Taking a Weight off Health Care Systems

Arya M. Sharma, MD/PhD, FRCPC

Scientific Director
Canadian Obesity Network

Professor and Chair in Obesity Research & Management
University of Alberta

Medical Director
Alberta Health Services Provincial Obesity Strategy

www.obesitynetwork.ca

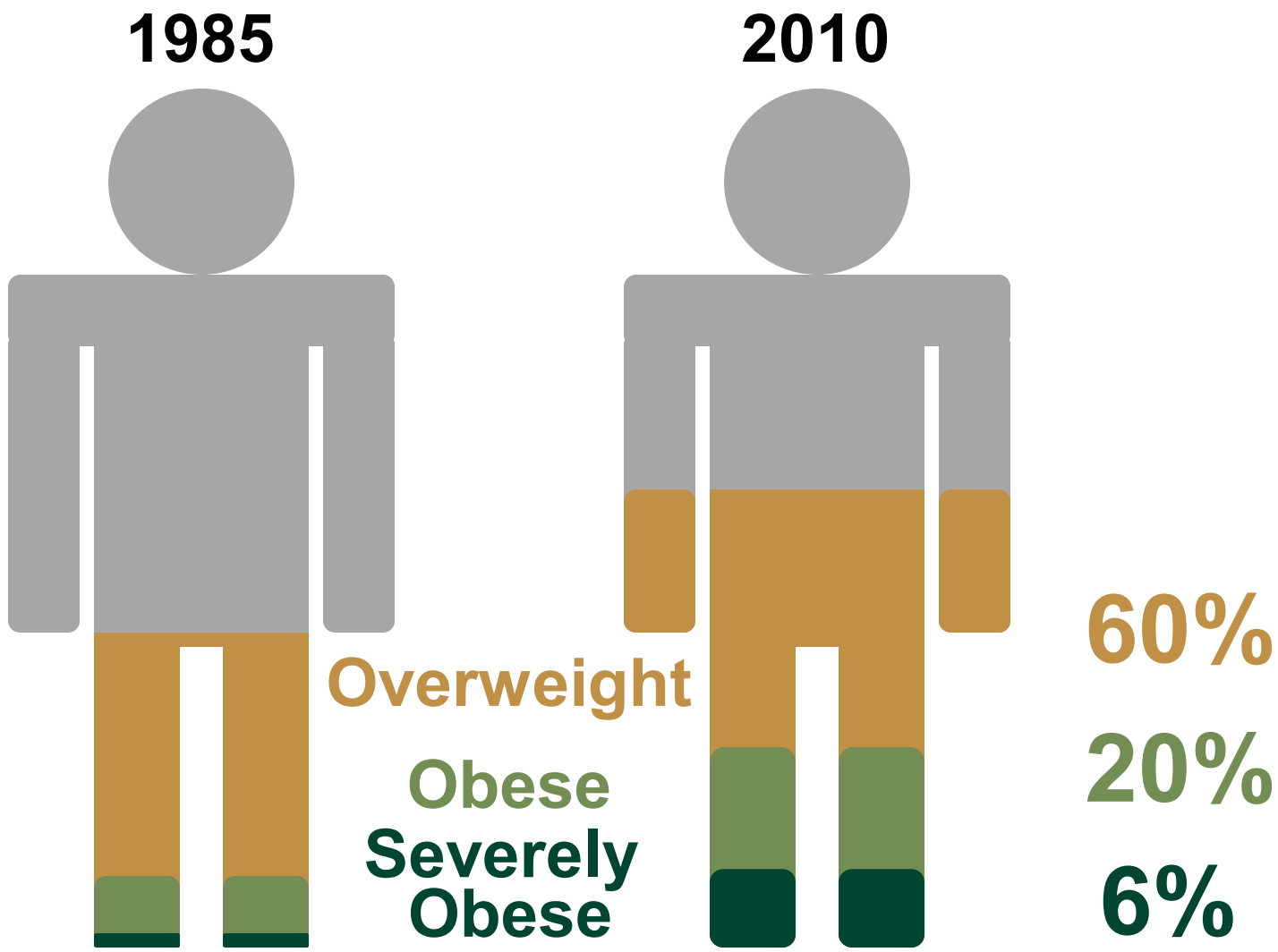
Vital Statistic: Waist Circumference

Faculty of Medicine & Dentistry
University of Alberta

Sharma AM, 1995

Obesity in Canada

Faculty of Medicine & Dentistry
University of Alberta



Statistics Canada 2010

Obesities are heterogeneous complex disorders of multiple etiologies characterized by excess body fat that threatens or affects socioeconomic, mental or physical health

Sharma 2007

ClinicoEconomics and Outcomes Research

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Health status, hospitalizations, day procedures, and physician costs associated with body mass index (BMI) levels in Ontario, Canada

After covariate adjustment, the hospitalization and physician costs were respectively 40% and 22% higher among obese and overweight adults than among normal-weight adults.

Manbubul Haq
Valerie H Taylor[3]
Arya M Sharma[4]
Hamid Reza Nakhai-Pour[1]
Daria O'Reilly[1,2]
Feng Xie[1,2]
Lisa Dolovich[2,5,6]
Ron Goeree[1,2]

of adults will succumb to the medical complications of obesity. However, little is known about the burden of obesity in adults living in Ontario.

Objectives: To present an overview of the human and economic burden associated with BMI categories in Ontario, Canada, in terms of socio-demographics, comorbidities, health-related quality of life (HRQoL) and costs associated with hospitalization, same day procedures and physician visits.

Methods: The records of all Ontarians who participated in the Canadian Community Health Survey (CCHS), cycle 1.1 and provided consent to data linkage were linked to three administrative databases. Socio-demographic variables, medical characteristics, HRQoL, one year

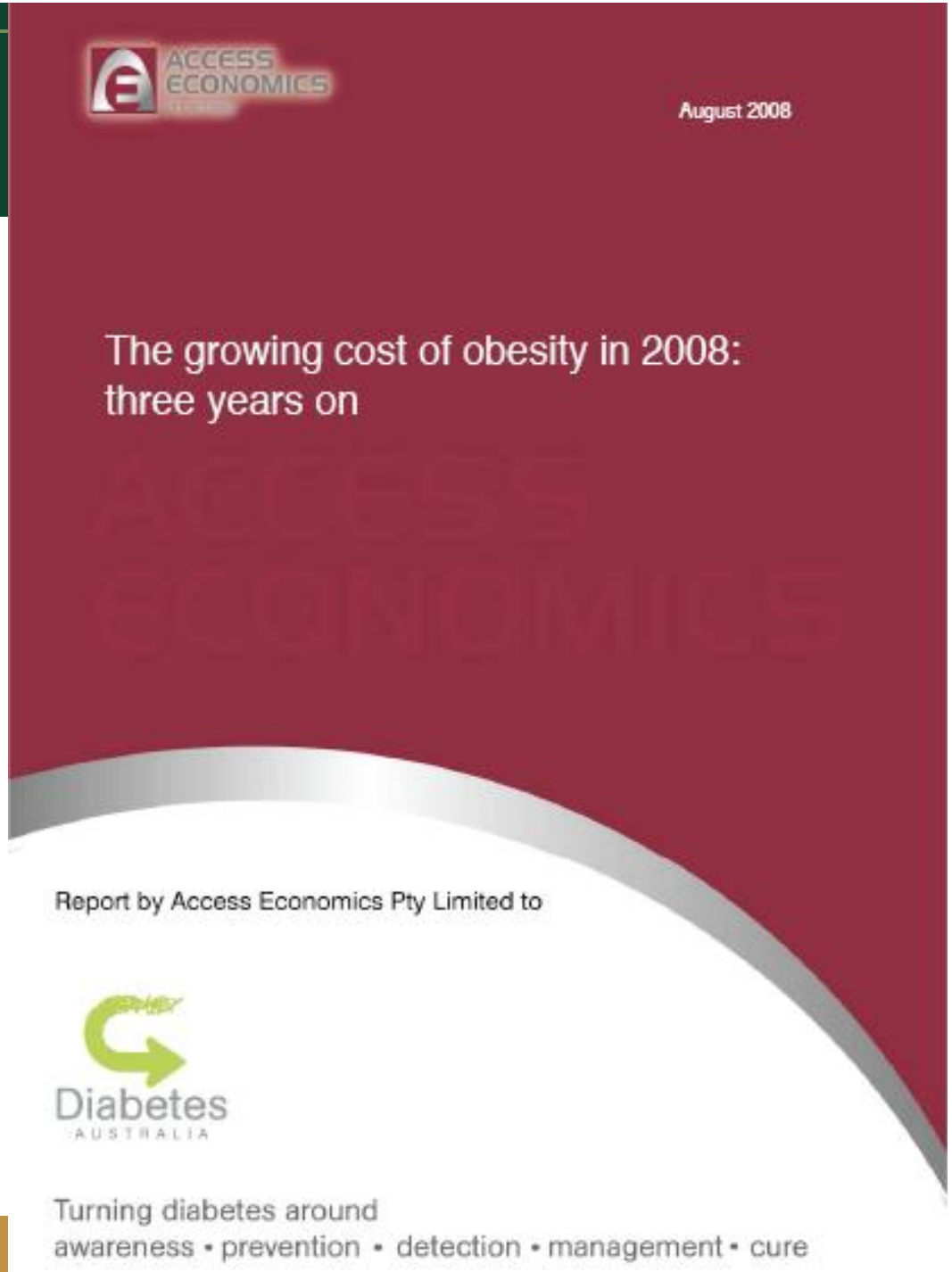
2008 Cost of Obesity in Australia estimated at $ 58 Billion

Cost of Obesity in Canada?

