Standard of Care: Bariatric

Physical Therapy Management of the Bariatric Patient

ICD 10 Codes:

E66: Obesity

Case Type / Diagnosis:

Bariatrics is a branch of medicine that aims to control obesity as well as treat patients with obesity and its sequelae[1]. The purpose of this standard of care is to provide guidelines for the physical therapy management of the patient with obesity. This standard of care will address the specific musculoskeletal and mobility needs for the bariatric population as well as the need to screen for additional services. Implications for physical therapy, contraindications and interventions that are reviewed in other standards of care (e.g. Cardiac, Pulmonary or General Surgery) apply to this population as well.

Definitions of Obesity:

- Obesity is defined as the excessive accumulation of adipose tissue that contributes to chronic disease and early mortality[2].
- A person is diagnosed with obesity when his/her body mass index (BMI) is greater than 30 kg/m^2. Morbid obesity is defined as a BMI greater than 40 kg/m^2. Obesity is associated with a number of co-morbidities, a description of which follows.

Table 1. Disease Risk* Relative to Normal Weight and Waist Circumference [3]

Table 1. Disease Risk* Relative to Normal Weight and Waist Circumference[4]

	BMI (kg/m^2)	Obesity Class	Waist Circumference: Men (≤40 in) Women (≤35 in)	Waist Circumference: Men (>40 in) Women (>35 in)
Underweight	<18.5		—	—
Normal†	18.5 - 24.9		—	—
Overweight	25.0 - 29.9		Increased	High
Obesity	30.0 - 34.9	I	High	Very high
	35.0 - 39.9	II	Very high	Very high
Extreme obesity	≥40	III	Extremely high	Extremely high

*Disease risk for type 2 diabetes, hypertension, and cardiovascular disease.

†Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

Epidemiology of Obesity[4]:

- Sixty eight percent of adults in the United States are considered overweight or obese
- Thirty three percent of adults in the United States are considered obese
- Persons with obesity pay 42% more in health care costs than normal weight individuals
- Obesity is more common in women than in men
- Obesity is associated with 112,000 excess deaths due to cardiovascular diseases each year
- Obesity is associated with 15,000 excess deaths due to cancer each year
- The prevalence of obesity increased among all ages, genders, racial and ethnic groups, and education levels between 1960 and 2006

Etiology of Obesity[2]:

- Weight Management – A calorie is a unit of energy which can be used to describe the amount of energy in food. A person must balance the number of calories the body needs for their bodily functions and physical activity with the number of calories the person consumes. If a person is consuming more calories than the body is using, the excess calories will be stored as fat and the person will gain weight[5].
- Genetics factors – Recent research has shown that there may be a genetic component in the way individual's bodies capture, store and release energy. One explanation is the theory of "thrifty genotype" which suggests genes that multiplied in the past under poor environmental conditions when food was scarce are now prevalent in today's environment. These genes drive the body to overeat, become sedentary and store energy and have a diminished ability to use dietary fats as fuel[6]. Another potential genetic link to obesity is the FTO (fat mass and obesity-associated) gene whose alleles are strongly associated with obesity related traits and can be linked to 3kg higher body weight than those individuals without these alleles[7].
- Environmental factors – A person's environment or community can influence their lifestyle decisions. For example a person may choose not to walk to work because of a lack of sidewalks. Also, a restaurant might not offer reasonable, healthful food choices and large portion sizes and the patrons are forced to make unhealthy choices[5].
- Social factors – At home, sedentary behaviors such as watching television and playing video games can become a way of life.[5]
- Racial factors – Obesity is viewed differently among different races. For example, several studies have show that obesity and attractiveness are positively correlated in Black Americans, and that they do not consider obesity a health risk. Obesity and attractiveness were negatively correlated in Caucasian Americans. In Latino Americans the connotations between obesity and attractiveness are much more neutral, with a heavy emphasis on family life, work life and happiness rather than weight[8].

Common Comorbidities:

Central Abdominal Fat: Central abdominal fat consists of both subcutaneous and deep visceral fats. Increased amounts of deep visceral fat are thought to be associated with changes in blood glucose removal, insulin resistance, and increased sympathetic activity, though the exact mechanisms are not fully understood[9-11,12]. The changes in insulin resistance and blood glucose removal lead to increased risk of hypertension, dyslipidemia, heart disease, coronary disease, stroke, venous thrombosis, and dementia[12]. Please refer to the Standard of Care for the Physical Therapy Management of the Patient with Diabetes in the Acute Care Setting for further information on type II diabetes.

Cancer: There is an increased incidence of certain cancers in the population of individuals with obesity, including esophageal, colon, rectal, liver, gallbladder, pancreatic, and kidney cancers, as well as non-Hodgkin's lymphoma and multiple myeloma. Obesity has also been linked to an increased risk of death from stomach and esophageal cancers in men and breast, uterus, cervical and ovarian cancers in women[12].

