



Metabolic Syndrome



Presented By:

- Dr. Cydreese Aebi, PhD, RPh
 - Clinical Pharmacy Coordinator, Oregon State Hospital
 - Oregon State University, College of Pharmacy
Affiliate faculty
- Richard Stansfield MPP
 - PAR Research Analyst, Oregon State Hospital
- Beverly Kaminski FNP
 - Nurse Practitioner, Oregon State Hospital



Metabolic Syndrome is:

- ✦ A constellation of major risk factors occurring together that increase the risk of heart disease, stroke, and diabetes^{1,2}
- ✦ AKA
 - ✦ Syndrome X
 - ✦ Dysmetabolic Syndrome
 - ✦ Insulin Resistance Syndrome
 - ✦ MetS



Components of Metabolic Syndrome

- ✦ Abdominal obesity
- ✦ Insulin resistance
- ✦ Dyslipidemia
- ✦ Hypertension
- ✦ Prothrombotic state
- ✦ Proinflammatory state



People with MetS are:

- ✦ **At 5X greater risk of developing type II diabetes²**
- ✦ **3X more likely to have a heart attack or stroke compared to people without MetS²**
- ✦ **More susceptible to other conditions³**
 - ✦ **Polycystic ovary syndrome (PCOS)**
 - ✦ **Fatty liver**
 - ✦ **Cholesterol gallstones**
 - ✦ **Asthma**
 - ✦ **Sleep disturbances**
 - ✦ **Sleep apnea**
 - ✦ **Insomnia**
 - ✦ **Sleep maintenance problems**



MetS Criteria

- ★ **Meets criteria have been established by multiple organizations with slight variations**
 - ★ **International Diabetes Foundation (IDF)**
 - ★ **National Cholesterol Education Program (NCEP) Third Adult Treatment Panel (ATP III)**
 - ★ **American Heart Association (AHA)**
 - ★ **World Health Organization (WHO)**

OSH MetS criteria

-
- ✦ 3 or more of the criteria must be present or the patient must be currently receiving treatment for the following criteria:
 - ✦ Obesity as determined by waist circumference: men >40 inches, women >35 inches or BMI >30 kg/m²
 - ✦ Blood Pressure >130/80 mmHg
 - ✦ Insulin Resistance or Type II Diabetes measured by: fasting blood glucose >100 mg/dL or HbA1C ≥7% in diabetics, ≥6% in non-diabetics
 - ✦ Dyslipidemia measured by: triglycerides >150 mg/dL plus one of the following:
 - ✦ HDL men <40 mg/dL, women <50 mg/dL
 - ✦ LDL >100 mg/dL
 - ✦ Total Cholesterol (TC) >200 mg/dL



Whose has Metabolic Syndrome Risk?

- ✦ Diabetics, and those with family hx of diabetes
- ✦ People with high: cholesterol, triglycerides, blood pressure, large waist circumference, obesity
- ✦ **Schizophrenics and others taking atypical antipsychotic medication**
- ✦ Certain ethnic groups: American Indian, Alaskan Natives, African American, Hispanics/Latinos
- ✦ Smokers
- ✦ Physical inactivity

Which comes first: psychiatric symptoms or cardiometabolic risk?





Schizophrenia Risk Factors

- ✦ ~80+% smoke compared to ~ 25% general population
- ✦ 40-62% of patients with schizophrenia are overweight
- ✦ Mortality due to cardiovascular disease twice as high as in general population
- ✦ The prevalence of diabetes in schizophrenic patients is 2-3 times that of the general population
- ✦ Associated with premature and excess mortality– average estimated 9-12 years loss of life expectancy.
- ✦ Dyslipidemia higher in schizophrenia compared to general population



Reasons for the Increased Risk

- ✦ Schizophrenic patients have a greater difficulty achieving treatment outcomes
 - ✦ Poor treatment compliance
 - ✦ Difficulty communicating physical needs
 - ✦ Difficulty comprehending healthcare advice and carrying out lifestyle changes



Reasons for the Increased Risk

- ✦ Schizophrenic patients have a high incidence of lifestyle risk factors^{4,5,6}
 - ✦ Poor diet (high fat, low fiber)
 - ✦ Physical inactivity
 - ✦ Smoking (between 50-90% are nicotine dependent)
 - ✦ Alcohol Use/Abuse



Reasons for the Increased Risk

- ★ Antipsychotic medications cause metabolic syndrome factors
 - ★ Weight gain
 - ★ Directly stimulate appetite via hypothalamic feeding center
 - ★ Increase in adipose tissue= insulin resistance
 - ★ Serotonin receptor antagonism decreases insulin production
 - ★ Diabetes
 - ★ Atypical antipsychotics may affect cellular reuptake of glucose
 - ★ Dyslipidemia
 - ★ Atypical antipsychotics increase serum triglycerides

