

Topic Overview: MEDICAL RETRIEVAL/TRANSFER

Module T5

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Session Objectives

- Identify the patient requiring retrieval consultation
- Consider the factors affecting medical retrieval
- Communicate with the medical retrieval unit
- Prepare a patient for the retrieval team
- Perform a team approach management of the trauma patient

Introduction

Early decision making in trauma is vital and this is no more obvious than in the patient likely to require retrieval. Some decisions that need to be made include:

1. Do I need to resuscitate this patient?
2. Do I need to get help here now?
3. Is there anyone with advanced airway and resuscitation skills available now?
4. Can I wait for help to arrive?

Clearly these issues take priority over organising any retrieval, but ideally resuscitation and retrieval should be performed simultaneously and through pre-defined protocols for your local resources.

Patient Considerations

Initially an AMPLE history and primary survey may be enough to recognise need for retrieval activation. A complete history of presenting illness, past medical history, medications (especially anticoagulants), allergies, social history (level of function) and patient weight are required as part of the secondary survey. Examination requirements include vital signs, primary & secondary surveys, changes to GCS, pupils, and any other injuries. Investigations such as BSL, ECG, electrolytes, FBC, X-rays, FAST etc. as available. Treatments initiated to date – drugs, fluids, lines etc. Simultaneous assessment and management is required in the management of major trauma.

Clinical Urgency:

Ultimately though you are going to need to make a provisional diagnosis with a list of differential diagnoses. i.e. what is wrong with the patient? And how urgent is it? The next decision is what needs to happen to the patient now? Where do they need to go? In other words why would you consider arranging for a medical retrieval/transfer? The patient needs to be in the appropriate centre to manage the condition, cause and if required possible complications. Consideration of co-morbidities is one of the roles of the emergency physician in caring for the trauma patient.

What local resources are available?

As a junior doctor, you could find yourself in an isolated setting being called upon to provide a level of medical care that is beyond your level of training and expertise. A patient with an acute head injury with a

GCS of 12 following a fall would not be an unusual presentation at any hospital and one needs to have a plan of what to do in such circumstances. What assistance can you draw upon when you are in such places and need help in a hurry? How will you access/contact more experienced help?

The most common practical help that is usually around in these circumstances is nursing staff. In rural hospitals, the nurses have often worked in the hospital for many years, long before you have arrived, seen emergencies of different types, and know who to call, and what to do. Many doctors careers have been saved by helpful nursing staff so don't ignore their suggestions. They are usually able to set up equipment you might not be familiar with, as well as drawing up drugs, placing lines and checking gear.

Rural hospitals are often serviced by anaesthetists, surgeons and other specialists (rural GP's, paediatricians, obstetricians etc.) and it is always worth bearing in mind some of the local resources one can access if there is an emergency. And if you can't actually access help on-site you might be able discuss difficult/complex cases with them. Even if they are technically not "on-call" these locally potentially available people should be contacted in any emergency situation where extra help is required.

Ambulance officers/paramedics are often very good at helping out with basic life support and some aspects of advanced life support. If they have delivered the patient to the hospital, they are often available to help out as well, so don't dismiss them too early. Once again, placing cannulae, assisting with immobilisation and restraining patients can be made much easier with a bigger team. In smaller towns in NSW, NSW ambulance has arrangements with the local hospitals to assist if asked.

If help is not available from within your local resources, there should be specialist advice available from tertiary referral centre of your local health district. Regardless of which specialty (whether cardiology, respiratory, trauma, paediatric, etc.) there should be someone available 24 hours a day to discuss the management of your patient, and if necessary to accept care if the patient needs transfer to the tertiary referral centre.

Furthermore, for acute resuscitative management the Aero-Medical Retrieval Service (also known as the Medical Retrieval Unit – MRU) consultant will be able to advise you. For children (age less than 15 years) the NETS Consultant will be able to provide a similar service.

Who needs Retrieval?

It is useful to have a decision making tool to guide decision making. Figure 1 is a list of the retrieval criteria available for all hospitals – this includes rural and remote hospitals, as well as the urban district hospital.