Obstructive Sleep Apnea: Obstructive sleep apnea (OSA) is defined as obstructive apnea or hypopnea due to repeated collapse of the upper airways during sleep. Sleep apnea is more common in individuals with a large neck or waist circumference. It is characterized by loud snoring, awakening from sleep with a choking or gasping sensation, fitful sleep, moodiness and morning headaches. Other risk factors for sleep apnea include hypertension, cardiovascular and cerebrovascular diseases and type II diabetes[13]. A modest weight loss of 10% of the body weight can help to reduce mass in the posterior airway and eliminate apnea episodes but in order to be successful, it must be permanent weight loss[14].

Obesity Hyperventilation Syndrome: Obesity hypoventilation syndrome (OHS) is alveolar hypoventilation resulting in hypoxemia[15]and an awake arterial hypercapnea greater than 45mmHg[16]. Similar to OSA, patients with OHS present with daytime sleepiness, fatigue and morning headaches, but patients with OHS also have daytime hypercapnea[16]. The exact mechanism of OSH is unclear, but it is known that there is a decrease in respiratory system compliance due to displacement of the abdominal contents and increased work of breathing due to an increase in physiologic dead space and a ventilation/perfusion mismatch. The patient develops respiratory muscle fatigue and decreased ventilatory muscle endurance, which is exacerbated by lack of sleep. When these respiratory impairments are combined with hypoventilation and diminished ventilatory drive, the patients develop severe hypoxemia, hypercapnea and sleep fragmentation[16]. As little as 10 kg of weight loss can cause an increased in vital capacity and maximal volume ventilation and a significant decrease in daytime PaCO2 with an increase in central ventilatory drive[16].

Obesity Cardiomyopathy: Obesity cardiomyopathy is defined as heart failure due solely to obesity, usually found in the patient with morbid obesity. These patients have a decreased lean muscle mass and increased fat mass causing decreased systemic vascular resistance and increased circulating blood volume, resulting in increased cardiac output. Increased CO causes left ventricular (LV) dilation and LV wall stress during diastole, which predisposes the patient to LV hypertrophy and decreased left ventricle filling during diastole. Patients with obesity cardiomyopathy develop the same symptoms as those individuals with cardiomyopathy from other etiologies; however, the symptoms of obesity cardiomyopathy often develop during periods of rapid weight gain. There is research to suggest that weight loss may help to reverse obesity cardiomyopathy by improving LV systolic and diastolic filling, resulting in improvement in New York Heart Association Function Classification for heart failure[17].

Orthopedic Considerations: An increase in body mass index is associated with an increase in orthopedic conditions such as arthritis, osteoporosis and joint immobility[18]. Osteoarthritis in patients with obesity is most common in the knees and ankles but has also been shown to occur in non weight bearing joins of the wrist and hand, suggesting that obesity can also alter cartilage and bone metabolism. Patients with obesity are 2.9 times more likely to develop knee osteoarthritis[19], and 3.12 times more likely to have hand osteoarthritis[20]. They are also at risk for increased development of plantar fasciitis[21]. There is less consistent data to support the relationship between hip osteoarthritis and obesity. A weight loss of 0.24% per week, or a total of 5.1%, can lead to a significant decrease in disability[22]. Also, weight loss of 10% over 12 weeks can lead to a moderate to large improvement in self reported disability[23].

Special Considerations:

Barriers to Healthcare: Patients with obesity are often resistant to seek medical care for multiple reasons including: their lack of control over the medical situations, the lack of privacy, their impaired mobility, their limited transportation, embarrassment, and decreased physical capabilities. This is exacerbated by fears of the inaccessibility of the hospital environment, room configurations, and potential limited access to the bathroom[24-27].

Aging: As people age, the proportions of fat and lean muscle mass changes. The percent of total adipose tissue increases and the mass of the skeletal muscles and organs decrease. Weight is redistributed centrally and the amount of intra-abdominal adipose tissue increases. Several studies have shown that aging patients lose lean tissue mass and strength, which is termed sarcopenia[28]. They also demonstrate a decline in muscle quality and muscle density due to lipid accumulation[29], an increase in visceral adipose tissue, and a decrease in bone mass[30]. These conditions are all noted to cause frailty, disability and loss of independence. When sarcopenia is combined with obesity there becomes a new population of 'obese frail'[31].

Indications for Treatment:

A. Indications for inpatient physical therapy intervention in the bariatric patient can include: new weakness, functional impairment and decreased endurance, which may be related to prolonged hospitalization, surgery or trauma.

B. Indications for physical therapy intervention in the outpatient setting may include primary prevention of obesity, secondary prevention of the sequelae associated with obesity, i.e. knee osteoarthritis or plantar fasciitis, or tertiary prevention to limit disability and restore function in patients with obesity[32], i.e. musculoskeletal pain or injury, gait training, endurance training or balance deficits.

C. The American Physical Therapy Association practice patterns that are applicable in this population should be based on the impairments and functional limitations present, e.g. musculoskeletal, cardiopulmonary.

