Objectives

1. Discuss the current prevalence rates, definitions and treatment approaches of obesity in the United States.
2. Understand use of current FDA approved anti-obesity medications (AOMs).
3. Describe various bariatric surgeries and understand which patients to refer for evaluation.

The Disease of Obesity

Impact on Mortality

Obesity is associated with a 50-100% risk of premature death compared to healthy weight individuals.

- Median survival rate is reduced by two-four years for individuals with BMI 30-35
- Median survival rate is reduced by eight-ten years for individuals with BMI 40-45 which is comparable to smoking.


In the news...

- Obesity extends duration of influenza A virus shedding
  - Aug 2, 2018
  - Obesity increases influenza disease severity & also extends by about 1.5 days how long the virus is shed.

- Obesity increases risk of premature death
  - July 2016
  - National study demonstrated that every 5 units higher BMI above 25 kg/m2 was associated with 31% higher risk of premature death.

According to the CDC in 2015-2016

- 38.6 % US population affected by obesity
- 52.2 million adults in US
- Estimated cost in 2008 was $147 billion

https://www.cdc.gov/obesity/data/adult.html [accessed 1 Aug 2018]
A look back in time...

- In 2000 starting to see the increasing prevalence of obesity.
- BMI seen as a major risk factor for DM.
- Low rates of addressing BMI with patients.

Evolving definition of obesity

- Obesity is a chronic disease
- NOT a character flaw
- Excess weight or unhealthy weight

It has been proposed to call obesity
- Adiposity-based chronic disease (ABCD)

Definition of Obesity

"Obesity is defined as a chronic, relapsing, multifactorial, neurobehavioral disease, wherein an increase in body fat promotes adipose tissue dysfunction and abnormal fat mass physical forces, resulting in adverse metabolic, biomechanical, and psychosocial health consequences."

National Obesity Trends

<table>
<thead>
<tr>
<th>GENDER</th>
<th>AGE</th>
<th>ETHNICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>Men</td>
<td></td>
</tr>
<tr>
<td>Obesity Rate for Adults by Gender</td>
<td>Obesity Rate for Adults by Sex</td>
<td>Obesity Rate for Adults by Race and Ethnicity</td>
</tr>
<tr>
<td>40.4%</td>
<td>35%</td>
<td>43%</td>
</tr>
<tr>
<td>34.3%</td>
<td>45%</td>
<td>48.6%</td>
</tr>
<tr>
<td>38.5%</td>
<td>58.1%</td>
<td>36.4%</td>
</tr>
<tr>
<td>36.4%</td>
<td>12.6%</td>
<td></td>
</tr>
</tbody>
</table>

Texas Obesity Rates: 33.7%

Ranking 8th/S1
Effects of BMI and Smoking Status on Survival
Men 35-100 years old

Cost of Obesity

- Cost of obesity in the United States in 2000 was more than $117 billion
- Many insurance companies do not cover clinical or non-clinical weight-loss programs

Influences of Our Times

- Portions
- Distractions
- Family Schedule
- Eating Out
- Work Schedule
- Business Meals

CAN YOU RELATE?

Convenience Crisis

- Home Cooking
- Daily Eating Out
Convenient Abundance

Adiposopathy Stress Cycle

Classifications

Classifications

BMI: a universal measurement but certainly not perfect

ACC/AHA Obesity Guideline 2013
Obesity Algorithm

Nutritional Intervention
Physical Activity
Behavior Therapy
Pharmaco-therapy
Bariatric Procedures
Motivational Interviewing

Obesity as a Disease
Data Collection
Evaluation and Assessment
Management Decisions

Comorbidities of Obesity

Pulmonary Disease
Obstructive Sleep Apnea
Hypertension
Idiopathic Intracranial Hypertension
Mallampati score of 3 or 4
Tonsillar hypertrophy/enlarged uvula
Peripheral edema
Cardiac dysrhythmia
HTN

Healthy Nutrition for Obesity

Healthy Nutrition for Obesity

Limit processed foods
Limit empty calories such as sweets, candy, chips
Beware of beverages with high calories/sugar

Encourage healthy proteins and fats
Carbohydrates should be complex carbs over simple carbs and look for low glycemic index foods
High fiber foods
Read the labels not the advertising!
Factors that affect nutrition

- Individual food preferences, eating behaviors, meal plans and schedules
- Cultural background & traditions
- Availability of food
- Financial constraints
- Nutritional knowledge
- Cooking skills and interest
- Household makeup: cooking for 1?