58 Billion / 20 Million x 33 Million =

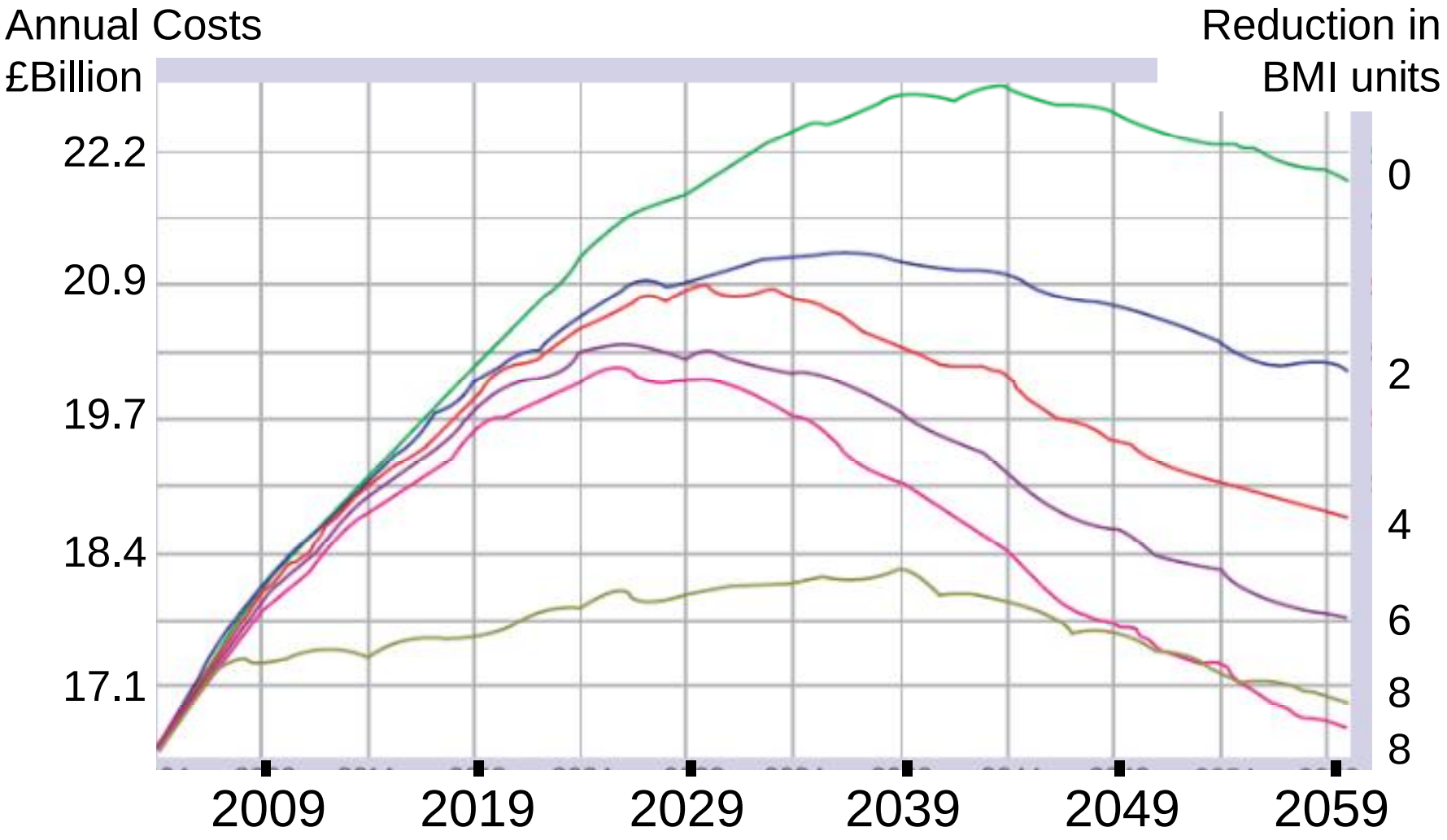
$ 95 Billion!

www.drsharma.ca



Englandôs predicted future Health Service costs based on either no action or reductions in adult BMI

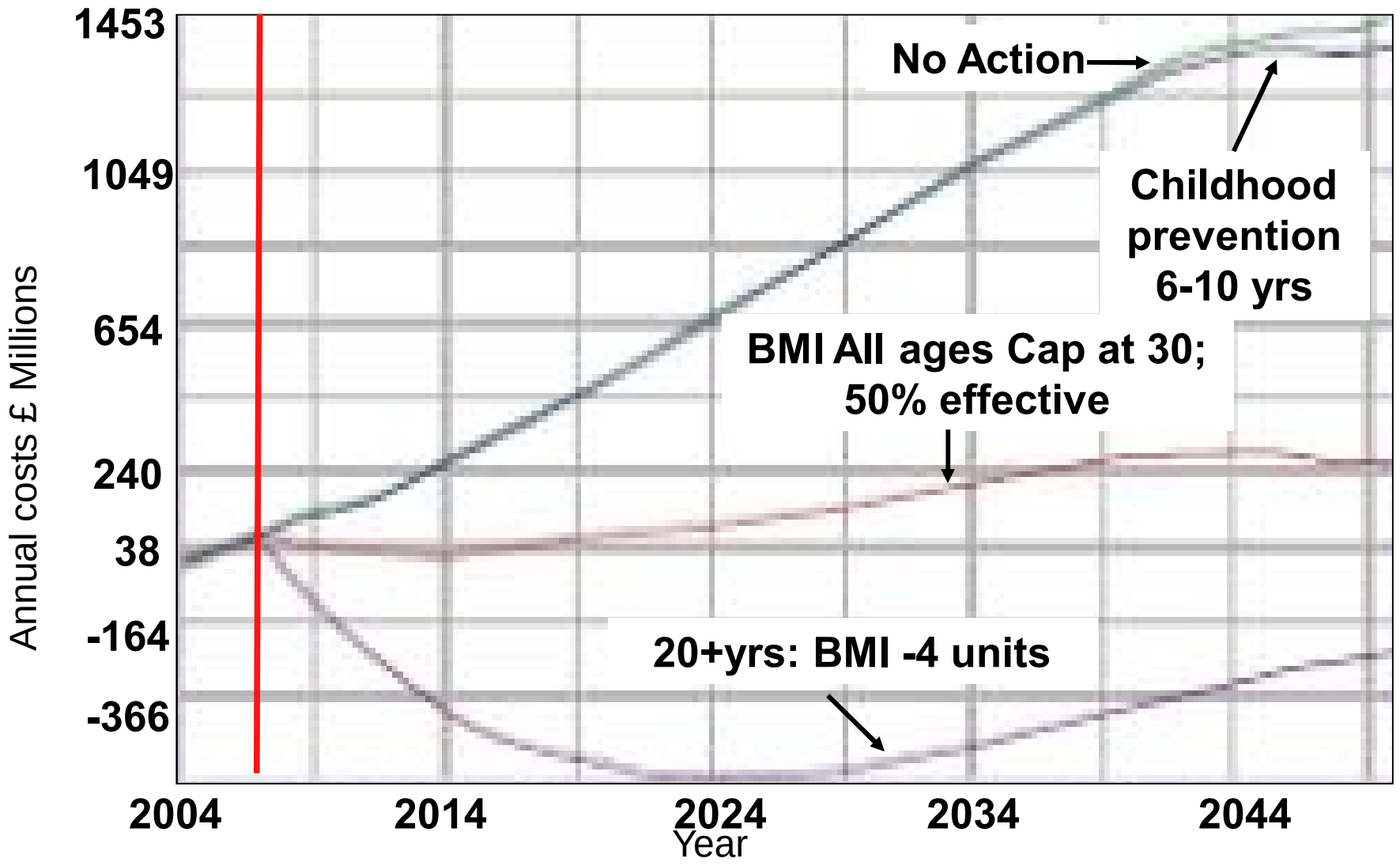
Faculty of Medicine & Dentistry
University of Alberta



All interventions affect 15-50 year olds except the last which is for all ages 15-100yr

Annual Diabetes Costs in England with Different Obesity Prevention Strategies

Faculty of Medicine & Dentistry
University of Alberta



http://www.bis.gov.uk/foresight/our-work/projects/current-projects/tackling-obesities


BARIATRIC
NURSING AND SURGICAL PATIENT CARE
• Use of the LAP-BAND
A Discussion with the
• Ice Chips and the Bitt
of Crushed Medicatio
• Pressure Ulcers in Hos
• Donabedian's Theory
for Bariatric Surgery
• A Res
on th
• The F
Policy
The Offi
Nation
International Journal of Obesity
SURGERY FOR OBESITY AND RELATED DISEASES
ASMBS
OBESITY SURGERY
The Journal of Metabolic Surgery and Allied Care
clinicalobesity
Childhood OBESITY
Let's Seize the Moment!
The Experts Speak
Roundtable
Patient-Centered Care in
Underserved Communities
Restoring the Promise
of a Healthy Childhood
Stop the Blame
and Start the Action
Making Fit Kids in New York City
Motivational Interviewing
for Families
Healthier U.S. School Challenge
Feature School
The Role of Breastfeeding