It is important that if these criteria are recognised in your patient, by any member of staff, that you consider contacting the medical retrieval service early to activate a retrieval team. Remember that often the distances travelled are long and take time, also a team may need to be called in to come to your hospital.

The MRU consultant will also be able to give you advise whilst you await the teams arrival.

Criteria for Level A - Retrieval
If your patients fall into any one of these categories, - Consultation with a Medical Retrieval Team should occur.

ACUTE CHANGES IN	GUIDELINES FOR THE MANAGEMENT/RETRIEVAL OF THE CRITICALLY ILL				
	AIRWAY	BREATHING (with patient on oxygen)	CIRCULATION (after resuscitation)	DISABILITY (after resuscitation)	OTHER
VITAL SIGNS	<ul style="list-style-type: none"> Threatened 	<ul style="list-style-type: none"> RR < 10 or > 30 SaO₂<92% on oxygen >50%FIO₂ Any child with apnoea>15s or cyanosis Marked work of breathing (Intercostal recession, use of accessory muscles, tracheal tug) 	<ul style="list-style-type: none"> SBP<90mm Hg HR<50 or >120b/m & pt. Compromised. Any child with poor peripheral circulation 	<ul style="list-style-type: none"> GCS 12< or falling 2 points on GCS scale Any Child with a decreased level of consciousness 	<ul style="list-style-type: none"> Any deteriorating or unstable patient
TREATMENT	<ul style="list-style-type: none"> Recent acute tracheostomy Any intubated patient Any child requiring nebulised adrenaline 	<ul style="list-style-type: none"> Any ventilated patient Any patient on CPAP Any patient on BIPAP 	<ul style="list-style-type: none"> Unstable AMI Complex monitoring needed Transvenous/thoracic pacing needed All life threatening arrhythmias. Unstable patient requiring Inotropes or volume resuscitation 	<ul style="list-style-type: none"> Use of sedating drugs 	<ul style="list-style-type: none"> Major emergency surgery needed Severe diabetic ketoacidosis
DIAGNOSIS	<ul style="list-style-type: none"> Upper airway obstruction Facial or airway burns Severe facial trauma Epiglottitis/Croup (Moderate – Severe) 	<ul style="list-style-type: none"> Severe asthma Pneumothorax Major chest /abdominal trauma Penetrating torso injury Any child in respiratory distress 	<ul style="list-style-type: none"> Burns>20% Any child with Burns>10% Severe Sepsis and Multi-organ failure Repeated Cardiac Arrest Any child with Cardiac Arrest 	<ul style="list-style-type: none"> Acute Coma Meningitis with sepsis/seizure Continuous/repeated seizure Spinal injury with neurological signs 	<ul style="list-style-type: none"> Poisoning Envenomation Anaphylaxis Near drowning Major Pelvic fractures Multiple long bone fractures

Figure 1: Criteria for Medical Retrieval

Steps in organising medical retrieval

1. Most importantly continue treating the patient
2. Confirm the indication for retrieval
3. Establish the urgency
 - a. Time-urgent (needs to be transferred now) OR
 - b. Not time urgent (can the patient wait for a short period of time – up to 24 hours) OR
 - c. Potentially wait up from 24 to 72 hours.
4. Contact AMRS (1800 650 004) – use a portable phone

Consult the NSW Health policy 2011_031 – this outlines the process however nurses and other doctors working at the same facility should be able to advise you on this. Though with many things – if in doubt, call the AMRS.

What you may need during that phone call

Name, age and weight are the basic information that would be typically requested. Such patient details are usually available but retrieval can occur even if these are not at hand. The patient's weight is particularly important, especially for paediatric or bariatric (overweight) patients, both require particular arrangements for transfer. One of the ongoing issues in medical retrieval is gaining an accurate assessment of the patient's weight. Methods of assessment include not only asking the patient (or parent/carer/partner) and physically weighing them but there's also a Bariatric Chart available from MRU, which can be faxed through to your facility.

