Title: Bariatric patient transfer

Version: 3

Related Documents:
- Sikorsky S92A SOP
- SAS Manual handling SOP
- SAS Musculoskeletal Risk Assessment
- SAS Operational procedure for the transportation of bariatric patients in south west division (appendix A)

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Reviewer: L Curatolo

Aims

- To provide information regarding the logistical challenges associated with transporting bariatric patients.
- To describe the role of the bariatric ambulance.
- To provide guidance on the medical management of critically ill bariatric patients for transfer.

Background

Rates of obesity in the UK are increasing with approximately 25% of the population now classed as clinically obese. Morbid obesity is defined as a Body Mass Index of greater than 40 kg.m$^{-2}$ and is associated with significant co-morbidities which can lead to or complicate critical illness. These patients pose significant challenges in their clinical management and transfer for definitive care.

Application

EMRS & ScotSTAR team members.
Air Division Paramedics.
Patients Appropriate for EMRS Activation;

All SAS vehicles and aircraft have absolute weight limitations for compliance with crash regulations and operation of trolley and winching mechanisms. Patients’ weights are frequently underestimated by health care staff. When considering if a patient exceeds weight limitations you must also consider the additional weight of EMRS equipment (including the vacuum mattress) likely to be resting on the patient particularly during loading. Maximum weight limits quoted in this SOP for each aircraft are absolute and exceeding them risks damaging the aircraft.

The main limitation however, is most likely to be space restriction and therefore it is useful to measure the patient’s maximum width. This will usually be the inter-elbows distance measured with the patient’s arms by their side (as they would be in the vacuum mattress) or the width of their hips.

1. EC 145/135 Helicopter

The EC 145 Helicopter has an air sled stretcher system which has a maximum weight capacity of 250kg. The narrowest point in the stretcher tunnel is 70cm therefore any packaged patient exceeding this width will not fit in the aircraft.

The EC135 Helicopter has an air sled stretcher system with a maximum weight capacity of 150kg. The narrowest point in the stretcher tunnel is 65cm therefore any packaged patient exceeding this width will not fit in the aircraft.

2. King Air Fixed Wing

The King Air aircraft has a maximum stretcher limit of 203kg providing the patient can walk up the steps unaided and lie down on the stretcher. The winch limit for non ambulatory patients in the 165Kg, however due to the difficulties in manoeuvring heavy patients into the aircraft, the crew will not work with patients exceeding 135kg.

Should a “spare aircraft” be in use please check the loading and weight restrictions with ACC as loading mechanisms may vary.

In order to keep the central aisle clear, the width restrictions in all king air planes are similar to those of the EC 135/145 helicopter.

3. SAS Road Ambulances

An A&E ambulance can winch/carry considerably heavier patients, however, similar dimension restrictions apply as the trolley beds are no wider than aircraft stretchers and therefore securing patients properly is a major issue. SAS crews will not be required to transfer any patient they feel is not properly secured in the vehicle.

An A&E ambulance Ferno trolley can carry a maximum weight of 300 kg but the height of the trolley cannot be adjusted above weights of 200 kg. The CCT6 trolley has a maximum weight restriction of 181kg.
The road ambulance winching mechanism has a maximum limit of 425kg.

Policy

1. Transferring patients by Bariatric Ambulance

SAS have specifically adapted ambulances for the transport of bariatric patients and are operated by appropriately trained staff. The primary advantage of these vehicles to the EMRS is that they have a specific bariatric trolley bed designed to transfer patients who are too wide for standard SAS trolleys and stretchers. They also carry additional moving and handling aids designed specifically for the safe movement of bariatric patients.

SAS availability of bariatric vehicles and equipment varies depending on division and only the South West division have a formal SOP for the activation of their 3 bariatric ambulances (see appendix). These ambulances are adapted patient transport vehicles; they have piped oxygen via two F sized cylinders (1360L each) but have no supplemental suction or power points. With this in mind it is prudent that the equipment requirements of the retrieval are discussed with the appropriate ACC when ascertaining if a bariatric vehicle/crew are required and the EMRS should bring additional oxygen and battery supplies for prolonged transfers. There may be considerable delays in sourcing a bariatric vehicle and it may not be possible out of hours, furthermore it would only be suitable for patients who can be transported by land.