Contraindications / Precautions for Treatment:

A. Please refer to departmental guidelines for reference ranges for vital sign parameters and lab values.

B. Please refer to other standards of care for specific contraindications/precautions for treatment related to recent surgery (e.g. cardiac, orthopedic) or any other medical procedures.

Evaluation:

A. History of Present Illness (HPI):
    a. Onset and duration of symptoms leading to presentation
    b. If the patient is an inpatient, HPI may include:
        1. Reason for admission to the hospital (e.g. exacerbation of comorbid illnesses, plans for surgical intervention for weight management or for any surgical intervention for any other body system)
        2. If admitted for gastric bypass surgery, note any prior interventions or treatments, including anti-obesity medications, alternative therapies (e.g. yoga, hypnosis), participation in weight loss programming or prior surgical interventions.

c. If the patient is being treated as an outpatient, HPI may include:
    1. Reason for presentation (e.g. musculoskeletal pain or injury, gait training, endurance training, balance deficits or a weight loss program)
    2. Any pertinent diagnostic testing completed prior to initial evaluation
    3. Past Partners Longitudinal Medical Record (LMR) notes from relevant service providers and any prior physical or occupational therapy interventions.

B. Past Medical/Surgical History:
    a. Presence of comorbid conditions such as diabetes, coronary artery disease, hypertension, hypercholesterolemia, sleep apnea, obesity hyperventilation syndrome
    b. Prior surgeries or interventions for obesity management
    c. Prior or current orthopedic conditions or surgeries
    d. Any other relevant past medical or surgical history

C. Hospital Course (if inpatient):
    a. Previous and ongoing medical or surgical treatments
    b. Dates of any procedures or post procedure complications
    c. Current laboratory data
    d. Relevant diagnostic testing

D. Social History:
    a. Family and caregiver support systems
    b. Patient roles within the home and community
    c. Patient's expectations and goals
    d. Patient's professional role/occupation
    e. Patient's preferred hobbies and recreational activities
    f. Patient's readiness to change behaviors and follow through with exercise recommendations[2,33]

E. Prior Functional Level:
    a. Baseline ambulation, including distance and symptomatology
    b. Assistive devices if applicable, including use of wheelchair or power scooters if not ambulatory
    c. Home environment, modifications, e.g. ramp, stair lift, and any potential barriers to returning home
    d. Sleeping arrangements (i.e. head of bed elevated, sleeping in a recliner chair) and any use of a home oxygen delivery system, including bilevel or continuous positive airway pressure
    e. Prior or current exercise program

F. Medications:
    a. Refer to the Longitudinal Medical Record or Outpatient Health Screen for current medication list. It is important to note that the presence of adipose tissue alters the absorption of many medications, therefore conventional doses may be subtherapeutic or toxic[34] and it is important to monitor medication blood level if available.
    b. Some patients may have a history of or currently be using anti-obesity medications. The use of weight loss medication is recommended when the patient is at risk for medical comorbidities due to their weight. Currently there are four medications approved by the Food and Drug Administration (FDA) for weight loss[35].
        1. Phentoermine, Diethylproprion and Phendimetrazine are categorized as appetite suppressants which aid weight loss by stimulating brain chemicals to decrease the appetite. These medications may have the following side effects: increased heart rate and blood pressure, sleeplessness, nervousness, dizziness and headache[35].
        2. The fourth medication, Orlistat, is available as a prescription or over the counter under the brand name 'Alli'. Orlistat is a lipase inhibitor, which decreases the body's ability to absorb dietary fat by blocking the lipase enzyme so it cannot break down fat. Up to 1/3 of the body's dietary fat consumption can be eliminated without absorption. Gastrointestinal discomfort is a potential side effect, including abdominal cramping, diarrhea, and incontinence[36].

Examination

This section is intended to capture the most commonly used assessment tools for this case type/diagnosis. It is not intended to be either inclusive or exclusive of assessment tools.

A. Vital Signs: refer to Contraindications/Precautions for Treatment listed above.
    1. Note that cardiac rate and rhythm may be difficult to palpate due to excessive adipose tissue[2].
    2. Pulse oximetry may not be accurate due to the layer of adipose tissue present in the fingers. If available, an arterial blood gas may be a more accurate representation of oxygen saturation[27].
    3. Many patients with obesity have increased arm circumference. Use of a blood pressure cuff that is too small for the patient's arm circumference has been shown to artificially elevate the blood pressure reading. Systolic blood pressure may be artificially elevated 5-9mmHg when a small blood pressure cuff is used and the diastolic blood pressure may also be elevated 4-7mmHg. Suggested cuff length related to arm circumference is as follows, and is often marked on the inside of the cuff[37]:

Cuff Size	Arm Circumference

Regular (12 x 23 cm)	Less than 33 cm
Large (15 x 33 cm)	33 – 41 cm
Thigh (18 x 36 cm)	Above 41 cm