Popular diets

- Ketogenic
- Paleo
- Atkins
- Mediterranean
- Ornish
- DASH (Dietary Approaches to Stop HTN)
- Commercial Diet programs
  - Weight Watcher's
  - Nutrisystem
  - Jenny Craig

Hunger, appetite and satiety

- STOP-Bang Questionnaire
- Screen for sleep apnea
- QOL Indicator
- 2018 PAR-Q+ to establish exercise readiness

Sleep Apnea

In office questionnaire
Sleep study referral
  - In-home study
  - In-lab overnight study
  - AHI (Apnea hypopnea index)
    - 5-15/hour = mild sleep apnea
    - 15-30/hour = moderate sleep apnea
    - > 30/hour = severe sleep apnea
Consequences of untreated OSA
  - Worsening obesity
  - OSA
  - Cardiovascular disease
  - Nocturnal dysrhythmias
  - OSA
  - HTN
  - DM
  - Pulmonary HTN

Gender Specific Manifestations of Adiposopathy

Women
  - Hyperandrogenemia
  - Hirsutism
  - Acne
  - Polycystic ovarian syndrome
  - Menstrual disorders
  - Infertility
  - Gestational DM
  - Preeclampsia
  - Thrombosis

Men
  - Hypoandrogenemia
  - Hyperestrogenemia
  - Erectile dysfunction
  - Low sperm count
  - Infertility
Increased risk of cancer

- Bladder cancer
- Brain cancer
- Breast cancer (post-menopausal)
- Cervical cancer
- Colon cancer
- Endometrial/uterine
- Kidney cancer
- Leukemia
- Liver cancer
- Multiple myeloma
- Non-Hodgkin lymphoma
- Pancreatic cancer
- Prostate cancer (worsened prognosis, not necessarily increased risk)
- Stomach cancer
- Thyroid cancer

New Patient Diet History

- Previous diet history
- Highest and lowest adult weights
- Co-morbidities
- Eating disorders
- Activity level: current and previous
- Social: tob/ETOH/drugs/employment/support system/home environment
- Medications/allergies
- Eating out

Eating History

- Meals/Snacks
  - Timing
  - Frequency
  - Nutritional content
  - Portions
  - Who prepares foods

- Behaviors
  - Triggers/nighttime eating/binge eating/readiness for change
  - Record keeping

Physical Activity

- Assess readiness
- Able to walk?
- Weight bearing exercise?
- Ultimate goal is at least 150 minutes weekly of moderate physical activity and resistance training for core strength
- Consider PT referral
- Network with your local trainers and gyms

Lab Workup

- Fasting CMP
- Hemoglobin A1C
- Fasting lipids
- Uric Acid
- Thyroid panel
- Vitamin D, B-1, B-12
- CBC
- Iron studies

Based on H&P the patient may need additional testing such as:
- Cardiac stress test
- Sleep study
- Echo
- Bone density scan

MOTIVATIONAL INTERVIEWING
Stages of Change

- Pre-contemplation: Unawareness of the problem
- Contemplation: Thinking of change in the next 6 months
- Preparation: Making plans to change now
- Action: Implementation of change
-Maintenance: Prevention of relapse
- Relapse: Restart of unfavorable behavior

Motivational Interviewing: Focus

**Collaboration:**
- Working together to find and implement pragmatic solutions
- Not focusing on who is right and who is wrong

**Evocation:**
- Drawing out the patient’s thoughts and ideas regarding solutions
- Not telling the patient what to do

**Autonomy:**
- Empowering the patient to own the solution
- Not the authoritarian power of the clinician

Motivational Interviewing Techniques: 5A’s of Obesity Management

**Ask**
- Ask for permission to discuss body weight.
- Explore readiness for change.

**Assess**
- Assess BMI, waist circumference, and obesity stage.
- Explore drivers and complications of excess weight.

**Advise**
- Advise the patient about the health risks of obesity, the benefits of modest weight loss (i.e., 5-10 percent), the need for long-term strategies, and treatment options.

