



Bariatric Patients: Guidance and Advice for the Radiography Workforce

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Published: Friday, March 1, 2013

ISBN: 1-871101-94-8

Summary

The Society and College of Radiographers (SCoR) publishes this guidance for the radiography workforce, including recommendations for action so that the care of bariatric patients in imaging and radiotherapy departments is of the highest standard and that members of the radiography workforce imaging and radiotherapy services are protected from possible injury related to moving and lifting.

1. Introduction

1.1

The Society and College of Radiographers (SCoR) publishes this guidance for the radiography workforce, including recommendations for action so that the care of bariatric patients in imaging and radiotherapy departments is of the highest standard and that members of the radiography workforce imaging and radiotherapy services are protected from possible injury related to moving and lifting.

1.2

Bariatrics is the science of providing healthcare for those who are extremely obese. There is a noticeable increase across the UK in the number of extremely obese patients being admitted to hospitals; this trend presents a challenge to healthcare providers and facilities to provide dignified care that is effective and safe, both for the patient and the provider.¹ Members of the radiography workforce need to predict the challenges which may present in the care of bariatric patients and prepare adequately for them. It is essential that all healthcare professionals work collaboratively and accept standardised, evidence-based approaches in the care they provide for this group of patients. In addition, radiographers must adhere to the Health Care Professions Council (HCPC) profession-specific standard which states that s/he must know and be able to apply appropriate moving and handling techniques.^{2,3}

2. Terminology and definitions

2.1

The term bariatric (from the Greek *barros*) means large or heavy and covers a wider population than obese to extremely obese, as some patients may fall into bariatric guidelines even if their weight and

body mass index (BMI) are lower than the accepted World Health Organisation (WHO) classification (see Table 1) owing to their weight distribution and girth size.⁴

2.2

Broader definitions of bariatric also refer to body size or shape, waist circumference and immobility problems.

2.3

Bariatric patients' body shape and weight is often described as either pear-shaped (weight distributed unevenly with heavier lower body - typically female) or apple-shaped (weight distributed around the centre of the body - typically male) or bulbous-gluteal (weight carried on the buttocks often causing a 'protruding shelf' behind the back).

2.4

For adults, the BMI is used to calculate whether a person is underweight, a healthy weight, overweight, or obese for their height.

Table 1. World Health Organisation (WHO) Classification ⁵

BMI kg/m ²	classification
18.5 -24.9	normal
25-29.9	overweight
30-39.9	obese
> 40	extreme 'morbid' obesity

2.5

BMI, as an index of obesity and extreme obesity does, however, have its limitations as it is unable to differentiate between lean mass and fat mass or to characterise the distribution of body fat.⁶

2.6

BMI must also be corrected for age, gender and ethnicity.⁷

2.7

In addition to BMI, the body weight of a patient is also used in most bariatric protocol documents issued by employing authorities. However, in practice, there are variations as to which weight range is used; from someone in excess of 114kg to in excess of either 127kg or 159kg.

2.8

It is of great importance that it is not only BMI or weight alone but also shape and potential inability to fully co-operate that impacts on the radiography workforce. Many of these patients have limited mobility and decreased lung capacity which reduces their ability to assist in movement.^{8,9}

3. Consequences of obesity for the imaging and radiotherapy department

3.1

Obesity rates continue to increase across the UK. The prevalence of obesity has more than tripled in the last 25 years.

3.2

Statistics related to England have identified 26.1% of both men and women aged 16 and over classified as obese in 2010 and 1% to 2% as morbidly obese, with 16% of all children obese.¹⁰

3.3

Britain's obesity problem is ranked as the worst in Europe and the third-worst in the world, behind Mexico and the USA¹¹ resulting in enormous direct and indirect costs to the NHS, currently estimated as £4.3bn per year.¹²

3.4

It has been recognised that there are many and varied consequences of obesity for imaging services (see Table 2). In addition to this list, the need to prepare adequately may mean that bariatric patients may experience delay in the imaging examination being carried out.

Table 2. Consequences of obesity in the radiology department⁶

Consequences of obesity
Missed diagnoses
Non-diagnostic scans
Equipment failure/breakage
Embarrassing situation for patients
Increased radiation dose to patients and staff
Musculoskeletal disorder (MSD) risks to staff

4. Manual handling risks: the evidence base

4.1

Research undertaken by Loughborough University for the Health and Safety Executive (HSE) identified a number of generic risks involved in the healthcare pathway of bariatric patients and recommended a multifactor approach to minimising injury to patients and staff which involved the use of risk assessments and work environment redesign.¹³ (see Table 3)

Table 3. Generic manual handling risks¹³

Generic Risks
Patient factors: weight, shape, mobility, pain, co-operation, privacy, comfort, dignity
Building/vehicle, space & design: space, clearance, safe working load (SWL) floor, lifts, doors, corridors
Equipment : fit, inserting, availability, suitability, compatibility, size, effort to move
Communication: between agencies/departments, time delay
Organisation and staff issues: policies, culture, number, training, competence, delay