Atypical Antipsychotics

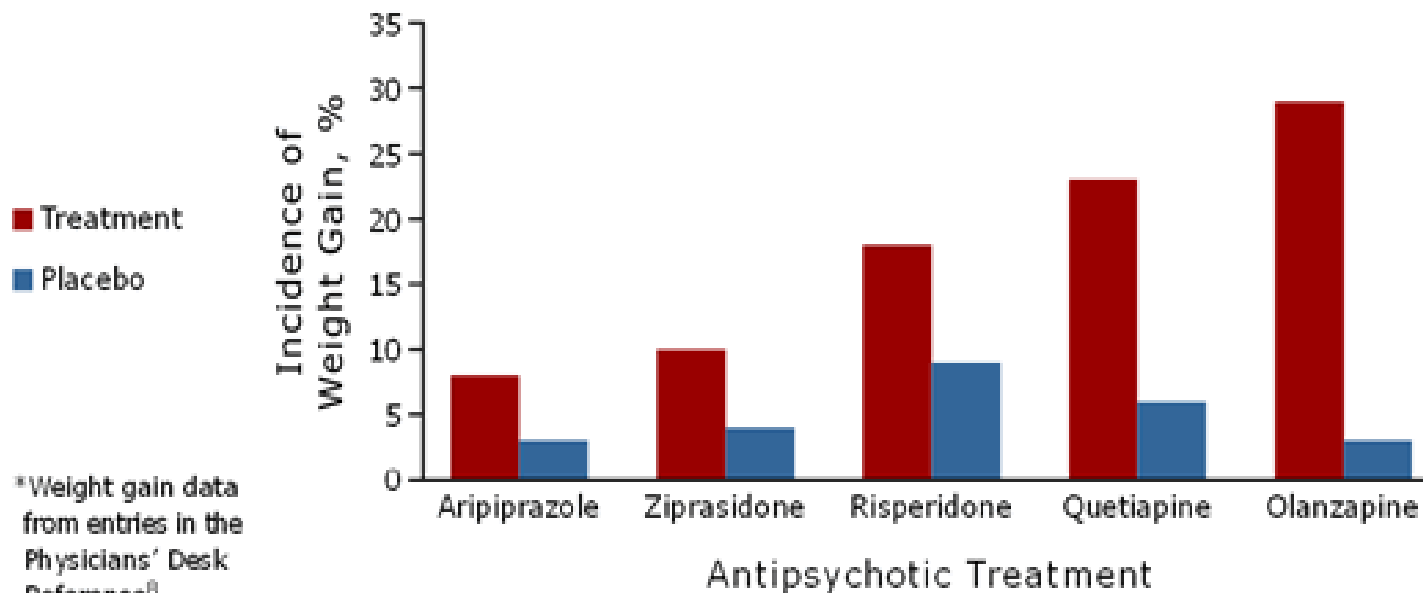
<i>Brand (generic)</i>	Weight Gain	Dyslipidemia	Diabetes Risk
<i>Clozaril</i> (clozapine)	High	High	High
<i>Zyprexa</i> (olanzapine)	High	High	High
<i>Seroquel</i> (quetiapine)	Moderate	Moderate	Moderate
<i>Risperdal</i> (risperidone)	Moderate	Moderate	Moderate
<i>Abilify</i> (aripiprazole)	Low	Low	Low
<i>Geodon</i> (ziprasidone)	Low	Low	Low

Comparison of Antipsychotic Agents. *Pharmacist's Letter/Prescriber's Letter* 2009;25:251010.