**Agree**
- Agree on realistic weight loss expectations, targets, behavioral changes, and specific details of the treatment plan.

**Arrange/Assist**
- Assist in identifying and addressing barriers, provide resources, assist in linking and consulting with appropriate providers, arrange regular follow-ups.

Multifactorial Approach to Therapy

- Diet recall
- Previous Success
- Build on preferences
- Increased Physical Activity
- Behavioral Therapy
- Primary care
- Dietitian
- Counselor

Hunger Hormones

- **Ghrelin** increases appetite
- **Leptin** decreases appetite

All or nothing
Cardiovascular effects of Glucagon-like peptide 1 (GLP-1) receptor agonists

Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/Publication/...Pleitropic-effects-of-GLP-1-or-GLP-1R-agonists-on-the-human-heart-C_G_47702523[accessed 5 Aug, 2018]

Hunger Hormones

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Source</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCK</td>
<td>GI Tract</td>
<td>Limits size of meal</td>
</tr>
<tr>
<td>Amylin, insulin, glucagon</td>
<td>Pancreas</td>
<td>Limits size of meal</td>
</tr>
<tr>
<td>PYY</td>
<td>Intestines</td>
<td>Promotes need to eat</td>
</tr>
<tr>
<td>GLP-1</td>
<td>Stomach</td>
<td>Promotes need to eat</td>
</tr>
<tr>
<td>Orexyn</td>
<td>Stomach</td>
<td>Promotes need to eat</td>
</tr>
<tr>
<td>Leptin</td>
<td>Adipose tissue</td>
<td>Promotes regulation of food intake</td>
</tr>
<tr>
<td>Ghrelin</td>
<td>Stomach</td>
<td>Increases appetite</td>
</tr>
</tbody>
</table>

The hormones that control our hunger

Examples of hormones that control the hypothalamic neurons and the effect they have on hunger:

- **Pancreas:**
  - Amylin
  - Insulin
  - Pancreatic polypeptide (PP)
  - Inhibit hunger

- **Upper small bowel:**
  - Cholecystokinin (CCK)
  - Inhibit hunger

- **Lower small bowel:**
  - Peptide YY
  - Glucagon-Like Peptide 1 (GLP-1)
  - Orexyn
  - Inhibit hunger

- **Fat cells:**
  - Leptin
  - Inhibit hunger

- **Stomach:**
  - Ghrelin
  - Increase appetite

Drugs That Increase Weight

- TCAs
- MIAAs
- Paroxetine
- Lithium
- Glucosamine
- Chloramphenicol
- Risperidone
- Carbamazepine
- Valproate
- Mirtazapine
- Gabapentin
- Amitriptyline
- Valproic acid
- Diphenhydramine
  - Some beta blockers
  - Propranolol
  - Atenolol
  - Metoprolol
  - Older sodium channel blockers
  - Lisinopril
  - Amiodipine
  - Felodipine
  - Diabetes medications
  - Most insulins
  - Sulfonamides
  - Thiazolidinediones
  - Meglitinides
  - Some epilepsy medications

Anti-obesity Medications (AOBMs) Pharmacotherapy

- Qsymia
- Belviq
- Saxenda
Food and Drug Administration (FDA) Principles

FDA-approved Anti-obesity Medication indications:
- Patients with obesity (e.g., BMI ≥ 30 kg/m²)
- Patients who are overweight (e.g., BMI ≥ 27 kg/m²) with presence of increased adiposity complications (e.g., type 2 diabetes mellitus, hypertension, dyslipidemia)
- Anti-obesity medications are contraindicated in patients hypersensitive to the drugs.

*If no clinical improvement (e.g., at least 4 - 5% loss of baseline body weight) after 12-16 weeks with one anti-obesity medication, then consider alternative anti-obesity medication or increasing anti-obesity medication dose (if applicable).