2. Transferring patients by Coastguard Air assets

Where transfer of a patient is time critical and or the bariatric ambulance is not available or appropriate, aeromedical transfer of the patient utilising Coastguard aircraft may be considered. As there will still be considerable difficulties in packaging and loading the patient, the retrieval of patients weighing in excess of 200kg may not be possible by EMRS, without the aid of additional bariatric equipment and hoists. The Coastguard currently does not have access to such equipment.

Patients will still require transfer to and from the aircraft usually by road. If a patient cannot be secured safely in the ambulance trolley or a bariatric ambulance cannot be used for these transfers, consideration can be given to transferring the patient on the floor of the largest ambulance available. This will only be suitable for very short transfers (within hospital grounds) and is at the discretion of the road ambulance crew.

Loading and unloading the patient will require many people and good communication therefore it should not be done while the rotors are turning. Additional support from the Fire and Rescue service to help lift the patient may be requested via ACC.

The Coastguard stretcher has a maximum weight capacity of 147Kg and width restriction of 60cm and is therefore unlikely to be suitable for packaging of bariatric patients who do not fit a standard vacuum mattress. The Coastguard Sikorsky S92 is equipped with a ramp at the rear of the aircraft for loading and unloading patients and crew. It is likely that during
this manoeuvre the auxiliary power unit (APU) will be running. This is extremely noisy and will make communication between team members difficult. A moving and handling briefing should therefore be held with all team members in a quieter area prior to entering the aircraft.

Once inside the helicopter, slide sheets on the floor may help reduce the push pull effort required to position the patient. You are best guided by the Coastguard aircrew as to the safest way to secure the patient inside the aircraft. Consider flight attitude of the aircraft when in the cruise (3 degrees nose down).

An Oxford wedge or a back pack can be placed at the back of the patient to provide some degree of head up tilt and aid ventilation.

**Medical management on scene**

- **Airway**

Obese patients have an increased incidence of difficult intubation, particularly in those with a history of Obstructive Sleep Apnoea (OSA). Due to increased soft tissue around the head and neck, bag mask ventilation can also be challenging. Furthermore, there is a high incidence of gastro-oesophageal reflux in this patient group increasing the risk of regurgitation and aspiration. The airway of all bariatric patients must therefore be carefully assessed, and there should be a low threshold to secure the airway prior to departure in any patient with the potential for airway compromise.

Due to a large fat pad on the patients upper back maintenance of the “sniffing the morning air” intubation position may not be possible and the “ramped position” should be adopted. This involves maintaining a $30^\circ$ head up tilt during preoxygenation and intubation and placing a pillow or blanket under the shoulders of the patient with additional pillows under the head until the auditory meatus is in line with the sternal notch.

“Sniffing the morning air”

“Ramped Position”
If available, access to the local difficult intubation trolley is advised. A Gum Elastic Bougie is particularly useful in patients with difficult laryngoscopy and should be immediately available. Bag mask ventilation should be performed with a two handed technique and the use of airway adjuncts to minimise gastric insufflation.

Uncut ET tubes should be used and they should be tied securely before departure.

- **Breathing**

Obese patients have a reduced functional residual capacity and therefore a reduced oxygen reservoir, they can and will desaturate rapidly during airway manipulation particularly if in the supine position. The increased weight of the chest wall results in reduced compliance and increased work of breathing in spontaneously ventilated patients and a requirement for higher airway pressures during invasive ventilation.

Where possible obese patients should be kept sitting up by 30° or more. Higher levels of PEEP should be used in mechanically ventilated patients and higher airway pressures tolerated. Prolonging inspiratory time may help limit airway pressures as long as expiratory flow returns to zero before the next breath. Tidal volumes of 6-8ml/kg based on ideal body weight should be used with ETCO₂ controlled by increasing the respiratory rate.

Serious consideration should be given to intubating obese patients who require sedation for transfer as they are often very sensitive to respiratory depressants.

- **Circulation**

Establishing IV and IO access may be difficult due to increased soft tissue. Central access may therefore be the only definitive means of establishing secure IV access before departure.