Antipsychotic Weight Changes

Adverse Effects of Antipsychotics

Clinically Significant ($\geq 7\%$) Weight Gain During Antipsychotic Treatment*

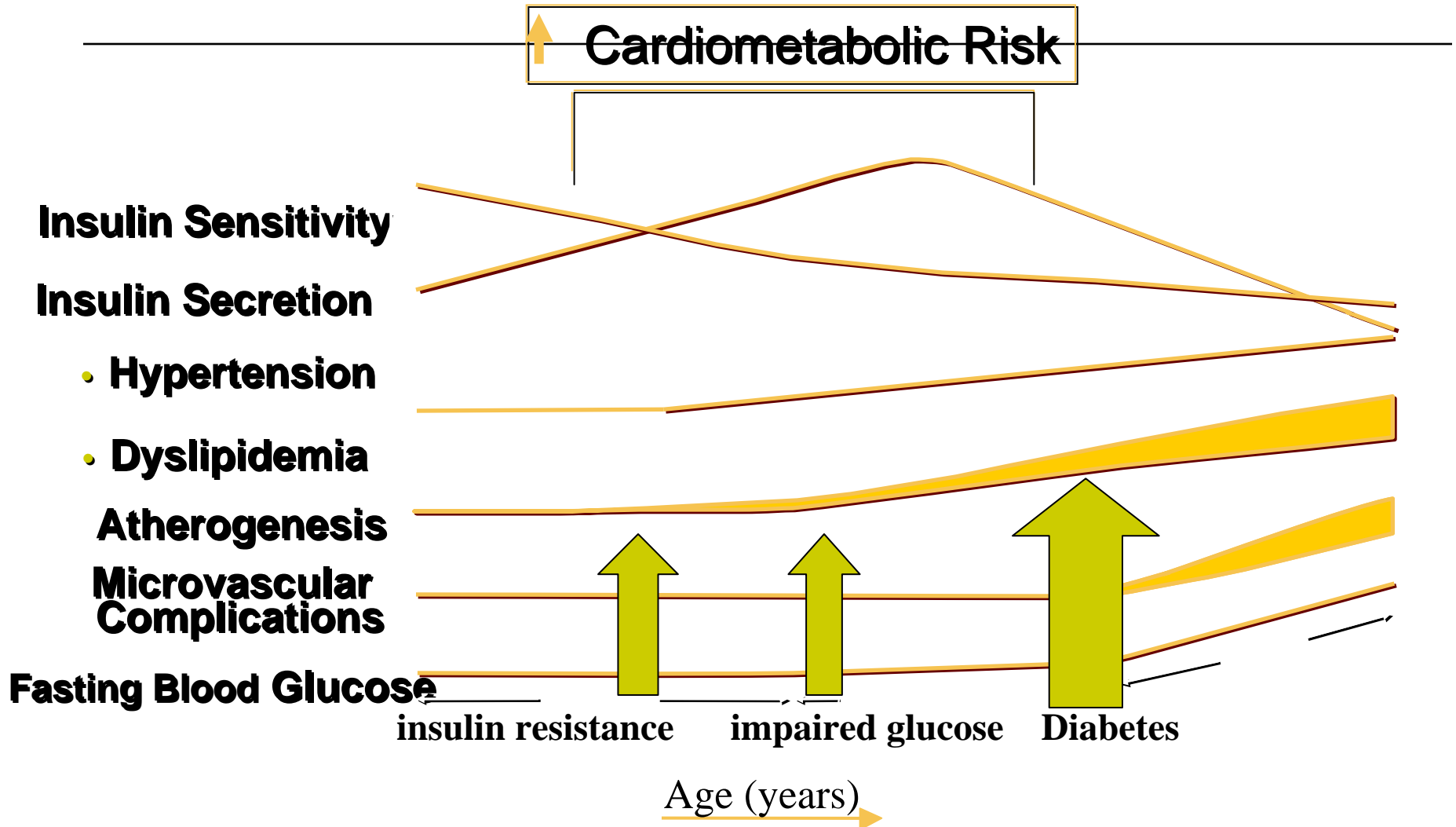




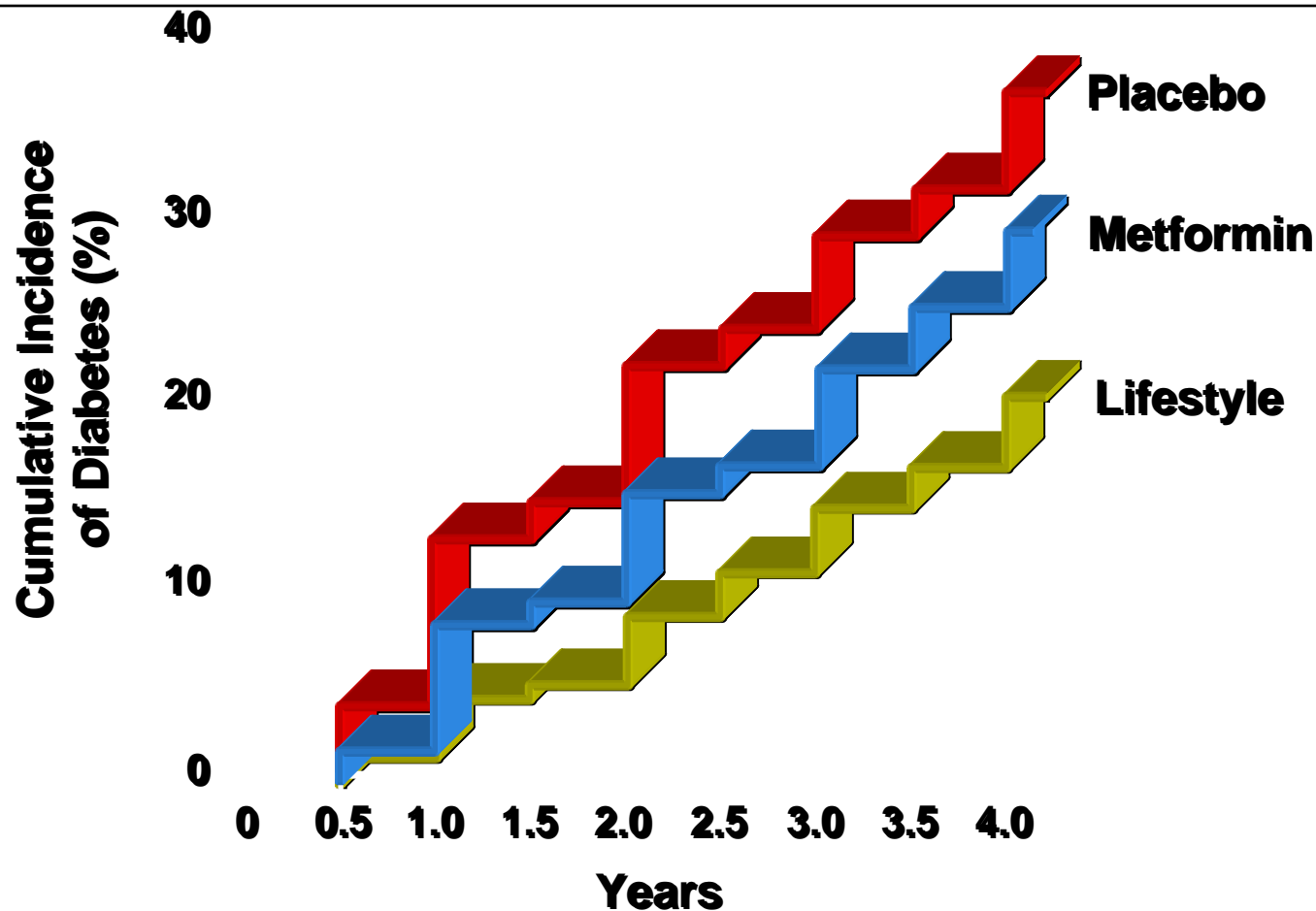
Treatment of Metabolic Syndrome

- ★ **Treatment involves non-pharmacologic and pharmacologic interventions**
 - ★ MetS components are treated to decrease CV risk and delay/prevent the progression to diabetes
- ★ **Non-pharmacologic interventions**
 - ★ Lifestyle changes (diet, exercise)
- ★ **Pharmacologic interventions (if applicable)**
 - ★ Diabetic management
 - ★ Hypertension treatment
 - ★ Hyperlipidemia treatment

Proposed Metabolic Observations in the Natural History of Type 2 Diabetes



Relative Effectiveness of Interventions in DPP



**Oregon State
Hospital 2010**



Oregon State Hospital 2010-2011





Who is Oregon State Hospital?

- ★ 650 patients on Salem Campus
 - ★ Forensic and civil commitments;
 - ★ Schizophrenia, Bipolar, Antisocial disorder, dementia, head trauma, and a geriatric unit
- ★ 100 patients on Portland Campus (POSH)
 - ★ Civil commits
- ★ 65 patients in Pendleton (Blue Mt. Recovery)
 - ★ MRDD and dementia
- ★ New hospital to be built in Junction City ~2013
- ★ ~1800 employees



Why a Metabolic Clinic at OSH?

- ✦ OSH patients high incidence of:
 - ✦ Diabetes
 - ✦ High cholesterol, lipids, triglycerides
 - ✦ High blood pressure
 - ✦ Obesity, abdominal and overall
 - ✦ High BMI (body mass index)



Why a Metabolic Clinic at OSH?

- ✦ OSH Patients at high risk due to:
 - ✦ Disease state
 - ✦ Schizophrenia, mood disorders
 - ✦ Medications treating disease state
 - ✦ Antipsychotics, antidepressants, mood stabilizers
 - ✦ Inactivity/lifestyle within OSH
 - ✦ Dietary habits and choices
 - ✦ Ordering “out”, vending machines



Metabolic Syndrome Clinic Objectives

- ✦ Identify patients at risk of developing MetS
- ✦ Implement a treatment plan for assessing, educating, and monitoring these patients
 - ✦ using medication management and dietary/lifestyle adjustments.
- ✦ Decrease incidence of metabolic syndrome
- ✦ Increase quality of life for patients
 - ✦ Decrease incidence of diabetes and cardiac events
 - ✦ Prevent additional medication and health care costs by preventing disease