4.2

In addition to generic risks, other risks specific to imaging can be identified:

Table 4. Specific manual handling risks in imaging¹³

Specific Risks

Travel distance and weight of pushing trolley to department

Manoeuvring of patient into position

Finding anatomical points

Safe Working Load (SWL) - of radiology equipment
--

Unavailability of radiolucent trolley suitable for bariatric patient
--

Size of scanner aperture

Ensuring static postures

4.3

Manual handling of patients puts healthcare staff at considerable risk of musculoskeletal injury.¹⁴ Work related musculoskeletal disorders (MSDs) among UK workers are such a major cause of disability and lost work days that back pain alone has been estimated to cost industry £3.44 billion every year.

4.4

Within the NHS, manual handling accidents account for 40% of all sickness absence at a cost of around £400 million each year.¹⁵

4.5

Most of the patient moving and handling evidence-base relates to the education of nurses in patient handling techniques. There does, however, appear to be very little evidence of the effectiveness of educational based training for safe patient handling, either in a school of nursing-based programme or applied to qualified staff in the workplace.¹³

4.6

Recent evidence shows that no amount of training in proper body positioning or lifting will prevent injury when the load exceeds that which the body can tolerate.¹⁴

4.7

A strong body of research has demonstrated that the use of mechanical lifting equipment is effective in reducing the incidence of musculoskeletal disorders.¹⁶ However, mechanical aids are often not available within the department or nearby.

4.8

In the USA, recommendations¹⁷ advise that under ideal conditions, the maximum limit for manual patient lifting is 16kg (35 lb/2 stone 7lb).

4.9

The activity of elevating a limb of a bariatric patient in order to place a cassette beneath it can involve large weights. A leg is approximately 16% of a person's total body weight. So, for a patient of 159kg (350lb/25 stone), the weight of a leg would be 25kg (55lb/4 stone) which exceeds this safe lifting load.

4.10

In situations which are less than ideal, and including situations which involve repetitive movements whereby the same movement is repeated many times during the working day, the maximum recommended weight limit is less than 16kg. This includes lifting:

- with extended arms; when near the floor;
- when sitting or kneeling;
- with the trunk twisted or the load off to the side of the body;
- with one hand;
- in a restricted space;
- during a shift lasting longer than eight hours ¹⁷.

4.11

In the UK, the Manual Handling Regulations (1992) (see Relevant Legislation) set no specific requirements such as weight limits as it is believed that there is no such thing as a safe maximum weight. Weight is only one factor that needs to be considered in deciding how much force is required to move a given load (and, therefore, how much risk is involved under specific conditions). For example, being able to push rather than pull usually reduces the risk to the worker.

5. Bariatric referrals to imaging and radiotherapy

5.1

A risk assessment will have been carried out by the admitting department and ward who should inform the department well in advance of any referral. It should be noted that patients often weigh much more than they think or say and good practice dictates that an accurate assessment must be undertaken before the patient attends for imaging/treatment.

5.2

Key risk assessment factors prior to acceptance of a bariatric patient should include:

- patient's weight, size, girth;
- ability to follow instructions
- moving and handling needs;
- ability to physically assist with any transfer;
- willingness to co-operate;
- clinical condition;
- levels of comfort and pain;
- mode of transport.
- bed weight, PAT slide

5.3

Referral requests must be checked for justification: often a bariatric patient is referred for examinations that are inappropriate, leading to missed diagnosis or appointment cancellations eg ultrasound of abdomen for pancreatic lesion (when the pancreas probably will not be seen).⁶

5.4

Consider visiting patient to identify whether it is possible for any imaging examination to be undertaken on the ward or accident and emergency department. If undertaking mobile radiography on the ward, the bariatric patient may be in wider beds than normal, thus increasing the difficulties for patient positioning and manual handling safety. Request that radioluscent-topped trolley be used if appropriate.

5.5

The table weight and gantry aperture limits of all equipment should be clearly displayed on the equipment with a separate list also available within the department. Patients who exceed the weight limit of the table as defined by the manufacturer can potentially damage the table or its motor mechanics. The table and table motor are insured by manufacturers up to their specified weight only.

5.6

Patients may meet the weight limit of a table but may exceed the gantry or bore diameter because of their girth. Typically, the industry-standard aperture in fluoroscopy is 45 cm; the gantry diameter in CT, including multi detector CT, is 70 cm; and the bore aperture in MRI is 60 cm.¹⁸

5.7

Although the aperture diameters are accurate in the horizontal plane, they do not account for the table thickness entering the gantry or bore and, therefore, overestimate the vertical distance (antero-posterior distance in a supine patient). Typically, in the vertical plane, 15-18 cm must be subtracted from the gantry or bore diameter to account for the table thickness.¹⁸

5.8

Determine the number of required staff, type of moving and handling equipment required and the techniques for the transfer or other task to be undertaken before the patient arrives in the department..