Blood pressure cuffs may not be large enough to fit around the patient’s upper arm and are likely to be unreliable, therefore invasive BP monitoring should be established for any prolonged transfers particularly in unstable patients.

There is also a risk of venous thrombosis which will be aggravated by the cramped conditions of packaging and transfer. Prophylactic use of low molecular weight heparin should be considered if not contraindicated.

- **Drugs**

Pharmacokinetics and pharmacodynamics are altered in obese patients and the dose of drugs should NEVER be calculated based on the patient’s actual weight.

For highly lipid soluble drugs, such as induction agents and synthetic opiates, Ideal Body Weight (IBW) should be used when calculating the dose, this is due to an increase in volume of distribution secondary to the increased body fat.
IBW (kg) = height (cm) – x (where x= 100 for males and 105 for females)

For less lipid soluble drugs, such as muscle relaxants, lean body mass should be used or IBW plus 20%.

- Packaging

Vacuum mattresses are the preferred method of immobilising and transferring patients by the EMRS. There is a specific bariatric mattress (marked as such) stored amongst the vacmats. There are restrictions to the maximum size of patient which it can accommodate in order to safely secure a bariatric patient. The maximum dimensions that the bariatric mattress can accommodate are:

- Shoulders <100cm
- Chest/ Abdomen <85cm
- Hips <85cm
- Lower legs <80cm

Larger patients may be accommodated by not applying all of the straps, however at least one strap should be applied over upper and lower body. Tight restraining straps may cause pressure sores, peripheral nerve damage, impede ventilation and increase risk of venous thrombosis. Where available slide sheets should be used to move patients on and off vac mattresses, they should be removed once the patient is positioned. If the patient is awake they should be encouraged to co-operate as much as possible.

Equipment used to package the patient and any additional equipment resting on the patient will add to the overall weight and may therefore exceed stretcher limitations. These weights should be taken into account when transferring bariatric patients

- Bariatric Vacuum Mattress 10 kg
- MRX monitor 8 kg
- Oxylog 3000 6 kg
- ZD oxygen cylinder 4 kg
- Syringe driver 1 kg
- 2 blanket 1 kg
- Pillow 0.5 kg
- Fluids* 1L = 1 Kg

*Remember to include pressurised fluids for invasive line monitoring, pressure bag weighs 0.3 kg
References:

www.ic.nhs.uk

Peri-operative management of the morbidly obese patient. London Association of Anaesthetist of Great Britain and Ireland 2007

Collins, Lemmens et al. Laryngoscopy and morbid obesity: a comparison of the “sniff” and “ramped” positions. Obesity surgery 2004; 14; 1171-5

Jones, Trevithick et al. Retrieval and transfer of bariatric patients in NSW. Current Anaesthesia and Critical Care 2010; 21: 287-91
(Appendix)

SCOTTISH AMBULANCE SERVICE

SOUTH WEST DIVISION

OPERATIONAL PROCEDURE FOR THE TRANSPORTATION OF BARIATRIC PATIENTS IN SOUTH WEST DIVISION (Abridged Version)
## Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>9</td>
</tr>
<tr>
<td>Standards of Training</td>
<td>10</td>
</tr>
<tr>
<td>Crewing / Operation of Bariatric vehicles</td>
<td>11</td>
</tr>
<tr>
<td>Locations of Bariatric capable vehicles</td>
<td>12</td>
</tr>
<tr>
<td>Operational Response models to Bariatrics</td>
<td>13</td>
</tr>
<tr>
<td>Operational Response Algorithms</td>
<td>18</td>
</tr>
<tr>
<td>Sample Bariatric Retrieval Log</td>
<td>22</td>
</tr>
<tr>
<td>Supporting Information for EMDC / ASO staff</td>
<td>23</td>
</tr>
<tr>
<td>Equipment carried by Bariatric PTV’s</td>
<td>24</td>
</tr>
</tbody>
</table>
Introduction:

This document identifies the procedure that should be applied operationally within South West Division and the information should be obtained in order to best plan for the care and transportation of bariatric patients.

The document differentiates between ‘Acute’, those are calls liable to be processed by Emergency Medical Dispatch Centres (EMDC), and ‘Planned’, those calls which will be processed by Area Service Offices (A.S.O)

This is a theoretical distinction as in practice the two will liaise given the Bariatric Patient Transport Vehicle (B-PTV) is the vehicle of choice for conveying bariatric patients in South West Division.