Bariatric Care

Faculty of Medicine & Dentistry
University of Alberta

Sensitivity

Transport, Mobility & Patient Safety

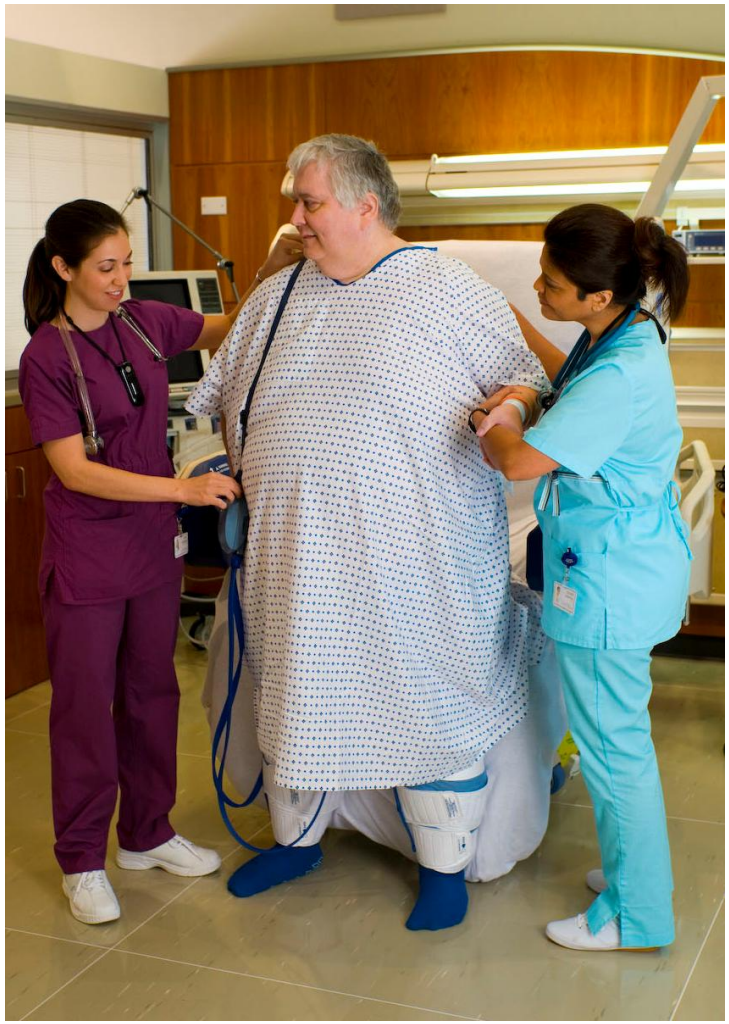
Wound and Skin Care

Personal Hygiene

Instrumentation

Exercise & Physical Therapy

Provider Safety



Nursing

Medicine

Physiotherapy

Occupational Therapy

Exercise

Nutrition

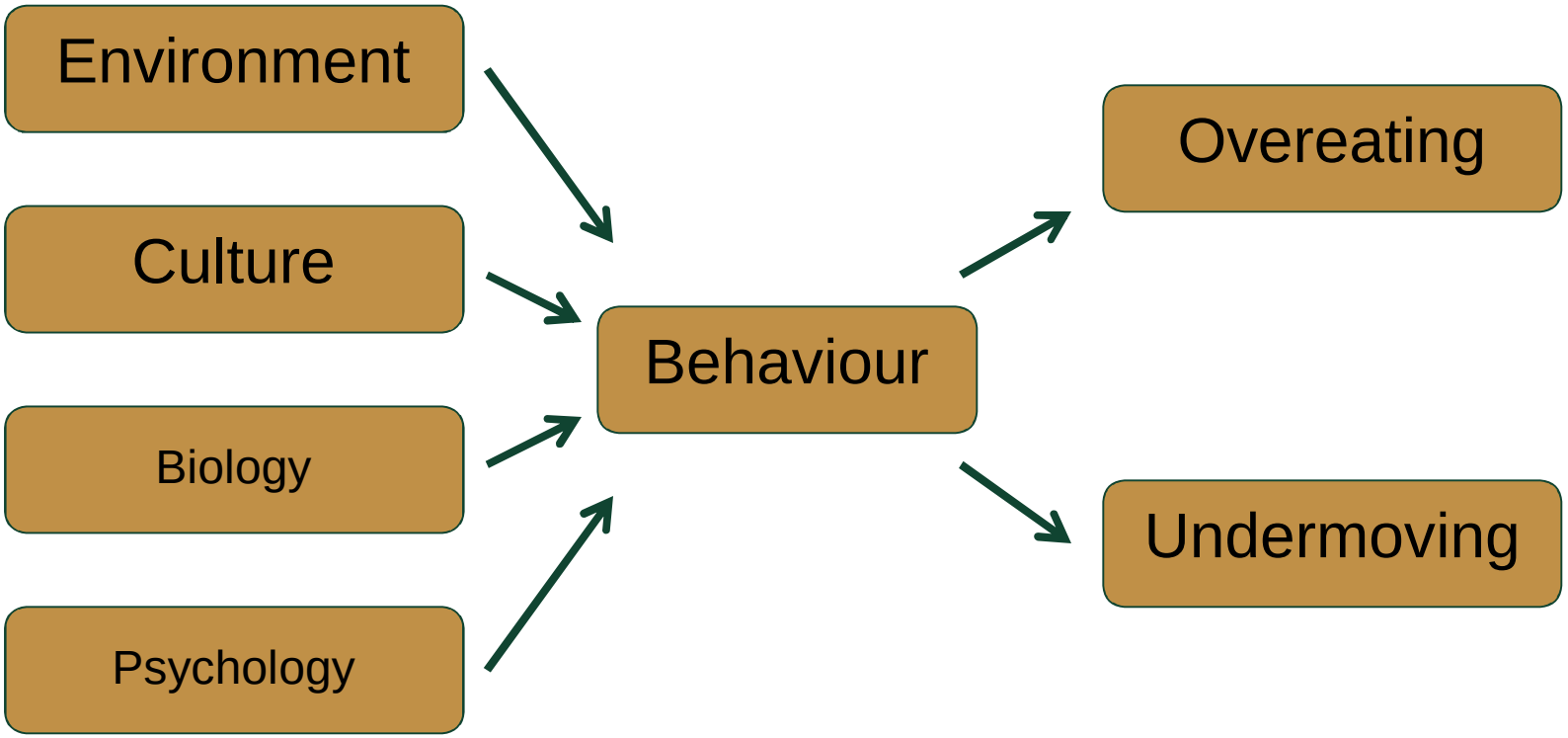
EMS

Transportation Services

Can we Change Weight Bias in Health Professionals?

Why?

What?



Bias & Stigma ↓

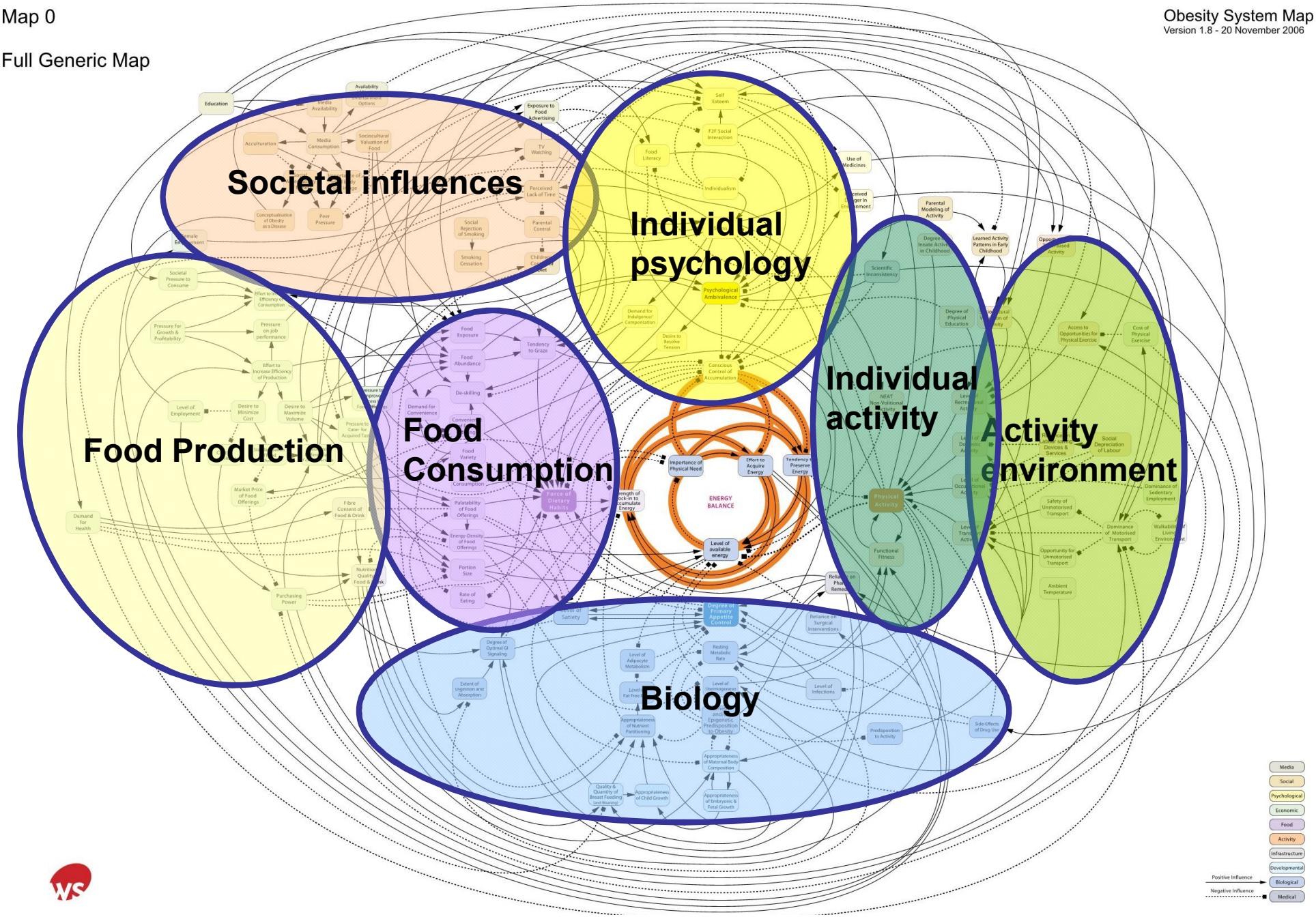
Bias & Stigma ↑

Sharma AM, 2011

Map 0

Full Generic Map

Obesity System Map
Version 1.8 - 20 November 2006



Lack of exercise main factor in high obesity rates

CBC News Posted: Jun 20, 2011 2:52 PM ET | Last Updated: Jun 21, 2011 9:54 AM ET 303

Vancouver has one of the lowest obesity rates in the country. (Chris Helgren/Reuters)

Publications
Health Reports
82-003-X
Vol. 22 No. 1
Articles in this release
About Health Analysis Division
Copyright
Browse by
Author
Subject

Physical activity of Canadian children and youth: Accelerometer results from the 2007 to 2009 Canadian Health Measures Survey

by Rachel C. Colley, Didier Garriguet, Ian Janssen, Cora L. Craig, Janine Clarke and Mark S. Tremblay

For this article...
Abstract
News release in *The Daily*
Tables and figures
References
To extract charts and tables
Download PDF of article

Growing evidence indicates that the health of Canadian children has deteriorated in the past few decades.[1-4] Childhood obesity has risen sharply[5-7]—a quarter of children and youth are now overweight or obese—and physical fitness has declined.[8] Yet paradoxically, according to self-reported data, the majority of Canadian youth are

Sex /Age group/BMI category	Intensity of activity					Step counts
	Sedentary	Light	Moderate	Vigorous	Moderate-to-vigorous	
	Average minutes per day					Average
BMI category						
Not overweight/obese†	524	249	46	2	48	10,224
Overweight	515	262	43	1E	44	10,450
Obese	544	263	47	<3	48	11,159

Why Obesity is More About Calories In than Out

Faculty of Medicine & Dentistry
University of Alberta

Number of Kcal you can **burn** in a minute

~5 Kcals

Number of Kcal you can **eat or drink** in a minute

>500 Kcals

DO I LOOK FAT IN THESE GENES?

RARE GENETIC DISORDERS OFFER INSIGHT TO OBESITY

Studies of twins, adopted children and their families have provided strong evidence of the heritability of obesity. In particular, a 1990 study of identical twins raised apart found that their adult BMI was strongly correlated to each other (despite being separated at birth) rather than to the families in which they were adopted (Stunkard, *N Engl J Med*).

While estimates vary widely as to what share of an individual's BMI is attributable to genetics (30% to 70%, depending on the study), most studies suggest that severe early onset obesity in children is likely to be associated with a genetic disorder.

Pediatric endocrinologist Andrea Haqq of the University of Alberta studies childhood obesity and its genetic roots. Of the single-

Our Genes Have Changed!

CONDUIT

Summer 2008 · Volume 2 · Number 1 $4.95

A better start for your baby... and you

SEE PAGE 13

INSIDE


FRAGILE

CONDUIT

Fall 2009

Volume 3 • Number 3 • $4.99

COGNITIVE
Behavioural Therapy

TEACHING
Kids to be Their Best

THE COST OF OBESITY
for Employers

WEIGHT BIAS & DISCRIMINATION:
THE NEW RACISM?

SEE PAGE 6

STICKS AND STONES BREAK BONES, BUT WORDS CUT TO THE HEART

Children suffer from weight-focused bias and bullying

It will not surprise many working in the field of weight and obesity — or even those in the general public — to read that multiple studies have confirmed that weight bias exists in our culture. But the extent to which children as young as three are subjected to this bias is alarming. Several studies report that among overweight youth, 30% of girls and 25% of boys experience weight-focussed peer victimization (Eisenberg, 2003). Vulnerability to bullying increases with bodyweight, with 60% of the heaviest children reporting harassment by their peers. The association between bullying and weight is so strong, in fact, that a child's BMI can accurately predict the likelihood of future victimization.