5.9

Prior to transfer, review the appropriate algorithm for the transfer task to be performed (see appendix A).

6. Bariatric patient needs

6.1

Just as carers have a right to a safe working environment, obese and morbidly obese patients have a right to safe, dignified and respectful care.¹

6.2

Bariatric individuals often suffer from a number of co-morbidities associated with their weight and body habitus such as oedema and dyspnoea which might affect their ability to co-operate fully during an examination or treatment.

6.3

Extra care must be taken to prevent damaging the patient's skin during all patient handling and treatment activities. Bariatric patients often have problems with skin excoriation, rashes and ulcers in the deep folds of the legs, breast, abdomen and perineum.¹⁹

6.4

Studies have shown that nurses, doctors and other health care professionals often have strong negative attitudes towards obese people. This bias can be expressed by overt verbal or physical behaviours as well as subtle or covert innuendo. Such negative and judgemental attitudes need to be explored and addressed through appropriate staff training and education which is specific to

bariatric patients. The same standard of care should always be applied to everyone without bias.²⁰

6.5

In order to maintain patient dignity it is important that proper names for assistive equipment are used such as 'extended capacity' rather than 'big' bed or 'hefty' lift etc. Equipment often has an "industrial appearance" which can negatively affect patients' self image.

6.6

The perceived prejudice and discrimination by health care workers can lead bariatric patients to avoid any health screening offered to them and avoid seeking healthcare advice until their medical condition requires urgent attention. Embarrassment about their size and impaired mobility will play a part in this.

6.7

It has been suggested that in the event of not being able to accommodate very large people, large capacity CT equipment at zoos could be used as an alternative. Apparently many veterinary schools have reported that they have policies that specifically prohibit the imaging of humans. Research in this area has concluded that animal facilities are not a viable alternative for the diagnostic imaging of human patients.²¹ This approach of considering the contact of zoos and veterinary practices will inevitably have a negative psycho-social impact on patients.⁶ Alternative solutions to this must be considered well in advance of the admission of any bariatric patient.

6.8

Providing appropriately sized gowns will instil confidence in the patient towards the department's ability to provide all round care to all patients whatever their situation. Also, the patients' privacy must, of course, be protected.

6.9

Apart from the physical limitations to accommodate bariatric patients due to table weight and gantry diameter limits, a large body habitus degrades image quality. Maximising image quality while at the same time minimising dose has to be addressed.

6.10

Increasing the kVp increases penetration but lowers the contrast. Increasing the exposure time whilst improving image quality may result in motion artefacts, as often bariatric patients have difficulty in holding their breath.²¹ Closer collimation and use of a grid for areas not usually requiring a grid for examination will reduce scatter and help to improve image quality.^{20, 23, 24, 25}

6.11

Bariatric patients may be averse to the assistive equipment as it can lead to loss of a sense of control, feelings of insecurity and discomfort.⁸

6.12

Several recent journal articles refer to the issues surrounding the imaging of the obese patient.^{20, 23, 24, 25, 26}

7. Conclusions

Gallagher¹⁹ highlights the need for a suitable bariatric pathway policy and protocol from admission to discharge and argues that failure to plan for the total management of the patient may mean that healthcare staff are faced with inadequate resources to provide basic care.

Failure to provide adequate equipment and appropriate management of obese patients could result in their safety being compromised and injury to both patients and staff.²⁷

There appears to be a lack of appropriate equipment and assistive equipment for morbidly obese patients, who are also at greater risk than other patients because they have less physiological reserve.²⁰

When making decisions on issues that relate to safety, the radiography workforce should keep in mind that safe patient handling must be balanced equally with staff safety and patient participation. The final decision must be one that is safe for the worker and for the patient and encourages patient participation and independence. The radiography workforce should lay equal emphasis on each of these considerations.¹

Under their contract of employment the radiography workforce are obliged to carry out reasonable instructions from the employer. When assessing whether an instruction is reasonable the following factors should be taken into account:

- Is it legal? Employees are not obliged to carry out illegal instructions
- Do I have the skills required to carry out the work required? Employees must have the required skills and competency to carry out the request. Employees must have received and understood relevant training.
- Is it safe? Employers cannot expect employees to carry out work which puts them or their patients in an unsafe situation. Risk assessments are a legal obligation and any findings must be acted upon. For example, if the risk assessment identified that hoists and lifting aids should be used, then these must be provided and training given on the correct use.

8. Recommendations

1. that all members of the radiography workforce must be familiar with, and adhere to, the specific requirements including any specific training outlined in their employer's bariatric protocol for the care, moving and handling of bariatric patients. This document is generally in addition to the employer's Moving and Handling Policy. However, staff need to be aware that the existence of a bariatric policy does not necessarily equate to implementation, as recent studies have found that equipment, including radiology equipment, is not always readily available when and where required.²⁷ NHS bariatric protocols are designed to be in line with legislation that places a general duty on employers to "ensure so far as is reasonably practicable, the health, safety and welfare at work of all staff"²⁸ and to avoid hazardous manual handling.