For children, paediatric harnesses, car seats and humid cribs are some of the options available for transfer depending on their size.

Patients over 100kg, the patient needs to be sized using the Bariatric Chart. This guides MRU/AMRS as to whether a normal ambulance stretcher (road, plane or helicopter) or a special bariatric stretcher needs to be arranged. If a bariatric transfer needs to occur this can add hours to the time it takes to a normal retrieval. The bariatric vehicles are often tasked on other transfers and the special stretcher arrangement is slower to be fitted to the helicopter for this specific purpose.

MRU typically seeks information in a set format in critically unwell patients and an ABCD approach standardises this.

Clinical details – the history, physical examination, investigations, treatments, medications, allergies, and the reason for transfer

A – Is the patient intubated? C-spine collar on? NGT?

B – Respiratory rate, sats, FiO₂, work of breathing, and all the ventilator settings

C – Pulse rate, BP, perfusion, urine output and ECG

D – GCS and pupils

Access – IV cannulae, Intra-osseous, Central lines, arterial lines, IDC

Medications – IV fluids (including blood products), drugs given (e.g.. Thrombolytic, Antibiotics etc), and current infusions (sedation, inotropes)

Results – Blood results - FBC, UEC, Blood gases, BSL, troponin, lactate (as available), and other investigations (X-rays, CT etc)

Lastly, there is often a treating doctor or facility that have been involved in the patients care previously. These details are needed to ensure the patient is taken to their usual destination under their usual doctor if this is the case. Other details might be requested are if the patient poses an infectious risk (e.g.. H1N1, VRE, MRSA) and whether patients family/NOK have been involved.

Preparing the patient

Most retrievals take some time to arrange and coordinate and there might be some things asked of you, and the team at your facility in order to minimise on-scene time (and therefore transfer times) by the medical retrieval team. Of course some of these may be difficult, if not impossible, depending on your resources, but it can speed up the transfer of patients considerably if infusions are drawn up and lines are placed before the Medical Retrieval team arrive.

- Access – common requests are for arterial and central lines, Nasogastric tubes, and an IDUC to be placed if they have not already.
- Infusions – sedation (morphine, midazolam, fentanyl, propofol), and inotropes (adrenaline, noradrenalin) are frequently required. Note that the concentrations of each should be clearly discussed with the retrieval team as different teams might use different concentrations.
- Medications – requests might be for the patient to receive these now or for you to arrange for them to be drawn up ready for the retrieval team to use. Neuromuscular blockers (rocuronium, vecuronium), vasopressors (metaraminol) and a primed pump set are commonly requested items.

Lastly, MRU/AMRS will ask for a copy of all the patient's documentation to be prepared. This is essential for the passage of clear communication throughout the retrieval process. Notes, medication and fluid charts, X-rays, ECGs are just some of the commonly required information. Other matters that might be requested include making sure the NOK are aware of the planned transfer and (in the case of the paediatric patient) arranging for them to accompany the patient.

In the instance of the seriously unwell patient the MRU/AMRS will try not to burden you with too many requests for detail or tasks to perform. Obviously there is some essential detail they need for the transfer but if certain things need to wait then it is important to let MRU/AMRS know there are other more pressing matters.

Principles of Medical Retrieval

Getting the right patient, to the right place, in the right time, with the right care.

Firstly, it is critical to ask why are we doing this retrieval. What does the patient have wrong with them, what do they need (investigation and treatment) and where do they need to go? Usually the patient needs to be taken to a tertiary referral centre to access high level services, however occasionally it might be better to take the definitive care to the patient. An example of this would be taking snake antivenom to a rural hospital, or a neurosurgeon to the head injured patient with evidence of an extradural haematoma and low GCS.

Medical Retrieval operates as part of a system. The reality of the geography in NSW is that we can't afford to have tertiary referral centres within an hour drive of all our population. Indeed NSW has a sparse population, with many small hospitals scattered throughout the state, with limited health funds. There is a "tyranny of distance" that exists here and the Medical Retrieval is just one part of the solution to this problem. Also part of "the system" are Tertiary Referral Centres, Metropolitan and Rural Local Health Districts, and the Sydney Children's Hospital Network. Each part of the system has a normal arrangement for the transfer of patients from within their area, and medical retrieval works within those usual arrangements.