LINKING MENTAL HEALTH AND CHILDHOOD OBESITY

Making connections to help find solutions

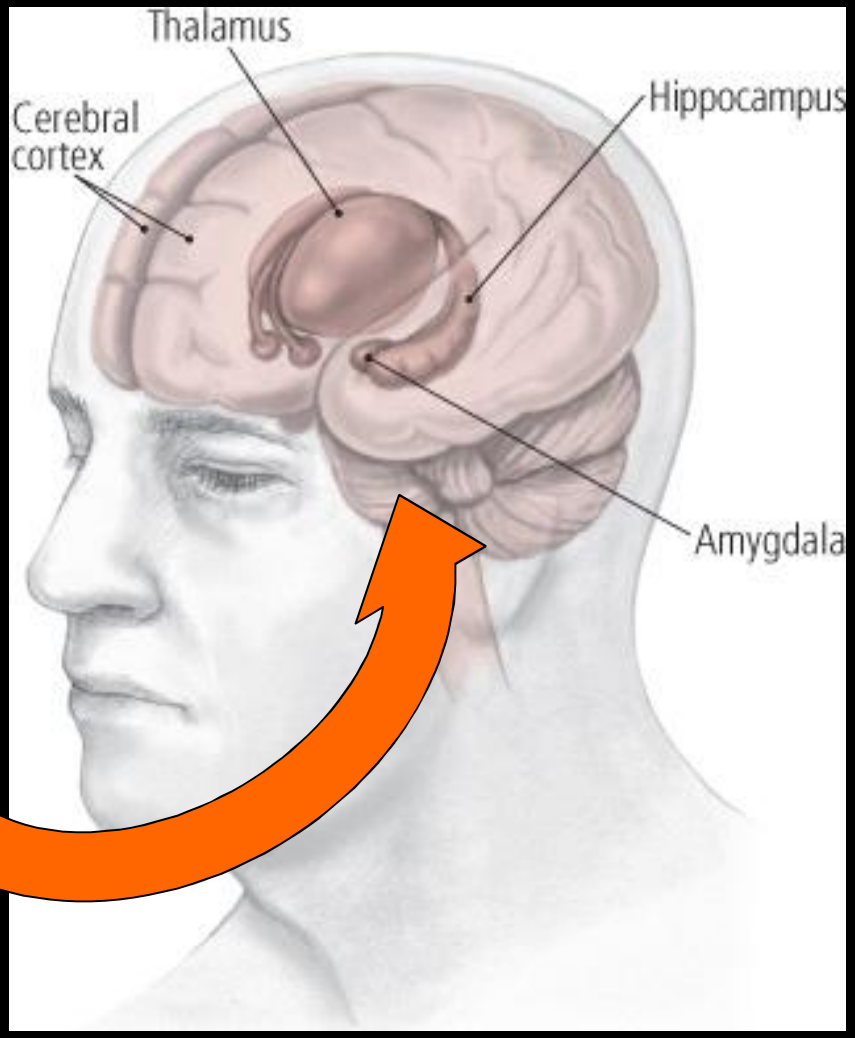
Coincidence cannot be held accountable for the national mental health crisis and obesity epidemic ripening side-by-side among Canada's children and youth. That's why researchers, clinicians and policy makers have been examining how the two may go hand in hand.

Merely acknowledging a relationship between obesity and mental health issues in children has been a major step towards progress, says Dr. Dina Panagiotopoulos, clinician scientist at the Child & Family Research Institute, pediatric endocrinologist at BC Children's Hospital and assistant professor of endocrinology in UBC's department of pediatrics. "We now assess for the presence of psychological/psychiatric concerns at the initial assessment and try to provide a multidisciplinary treatment plan that focuses on both the child's physical and mental well-being."

The perspectives on these comorbid conditions are many, and a growing understanding of the correlation between mental health and weight issues is enabling experts to tackle the problem from different sides of the equation. One question is, if weight trouble starts in childhood, what are the long-term repercussions for physical and mental health? Obesity leads to increased risk for various chronic diseases leading to reduced life expectancy and quality of life, but it's less clear to what extent childhood obesity affects mental health.

Research led by Paul Veugelers at the University of Alberta's School of Public Health has found that body weight and self-esteem are inversely related in children. His national findings in *Health Reports/Statistics Canada* (June

Depression and Appetite

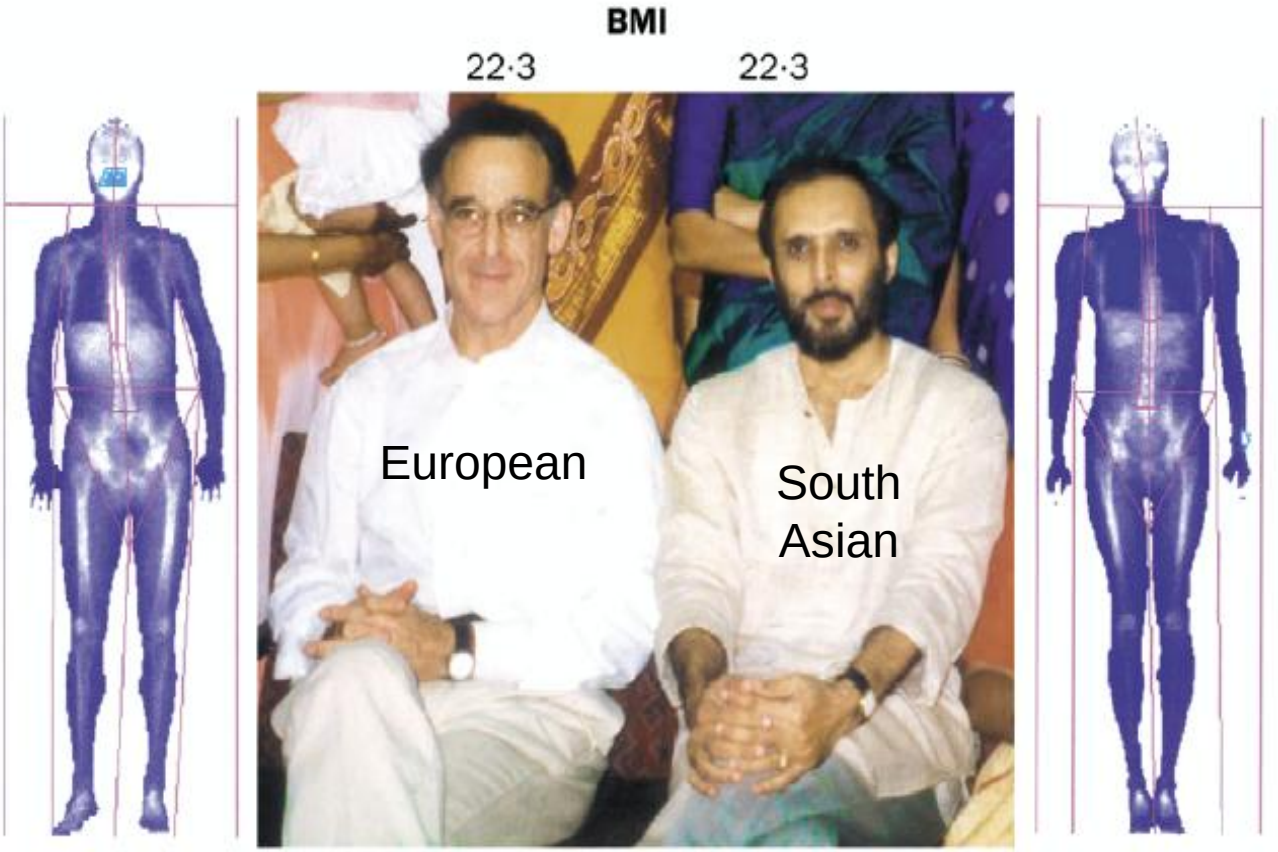


Addictions

Protection

BMI and Body Fat

Faculty of Medicine & Dentistry
University of Alberta

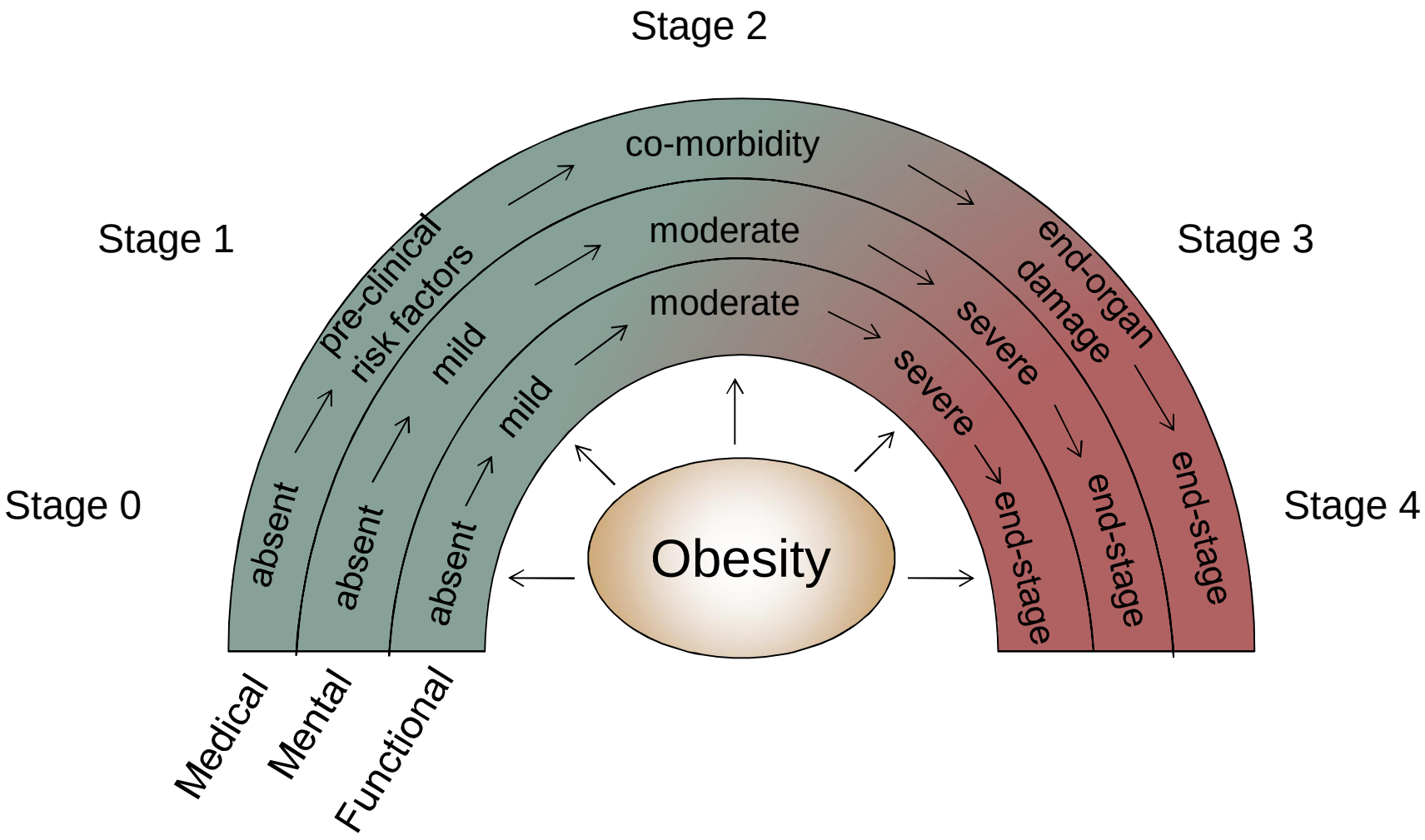


Yajnik CS, *Lancet.* 2004 Jan 10;363(9403):163.