Metabolic Syndrome/Wellness Objectives

- Changes in Canteen
 - Provide healthy snack choices
- Changes in Vending machines
 - Replace high caloric beverages with healthy options
- Changes in Dietary Services
 - Provide healthier food choices, snack choices, bedtime snack choices
- Exercise
 - Provide more activity and exercise programs/classes
- Provide education to staff and patients



OSH Metabolic Clinic Team

✦ **Metabolic Physician**

- ✦ Referrals, physical assessment, monitoring, and treatment modifications if needed

✦ **Clinical Pharmacist**

- ✦ Identify/discuss medication issues, reinforce lifestyle changes, set attainable and measurable goals for lifestyle changes and medication issues. Teach metabolic syndrome class on Tx Mall
- ✦ Maintains flow sheet and attendance for research analyst

✦ **Nurse Practitioner**

- ✦ Visits patients “pre” clinic to assess interest, physical assessment at clinic appointment, coordinates appointments
- ✦ Coordinates teaching metabolic syndrome class in Tx Mall



Metabolic Team continued..

- ★ **Dietician** consults with patient on ward
 - ★ Dietary needs assessment (calories, carbs, etc)
 - ★ Dietary consults sent before each clinic appointment
- ★ **Recreation Therapists**
 - ★ Designing more ‘active’ classes for patients to get involved in via Treatment Mall and at other times.
 - ★ Basketball, grounds walks, volleyball, fitness, yoga, pilates, Wii sports and outings (hiking).
- ★ **PAR research analyst**
 - ★ Tracks and collates data for outcomes



OSH Metabolic Clinic Opening

- ✦ Preparations for clinic opening May-July 2009
 - ✦ Clinic room/time allocated
 - ✦ Chart forms prepared
- ✦ Opened clinic August 2009
 - ✦ Trial 50I ward
 - ✦ 30 minutes with clinical pharmacist
 - ✦ 30 minutes with physician
 - ✦ Dietician met with patient individually on ward



Changes Made During Trial Period

- ★ Changed individual appointments with physician and clinical pharmacist to a combined appointment with physician and clinical pharmacist (team approach).
~30-40 minutes
 - ★ Shortens length of appointment
 - ★ Can coordinate medications easier
 - ★ Patient recognizes team support
- ★ Chart Forms finessed.
- ★ Nurse Practitioner added to the team, and clinic appointments.