The South West Division strategy relies on the availability of competent staff suitably trained in the use of specialist (bariatric) equipment and the availability of a Bariatric equipped P.T.V (B-PTV) which can then provide a reasonable response time across the three Sub-Divisions that constitute South West Division.
Training Requirements:

It is highly recommended that all road crews are given an overview of bariatric care and transport during PP training, but only a select number of staff will receive enhanced training in the use of equipment.

The training required for staff members to be deemed as ‘competent staff’ is also outlined below, this is guidance which must be complied with to ensure that a safe and effective response is available to a Bariatric incident.

**Initial Training:**

Staff members forming the team who will be deployed to a Bariatric incident must undergo an initial 1 day training course which must be facilitated by an instructor trained and approved by the Service’s ergonomic advisor Graham Foreman (List of trained facilitators above).

On successful completion of the 1 day course, candidates will receive an in house certificate of competence. Refresher training will be required to prevent skill atrophy as outlined below.

**Refresher Training:**

Upon successful completion of the initial Bariatric’s training course, operatives required to man/operate the Bariatric vehicle must attend a refresher course on an annual basis, this course should be a least a half day in duration and facilitated by an instructor meeting the criteria outlined previously.
**Crewing / Operation of Bariatric Vehicles**

It should be noted that, on deployment of the Bariatric vehicles, both crew members **should** ideally be fully trained in Bariatric procedures, however, one trained member of staff will suffice unless the C-Max battery powered chair or Stryker chair are required to facilitate transport, in these instances, a double trained crew **must** be deployed to ensure safe retrieval / transfer of the patient.

Crews attending and managing Bariatric patients retrievals / transfers must complete a Bariatric Retrieval Log on completion of each case. This is to provide information in relation to the Bariatric retrieval which can be collated and used to assist in developing the Bariatric service by identifying equipment use/effectiveness, and also identify the need for alternative equipment to be procured. The suitability of the base location of vehicles can also be evaluated and assist in identifying the need for the redeployment of Bariatric vehicles to better match the demand for this service.

The Bariatric Retrieval Log should identify the following:

- Date of incident
- Description of layout of retrieval site; flat, house spiral staircase etc
- Description of how the retrieval was achieved
- Identify the equipment used to facilitate retrieval
- Any issues / problems encountered
- **No patient identifiable information should be recorded on the log.**

The Bariatric Retrieval log should be forwarded to Ayr Divisional Headquarters on a Monthly basis from each Bariatric vehicle location. Divisional HQ will then collate the data and forward on to Graham Foreman, ergonomics advisor.
Locations of Bariatric Capable Vehicles

South West Division currently deploys 3 Bariatric capable vehicles, one in each of the Sub-Divisional areas. The configuration of these vehicles could have been either that of Urgent Tier or Patient Transport Vehicle, however, South West Division has opted for the Patient Transport Vehicle option.

The Bariatric Patient Transport Vehicle (B-PTV) is deployed on normal patient transport duties on a day to day basis and is manned with suitable trained staff. This means that it may not always be readily available to be deployed to Bariatric patients in the acute situation, liaison between E.M.D.C and A.S.O’s is essential to promote effective deployment when required.

The locations and call signs of the Bariatric PTV’s are indicated below:

* Denotes an aspiration of 24/7 capability, currently operating on 8/5 basis however training is ongoing to achieve full capability.
Operational Response Models to Bariatric Cases

Acute Response (In Hours)

During operating hours for Patient Transport Services, the Bariatric capable vehicles (B-PTV) in operation in South West Division will be engaged in their core duties.

When E.M.D.C establishes that a call requires a bariatric capable vehicle response (this may be advised to the call taker by the call originator, or the call taker may establish this from information given by caller, or a crew already on scene at a call may advise a dispatcher that they require Bariatric support), E.M.D.C staff will be required to determine the following information:

- What additional resource is required?
  - An additional crew
  - A Bariatric vehicle, equipment and appropriately trained staff
  - Additional support from Fire & Rescue Service
- What is the available timeframe (dependant on patient’s clinical condition) to provide that support?
- What is the availability and location for the nearest Bariatric capable vehicle and crewmember(s), this will require liaison with the appropriate Area Service Office (A.S.O)?