DXA scan of two individuals with the same BMI but markedly different percent body fat

Edmonton Obesity Staging System (EOSS)

Faculty of Medicine & Dentistry
University of Alberta



Sharma AM & Kushner RF, *Int J Obes* 2009

CMAJ RESEARCH

Using the Edmonton obesity staging system to predict mortality in a population-representative cohort of people with overweight and obesity

Raj S. Padwal MSc MD, Nicholas M. Pajewski PhD, David B. Allison PhD, Arya M. Sharma MD PhD

ABSTRACT

Background: Anthropometric-based classification schemes for excess adiposity do not include direct assessment of obesity-related comorbidity and functional status and thus have limited clinical utility. We examined the ability of the Edmonton obesity staging system, a 5-point ordinal classification system that considers comorbidity and functional status, in predicting mortality in a nationally representative US sample.

Methods: We analyzed data from the National Health and Human Nutrition Examination Surveys (NHANES) III (1988–1994) and the NHANES 1999–2004, with mortality follow-up through to the end of 2006. Adults (age ≥ 20 yr) with overweight or obesity who had been randomized to the morning session at the mobile examination centre were scored according to the Edmonton obesity staging system. We examined the relationship between staging system scores and mortality, and Cox proportional hazards models were adjusted for the presence of the metabolic syndrome or hypertriglyceridemic waist.

Results: Over 75% of the cohort with overweight or obesity were given scores of 1 or 2. Scores of 4 could not be reliably assigned because specific data elements were lacking. Survival curves clearly diverged when stratified by scores of 0–3, but not when stratified by obesity class alone. Within the data from the NHANES 1988–1994, scores of 2 (hazard ratio [HR] 1.57; 95% confidence interval [CI] 1.16 to 2.13) and 3 (HR 2.69; 95% CI 1.98 to 3.67) were associated with increased mortality compared with scores of 0 or 1, even after adjustment for body mass index and the metabolic syndrome. We found similar results after adjusting for hypertriglyceridemic waist (i.e., waist circumference ≥ 90 cm and a triglyceride level ≥ 2 mmol/L for men; the corresponding values for women were ≥ 85 cm and ≥ 1.5 mmol/L), as well as in a cohort eligible for bariatric surgery.

Interpretation: The Edmonton obesity staging system independently predicted increased mortality even after adjustment for contemporary methods of classifying adiposity. The Edmonton obesity staging system may offer improved clinical utility in assessing obesity-related risk and prioritizing treatment.

Competing interests: Raj Padwal and Arya Sharma are supported by an alternative funding plan from the Government of Alberta and the University of Alberta. David Allison has received grants, honoraria, donations, and consulting fees from numerous other commercial and nonprofit entities with interests in obesity. No other competing interests were declared.

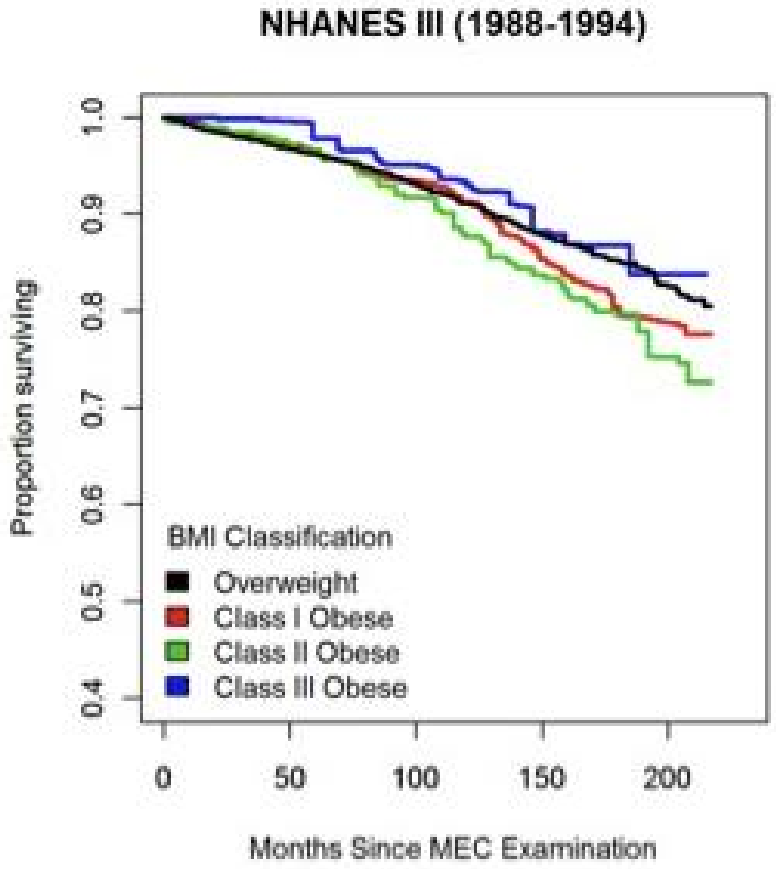
This article has been peer reviewed.

Correspondence to:
Dr. Raj S. Padwal,
rpadwal@ualberta.ca

CMAJ 2011. DOI:10.1503/cmaj.110387

EOSS Predicts Mortality in NHANES III

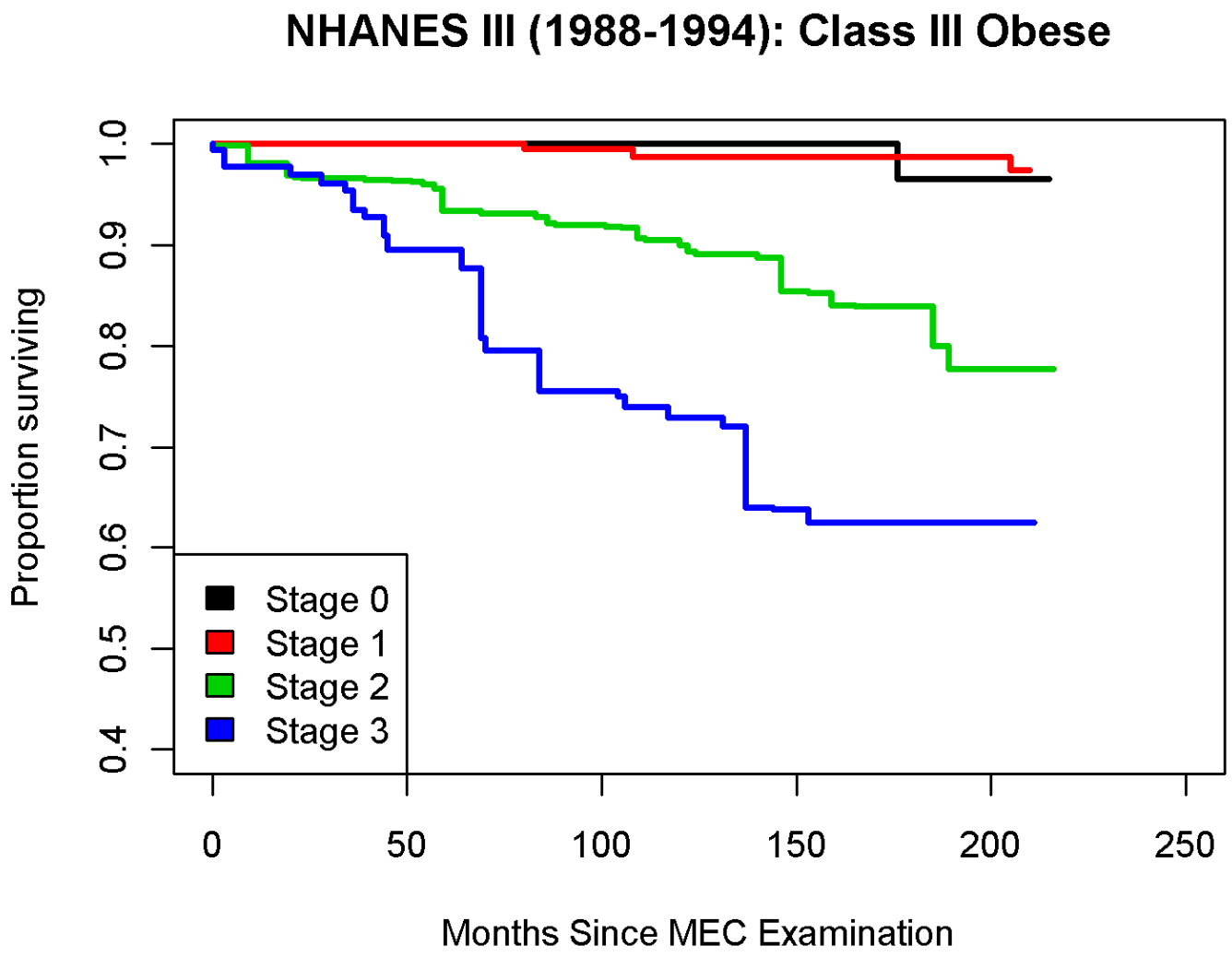
Faculty of Medicine & Dentistry
University of Alberta