B. Anthropometrics: including current height, weight, BMI and waist circumference[38]. Increased waist circumference values have been shown to correlate with BMI and abdominal fat and signify increased health risk for men and women[2].
C. Body Types[39]:
    1. Apple Ascites - High waist to hip ratio, the apex of the abdominal wall is displaced anteriorly
    2. Apple Pannus - High waist to hip ratio, large pannus with inferior abdominal drift
    3. Pear Abducted - Low waist to hip ratio, most of the tissue bulk is located below the belt line, medially
    4. Pear Adducted - Low waist to hip ratio, most of the tissue bulk is located below the belt line, laterally around the thighs
    5. Gluteal Region - A shelf of excess tissue protrudes posteriorly, particularly in sitting
D. Pain: Pain should be assessed using a visual analog scale or numeric pain rating scale as with any other patient population. Care should be taken to address patterns of pain associated with long term stress on the weight bearing joints of patients with obesity[38].
E. Palpation: Palpation may be difficult due to the presence of adipose tissue over bony landmarks.
    1. Patients with apple ascites obesity will demonstrate a rigid and immobile abdominal wall with an immobile umbilicus[39].
    2. Patients with apple pannus obesity have mobile abdominal tissue[39].
F. Circulation: Peripheral pulses may be difficult to assess, and the patient may have lower extremity edema due to immobility and venous stasis[34].
G. Range of Motion (ROM): ROM may be limited by tissue accumulation around joints, therefore impairing flexibility and full joint ROM[38]. Patient positioning during ROM measurement may need to be adjusted depending on the patient's tolerance to lying flat.
H. Strength: Strength testing should include functional assessment and manual muscle testing.
    1. The therapist may need to adjustment their hand placement on the patient's body during strength testing in the case of excessive tissue bulk[38]**.** Adjustment of patient position may be necessary as well due to the inability to lie flat.
    2. Patients with obesity may utilize improper positioning to allow for muscle substitution during strength testing, therefore care should be taken to ensure proper positioning for accurate strength assessement[38]**.**
    3. Rhabdomyolysis has been reported in morbidly obese patients undergoing prolonged surgeries. The hypothesis is that the long surgical time combined with the pressure from the patient's body mass on the skeletal muscles can cause rhabdomyolysis. Factors such as a BMI > 40kg/m^2, diabetes, hypoalbuminemia, peripheral vascular disease, post operative sepsis and hypokalemia and preoperative use of statins may increase the risk of rhabdomyolysis in the post

operative morbidly obese patient[40]. Rhabdomyolysis should be considered in the differential diagnosis in the weak postoperative patient.

I. Sensation: Sensation may be diminished due to comorbid conditions such as diabetes and peripheral vascular disease or due to poor blood supply to the fatty tissues. Peripheral nerve injury can occur as a result of impingement by adipose tissue[38].

J. Posture/alignment: It is important to describe the patient's body type[39].
   1. Patients with the apple ascites body type may demonstrate accessory muscle hypertrophy, cervical convexity, elevated clavicles, and a flexed trunk. In standing, the abdominal wall does not shift inferiorly.
   2. Patients with apple pannus may demonstrate lumbar lordosis, and the pannus generally drifts inferiorly in supine and standing.
   3. Patients with the pear abducted body type demonstrate abducted femurs.
   4. Patients with pear adducted body type demonstrate adducted femurs.

K. Auscultation[27]:
   1. Auscultation of heart sounds may also be difficult due to the distance between the chest wall and the heart. The patient can be placed in left sidelying or in a sitting position to bring the heart closer to the chest wall for better auscultation.
   2. Auscultation of breath sounds may be challenging due to the adipose tissue between the bell of the stethoscope and the lungs.

L. Breathing Pattern: There is a burden on the chest wall by the adipose mass, which reduces chest wall compliance, making inspiration difficult. This results in lower lung volumes and flows[41]. Patients often have to rely on abnormal breathing patterns to achieve ventilation. For example, patients with the apple ascites body type have chronic difficulty with breathing and rely heavily on the use of accessory muscles. They often seek bilateral upper extremity stabilization to decrease work of breathing[39].

M. Skin Integrity: Patients with obesity are at increased risk for skin breakdown due to poor blood supply to adipose tissue, high glucose levels and higher body temperature.
   1. Elevated body temperature leads to increased perspiration and moisture, leaving the skin at high risk for irritation, breakdown, and ulceration. These patients are at increased risk for pressure ulcers and ulceration within skin folds, particularly around the neck, under the breasts, around the abdomen and in the groin and perianal areas[34].
   2. Powders should not be used in the skin folds due to its abrasive nature[34].
   3. The patient should be placed on a mattress with special pressure relieving qualities[27].
   4. Care should be taken to avoid lines and tubes positioned within skin folds[34].
   5. Surgical wounds are at greater risk for wound dehiscence due to diabetes, hypoproteinemia, decreased blood flow and tension at the wound edges[42],[40]. Abdominal binders may assist in decreasing stress on the incision may help to decrease the patient's report of pain[34].
   6. Patients with apple pannus often have hypercallus on the plantar aspects of the feet and where the pannus meets the thighs during gait[39].