Thirdly, if Medical Retrieval is to operate efficiently and safely, the team, its equipment and transport all need to be prepared for the task it is designed to perform. This occurs long before the referring phone-call comes through.

Just like in hospitals, communication errors are the leading cause for morbidity and mortality in medical retrieval. The critical phases for communication are at the initial phone-call, while on-scene with the patient at the referring centre, and during the transfer within the team. The handover of the patient that occurs both over the phone and when the retrieval team arrive are key times when information is omitted and overlooked. There are a number of systems in place to minimise this, the retrieval team use a retrieval planning sheet, the hospitals typically use an Interhospital Transfer Checklist and the medical retrieval teams are taught to gather information in particular formats which make it easy to recall and note when details are missing.

Further to this, it is important that the treating doctor document not only the clinical details but also any conversations you have had. Consultations and medical advice from different teams should be clearly written so there is a record of conversation. This facilitates timely information transfer and minimises the risk of miscommunication.

The Retrieval Team

So now we have looked at a few principles of Medical Retrieval, who is that typically forms a medical retrieval team? Within NSW and most other Australian states, a doctor and, either a nurse or a paramedic forms the medical retrieval team. This may change depending on some circumstances but this combination would form the backbone of most retrievals. Occasionally there might be an additional doctor, nurse or paramedic if the need arose AND the extra personnel available AND it was feasible to transport them.

Doctors who form part of the Retrieval team are usually selected from one (or more) of the three critical care colleges (ACEM, ANZCA or CICM) in Australia. These doctors are more experienced in critical care than any of the other specialty areas and their selection ensures a degree of familiarity with the acutely unwell.

Similarly the nurse or paramedic forming the team should be drawn from areas in their respective services where they have gained experience managing acutely unwell patients.

Essential knowledge is an understanding of the principles of safe transfer, and familiarity with any patient monitoring systems. They need to know to anticipate and prepare for any potential serious emergencies that could occur during the transfer of a patient.

Essential skills include advanced airway management, the provision of ventilatory support, placement of vascular devices, any other life/limb/eye saving measures, and the ability to manage single or multiple organ failure.

Essential attitudes include the ability to work in dynamic situations; with different medical support staff; to be able to communicate effectively with medical, nursing, paramedical and administrative staff as well as patients and their relatives.

Essential training includes that specific for the transport modality (e.g. Helicopter Underwater Escape Training), medical equipment (generic e.g. medical kits and special e.g. Intra-Aortic Balloon Pump), the anticipated work environment (e.g. Pre-hospital or inter-hospital) and EMS/Referral network.

The next aspect of medical retrieval we will look at is what medical equipment you can expect the medical retrieval team to bring along. As mentioned above there may be some variation in the type of medical equipment used depending on the mode of transport but the medical team should be familiar with their use. Under some circumstances, the medical team may chose to bring along specific or specialised gear depending on the patient's condition.

As a generic statement, any equipment carried by a retrieval team should be appropriate for each transport platform. The patient's condition, its severity, the level of intervention required and the duration of transport should all be taken into account when selecting equipment. Below is a fairly exhaustive list of medical equipment carried by most medical retrieval teams. Size, weight, volume, battery life, oxygen consumption, durability and suitability for use under particular conditions are all taken into account when they are selected for use. In order to minimise any harm to the patient, treating team or the damage to the equipment itself, the equipment should be properly restrained in/on any transport modality, as should the patient's stretcher.