Metabolic Clinic Timeline

- ★ End of trial phase on 50I ward November 2009
- ★ Opened to 50F ward patients December 2009
- ★ Opened to Transitional patients Feb 2010
- ★ Opened to Salem campus via clinic doctors' referral during March 2010
- ★ Began teaching treatment mall classes in Jan 2010

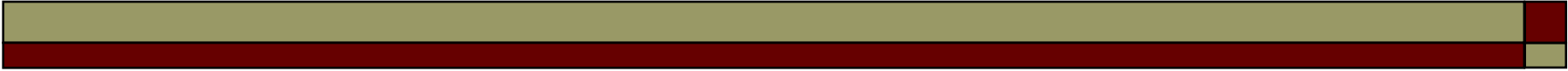
Table 1 – Patient Demographics

	TOTAL	Male	Female
PATIENTS	46	22	24
Diabetic	19	11	8
Non Diabetic	27	11	16
UNIT			
34C	1	0	1
35A	2	1	1
35C	1	1	0
50F	10	10	0
50G	2	2	0
50I	26	4	22
Cottages	4	4	0



Case Study 1 -

- White Female, age 23
- Diagnosis: Major Depressive Disorder, Post-traumatic Stress Disorder
- Risk Factors include: Diabetic
- Clinic 1, patient presented with:
 - obesity, weight: 251.5 BMI 40, the level used for morbid obesity
 - elevated cholesterol (267 mg/dL)
 - triglycerides (313 mg/dL),
 - waist circumference >53 in,
 - Psychiatric Medications: Quetiapine; Topiramate; Olanzapine; Clonazepam

- 
-
- Patient set goals:
 - Weight loss of 5lbs per month,
 - Increase exercise by 3 times per week
 - Skip dessert 3 times per week - remove ice cream toppings.
 - Education materials: Cholesterol good and bad; niacin; checking food labels
 - Goals met or improved upon
 - Exemplary Attitude



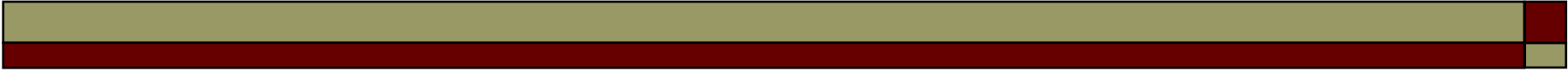
□ By Clinic 3:

- Weight 239.5: A reduction of 12lbs in three months.
- BMI 37.5: a reduction in BMI of 2.5
- Waist 49 – a reduction of 4 inches
- Blood Pressure
- Glucose
- Total Cholesterol: 200: a reduction in total cholesterol of 67mg/dL)
- Triglycerides: 212



Case Study 2 -

- White Female 59
- Diagnosis: Schizoaffective, Nondependent abuse of drugs
- Risk Factors include: Type 2 Diabetes
- Clinic 1, patient presented with:
 - obesity, BMI 40.3
 - elevated cholesterol (205 mg/dL)
 - triglycerides (329 mg/dL)
 - waist circumference > 51 in
 - low HDL (25mg/dL) 44mg/d
 - Psychiatric Medications (Daily Doses): quetiapine (800mg), risperidone (6mg),

- 
-
- Started on Niacin 500g bedtime
 - Patient Set Goals:
 - Decrease-salt, and
 - increase exercise through daily classes
 - Education materials: Activity and Diabetes; How to change habits; Salt-decrease
 - Goals unmet or little improvement
 - Attitude and Commitment Questionable



□ By Clinic 3:

- Weight 250.5Ibs: A gain of 1 lb
- BMI 40.4: An increase of .1
- Waist 52 inches: Increase of 1 inch
- Blood Pressure: 126/89 – 132 /82

Table 2 – Sample of 49 Patients attending the Metabolic Syndrome Clinic at OSH

	Average Time 1	Average Time 2	Pts with positive trend	Total change	Significant
Weight (lbs)	223.60	215.49	60%	-57.5lbs	--
BMI	35.75	35.00	52%	-16.9	--
Waist (In)	46.65	46.02	54%	-2.55	--
Glucose (mg/dl)	114.83	116.67	48%	+9	--
Cholesterol (mg/dl)	181.52	177.95	54%	-275	--
Triglycerides (mg/dl)	187.45	166.61	56%	-532	--

Table 3 – Sample of 18 that have attended at least 3 clinics

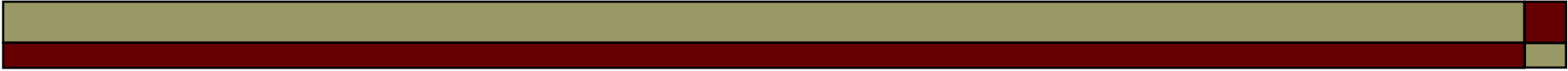
	Average Clinic 1	Average Clinic 3	Pts with positive trend	Total change	Significant
Weight (lbs)	220.56	220.56	61%	0	--
BMI	35.97	35.78	39%	-1.90	--
Waist (In)	46.35	46.26	50%	-1.30	--
Glucose (mg/dl)	103.00	105.36	39%	-22	--
Cholesterol (mg/dl)	197.06	192.79	56%	-162	--
Triglycerides (mg/dl)	202.17	180.33	50%	-128	--

