreed position as to what the police escort may be asked to assist for care of the psychiatric patient. Police are trained in physical restraint measures and use of mechanical restraints such as handcuffs but the safety of restraint needs to be supervised by the attending medical staff during aeromedical retrieval. For example, prone positioning during physical restraint carries high risk of restraint asphyxia, even for a well trained team.

When to intubate:

The question of when to administer general anaesthesia and tracheal intubation as a method of chemical restraint for the psychiatric aeromedical retrieval often arises, certainly in Australian setting.

Whilst it might seem to be an elegant solution to manage a highly agitated patient in aeromedical setting, it poses several issues that must be considered.

- It is the highest level of restraint and in some cases may be excessive
- It carries all the risks of general anaesthesia and intubation of trachea, including the extubation phase
- It requires handover into a resuscitation area in emergency department or an ICU, thereby taking up valuable resources /time.
- Psychiatric assessment may be delayed after handover due to need to recover and extubate patient
- Case reports of awareness whilst under general anaesthesia and intubated for psychiatric aeromedical retrieval have occurred
- Case reports of actual physical complications have occurred including pulmonary aspiration due to vomiting on extubation, ventilator associated pneumonia, pulmonary embolism and dental injury.
- It offers little more over mechanical restraints and carefully performed procedural sedation.
- In event of emergency landing, the patient is totally reliant on escape by the retrieval staff.

My suggested indications for general anaesthesia and tracheal intubation are :

1. Failed trial of ketamine procedural sedation
2. High vomiting and pulmonary aspiration risk i.e poisonings/intoxications/overdoses
3. High risk for procedural sedation i.e severe sleep apnoea/COPD

Second handover (to receiving facility):

- If patient has been given parenteral sedation for retrieval then handover should occur at the receiving facility. If patient has been intubated and general anaesthesia used then do not try to extubate anywhere but at the receiving facility in a formal resuscitation area.
- Once landed, the level of sedation does not need to be as deep as during flight. If on maintenance ketamine infusion, depending on time to arrival at the receiving facility, this can be ceased and the patient allowed to recover to lighter levels of sedation.
- Mechanical restraints if used should be maintained until handover to receiving team
- Handover communications include all written transfer documents, including those related to involuntary status under mental health act. Verbal handover of retrieval management including all medications and dosages administered.

Special considerations :

1. Autism and other developmental disorders of behaviour : in general the same approach as above outlined should be undertaken. Oral sedation is often the best method with support of parent or regular carer who is almost always in attendance for such persons due to their special care needs. Droperidol, ketamine or olanzapine orally are all effective and been well studied in this patient group. Disguising the medication in a sweet drink is often useful as some are bitter i.e ketamine.
2. Psychostimulant intoxication : in general the same approach as above outlined should be undertaken. Concerns regarding the stimulant effect of ketamine in a patient acutely experiencing stimulant effect from methamphetamines are theoretical and the practical experience in prehospital use is that ketamine is effective and safe sedative for such cases.

Future directions towards best practice for psychiatric aeromedical retrieval:

- Minimising or avoiding aeromedical retrieval of patients with acute psychiatric illness. If the patient can be safely managed remotely with telemedicine assessment and supervision from specialist psychiatrists then this not only avoids a risky aeromedical transfer but it keeps the patient locally with their family and social supports. South Australia has championed his strategy in recent years with good results. It requires a formal governance structure between retrieval service and the mental health service , both responsible for assisting in mental health emergencies in rural and remote areas. Decisions around aeromedical retrieval should be jointly made with senior consultant input from the retrieval and mental health service. This strategy also includes infrastructure aspects such as adding secure mental health beds and trained staff to rural hospitals, thereby allowing them to adequately manage involuntary patients locally.
- Advanced environmental modulation during aeromedical transfer : dedicated headsets for noise protection but also auditory modulation with relaxing music or verbal communication

with retrieval staff. Visual modulation with virtual reality eye pieces to allow for display of relaxing images or distraction with movie comedies.

- Ketofol infusion sedation : mixture of ketamine and propofol or two separate infusions to balance effects of both sedatives .
- Brain activity monitoring : Bispectral Index Monitoring or BIS is well studied modality to monitor for depth of anaesthesia. This may allow for fine tuning of procedural sedation with studied agents such as propofol or ketamine or combination of both.

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