Once EMDC establish the level of support required, appropriate arrangements should be made to realize supporting resources;

Additional crew required:

E.M.D.C should allocate a supporting A&E crew within available timeframe to allow bariatric patient to be transported.

Bariatric vehicle, equipment and appropriately trained staff:

E.M.D.C should arrange via A.S.O for Bariatric vehicle to be re-tasked to provide transport to A&E crew on scene. This may result in the requirement to re-allocate the planned workload of the Bariatric capable P.T.V. E.M.D.C should, where possible, provide assistance to the A.S.O in managing the previously planned workload for the B-PTV. Additionally, the B-PTV may require to return to its base to collect additional equipment prior to deploying to scene.
Additional support from Fire & Rescue Service

If it is established by E.M.D.C or crew on scene that additional support is required from the Fire & Rescue service, E.M.D.C should;

- Contact Fire & Rescue Control Centre to explain incident type and request assistance on scene
- Ensure that the Operational Manager on Call or Team Leader is tasked to scene to liaise / co-ordinate with Fire & Rescue personnel.

It should be noted that Fire & Rescue services will attend emergencies where the service is unable to operate its specialist equipment. It is generally left to the discretion of Fire & Rescue Services whether they attend planned admissions where the care could not be provided in the house/home. Fire & Rescue Services are reluctant to move patients back into their home. This is understandable as potentially we could then be moving a patient into a place of danger. In many cases, Fire & Rescue Services have been very helpful by assisting the S.A.S compile a report as to the unsuitability of some premises for patients who are due to be discharged. This is another reason why, wherever possible, the locus should be assessed prior to the patient being moved.

Activity at scene of call

When required resources arrive at the scene, A&E crewmembers present will lead on the clinical care of the patient, however, in terms of controlling / managing the patient movement with specialist equipment, the appropriately trained member(s) of staff must co-ordinate this activity. Good liaison / communication between team members present will be essential to ensure the safety of patient & crewmembers during these operations.

Delays in supporting resource availability

In the event that the local Bariatric PTV is not available within a suitable timeframe, the following should be considered by E.M.D.C for the interim period until its arrival;

- Request for mutual aid from neighboring Sub-Divisional or Divisional resource
• Request made to territorial N.H.S Board for medical assistance on scene (district nurse / O.O.H’s G.P etc) to support patient until arrival of suitable resources.

Acute Response (Out of Hours)

In the Out of Hours period, there is little or no Patient Transport Services operating and it will be unlikely that the B-PTV will be deployed on operational duties within these times. A number of A&E staff at locations where the Bariatric PTV is based have been trained in Bariatric procedure (see list of trained staff) to provide Bariatric capability within this period of the day.

The ‘in hours’ procedure should be applied with the following variations evident; on establishing the need as previously mentioned for Bariatric capable vehicle, equipment and trained staff, E.M.D.C should identify from the list of trained staff if any trained A&E staff are on duty. Once suitably trained staff member(s) are identified, E.M.D.C should carry out the following:

• Task the crewmember(s) to return to base (if not already there) and suitably equip the B-PTV ready for deployment.
• Rendezvous with the resources on scene (A&E crew, Manager & Fire & Rescue personnel).
• Direct / manage operations in relation to the use of the Bariatric specialist equipment to afford a safe patient transfer.

Planned Response

When A.S.O establishes that a call requires a bariatric capable vehicle response (this may be advised by the booking authority or a crew already on scene at patients address), A.S.O staff will be required to determine the following information:

• What additional resource is required?
  o An additional crew
  o A Bariatric vehicle, equipment and appropriately trained staff
  o Additional support from Fire & Rescue Service
• What is the available timeframe?
  o Advanced bookings should have site visit/risk assessment completed
• What is the availability and location for the nearest Bariatric capable vehicle and crewmember(s)?
Once the A.S.O has established the level of support required, dependant on whether this is an advanced booking or reactive to a crew on scene, appropriate arrangements should be made to plan for and deal with these cases.