Table 4 – Sample of 11 that have attended at least 4 clinics

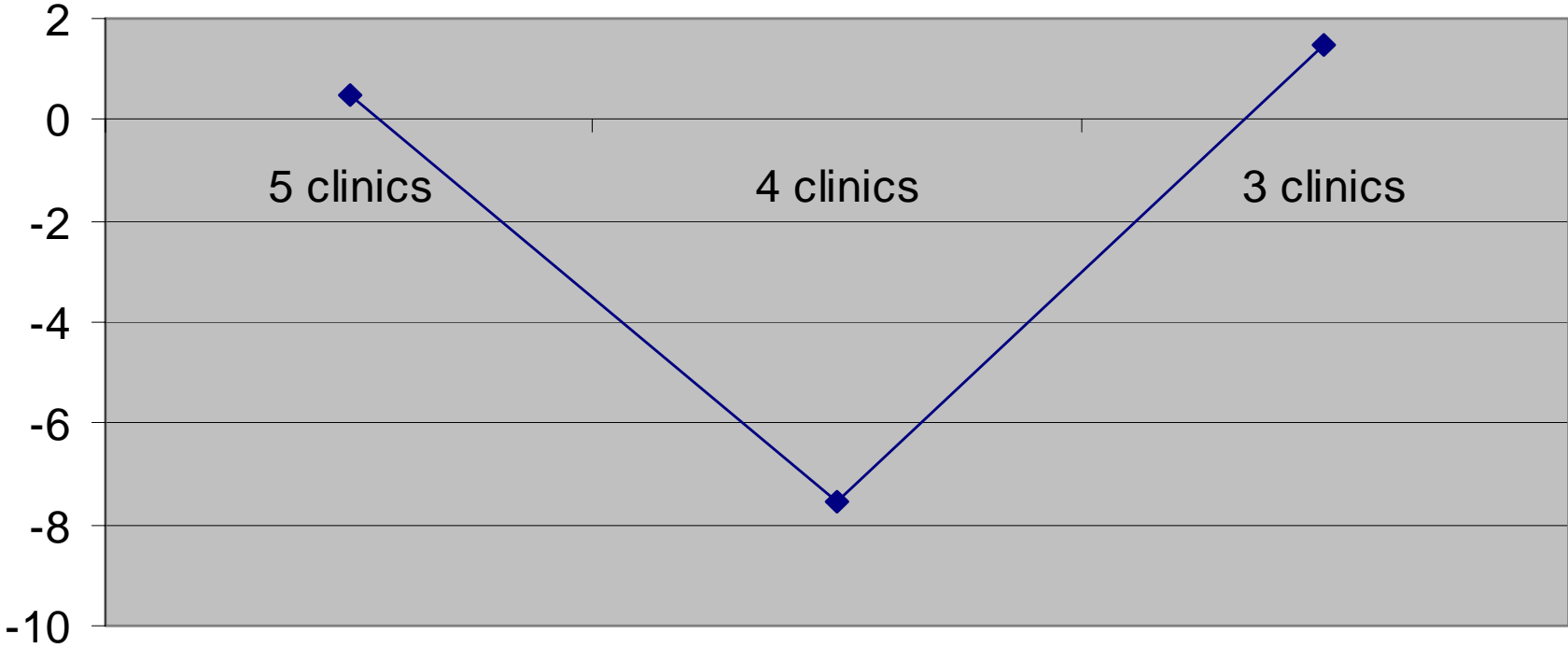
	Average Clinic 1	Average Clinic 4	Pts with positive trend	Total change	Significant
Weight (Ibs)	210.90	208.18	64%	-30Ibs	--
BMI	34.60	34.03	64%	-6.1	--
Waist (In)	45.65 in	44.83 in	36%	-1.25	--
Glucose (mg/dl)	103.10	128.25	18%	+68	--
Cholesterol (mg/dl)	195.73	178.3	55%	-211	--
Triglycerides (mg/dl)	224.00	184.22	46%	-189	--