2. that managers undertake a risk assessment and identify potential hazards in their department which may impact on the safety of their staff and bariatric patients. This needs to be carried out well in advance of the admission of any bariatric patient. The radiography workforce should be aware and understand any documentation in this respect.

3. that a system and protocol for the department should be established with regard to the handling and care of bariatric patients. These protocols should be reviewed regularly to identify any issues and to benefit staff who infrequently come across bariatric patients.

4. that a list should be compiled detailing the weight limits of every relevant item of equipment in the department which may be used by a bariatric patient. Weight limits of equipment should be displayed so they are immediately visible and accessible to staff.
5. that, in addition to recommendation 4., a list should be compiled of the aperture diameter limits for relevant equipment, bearing in mind that 15-18cm must be subtracted from the gantry or bore diameter of CT and MRI units to account for the table thickness. Information should be clearly displayed on each item.
6. that local procedures should be put in place for the management of any patients who exceed the weight limits of any equipment.
7. that all staff should be familiar with the Lifting Operations and Lifting Equipment Regulations (LOLER) ²⁹ [a](#) and receive training in equipment operation and handling practices. This should be done on a regular basis. In addition to routine maintenance and servicing, LOLER requires employers to ensure that lifting equipment is inspected and thoroughly examined either at six-month intervals or in accordance with a written scheme of examination. For any assistive handling equipment kept in the department, this must be within the remit of the departmental manager.
8. that the purchase or renting of appropriate assistive equipment should be considered, following consultation with, and advice from, health and safety specialists.
9. that staff need to be aware of the location of specialist bariatric assistive equipment when held centrally, so that it can be obtained when required.
10. that sufficient staff are available to ensure the safe manual handling and care of a bariatric patient, as once commenced it is generally too late to call for additional assistance. The bariatric patient algorithms (Appendix A) provide this information.
11. that the radiography workforce are aware of the advised maximum lifting weight limit of 16kg (35lb) and that if, for example, a limb of a bariatric patient exceeds this limit then an assistive device should be used.
12. that there is advanced planning of examinations and treatments of bariatric patients, and similar principles when dealing with urgent /emergency requests for examinations.
13. that any procedure which involves handling the patient requires a review of the procedure with the patient and staff just before proceeding ^{16.21.30} [_](#). It is important never to hurry but to think ahead, anticipate problems and proactively resolve any issues. A back up plan is essential.
14. that an evaluation should be undertaken once the examination has been completed and the patient transferred from the department. This should include assessment of the effectiveness of the handling procedure, identification of any equipment shortages and limitations, prediction of future needs and collection of data on unforeseen events.
15. That consideration must be made and a rationale provided, for the assignment, of a member of staff to be the bariatric specialist for the department.

Appendix A: Bariatric Algorithms

What follows is a series of Bariatric algorithms obtained from the following sources:

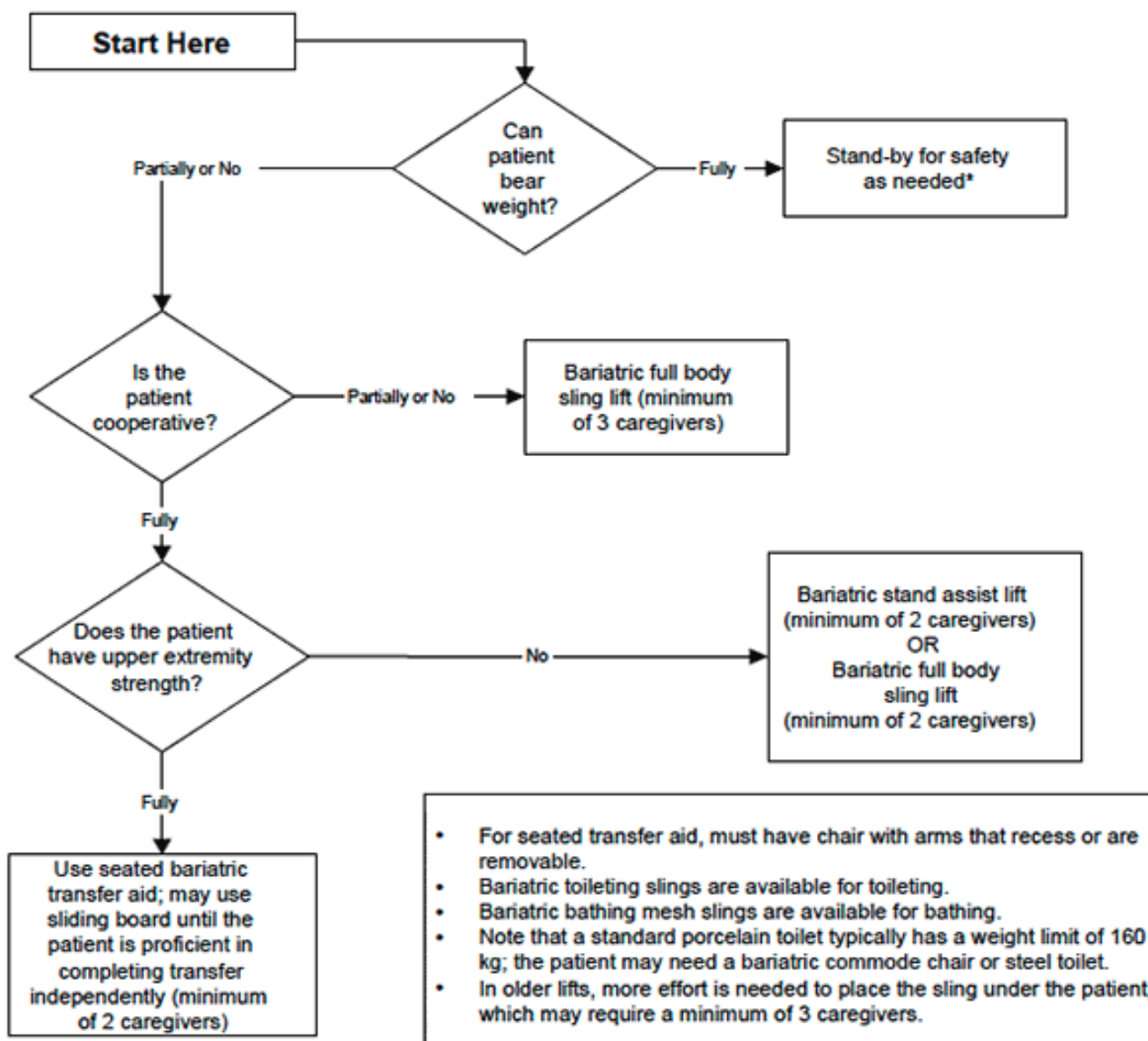
Waters TR, Nelson A, Hughes N, Menzel N. (2009) Safe Patient Handling Training of Schools of Nursing: curricular materials. Curriculum developed in partnership with the National Institute for Occupational Safety and Health (NIOSH), the Veterans Health Administration (VHA) and the American

Nurses Association (ANA) Cincinnati: DHSS (NIOSH) publication No. 2009-127 Available at:
<http://www.cdc.gov/niosh/docs/2009-127/pdfs/2009-127.pdf> (Accessed 19th February 2013)

and

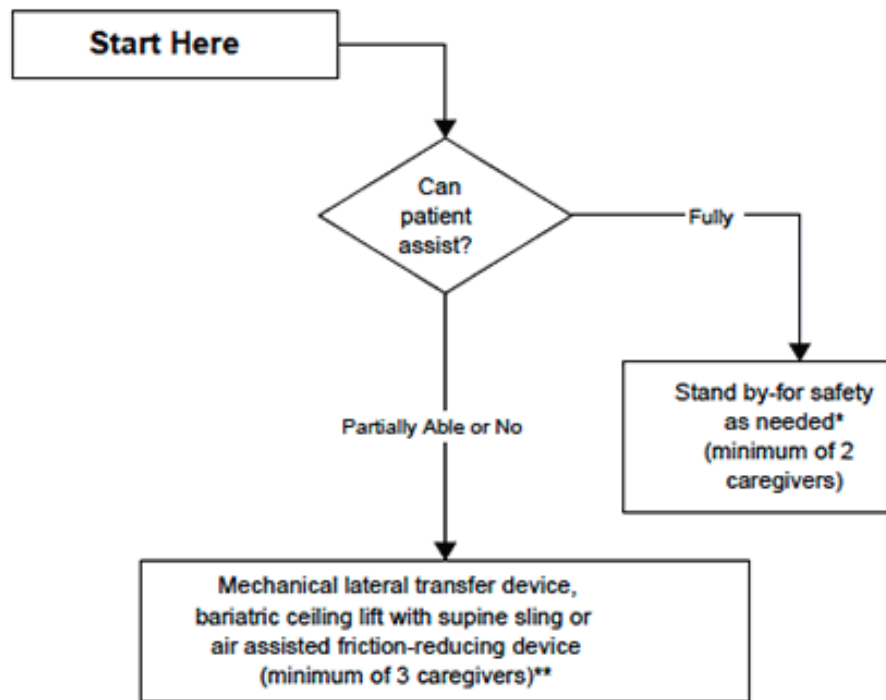
Special handling and movement challenges related to Bariatrics Available at :
<http://www.visn8.va.gov/VISN8/PatientSafetyCenter/safePtHandling/Special...>
(Accessed 19th February 2013)

Bariatric Algorithm 1: Bariatric Transfer To and From: Bed/Chair, Chair/Toilet, or Chair/Chair



- Stand-by for safety.* In most cases, if a bariatric patient is about to fall, there is very little that the caregiver can do to prevent the fall. The caregiver should be prepared to move any items out of the way that could cause injury, try to protect the patient's head from striking any objects or the floor and seek assistance as needed once the person has fallen.
- If patient has partial weight-bearing capability, transfer toward stronger side.
- Consider using an abdominal binder if the patient's abdomen impairs a patient handling task.
- Assure equipment used meets weight requirements. Standard equipment is generally limited to 115-160 kg. Facilities should apply a sticker to all bariatric equipment with "EC" (for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the healthcare provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 16kg of a patient's weight, the patient should be considered to be fully dependent and assistive devices should be used for the transfer.