Padwal R, Sharma AM et al. CMAJ 2011

EOSS Predicts Mortality at Every Level of BMI NHANES III

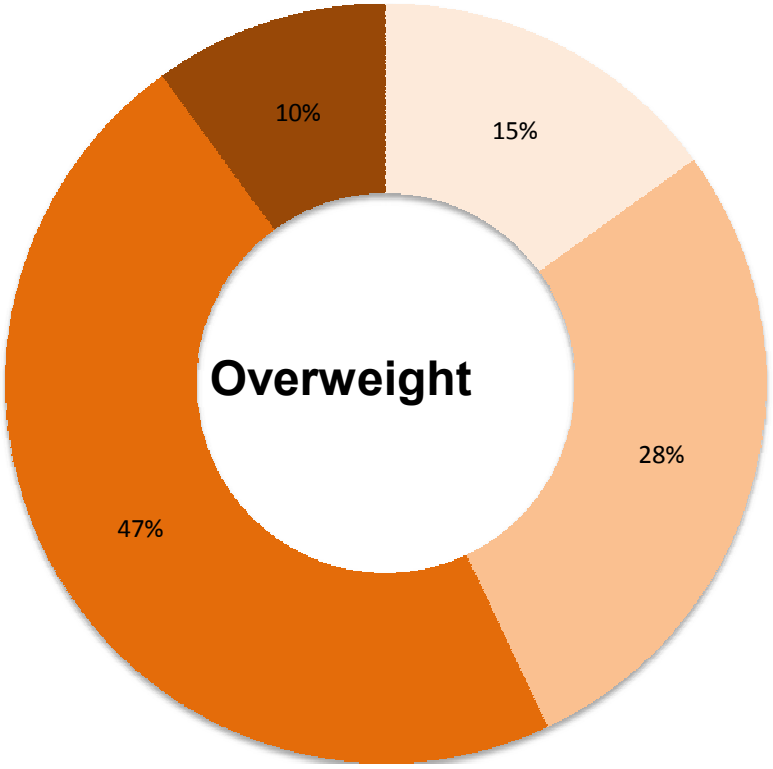
Faculty of Medicine & Dentistry
University of Alberta



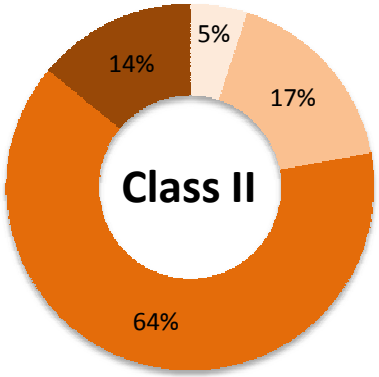
Padwal R, Sharma AM et al. CMAJ 2011

EOSS Distribution Across BMI Categories NHANES III (1988-1994)

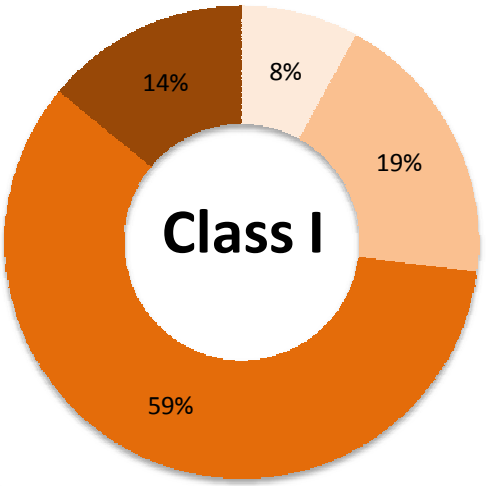
Faculty of Medicine & Dentistry
University of Alberta



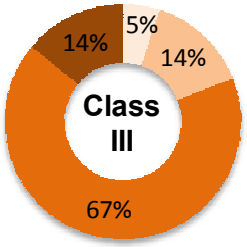
50 million



10 million



23 million



6 million

EOSS Stage 0
EOSS Stage 1
EOSS Stage 2

Padwal R, Sharma AM et al. CMAJ 2011

EOSS: EDMONTON OBESITY STAGING SYSTEM - *Staging Tool*

STAGE 0

- **NO** sign of obesity-related risk factors
- **NO** physical symptoms
- **NO** psychological symptoms
- **NO** functional limitations

Case Example:
Physically active female with a BMI of 32 kg/m², no risk factors, no physical symptoms, no self-esteem issues, and no functional limitations.

Class I, Stage 0 Obesity

EOSS Score

WHO Obesity Classfication

STAGE 1

- Patient has obesity-related **SUBCLINICAL** risk factors
(borderline hypertension, impaired fasting glucose, elevated liver enzymes, etc)
- OR -
- **MILD** physical symptoms - patient currently not requiring medical treatment for comorbidities
(dyspnea on moderate exertion, occasional aches/pains, fatigue, etc.) *- OR -*
- **MILD** obesity-related psychological symptoms and/or mild impairment of well-being
(quality of life not impacted)

Case Example:
38 year old female with a BMI of 59.2 kg/m², borderline hypertension, mild lower back pain, and knee pain. Patient does not require any medical intervention.

Class III, Stage 1 Obesity

WHO CLASSIFICATION OF WEIGHT STATUS (**BMI** kg/m²)

Obese Class I ..... 30 - 34.9
Obese Class II ..... 35 - 39.9
Obese Class III ..... ≥40

Stage 0 / Stage 1 Obesity

Patient ***does not meet clinical criteria for admission*** at this time.
Please refer to primary care for further preventative treatment options.

STAGE 2

- Patient has an **ESTABLISHED** obesity-related comorbidities requiring medical intervention
(HTN, Type II Diabetes, sleep apnea, PCOS, osteoarthritis, reflux disease) *- OR -*
- **MODERATE** obesity-related psychological symptoms
(depression, eating disorders, anxiety disorder) *- OR -*
- **MODERATE** functional limitations in daily activities
(Quality of life is beginning to be impacted)

Case Example:
32 year old male with a BMI of 36 kg/m² who has primary hypertension and obstructive sleep apnea.

Class II, Stage 2 Obesity

STAGE 3

- Patient has **significant** obesity-related end-organ damage (myocardial infarction, heart failure, diabetic complications, incapacitating osteoarthritis) *- OR -*
- **SIGNIFICANT** obesity-realted psychological symptoms
(major depression, suicide ideation) *- OR -*
- **SIGNIFICANT** functional limitations
(eg: unable to work or complete routine activities, reduced mobility)
- **SIGNIFICANT** impairment of well-being
(quality of life is significantly impacted)

Case Example:
49 year old female with a BMI of 67 kg/m² diagnosed with sleep apnea, CV disease, GERD, and suffered from stroke. Patient's mobility is significantly limited due to osteoarthritis and gout.

Class III, Stage 3 Obesity

STAGE 4

- **SEVERE** (potential end stage) from obesity related comorbidities *- OR -*
- **SEVERELY** disabling psychological symptoms *- OR -*
- **SEVERE** functional limitations

Case Example:
45 year old female with a BMI of 54 kg/m² who is in a wheel chair because of disabling arthritis, severe hyperpnoea, and anxiety disorder.

Class III, Stage 4 Obesity

Alberta Health Services

UNIVERSITY OF ALBERTA

Sharma AM & Kushner RF, *Int J Obes* 2009

Isn't Obesity Simple?

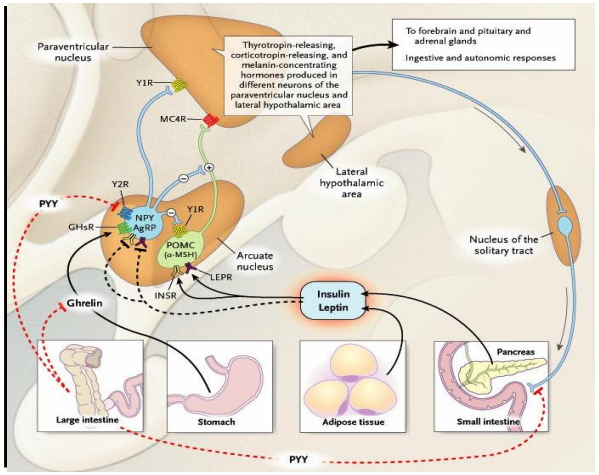
Faculty of Medicine & Dentistry
University of Alberta

Genetics

Diet

+/-

Energy In



+/-

Exercise

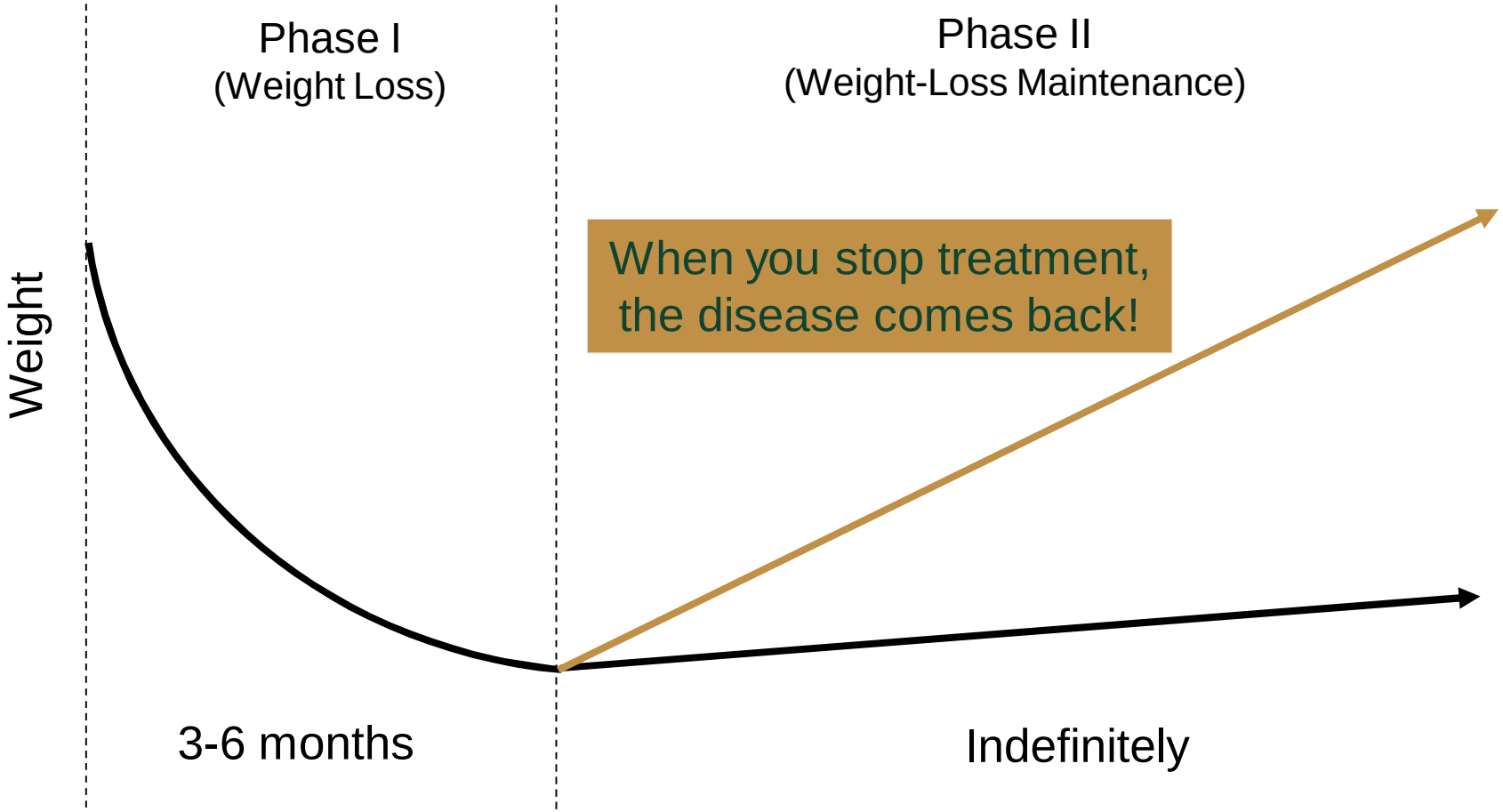
Energy Out

Energy Regulation is Complex!

