**Introduction**

- Increasing obesity has led to an increase in metabolic syndrome
- Affects ~32% of adults over the age of 20 and up to 45% over age 50

**Outline**

- Overview
- Diagnostic Criteria
- Medical Treatment
- MNT
- Patient M
- Critical Comments

**Metabolic Syndrome**

- Also known as...
  - Syndrome X
  - Insulin resistance syndrome
  - Obesity syndrome

**What is it?**

- Group of risk factors that promote the development of
  - Atherosclerotic Cardiovascular Disease
  - Type II Diabetes

**What are these factors?**

- Abdominal obesity
- High fasting blood sugar
- High triglycerides
- High blood pressure
- Low HDL
Adipocytes

Adipose tissue
- Subcutaneous adipose tissue
- Visceral adipose tissue
INCREASED RISK

- Obesity
- Poor diet
- Inactive
- ↑ age

- Genetics and inheritance
- Smokers
- Antipsychotic meds
**RELEVANCE?**

- 47 million adults!
- Compared to an individual without the syndrome…
  - 2 x as likely to develop heart disease
  - 5 x as likely to develop diabetes
- Will soon be a bigger risk factor for heart disease than smoking

**MENTALLY ILL PATIENTS**

- Metabolic syndrome in psych disorders is 2 x more common
- Physical inactivity, stress, psychotropic drugs, altered glucose metabolism, dyslipidemia
- Leading cause of morbidity & mortality in those with schizophrenia

**DIAGNOSTIC CRITERIA**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting blood sugar</td>
<td>≥100 mg/dL or individual is taking a Rx for high glucose</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>≥130/85 mmHg or individual is taking an antihypertensive Rx</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>≤35 inches in women and ≥40 inches in men</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>&lt;50 mg/dL in women and &lt;40 mg/dL in men or the individual is taking a Rx for low HDL</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>≥150 mg/dL or the individual is taking a Rx for high triglycerides</td>
</tr>
</tbody>
</table>

**MEDICAL TREATMENT**

- Blood Pressure Medications
- Cholesterol Medications
- Blood Sugar Medications

**OVERALL GOALS OF MNT**

- Improve or correct the cardio-metabolic risk factors
- Initial weight goal of 7-10%
- Biochemical goal levels:
  - Fasting plasma glucose <100 mg/dL
  - Total cholesterol <200 mg/dL
  - LDL cholesterol <100 mg/dL
  - HDL cholesterol Men >40 mg/dL, Women >50 mg/dL
  - Triglycerides <150 mg/dL
  - Blood pressure <130/80 mm Hg

**MNT: PHYSICAL ASSESSMENT**

- Abdominal obesity
- Waist circumference
  - Women ≥ 35 in
  - Men ≥ 40 in
- Estimate of body fat
  - BMI
**MNT: LAB VALUES**

- Diagnostic criteria
- C-reactive protein
- Degree of impaired glucose regulation:

<table>
<thead>
<tr>
<th>Category</th>
<th>FPG Test</th>
<th>2-hour PG Test</th>
<th>HgA1c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;100 mg/dL</td>
<td>&lt;140 mg/dL</td>
<td>&lt;5.7%</td>
</tr>
<tr>
<td>IFG</td>
<td>100-125 mg/dL</td>
<td>Pre-diabetes: 5.7-6.4%</td>
<td></td>
</tr>
<tr>
<td>IGT</td>
<td>140-199 mg/dL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>=26 mg/dL</td>
<td>=200 mg/dL</td>
<td>=6.5%</td>
</tr>
</tbody>
</table>

---

**DIETARY APPROACHES**

- Mediterranean diet
- FirstLine Therapy Food Plan
- Dietary Approaches to Stop Hypertension (DASH)

---

**MEDITERRANEAN DIET**

- Improvements in
  - lipid profile
  - waist circumference
  - blood pressure
  - glucose regulation

**FIRSTLINE THERAPY FOOD PLAN**

<table>
<thead>
<tr>
<th>Food category</th>
<th>Recommendation/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low GI vegetables (&lt;55)</td>
<td>≥3 servings/day</td>
</tr>
<tr>
<td>Moderate GI vegetables (55-70)</td>
<td>1 serving</td>
</tr>
<tr>
<td>Legumes</td>
<td>≥1 servings/day</td>
</tr>
<tr>
<td>Animal and vegetable proteins</td>
<td>unlimited</td>
</tr>
<tr>
<td>Nuts and seeds</td>
<td>1 serving</td>
</tr>
<tr>
<td>Low GI fruits</td>
<td>2-3 servings/day</td>
</tr>
<tr>
<td>Dairy</td>
<td>2-3 servings max</td>
</tr>
<tr>
<td>Whole grains</td>
<td>1 serving</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>4 servings</td>
</tr>
</tbody>
</table>