N. Gait: Gait analysis of patients with obesity shows a larger base of support, increased time in weight bearing, and decreased step length which leads to decreased gait speed and

cadence[43]. Gait training should be conducted with the appropriate assistive device, taking care to note the equipment weight limit.

O. Aerobic capacity and endurance: The physical therapist should take great care to choose the appropriate test to assess aerobic capacity based on the patient's prior level of function, pain, muscle strength, range of motion, balance or certain cardiorespiratory conditions. Potential tests include, but are not limited to:
    a. The timed stair climbing test which can address functional impairment[38].
    b. The untimed 4 flight stair climbing test with symptom report can address functional impairment[44].
    c. The six-minute walk[45] test is highly reproducible in obese individuals and can be used to quantify aerobic impairment[46].
    d. The two minute assessment of vital sign recovery in the instance of patients who cannot tolerate other more formal and standardized testing can be used[38].
    e. The Rate of Perceived Exertion (RPE) scale has been used to assess exercise intensity in obese women[44].

P. Functional Mobility:
    1. Bed mobility
    2. Transfers
    3. Gait (level and stairs)
    4. Self care activities

Surgical Interventions:

Indicated for patients with BMI >40 or BMI >35 with associated risk factors/diseases[47]

A. Roux-en-Y Gastric Bypass (RYGB): In this procedure, the upper portion of stomach is stapled to create a small 15-25mL reservoir that attaches to the Roux limb of the jejunum. This procedure is restrictive, limiting food intake (early satiety) and causing malabsorption due to surgical bypass of part of the intestinal tract. The minimum amount of bypass includes the distal stomach, the entire duodenum and 40 cm of the proximal jejunum[47]. This procedure can be an open procedure with incision sites vertically down the patient's midline from xyphoid to umbilicus, or laparoscopically with multiple small incisions[48]. Weight loss after this procedure is generally greater than 100 pounds and has an operative 30 day mortality of 0.5% and an operative morbidity of 5%[47]. Laparoscopic procedures have a higher rate of intraabdominal complications but a shorter hospital length of stay and lower rate of wound complications. Open procedures have a higher risk of ventral hernia formation. Both procedures can be totally reversed if necessary[47].

B. Laparoscopic Adjustable Gastric Banding: In this procedure, a small balloon band is placed around the upper portion of stomach and the balloon is inflated to limit the capacity of the stomach to approximately 15mL. This procedure is purely restrictive in nature and the opening can be adjusted as needed via a port in the skin of the stomach[47]. Weight loss after gastric banding is generally about 50% of the excess body weight and is progressive over time. The operative mortality is about 0.1% and the operative morbidity is about 5%. Long term complications from this procedure can include gastric prolapse,

stomal obstruction, and gastric necrosis. This procedure can be reversed by removal of the band and port[47].

C. Panniculectomy: A panniculus is defined as excess skin, tissue and fat resulting from massive weight loss and can cause rashes, back pain, physical limitations and poor cosmetic appearance. A panniculectomy is an individually customized surgical procedure in which the panniculus is removed. The average hospital length of stay for such a procedure has been reported at 3 days. Uncompromised wound healing has been reported in 48% of patients, while wound closure was delayed or complicated in 20% of patients and postoperative seroma required drainage in 28% of patients[49].

Assessment

A. Diagnosis:

1. The Guide to Physical Therapist Practice lists two practice patterns in which obesity is explicitly stated in the inclusion criteria[38].
    a. "Primary Prevention/Risk Reduction for Cardiovascular/Pulmonary Disorders"
    b. "Primary Prevention/Risk Reduction for Integumentary Disorders"
2. A patient with obesity could also fit into almost any practice pattern for a comorbid condition or unrelated condition. These might include:
    a. Any acute or chronic cardiac, pulmonary, oncological or neurological disease
    b. Specific impairments related to any surgical intervention, complication, prolonged bedrest or prolonged hospitalization
    c. Impaired aerobic endurance
    d. Musculoskeletal pain or trauma

B. Problem List[50]

a. Potential Body Structure Impairments:
    a. Structures related to digestive, metabolic and endocrine systems
    b. Joint ROM
    c. Skin integrity
b. Potential Body Function Impairments:
    a. Weight maintenance (primary or secondary obesity)
    b. Muscle Performance/Strength
    c. Balance
    d. Aerobic Capacity
    e. Altered hemodynamic response to exercise
    f. Pain
    g. Ventilation
    h. Repair function of skin

c. Activity Limitations:
    i. Bed mobility
    ii. Transfers
    iii. Ambulation
    iv. Stair climbing
    v. Self Care Activities
d. Participation Restrictions
    i. Household tasks
    ii. Ability to live independently
    iii. Ability to fulfill life roles
    iv. Ability to participate in occupational activities
    v. Ability to socialize with friends/family
    vi. Ability to participate in hobbies or recreational activities
    vii. Ability to gain access to community buildings and activities
e. Contextual Factors
    i. Personal factors: support system, experience with the condition
    ii. Enviromental factors: home setup, equipment availability etc

D. Prognosis: Prognosis is dependent upon the patient's readiness to change and their active participation in the weight loss program. Prognosis may be simply related to weight loss and improvement in aerobic capacity, pain or functional status, but more often, is related to the patient's comorbid condition and the treatment of such. Please refer to the specific standard of care related to patient's admitting diagnosis or disease process (e.g. pulmonary, diabetes, vascular, etc) for guidelines regarding prognosis.