Sharma AM 2007

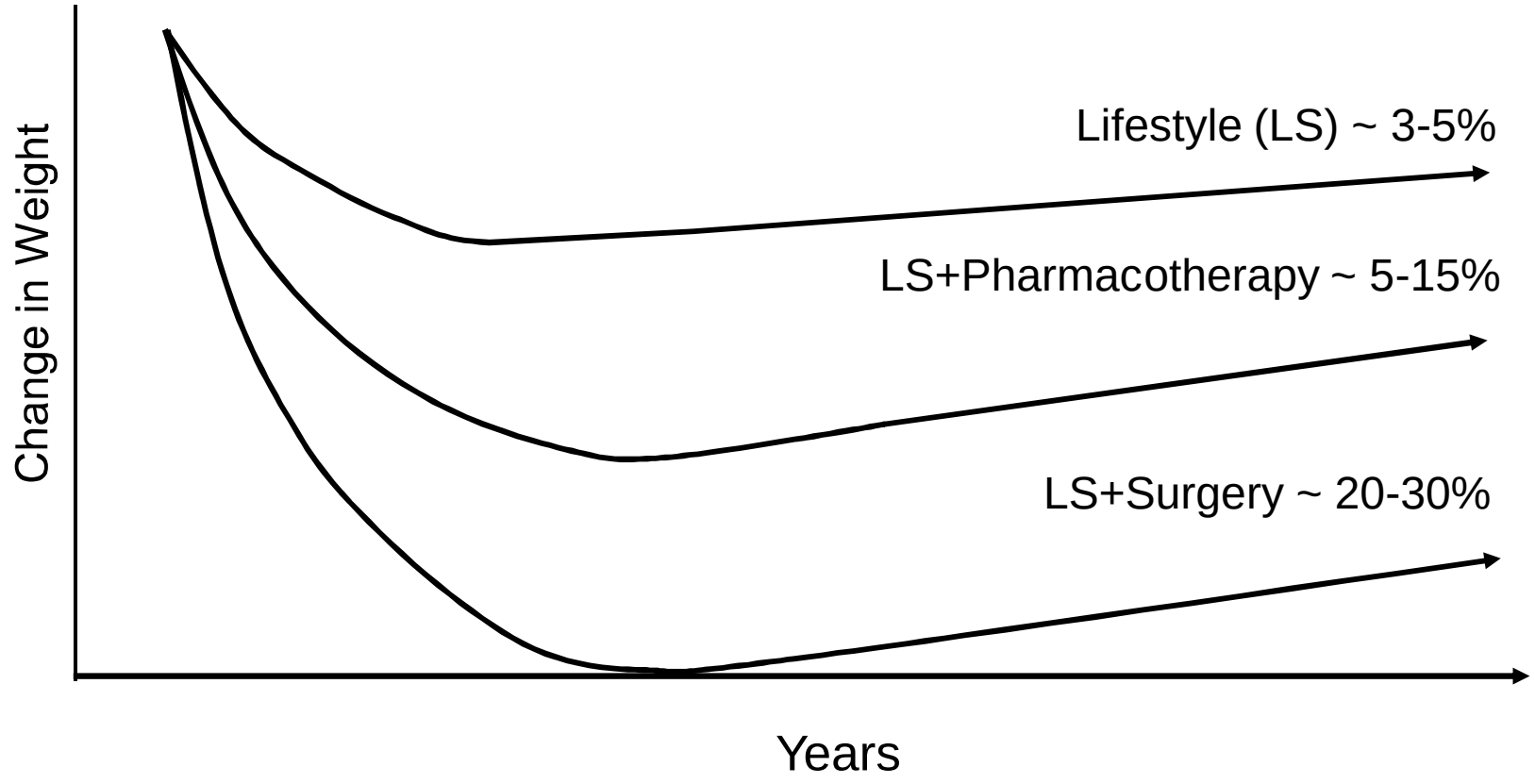
Phases of Obesity Treatment

Faculty of Medicine & Dentistry
University of Alberta



Treatment Success

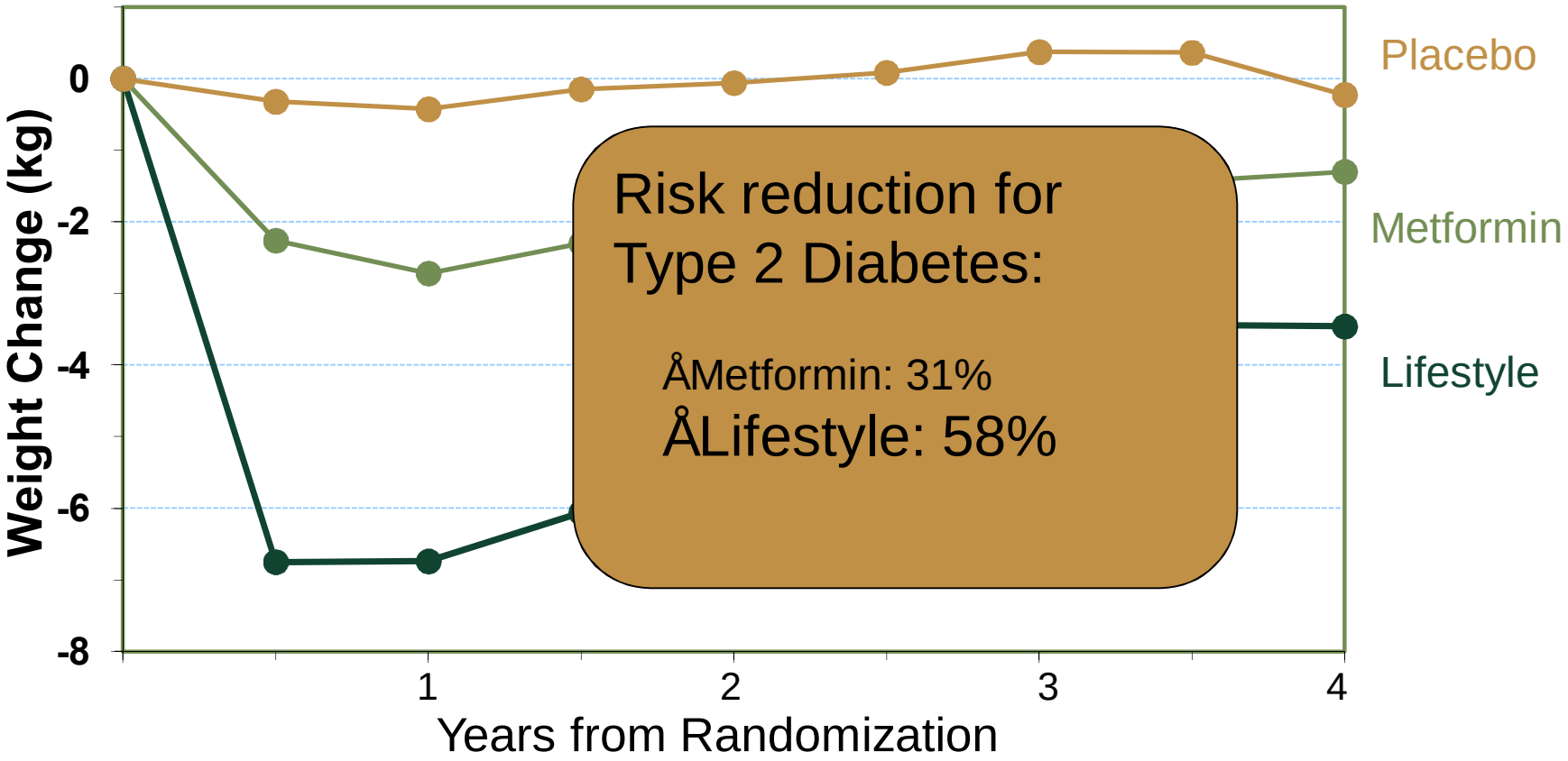
Faculty of Medicine & Dentistry
University of Alberta