---

**DASH DIET**

<table>
<thead>
<tr>
<th>Food</th>
<th>Servings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>6-8 per day</td>
</tr>
<tr>
<td>Fruits</td>
<td>4-5 per day</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4-5 per day</td>
</tr>
<tr>
<td>Meats, poultry, fish</td>
<td>≤6 per day</td>
</tr>
<tr>
<td>Fat-free or low-fat dairy</td>
<td>2-3 per day</td>
</tr>
<tr>
<td>Nuts, seeds, legumes</td>
<td>4-5 per week</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>2-3 per day</td>
</tr>
<tr>
<td>Sweets</td>
<td>≤3 per week</td>
</tr>
</tbody>
</table>

---

**SUPPLEMENTS**

- Vitamin D
- Vitamins A, C, E
- Omega 3 fatty acids
- Conjugated linoleic acid
- Magnesium
- Cinnamon
- Chromium
- Green tea & Ginseng
Vitamin D
- Adequate intake improves glucose regulation
- Inadequate intake increases insulin resistance and CRP

Vitamins A, C, E
- In metabolic syndrome, people had low levels of vitamins A, C, and E
- A, C, E improve oxidative stress levels

Omega 3 Fatty Acids
- EPA, DHA
  - ↓ risk of sudden cardiac death
  - ↓ BP
  - Improves dyslipidemia and inflammation

Conjugated Linoleic Acid
- CLA affects body fat mass and lean body mass
- Fat loss in humans by ~0.2 lbs per week

Magnesium
- In MetS- high levels of insulin circulating in the body → stimulate Mg excretion leading to depletion

Cinnamon
- Insulin sensitivity
- Helps regulate blood glucose
CHROMIUM

• Improves binding to insulin receptors
• Drops in glucose and improvements in Hg A1C

GREEN TEA & GINSENG

• Polyphenols & caffeine
• Ginsenosides

PHYSICAL ACTIVITY

• Moderate activity or greater intensity for 120 min/week
  • ↓ Triglycerides
  • ↑ HDL cholesterol
• Physical activity for 60 min/day at least 5 times/week
  • ↓ Waist circumference
• Resistance training 2 days/week
  • ↓ Obesity, systolic blood pressure, and hemoglobin A1C

NUTRITION COUNSELING (IN PSYCHOTIC DISORDERS)

Cognitive-Behavioral Therapy
Transtheoretical Model
Health Belief Model
Social Cognitive Theory

PATIENT M

• 44 year-old obese, unemployed, AA female
• Smoker
• Family history of mental illness
• Past med hx:
  - Type II diabetes
  - Hyperlipidemia
  - Hypertension
  - Anemia
  - Schizophrenia
  - Depression

MEDICAL & PSYCHIATRIC COURSE IN THE HOSPITAL

October 3rd, 2012
• Admitted with paranoid ideations and hallucinations
• Unsafe to be discharged into the community and admitted with schizoaffective disorder
PATIENT M'S COURSE IN THE HOSPITAL

Admitting orders (10/03/2012):
• cbc, lipid panel, HgA1C
• full psychiatric assessment
• OT for psychosocial functioning
• group therapy
• individual psychotherapy
• psychopharmacotherapy
• finger sticks BID
• dietary consult

MEDICATIONS

- Zocor: cholesterol and triglycerides
- NovoLog: regulate blood sugar levels
- Levemir: regulate blood sugar levels
- Diovan: blood pressure
- Clozaril: schizophrenia
- Prolixin: psychotic symptoms such as hallucinations and delusions
- Depakote: mania
- Nicorette: smoking cessation
- Protonix: gastroesophageal reflux

INTERDISCIPLINARY PLAN FOR PATIENT M

1. To provide safety and support to the patient
2. To encourage therapeutic relationships and assist the patient in acclimating to the unit and psyc programs
3. To improve the patient's symptoms of psychosis to a level that would allow her to be safely discharged back into the community
4. To improve the patient's ability to care for herself so as not to neglect her health conditions