E. Goals, including measurable parameters and specific timelines related to patient-specific impairments and functional limitations.
    1. For patients admitted to the hospital for musculoskeletal needs or general medical/surgical interventions, please refer to the specific standards of care for departmental guidelines.
    2. For patients referred to outpatient physical therapy for specific musculoskeletal needs or for continued post-surgical PT the patient's individual body structure and function impairments should be addressed. Please refer to the specific departmental guidelines as appropriate for more specific information.
    3. For patients seeking a weight loss program, a combination of burning calories through exercise and decreasing food intake is suggested. Please see the treatment planning and interventions section on aerobic capacity for specific exercise duration and intensity information.

4. For patients admitted to the hospital for gastric bypass surgery, the typical length of stay is 3 days. Some examples of appropriate goals may include:
    a. Independent bed mobility with head of bed flat, without siderails.
    b. Independent transfers with appropriate assistive device.
    c. Independent ambulation greater than 100 feet with appropriate assistive device.
    d. Independent ability to negotiate stairs as necessary to gain access to home
    e. Maintain O2 saturation > 92% on least supplemental O2.
    f. Verbalizes and demonstrates understanding of a home exercise program, activity progression, body mechanics and energy conservation techniques.
    g. Demonstrates appropriate hemodynamic response to activity
    h. If above short term goals are not met or appropriate support systems are not in place, the patient should consider placement in an extended care facility, home physical therapy or outpatient physical therapy services as appropriate.

Treatment Planning / Interventions

Established Pathway	___ Yes, see attached.	_X_ No
Established Protocol	___ Yes, see attached.	_X_ No

Interventions most commonly used for this case type/diagnosis

This section is intended to capture the most commonly used interventions for this case type/diagnosis. It is not intended to be either inclusive or exclusive of appropriate interventions.

A. Bed mobility
    1. Potential ways to make bed mobility easier include the use of friction reducing sheets or trendelenburg position for gravity-assisted boosting, use of the bed rails/trapeze if not contraindicated due to recent surgical procedure, and airflow mattress which can be deflated for mobility. Also, consider side vs. foot exit beds[39].
    2. Suggestions based on body type[39]:
        a. Apple ascites: This patient is often intolerant to supine and prone positions due to the retention of CO2 in these positions. This patient often uses pillows under the head to achieve the semi-fowler position to aid breathing. For bed mobility, the patient often assumes a supine position, spins to a perpendicular position relative to the head of the bed and elevates the trunk with the elbows, often using the counterweight of the legs over the edge of the bed. This patient may require a wider bed.
        b. Apple pannus: These patients demonstrate variable tolerance to supine positions depending on the mobility of the pannus. They often utilize the supine or prone flat spin techniques as described above to achieve out of bed positions.

c. Pear shape abducted: These patients often have difficulty rolling due to the abducted position and weight of the lower extremities, but tolerate supine well. They generally use a supine to long sit, to short sit technique for getting out of bed. They will often benefit from a narrow bed.
d. Pear shape adducted: These patients are generally well able to perform the logroll technique due to the mobile nature of their tissue bulk. They also may use a supine to long sit to short sit technique to achieve out of bed.
e. Pear shape with bulbous gluteal region: These patients have excessive posterior tissue bulk causing the pelvis to push anterior in relation to trunk when in supine. They may benefit from an air mattress to allow the heavy hips and lower limbs to sink into the mattress and the lighter trunk to remain more elevated.

3. A ceiling lift system can be used for repositioning in bed. Refer to Appendix A for weight limit information.

B. Transfer training
1. The patient's hips and knees should be in 90 degrees of flexion to help reduce the risk of patient sliding off the edge of the transfer surface.
2. The Egress Test: Used to determine if patient is safe to transfer, briefly the test consists of three parts[51]:
   a. Test 1: three repetitions of sit to stand to test their ability to weight-bear in functional context
   b. Test 2: marching in place to test their endurance
   c. Test 3: advance one step and return each foot, repeated times two trials, used to test their function and endurance combined.
3. Gait belt
   a. Can only be used for improved grip
   b. Must have appropriate length of belt, if the appropriate length cannot be achieved, a sheet can be utilized.
4. If applicable, the patient should move towards their stronger side during transfers.
5. Patients with obesity may require a wider seat. Patients with a bulbous gluteal region may require an increased seat depth to accommodate the posterior tissue bulk.
6. Utilize the appropriate number of staff to maintain patient and staff safety.
7. If a patient was not previously mobile, utilizing a mechanical lift will decrease risk of injury to the patient and the healthcare providers. The Guldman© ceiling lift system can also be used for supine to sit mobility and bed to chair transfers. The Golvo Lift© and Sabina Lift© systems can both be used for bed to chair or sit to stand transfers. Please refer to company websites for further information[52-54].