Anti-Obesity Drug Summary

<table>
<thead>
<tr>
<th>Drug</th>
<th>Description</th>
<th>Main Side Effects</th>
<th>Some Drug Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenetermine</td>
<td>Phentermine is an appetite suppressant drug that works on the hypothalamus, depending on the dose approved for treatment (30 mg/day or 37.5 mg/day). The most common side effects include dizziness, fatigue, nausea, dry mouth, and constipation occurring during the early weeks with one anti-obesity medication dose. It is a generally well-tolerated medication. Some patients may lose 5% - 10% of body weight. It also helps to manage concurrent conditions such as type 2 diabetes mellitus, hypertension, dyslipidemia. Major drug interactions include sympathomimetics, antidepressants, alcohol, allergy medications, and beta-blockers.</td>
<td>Some drug interactions include sympathomimetics, antidepressants, alcohol, allergy medications, and beta-blockers.</td>
<td>Highly frequent interaction with sympathomimetics, antidepressants, alcohol, allergy medications, and beta-blockers.</td>
</tr>
<tr>
<td>Qsymia (Phentermine HCL/Topiramate)</td>
<td>This is a combination of naltrexone and topiramate used to treat obesity in adults who have not responded to diet and exercise. It is a generally well-tolerated medication. Some patients may lose 5% - 10% of body weight. It also helps to manage concurrent conditions such as type 2 diabetes mellitus, hypertension, dyslipidemia. Drug interactions include opioids, warfarin, SNRI's, and antidepressants.</td>
<td>Some drug interactions include opioids, warfarin, SNRI's, and antidepressants.</td>
<td>Highly frequent interaction with opioids, warfarin, SNRI's, and antidepressants.</td>
</tr>
<tr>
<td>Lorcaserin</td>
<td>Lorcaserin is a selective serotonin receptor activator that reduces appetite and increases satiety. It is a generally well-tolerated medication. Some patients may lose 5% - 10% of body weight. It also helps to manage concurrent conditions such as type 2 diabetes mellitus, hypertension, dyslipidemia. Drug interactions include inhibitors, warfarin, and antidepressants.</td>
<td>Some drug interactions include inhibitors, warfarin, and antidepressants.</td>
<td>Highly frequent interaction with inhibitors, warfarin, and antidepressants.</td>
</tr>
</tbody>
</table>

Adipex

Phentermine 8, 15, 30 & 37.5 mg

Advantages:
- Generic
- Inexpensive
- Good for overeaters
- Decreases cravings

Disadvantages:
- Does not work for meal skippers
- Limited duration: 3 months
- Side effect profile: Common side effects include dry mouth, tachycardia, and insomnia.

Qsymia

Phentermine HCL/Topiramate

Week 1-2: Qsymia 7.5 mg/23 mg

Week 3-4: Qsymia 7.5 mg/46 mg

Week 5-8: Qsymia 7.5 mg/69 mg

Week 9-12: Qsymia 11.25 mg/92 mg

If dose escalation needed for ≥ 5% weight loss after 12 weeks.
Qsymia (Phentermine HCL/Topiramate)  
**Mechanism of action:** Targeted for proopiomelanocortin (POMC) neurons in hypothalamus decreasing appetite & satiety, increases satiety, carbonic anhydrase inhibitor
- **Pharmacokinetics:** Phentermine metabolized by liver & excreted by kidney, Topiramate is excreted mainly by kidney
- **Side Effects:** Paresthesia, dizziness, change in taste, constipation, dry mouth
- **Fetal toxicity:** Cleft palate. Increased HR, may cause DUB but not an increased risk of pregnancy; OCP should not be discontinued if spotting occurs. Avoid alcohol as may potentiate CNS depressants; may potentiate ↓K+ of non-potassium sparing diuretics. Need to increase hydration, may ↑kidney stones.
- **Contraindications:** Pregnancy, glaucoma, MAOIs (within 14 days), hyperthyroidism
- **Monitoring:** Obtain negative pregnancy test before starting and monthly
- **Possible lab abn:** ↓glucose; ↑creatinine; metabolic acidosis

Belviq (lorcaserin) 10 mg BID  
**Mechanism of action:** Serotonin 2C receptor agonist: reduces appetite via POMC neuron activation in the hypothalamus
- **Pharmacokinetics:** CYP2D6 metabolism: renal excretion
- **Side Effects:** Headache, nausea, fatigue, dry mouth, constipation, increase hypoglycemia in patients treated for DM (29%), can increase suicidal thoughts, consider using PQH-9 for screening
- **Decrease BP, HR, Total & LDL & fasting glucose
- **Contraindications:** Renal failure (eGFR<30ml/min), Pregnancy/breastfeeding, other 5HT drugs