Retrieval Equipment

- Respiratory support - OPAs, NPs, LMAs, oxygen (well in excess of that required), masks, nebuliser, self-inflating bag with PEEP valve, suction, portable ventilator (with alarms), intubation set, surgical airway set, pleural drainage equipment.
- Circulatory support - Monitor, defibrillator, external pacer as a combined unit, pulse oximeter, sphygmomanometer, vascular cannulae, IV fluids with pressure infusion sets, infusion pumps, arterial cannulae, arterial monitoring device, syringes and needles, pericardiocentesis equipment and a sharps container.
- Other equipment - NG, IDC, Wound care, thermal insulation/temp monitoring, limb splints, tourniquets, neonatal/paediatric equipment as required, trauma shears, portable torch, and personnel protective equipment (goggles, gloves, high visibility vest).
- Drugs - appropriate to patients clinical condition, accessible and labelled.
- Monitoring - pulse oximeter, capnometer, ventilator alarms (high & low pressure, low oxygen and battery supply), ECG, BP (non-invasive +/- invasive), temperature,

Mode of transport

- Ground – Ambulance and Specialised (paediatric/bariatric) vehicles
- Aeromedical – Fixed-wing and Rotary-wing (helicopter)

There are a number of different options in the transport of patients, each with its own unique set of advantages and disadvantages as listed above. There are some similarities that all modalities share, travel-related nausea and vomiting, noise, vibration, and G-forces can all impact upon critically ill patients. Aeromedical modalities both have potential issues with the effects of altitude with a lower atmospheric pressure and oxygen partial pressure, though these are potentially greater with fixed wing transport.

Other factors affecting transport modality choice include:

- a. Availability
- b. Distance to be travelled
- c. Terrain/geography
- d. Logistics of different transport modes
- e. Patient condition
- f. Equipment requirement
- g. Training of retrieval team
- h. Weather

Special Circumstances

There are a few types special patients that pose particular problems for medical retrieval; it is worth considering these and the issues that retrieving them raises.

The first of these is the sick or injured child. The child's age, size, co-morbidities and medical condition can be difficult to determine. Their physical and psychological needs are different to those of adults and their resuscitation and stabilisation can be quite intensive. NETS – NSW neonatal and paediatric Emergency Transport Service – is responsible for the retrieval of such patients and offers an excellent conference call facility when one contacts them. This allows them to give timely clinical advice, gain the clinical detail of the patient and to involve all the senior staff in the management of the patient at an early stage.

Obstetric patients pose a number of problems in the retrieval setting, particularly within the confines of the ambulance, helicopter or plane, with limited medical crew and limited resources. Ideally obstetric patients are not transported unless completely stable and even then with a plan of action if the mother were to deliver en-route. As one can imagine, the transport of such patients needs to involve the obstetricians, midwife, treating doctors and the retrieval team so that all contingencies are anticipated and planned for.

Bariatric patients pose a number of specific issues for transport, not the least of which is the specific difficulties involved in practically transporting them in a safe manner. There are weight and size limits on all the basic ambulance stretchers, with definite width-of-patient limits. As mentioned earlier, although the limits of the usual stretcher exceed 100kg, we know that once a patient is estimated greater than this weight there is a chance they will exceed the width-of-patient limits, and in NSW there is a bariatric sizing chart which is used to assess the patient for this. In NSW at the present time if a patient exceeds approximately 110 to 130kg they cannot be retrieved by normal ambulances, planes and helicopters.

Special devices such as balloon pumps and ECMO (by-pass) machines come with their own difficulties for retrieval. Weight, size and space along with team training all become issues and these transfers typically take many hours longer to organise and perform. Once again MRU/AMRS will be able to advise on the

requirements for this and will speak with the most senior doctors on-site at the sending and receiving facilities.

References

Inter-facility Transfer Process for Adults Requiring Specialist Care – NSW Health Policy Directive – PD2011_031

Retrieval Handover (Adults) – NSW Health Policy Directive – PD2012_019

Clinical Handover – Standard Key Principles – NSW Health Policy Directive – PD2009_060

Joint policy statement CICM, ANZCA & ACEM – Minimum Standards for Transport of Critically Ill Patients – PS52 (2010)

Retrieval Medicine: a review and guide for UK practitioners. Part 1: Clinical guidelines and evidence base. Shirley, P and Hearn, S from Emerg Med J 2006;23:937-94