C. Gait training/stairs
    1. The PT should attempt to correct musculoskeletal/postural abnormalities first.
    2. The PT should prescribe the correct assistive device, taking into consideration the weight limitations and structure of the device.
    3. The bariatric patient may have limited ambulation at baseline and may defer to a wheelchair for mobility. In this case, referral to a wheelchair clinic may be necessary for a thorough seating assessment.
    4. Gait training equipment is available for those patients who may not be able to ambulate without partial body weight support. The Guldmann© and Golvo© lift systems both have gait training slings. Please refer to Appendix A for weight limitations for commonly used equipment.

D. It is important that the health care provider choose the correct equipment with regards to weight limitations and the patient's height and width. Please refer to Appendix A for weight limitations and widths for commonly used equipment at Brigham and Women's Hospital.

E. Aerobic Exercise Prescription
    1. Examples include:
        a. Walking program
        b. Stationary bike
        c. Restorator
        d. Elliptical or Treadmill
        e. Swimming program, if appropriate (consider postoperative limitations such as incisions)
    2. Recommendations from The American College of Sports Medicine[55]:
        a. At least 150 minutes per week of moderate intensity exercise, defined as 55-70% of the patient's heart rate maximum is recommended for all adults as part of a healthy lifestyle. This has been shown to have a modest effect on weight loss, 2-3kg per week.
        b. For overweight adults a gradual increase in physical activity to 225-400 minutes per week is recommended for maximal weight loss of 5-7.5 kg per week.
        c. To prevent weight regain, 200-300 minutes per week of aerobic exercise has been recommended.
        d. Intermittent exercise (i.e. 10-15 minutes of exercise, 3 times per day for a total of 30-45 minutes of exercise in a day) has been shown to decrease incidence of cardiac risk factors and improve aerobic fitness but has not been shown to add additional weight loss. Intermittent exercise has been shown to be successful in helping a patient adopt a new exercise regime.
    3. Following gastric bypass surgery, research has shown improvements in physical function and health related quality of life and a decrease in pain. Post-surgical patients are able to participate in a daily walking program but demonstrate slower walking speeds and report a higher RPE when compared to non-operative control patients[56].

F. Resisted Exercise Prescription
    1. Resistance training has not been shown to increase weight loss, but adds muscle strength and endurance which is likely to have a positive impact on functional mobility and improves overall health risk factors[55].
    2. It is important to note that positions of certain exercises may need to be modified due to body habitus.

G. Exercise Training for the Elderly[55].
    1. Generally the focus of exercise in elders with obesity is on increasing function and quality of life, not on decreasing cardiac risk factors or the incidence of comorbidities.
    2. Flexibility, light progressive resistance training and balance training are all encouraged.
    3. Aerobic exercise should be initiated as tolerated.
    4. Aquatic therapy or non weight bearing activities might be utilized if the patient cannot tolerate weight bearing exercises.
    5. Elders with obesity who exercise have been shown to have decreased pain and increased six minute walk test distance[57,58].

H. Patient/Family Education
    1. Home exercise program[59]
        a. A home exercise program has been shown to improve BMI, decrease weight, maintain weight loss and improve aerobic capacity
        b. Moderate intensity resistance training 3-4x/week is recommended.
        c. A daily walking program of 30-50 minutes per day is a good way to incorporate exercise.
        d. Involving the patient and their family in weight training education sessions prior to discharge home is helpful for carryover.
        e. A written handout of information including the aerobic exercise prescription and pictures with instructions for resistance training can also help with carryover to the home setting.
    2. Body mechanics
        a. The patient should be educated on any post-surgical precautions such as the logrolling technique.
        b. An upright posture with ambulation should be encouraged for improved respiratory capacity
    3. Equipment
        a. The patient should be educated on any new equipment issued or any adjustments made to prior owned equipment.

Frequency & Duration:

This is based upon patient's impairments, tolerance to treatment and medical stability as per departmental guidelines.

A. Frequency
    1. Inpatient:
        a. Functional mobility: 3-5x/week
        b. Musculoskeletal needs: 2-3x/week
        c. Aerobic Conditioning: 2-3x/week for education and monitoring of aerobic exercise
        d. Screening: 1x visit
    2. Outpatient:
        a. Frequency is based on specific needs, typically for musculoskeletal or endurance issues, 1-2x/week.
        b. In the outpatient setting the number of physical therapy visits may be limited due to insurance approval.