Belviq XR 20 mg QD  
**Advantages:**
- Makes soda and sweets taste bad
- Not stimulant or narcotic
- Very tolerable, can be used in older adults

**Disadvantages:**
- Contaminated in pregnancy & breastfeeding
- Caution with moderate renal impairment & severe hepatic impairment
- Side effects: Nausea, fatigue, dizziness, dry mouth, constipation, memory
- Monitor glucose more frequently
- Monitor blood pressure

**Warnings:**
- Seizure syndromes
- Cognitive impairment
- Hypoglycemia in patients treated for DM (20%)

Saxenda (Liraglutide)  
**Mechanism of action:** GLP-1 agonist; POMC neuron activation (appetite control via the satiety center) delays gastric emptying
- **Pharmacokinetics:** 98% protein bound, No specific metabolizing organ (SC injection), 5-6% excreted in urine/feces
- **Side Effects:** Nausea, headache, vomiting, diarrhea, constipation, dizziness, dyspepsia, fatigue
- **Contraindications:** Personal or family history of medullary thyroid carcinoma (MTC), multiple endocrine neoplasia syndrome type 2 (MEN 2), genetic testing for certain genetic factors; patients with a history of pancreatitis, active gallbladder disease, active gallbladder disease; patients on Saxenda should be monitored for emergence or worsening of depression or suicidal thoughts.

**Warnings:**
- No pregnancy or breastfeeding
- No personal or family history of medullary thyroid cancer (MTC)
- Multiple endocrine neoplasia syndrome type 2 (MEN 2)
- Pancreatitis

**Dosages:**
- 0.6 mg daily
- 1.2 mg daily
- 1.8 mg daily
- 2.4 mg daily
- 3.0 mg daily

GLP-1 & Glucose metabolism
**Contrave**
(Naltrexone 8 mg/Bupropion 90 mg)

<table>
<thead>
<tr>
<th>Mechanism of action</th>
<th>Naltrexone is an opioid antagonist. Bupropion is an antidepressant suppresses appetite &amp; craving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacokinetics</td>
<td>Inhibits neuronal uptake of dopamine &amp; norepinephrine; activates POMC neurons in the hypothalamus leading to decreased appetite</td>
</tr>
<tr>
<td>Side Effects</td>
<td>GI: constipation, diarrhea, headache; dry mouth, insomnia</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Should NOT be administered with opioids or with other drugs metabolized to BUP (SSRIs, MAOIs, antipsychotics (haloperidol, risperidone &amp; thioridazine); beta blockers (metoprolol); type 1C antiarrhythmics (propafenone &amp; flecainide)</td>
</tr>
<tr>
<td></td>
<td>Do not take with uncontrolled HTN or history of seizures</td>
</tr>
<tr>
<td></td>
<td>Avoid use in individuals with eating disorders</td>
</tr>
</tbody>
</table>

**Black Box Warning**
Suicidal behavior & ideation

**Side Effects**
N&V, constipation, diarrhea, headache, dry mouth, insomnia

**Contraindications**
Should NOT be administered with opioids or with other drugs metabolized to BUP (SSRIs, MAOIs, antipsychotics (haloperidol, risperidone & thioridazine); beta blockers (metoprolol); type 1C antiarrhythmics (propafenone & flecainide) Do not take with uncontrolled HTN or history of seizures Avoid use in individuals with eating disorders

**Who Qualifies for Surgery?**
- BMI >40 OR BMI >35 with comorbidities
- History of non surgical weight loss attempts
- Loose skin
- Frequent snoring
- No psychological contraindications
- NON-SMOKER
- Tobacco free ≤ 3 months, nicotine free ≤ 2 months
- DEDICATED TO LIFESTYLE CHANGE

**Anti-Obesity Pharmacology**
**Dual Benefits**

<table>
<thead>
<tr>
<th>Obesity along with:</th>
<th>May consider:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>Saxenda</td>
</tr>
<tr>
<td>Migraines</td>
<td>Qnexa</td>
</tr>
<tr>
<td>Depression</td>
<td>Contrave</td>
</tr>
<tr>
<td>Smoking</td>
<td>Contrave</td>
</tr>
</tbody>
</table>