1. Advanced bookings should ideally have a site visit and/or a risk assessment completed prior to transport taking place to ensure an appropriate resource level is assigned to transporting the patient.

2. On the day cases, may require the provision of supporting resources in a more timeous manner, however, the first course of action should be to seek an alternative appointment/admission time to allow time to put appropriate resources in place. If this is not possible due to the level of urgency of the case, then the A.S.O should carry out the following:

Once A.S.O establishes the level of support required, appropriate arrangements should be made to realize supporting resources;

**Additional crew required:**

A.S.O should allocate a supporting PTS crew within available timeframe to allow bariatric patient to be transported.

**Bariatric vehicle, equipment and appropriately trained staff:**

A.S.O should arrange for a Bariatric vehicle to be re-tasked to provide assistance to PTS crew on scene. This may result in the requirement to re-allocate the planned workload of the Bariatric capable P.T.V. In extremis E.M.D.C should where possible provide assistance to the A.S.O in managing the previously planned workload for the B-PTV. Additionally, the B-PTV may require to return to its base to collect additional equipment prior to deploying to scene.

**Additional support from Fire & Rescue Service**

If it is established by A.S.O or crew on scene that additional support is required from the Fire & Rescue service, A.S.O should;

- Contact Fire & Rescue Control Centre to explain incident type and request assistance on scene
- Ensure that the Operational Manager or L.A.C.A is tasked to scene to liaise / co-ordinate with Fire & Rescue personnel.
It should be noted that Fire & Rescue services will attend emergencies where the service is unable to operate its specialist equipment. It is generally left to the discretion of Fire & Rescue Services whether they attend planned admissions where the care could not be provided in the house/home. Fire & Rescue Services are reluctant to move patients back into their home. This is understandable as potentially we could then be moving a patient into a place of danger. In many cases, Fire & Rescue Services have been very helpful by assisting the S.A.S compile a report as to the unsuitability of some premises for patients who are due to be discharged. This is another reason why, wherever possible, the locus should be assessed prior to the patient being moved.

Activity at scene of call

When required resources arrive at the scene, the management of the patient movement with specialist equipment is the responsibility of the appropriately trained member(s) of staff who must co-ordinate this activity. Good liaison / communication between team members present will be essential to ensure the safety of patient & crewmembers during these operations.

Delays in supporting resource availability

In the event that the local Bariatric PTV is not available within a suitable timeframe, the following should be considered by the A.S.O for the interim period until its arrival;

- Request for mutual aid from neighboring Sub-Divisional or Divisional resource
- Request made to territorial N.H.S Board for medical assistance on scene (district nurse / O.O.H’s G.P etc) to support patient until arrival of suitable resources.

The above Operation response models are summarized on the algorithms on the following pages.
EMDC Decision making for Acute Bariatric Cases

Acute Bariatric Operational Response

ASO Decision Making for Planned Bariatric Case

Planned Bariatric Operational Response

Information for Control staff to help identify what equipment is needed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Brief Description</th>
<th>Safe Working Load</th>
<th>Possible Alternative Specialist Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibex Chair</td>
<td>Used for bringing patient down stairs. It has a track system to allow the chair to be ‘bounced’ down the stairs. This track can also be used to go upstairs. Any patient over 16-17 stone is liable to be too heavy/awkward for even the strongest double crews to manage (NB – many crews will manage less) Chair will be difficult to use before SWL is reached due to the narrowness of the seat and chassis with resultant unsteadiness when under extreme load. The track system stops it being able to be bounced correctly down. With heavy patients the track system stops it being able to be used.</td>
<td>159kg / 25 stone</td>
<td>The powered stairclimber (C-Max) – (Safe Working Load 25st/159kg) found on an increasing number of double crewed PTVs (and some mid-tiers) will mechanically take patients up and down stairs. Staff may correctly advise you some uneven steps or extremely tight spirals cannot be managed. The Stairpro/EZ glide chairs (35 stone/222kg). These are a manual chairs fitted with tracks. The chairs can be brought down straight runs of stairs only using tracks – or otherwise carried up and down stairs – normally by a minimum of four staff (subject to risk assessment). Service bariatric wheelchair (40 or 70 st (254/445kg) – too wide for standard doorways but ok in adapted premises.</td>
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</tbody>
</table>