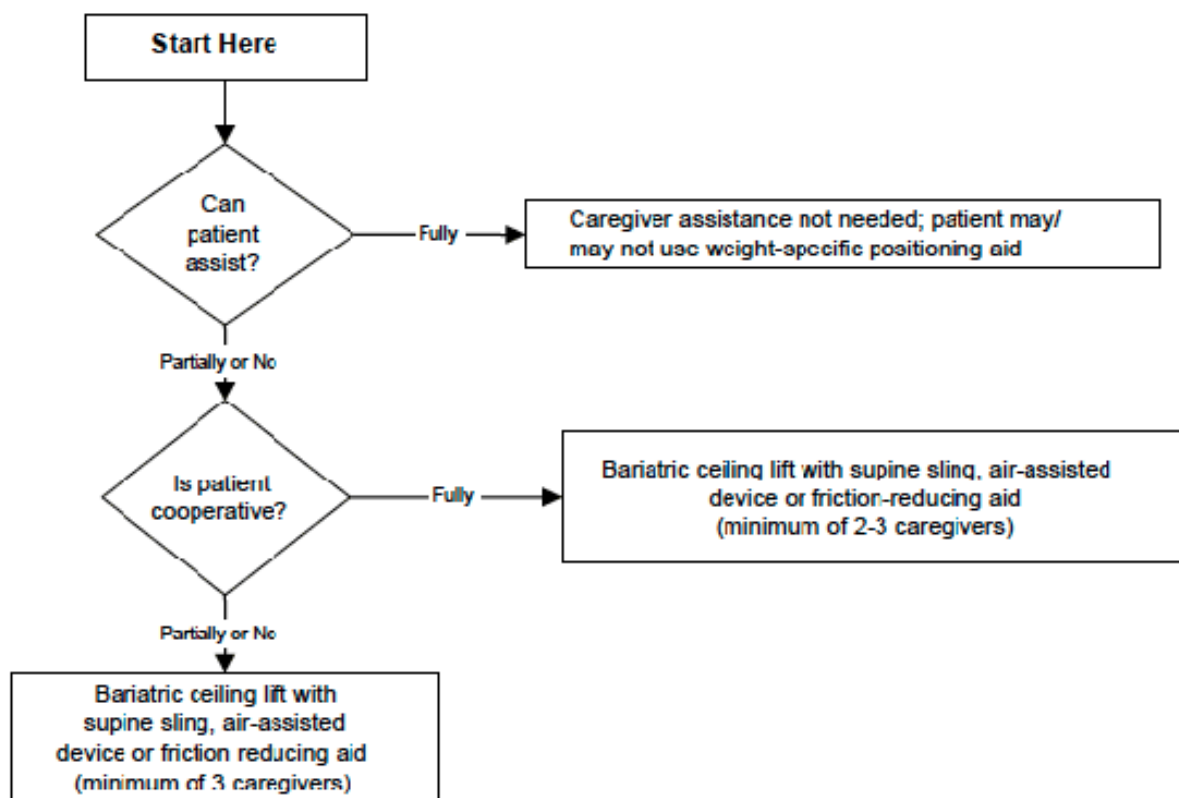
Bariatric Algorithm 2: Bariatric Lateral Transfer To and From: Bed/Stretcher/Trolley



- The destination surface should be about 1cm lower for all lateral patient moves.
- Avoid shearing force.
- Make sure bed is the right width, so excessive reaching by caregiver is not required.
- Lateral transfers should not be used with speciality beds that interfere with the transfer. In this case, use a bariatric ceiling lift with supine sling.
- Ensure bed or stretcher doesn't move with the weight of the patient transferring.
- ** Use a bariatric stretcher or trolley if patient exceeds weight capacity of traditional equipment.

- * "Stand-by for safety." In most cases, if a bariatric patient is about to fall, there is very little that the caregiver can do to prevent the fall. The caregiver should be prepared to move any items out of the way that could cause injury, try to protect the patient's head from striking any objects or the floor and seek assistance as needed once the person has fallen.
- * Assure equipment used meets weight requirements. Standard equipment is generally limited to 115-160 kg. Facilities should apply a sticker to all bariatric equipment with "EC"(for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- If patient has partial weight-bearing capability, transfer toward stronger side.
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- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the healthcare provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 16kg of a patient's weight, the patient should be considered to be fully dependent and assistive devices should be used for the transfer.