**Case studies**
AOMS

**Bariatric Surgery**

**Sleeve Gastrectomy**

**Gastric Bypass**

**Medical City**

**Medicalextra**
Operations

- Restrictive:
  - Laparoscopic vertical sleeve gastrectomy ("the sleeve")

- Restrictive and Malabsorptive:
  - Laparoscopic Roux en Y gastric bypass ("gastric bypass")

Laparoscopic Vertical Sleeve Gastrectomy

- Restrictive Procedure
- Developed early 2000’s
- NOT reversible
- 60-65% excess body weight loss
- ~1.5 hours

- Works by:
  - Restricting meal size
  - Hormonal mechanisms
  - Decreased appetite

Laparoscopic Roux en Y Gastric Bypass

- Combination procedure
- Long history (1960’s)
- NOT (easily) reversible
- 65-75% excess body weight loss
- ~2.5 - 3 hours
- Restricts meal size
- Hormonal mechanisms
- Reduces appetite
- Limits absorption

Risks - both procedures

- 0.1% risk of death (1 out of 1000)
- 4% risk of serious complications
- Bleeding
- Deep vein thrombosis (DVT)
- Pulmonary Embolism (PE)
- Wound infections
- Incisional hernias

Hospital Course

- Day of surgery:
  - Out of bed, walking around
  - IV pain medication
  - Bariatric clear liquids

- Post op day 1:
  - Bariatric clear liquids
  - Oral pain medications
  - Home on bariatric stage II diet
  - Medications liquid or crushed for 1 month after surgery

Bariatric surgery diet

- 2 weeks pre-op
  - 2 protein shakes per day and 1 reasonable meal

- Post op day 1
  - Bariatric Stage I (clear liquids, 30mL advancing to 60mL)

- Post op day 2-14
  - Bariatric Stage 2 (full liquids, mostly protein shakes)

- Post op day 15-30
  - Bariatric Stage 3 (pureed, baby food consistency)
**Lifetime Changes**

- Low fat, low carbohydrate, HIGH protein diet
  - <1000 calories per day
- Be active:
  - 30 minutes per day, 5 days per week
- Daily multivitamin; vit D, B12 & calcium
- No carbonated beverages, no straws
- Limit or avoid alcohol, sugary drinks
- Stay hydrated (64 ounces of liquids daily)

**Bariatric Case Study**

- 65 yo female with Lapband placed in 2010
- Struggled to find her green zone and had limit weight loss
- Seeks revision to sleeve gastrectomy
- Starting weight:
  - 256 lbs & BMI 40.09
  - After 3 month journey to surgery:
    - 243 lbs & BMI 38.06

**Post-op follow up**

- 3 months:
  - 220 lbs
  - 50 lbs loss
- 6 months:
  - 187 lbs
  - 69 lbs loss
- 9 months:
  - 210 lbs
  - 46 lbs loss

**ICD-10 Obesity Related Codes**

- E60.01 Morbid (severe) obesity due to excess calories
- E65.09 Other obesity due to excess calories
- E66.1 Drug induced obesity
- E66.2 Morbid (severe) obesity with alveolar hypoventilation
- E66.3 Overweight
- E66.8 Other obesity
- E66.9 Obesity, unspecified

Other codes:
- Z71.3 Nutritional Counseling
- E88.81 Metabolic Syndrome
- R63.2 Polyphagia
- R63.3 Abnormal weight gain
- G47.33 OSA

**Other codes**
- G47.33 Obstructive Sleep Apnea
- E88.81 Metabolic Syndrome
- R63.2 Polyphagia
- R63.3 Abnormal weight gain
- G47.33 Obstructive Sleep Apnea

**Take Away Pearls**

**Medical Weight Management**

- Rx therapy indicated:
  - BMI > 30
  - BMI > 27 with comorbidity
- Rx MUST be coupled with behavior modification, dietary counseling & increased physical activity

**Bariatric Surgery**

- Surgery is indicated with:
  - BMI > 40
  - BMI > 35 with comorbidity
  - HTN, HLD, DM, OA, OA
- Multi-disciplinary team & ongoing connection with comprehensive program is essential

**References**

- Cardiovascular effects of Glucagon-like peptide 1 (GLP-1) receptor agonists - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/pleitropic-effects-of-GLP-1-or-GLP-1R-agonists-Adapted-from-references-24_fig2_267740019 [Accessed 5 Aug, 2018]