Table 5 - Sample of 6 that have attended clinics
for 6 months

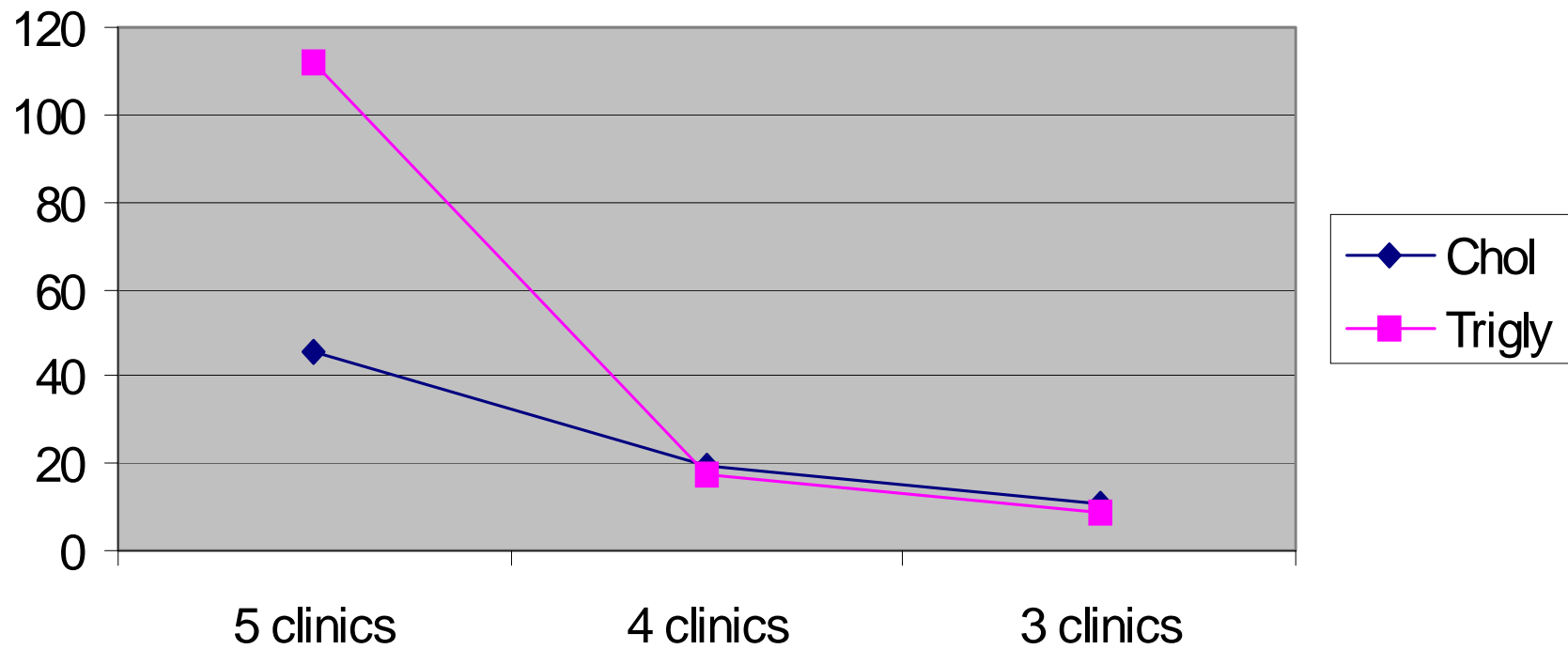
	Average Clinic 1	Average Clinic 5	Pts with positive trend	Total change	Significant
Weight (Ibs)	213.60	201.42	83%	-73Ibs	--
BMI	36.00	34.00	83%	-10	--
Waist (In)	44.92	42.96	83%	-11.75 In.	--
Glucose (mg/dl)	95.50	95.33	50%	-3	--
Cholesterol (mg/dl)	210.17	150.60	83%	-275	*
Triglycerides (mg/dl)	289.17	177.17	100%	-672	*



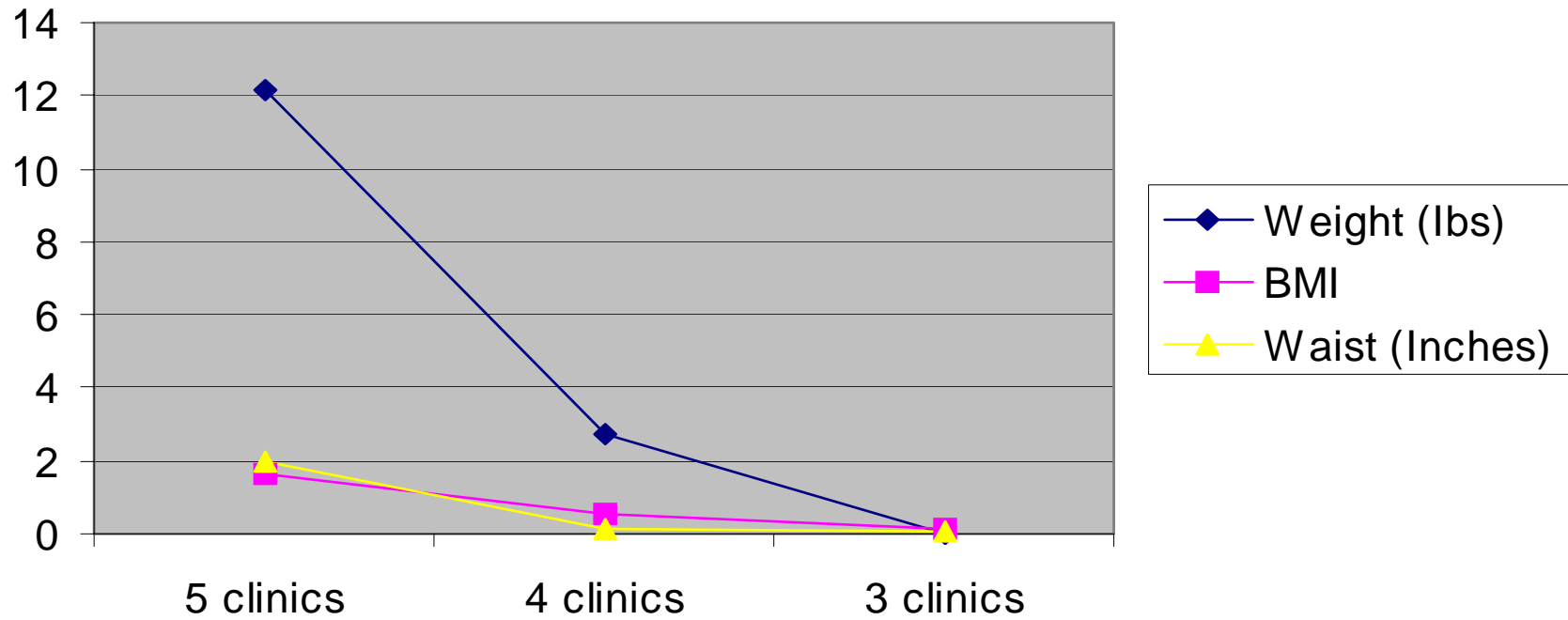
Average change in Glucose levels (mg/dl)