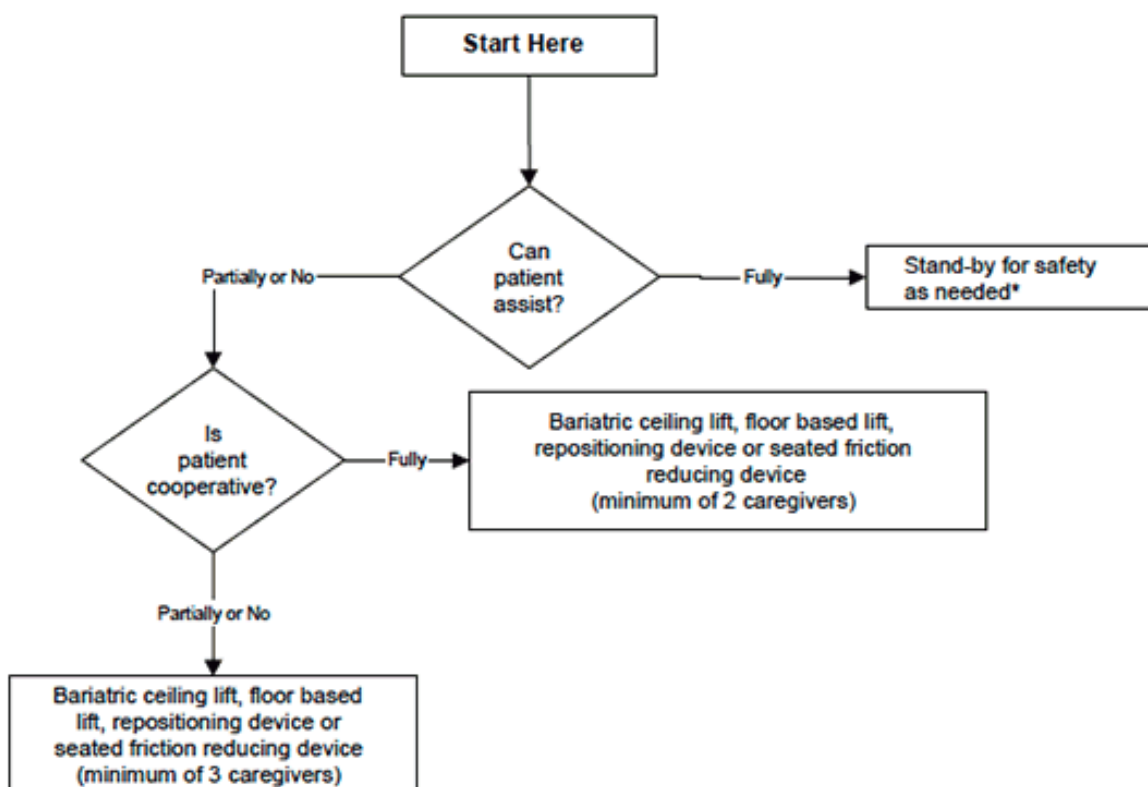
Bariatric Algorithm 3: Bariatric Reposition in bed: Side-to-Side, Up in Bed



- When pulling a patient up in bed, place the bed flat or in a Trendelenburg position (if tolerated and not medically contraindicated) to aid in gravity; the side rail should be down.
- Avoid shearing force.
- Adjust the height of the bed to elbow height.
- Mobilise the patient as early as possible to avoid weakness resulting from bed rest. This will promote patient independence and reduce the number of high risk tasks caregivers will provide.
- Consider leaving a friction-reducing device covered with drawsheet, under patient at all times to minimise risk to staff during transfers as long as it doesn't negate the pressure relief qualities of the mattress/overlay
- Use a sealed, high-density, foam wedge to firmly reposition patient on side. Skid-resistant texture materials vary and come in set shapes and cut-your-own rolls, for example, dycem

- If patient has partial weight-bearing capability, transfer toward stronger side
- Consider using an abdominal binder if the patient's abdomen impairs a patient handling task.
- Assure equipment used meets weight requirements. Standard equipment is generally limited to 115-160 kg. Facilities should apply a sticker to all bariatric equipment with "EC"(for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the healthcare provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 15 kg of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used for the transfer.