B. Reevaluations:
    1. Inpatient: The patient should be re-evaluated every 7-10 days throughout the length of inpatient stay or when a significant change in status occurs.
    2. Outpatient:
        a. Standard Time Frame- 30 days or less if appropriate
        b. A significant change in signs and symptoms or functional status

Recommendations and Referrals to Other Providers:

Referrals to other healthcare professionals including outpatient physical therapy, occupational therapy, an exercise physiologist, a nutritionist, or a wellness or weight loss center may be indicated after admission for a weight loss surgery. Patients involved in a multidisciplinary weight loss program have been shown to perform significantly better on the 6 minute walk test, indicating higher improvement in aerobic capacity than those individuals involved in a diet therapy alone group[60]. Brigham and Women's Hospital offers a Program for Weight Management at 221 Longwood Avenue, Boston MA. The program offers a personalized and physician monitored weight loss program including diet planning, meetings with a registered dietician and a weekly support group, More information can be found at http://www.brighamandwomens.org/Departments_and_Services/medicine/services/endocrine/WeightManagement/PWMdefault.aspx.

Discharge Planning

Commonly expected outcomes at discharge: The patient will return to their home environment with improved functional mobility, an independent and progressive aerobic conditioning program, a decreased oxygen requirement, and more appropriate assistive devices/mobility aides.

Transfer of Care:

1. If the above goals are not met during the inpatient stay, discharge to a rehabilitation hospital may be appropriate.
2. There are currently no federal requirements that nursing home facilities have bariatric equipment on site to provide care for patients with obesity. Some nursing facilities may consider patients with obesity as ineligible for admission due to lack of durable medial equipment (DME) and adequate staffing to support care for the patient. Also, some facilities may admit patients with obesity only to learn that they are unable to care for them adequately, requiring transfer of care back the emergency department or to another acute, subacute or residential facility[61]. In discharge planning, it is important to consider not only the medical issues but also the DME, physical, and emotional needs of this patient population. Rehabilitation therapists can help by ensuring that the care coordinator and medical team are aware of the patient's needs, thereby helping to ensure ease of transfer to an appropriate facility and prevent unnecessary readmissions.

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Appendix A

Bariatric Equipment	Weight Limit	Available in dept (X)
EXERCISE EQUIPMENT		
Moveo	400#	X
Stand Aid	400#	X
Tilt Table	400#	X
Training stairs (Value Line)	350#	X
MOBILITY		
Cane, straight, standard ht, heavy-duty (Medline)	500#	X
Cane, straight, heavy-duty, x-tall (TFI)	500#	X
Crutches, axillary -metal, short, med, tall (MediChoice)	350#	X
Crutches, metal, heavy duty, extra tall (TFI)	400#	X
Crutches, metal, heavy duty, tall (TFI or Lumex)	TFI - 450# Lumex - 600#	X
Crutches, metal, heavy duty, adult (TFI or Lumex)	TFI - 450# Lumex - 600#	X
Platform attachment, bariatric, for walker (Drive)	500#	X
Loaner slide board #1	600#	X
Loaner slide board #3	600#	X
Loaner slide board #33	600#	X
Sliding transfer board, bariatric (Therafin)	650#	X
Walker, adult (Lumex Imperial)	400#	X
Walker, heavy duty, extra wide TFI	500#	X
Walker, bariatric, rolling (Medline)	500#	X
Walker, bariatric rolling (Invacare)	700#	X
Walker wheels, bariatric	500#	X
Wheelchair, extra-wide,heavy duty, navy	500#	Transport Department
Wheelchair, bariatric	700#	Equipment
Wheelchair, halo (Invacare)	350#	X

Bariatric Equipment	Weight Limit	Available in dept (X)
LIFT/TRAPEZE		
Ceiling lift (Guldmann)	**Standard motor and slings 550#**	Installed in some patients' rooms.
Ceiling lift (Guldmann)	**Heavy duty motor and slings available for up to 1000# (must be requested)**	Can contact Equipment to obtain heavy duty motor or sling.
Hoyer lift slings	**400#, w/ sling in good condition**	X
Patient Lift: E-Z lift	**2 units: 650# and 1000# capacity**	Call E-Z lift team in Transport
Patient Lift: Liko - Sabino transfer lift	**440#**	Call equipment for lift and sling
Patient Lift: Liko - Golvo lift	**440#**	Call equipment for lift and appropriate sling
Overhead bed frame/trapeze	**300# (can be reinforced for bariatric bed)**	page ortho tech aide p12541
BEDS		
Bed, Stryker Secure II	**500#**	Equipment
Bed, KCI BariMaxx II	**1000#**	Equipment
Bed, KCI BariKare	**850#**	Equipment
Bed, Hill-Rom Total Care Bariatric II ICU bed	**500#**	Equipment
Bed, Hill-Rom Total Care Bariatric III ICU bed	**500#**	Equipment
CHAIRS		
Chair, grey Stryker Symmetry Plus Treatment Chair	**500#**	Equipment
Chair, "Cardiac" (Med)	**350#**	Equipment
Chair, "Cardiac" (Large)	**750#**	Equipment
Chair, stretcher, bariatric	**675#**	Equipment

Key:

- **Red = up to 350#**
- **Red and White stripe- up to 400#**
- **Blue = 500#**
- **Green = 600# or more**
- **Orange = up to 700#**
- **Purple = up to 1000#**

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