Average change in measures of Dyslipidemia (mg/dl)



Average change in measures of obesity





Metabolic Syndrome Education

- Treatment Malls

- Monday – Friday 9 am-3 pm

- Recovery Model

- Structured, centralized activity 20 hours / week

- Learning symptom management, coping skills, health and wellness, drug abuse/alcohol recovery, music/art/creativity, exercise and fitness

- Patients set goals for their learning



Metabolic Syndrome Class

- “Changing Your Future” (Metabolic Syndrome)
- Monday mornings in 2 malls (45 minute classes)
 - Forensic and Transitional malls
- Goals of classes:
 - Awareness of risk factors
 - Understanding of healthy choices for nutrition
 - Understanding of medications
 - Encouragement for increased exercise
 - Patients to keep daily logs of exercise



Tx Mall Class topics

- Diabetes, cholesterol, blood pressure, heart disease
 - Definition, prevention, treatment, medications
- “*Supersize Me*” film– discussion from film clips
- Nutrition
 - Healthy eating, fast food issues, fats, sugars, salt
- Why change is difficult
 - Peer pressure, motivation, lifestyle changes, activity options



Metabolic Syndrome Future:

- ◆ Expanded clinic hours
 - ◆ 6-8 hours per week of clinic time --April 2010
- ◆ Expanding Treatment Mall Classes
 - ◆ 2 classes up to 4 classes per week-- June 2010
- ◆ DASH diet (heart healthy) for patients
 - ◆ Started in March 2010
- ◆ Changes in vending machines to more healthy choices
- ◆ Continued “buy in” from OSH staff to encourage patients
- ◆ Increased exercise options for patients in new hospital
- ◆ More educational opportunities to teach staff and patients about metabolic syndrome.



QUESTIONS?

References

1. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment on High Blood Cholesterol in Adults (ATP III). *JAMA* 2001;285(19):2486-2497.
2. International Diabetes Foundation. The IDF Consensus Worldwide Definition of the Metabolic Syndrome. Available at www.idf.org. Accessed 12 Oct 2009.
3. Grundy SM, Brewer HB Jr, Cleeman JI et al. Definition of Metabolic Syndrome: Report of the National Heart, Lung, and Blood Institute. American Heart Association Conference on Scientific Issues Related to Definition. *Circulation* 2004;109:433-438.
4. Stahl SM, Mignon L, Meyer JM. Which Comes First: Atypical Antipsychotic Treatment or Cardiometabolic Risk? *Acta Psychiatr Scand* 2009;119:171-179.
5. Ryan MCM, Thakore JH. Physical Consequences of Schizophrenia and its Treatment: The Metabolic Syndrome. *Life Sciences* 2002;71:239-257.
6. Meyer JM, Stahl SM. The Metabolic Syndrome and Schizophrenia. *Acta Psychiatr Scand* 2009;119:4-14.
7. Hert MD, Eyck D, and Nayer AD. Metabolic Abnormalities Associated with Second Generation Antipsychotics: Fact or Fiction? Development of Guidelines for Monitoring. *Int Clin Psychopharmacol* 21(suppl 2):S11-S15.
8. Lambert TJR, Velakoulis D, and Pantelis C. Medical Comorbidity in Schizophrenia. *MJA* 2003;178:S67-S70.
9. Palacios K. Atypical Antipsychotics and Diabetes. *Pharmacist's Letter/Prescriber's Letter* 2003;19:191113.
10. American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists, North American Association for the Study of Obesity. Consensus Development Conference on Antipsychotic Drugs and Obesity and Diabetes. *Diabetes Care* 2004;27(2):596-601.
11. Lieberman JA, Stroup TS, McEvoy JP et al. Effectiveness of Antipsychotic Drugs in Patients with Chronic Schizophrenia. *N Engl J Med* 2005;353(12):1209-1223.
12. Meyer JM. A Retrospective Comparison of Weight, Lipid, and Glucose Changes Between Risperidone and Olanzapine Treated Inpatients: Metabolic Outcomes After 1 Year. *Journal of Clinical Psychiatry* 2002;63(5):425-433. [Abstract]
13. Sernyak MJ, Leslie DL, Alarcon RD et al. Association of Diabetes Mellitus with the use of Atypical Neuroleptics in the Treatment of Schizophrenia. *Am J Psychiatry* 2002;159:561-566.
14. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *JAMA* 2003;289:2560-2572.
15. American Diabetes Association. Standards of Medical Care in Diabetes: Executive Summary. *Diabetes Care* 2008;31(1):S5-S11.