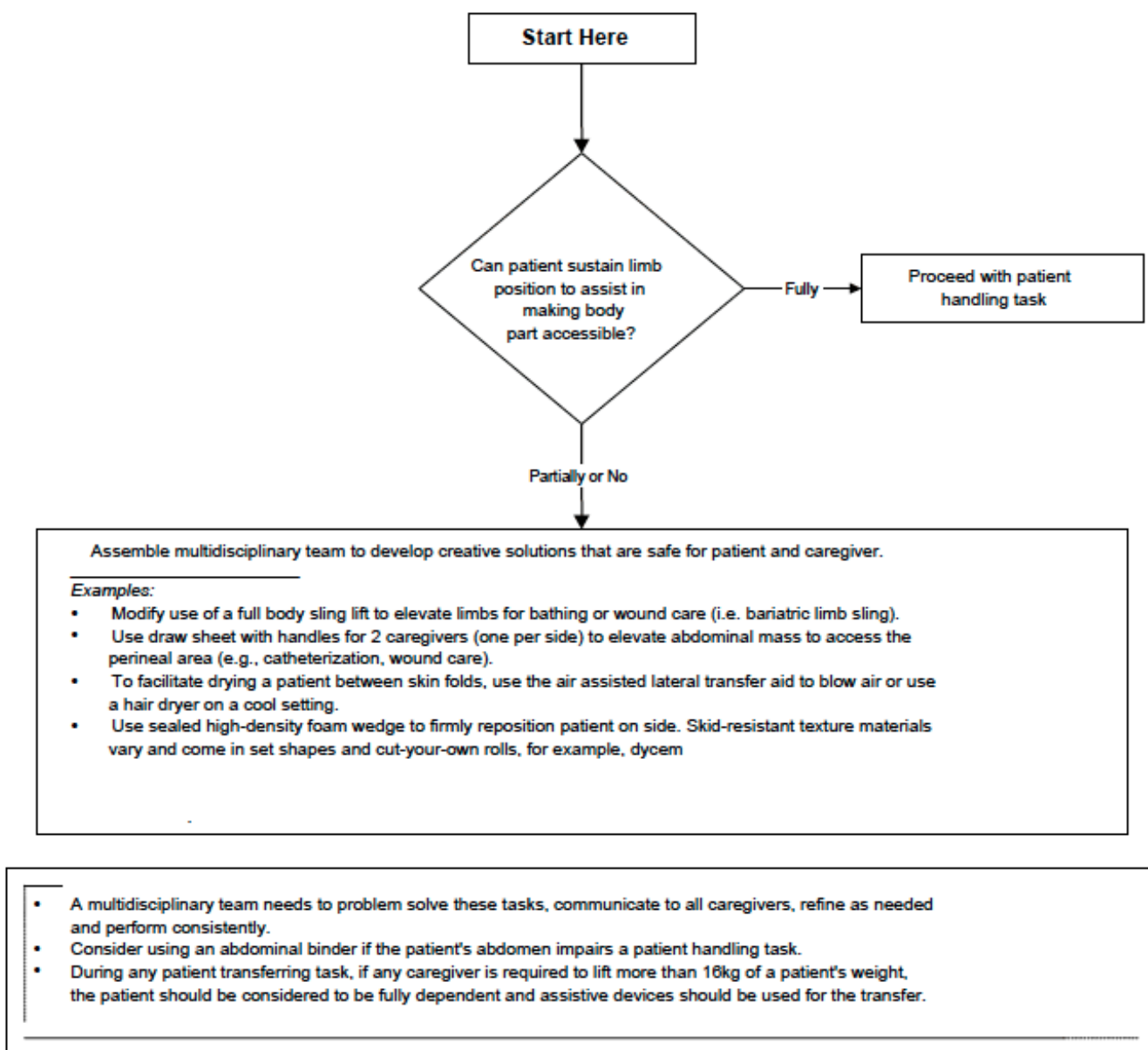
Bariatric Algorithm 4: Bariatric Reposition in Chair: Wheelchair, Chair, or Dependency Chair



- Take full advantage of chair functions, e.g., chair that reclines, or use an arm rest of chair to facilitate repositioning.
- Make sure the chair wheels are locked.
- Consider leaving the sling under the patient at all times to minimise risk to staff during transfers after carefully considering skin risk to patient and the risk of removing/replacing the sling for subsequent moves.

- * "Stand-by for safety." In most cases, if a bariatric patient is about to fall, there is very little that the caregiver can do to prevent the fall. The caregiver should be prepared to move any items out of the way that could cause injury, try to protect the patient's head from striking any objects or the floor and seek assistance as needed once the person has fallen.
- If patient has partial weight-bearing capability, transfer toward stronger side.
- Consider using an abdominal binder if the patient's abdomen impairs a patient handling task.
- Assure equipment used meets weight requirements. Standard equipment is generally limited to 115-160 kg. Facilities should apply a sticker to all bariatric equipment with "EC" (for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the healthcare provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 16kg of a patient's weight, the patient should be considered to be fully dependent and assistive devices should be used for the transfer.

Bariatric Algorithm 5: Patient Handling Tasks Requiring Access to Body Parts (Limb, Abdominal Mass, Gluteal Area)



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Relevant Legislation

The following legislation is relevant for assessing moving and handling risks:

Health and Safety at Work etc Act 1974 (HSWA)

Manual Handling Operations Regulations 1992 (MHOR) (as amended 2002)

Manual Handling Operations Regulations in 1992 (90/269/EEC Directive)

Management of Health and Safety at Work Regulations 1999

Provision and Use of Work Equipment Regulations 1998 (PUWER)

Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)

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