INITIAL NUTRITION ASSESSMENT

October 4th, 2012

Assessment
Diagnosis
Intervention
Monitoring & Evaluation

ASSESSMENT

- Height: 68 in
- Weight: 295 lbs
- BMI: 45 kg/m², obesity grade III
- Adjusted Body Weight: 189 lbs
- Ideal Body Weight: 126-154 lbs

Glucose: 291 H
H/H: 12.6-37.5 L
HgA1C: 9.4 H
Total Cholesterol: 233 H
Triglycerides: 293 H
Finger Sticks: 250-337 H
ASSESSMENT

- Mifflin-St. Jeor method – 500 kcal = ~2000 calories/day
- Protein needs: 86 g of protein/day
- Fluid needs: ~2000 mL/day

METABOLIC SYNDROME IN PATIENT M

<table>
<thead>
<tr>
<th>Blood sugar</th>
<th>100 mg/dL or individual is taking a Rx for high glucose</th>
<th>HgA1C 9.4, Glucose 291 mg/dL, Pt taking NovoLog, Levernir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>130/85 mmHg or individual is taking an antihypertensive Rx</td>
<td>130/85 mmHg, Pt taking Diovan</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>35 inches in women</td>
<td>&gt; 35 inches</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>50 mg/dL in women or the individual is taking a Rx for low HDL</td>
<td>unavailable</td>
</tr>
<tr>
<td></td>
<td>&gt; 150 mg/dL or the individual is &gt; 150 mg/dL</td>
<td></td>
</tr>
</tbody>
</table>

NUTRITION DIAGNOSES

- Obesity (NC-3.3)
- Excessive energy intake (NI-1.3)
- Excessive oral intake (NI-2.2)
- Inconsistent carbohydrate intake (NI-5.8.4)
- Nutrition-related knowledge deficit (NB-1.1)
- Undesirable food choices (NB-1.7)
- Physical inactivity (NB-2.1)

Excessive energy intake related to a caloric intake greater than her calculated needs to promote weight loss as evidenced by a BMI of 45/Obesity Grade III.

Inconsistent and inappropriate carbohydrate intake related to a deficit in nutrition knowledge as evidenced by high glucose of 291 mg/dL, high HgA1C of 9.4%, and high finger sticks of 250-337.
**NUTRITION INTERVENTION**

- **Food and nutrient delivery**
  - Modify diet to 2000 kcal CHO-consistent, ↓fat, ↓sodium
- **Nutrition education**
  - Nutrition relationship to health and disease
  - Educate on diet changes
  - Encourage attendance to monthly nutrition class & psyc unit walking club
  - Encourage fish consumption for anemia

---

**MONITORING AND EVALUATION**

| Intake | • Diet order  
• Energy intake  
• CHO intake and timing |
| --- | --- |
| Nutrition knowledge | • Attendance of classes  
• Level of nutrition knowledge |
| Anthropometrics | • Weight  
• BMI |
| Biochemical data | • Glucose profile  
• Lipid profile |

---

**FOLLOW-UP**

- **Diet order** Δ to 2000 kcal CCD, low fat, 2 g Na
- **Food and nutrient intake**
- **Food and nutrition knowledge**
- **Anthropometrics**
  - Weight: 266 lbs (120.9 kg)
  - BMI: 40 kg/m^2
- **Biochemical data**

---

**FOLLOW-UP #2**

- **Weight**: 266 lbs
- **BMI**: 40 kg/m^2
- **Revise calorie needs based on new wt**
  - Modify calorie restriction to 1800

---

**FOLLOW-UP**

- **Previous diagnosis of excessive energy intake being resolved on inpatient diet**
- **Finger sticks <300, but still >200s at times so diagnosis relating to carbohydrate intake was still in effect**

---

**Follow-Up**

- **Glucose**: 260 H, ↓ from adm
- **HbA1c**: 8.1 H, ↓ from adm
- **Total Cholesterol**: 187 H, ↓ from adm
- **Triglycerides**: 204 H, ↓ from adm
- **Finger Sticks**: 150 to < 300
- **Blood Pressure**: 129/74
CRITICAL COMMENTS

- Patients on clozapine gain an average of 11.7-13.9 lbs during the 1st yr of use
- Reduce REE estimates by ~280 calories/day
- Multivitamin and vitamin D
- Schizoaffective disorder → different nutrition counseling

Thank you to
Saint Joseph’s Medical Center nutritional care team!
Gayanne, Christina, and fellow interns!

REFERENCES