Diabetes Prevention Study

Mean Weight Change

Faculty of Medicine & Dentistry
University of Alberta

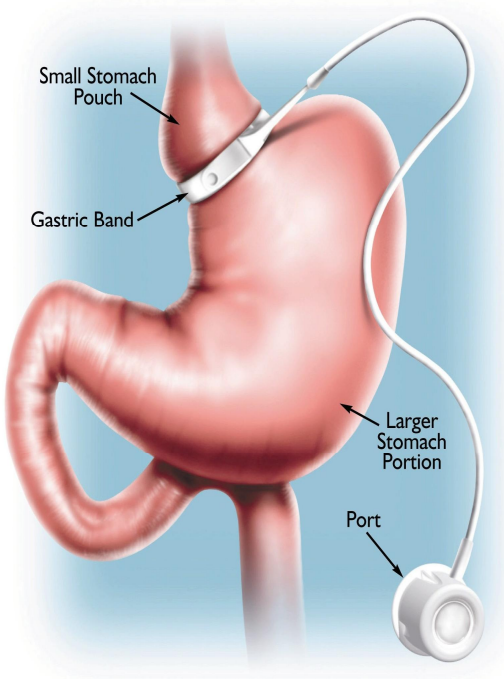


The DPP Research Group, *NEJM 346*:393-403, 2002

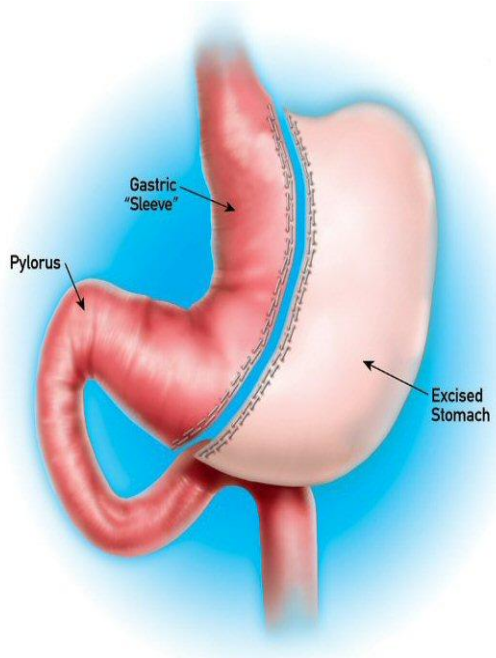
Common Bariatric Surgical Procedures

Faculty of Medicine & Dentistry
University of Alberta

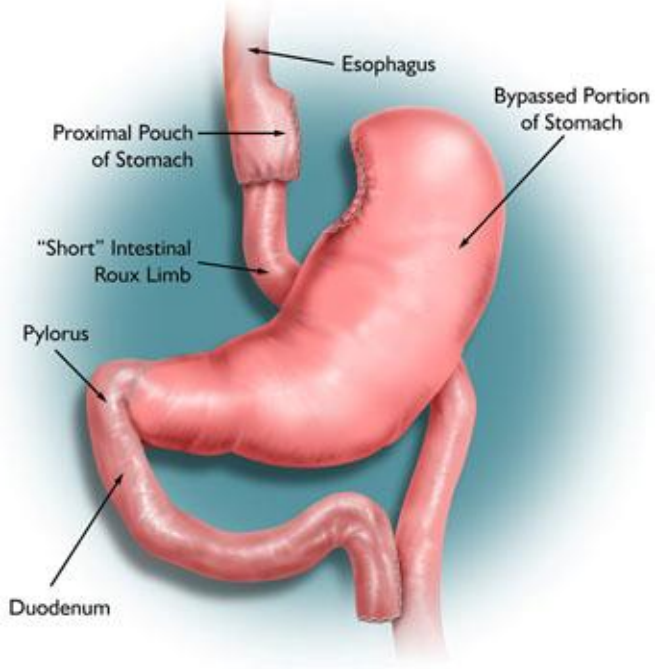
Adjustable Gastric-Banding



Vertical Sleeve-Gastrectomy



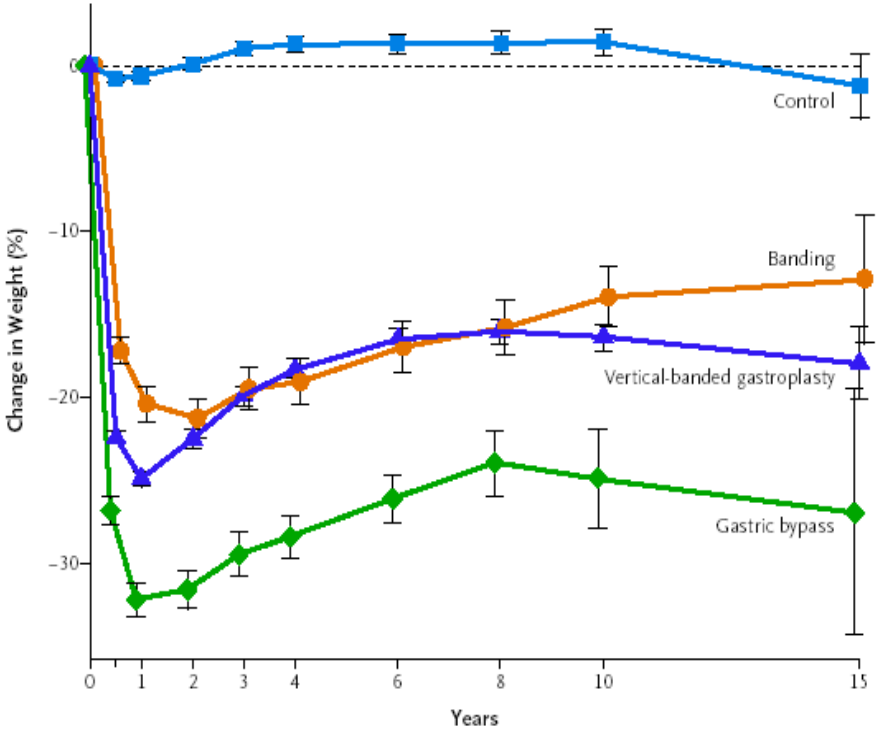
Roux-n-Y Gastric Bypass

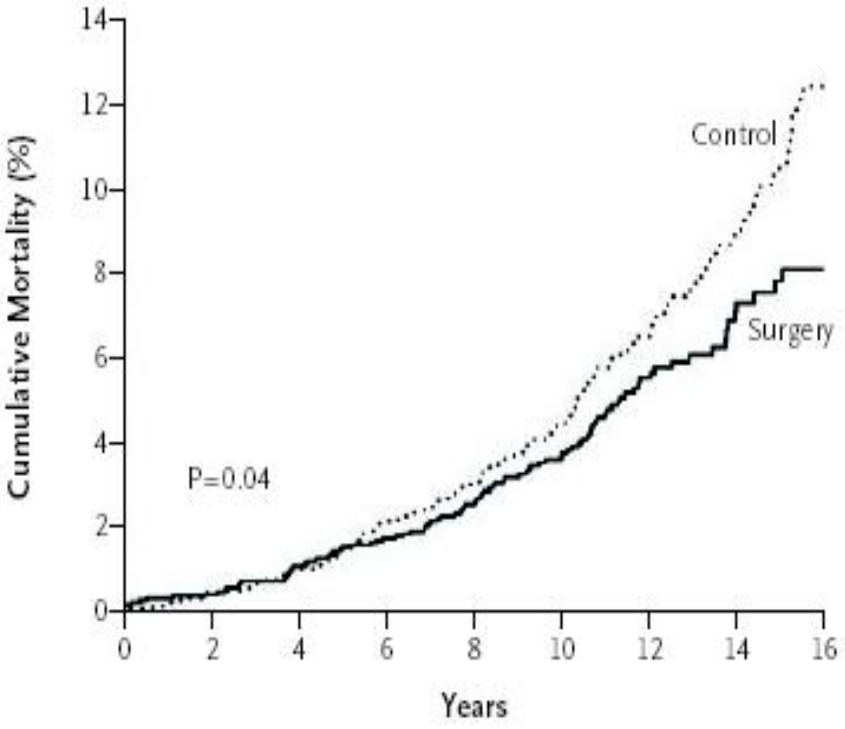


Bariatric Surgery Reduces Mortality in Swedish Obese Subjects (n=2010 vs. 2037)

Faculty of Medicine & Dentistry
University of Alberta

30% Reduction in All Cause Mortality

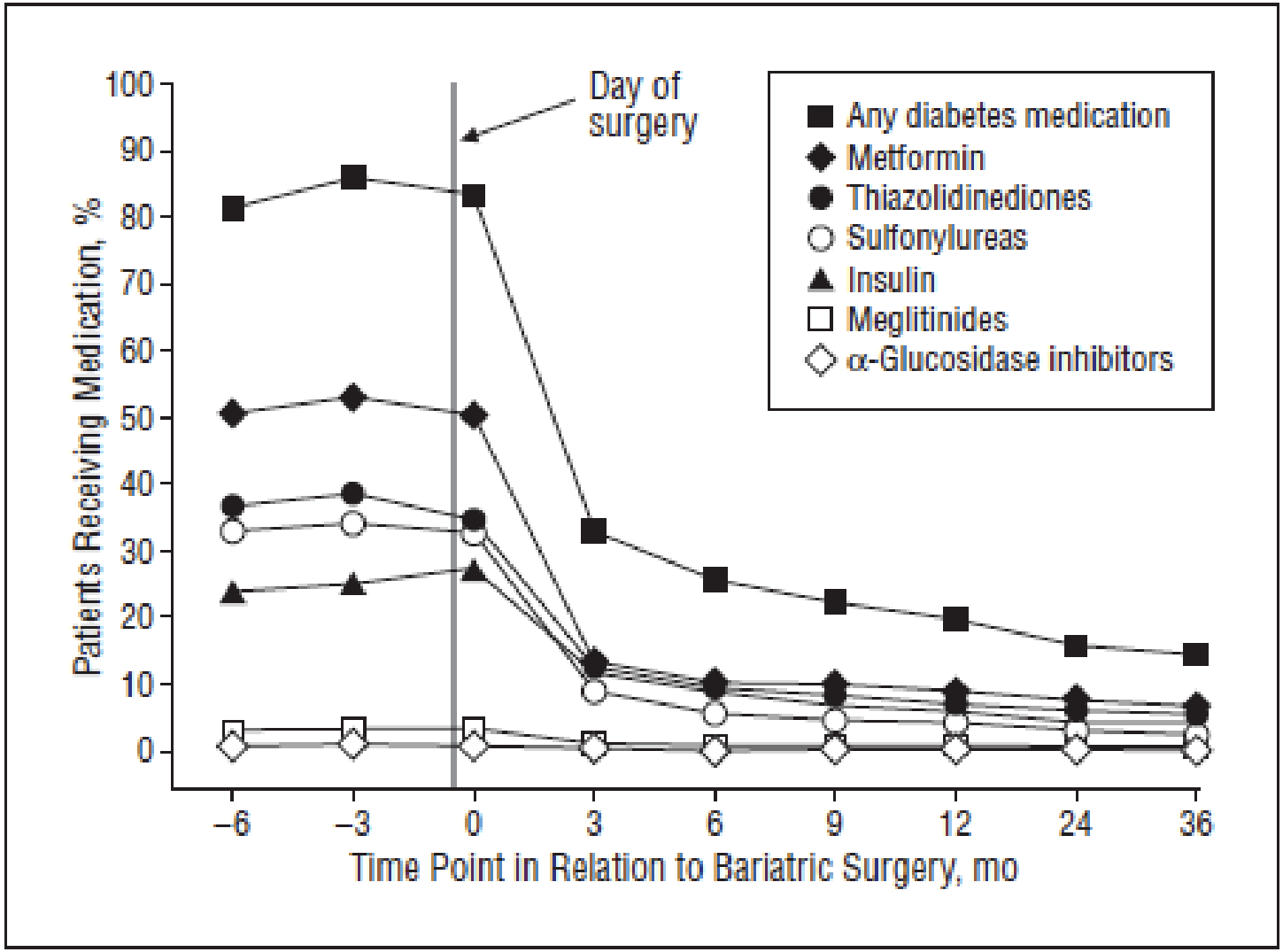




Sjostrom L et al. *NEJM* 2007;357:741-52

Use of Diabetes Medication Before and After Bariatric Surgery (n=2235)

Faculty of Medicine & Dentistry
University of Alberta



Makary MA et al. Arch Surg 2010;145:726

J Gen Intern Med 2011; 26:1183ï 94

Bariatric Surgery: A Systematic Review of the Clinical and Economic Evidence

Raj Padwal, MD MSc[1,4], Scott Klarenbach, MD MSc[1], Natasha Wiebe, MMath PStat[1], Maureen Hazel, MA[1], Daniel Birch, MSc MD[2], Shahzeer Karmali, MD[2], Arya M. Sharma, MD PhD[1], Braden Manns, MD MSc[3], and Marcello Tonelli, MD SM[1]

Surgery resulted in long-term incremental costï utility ratios of $ <1.000ï $40,000 (2009 USD) per quality-adjusted-life-year compared with non-surgical treatment.

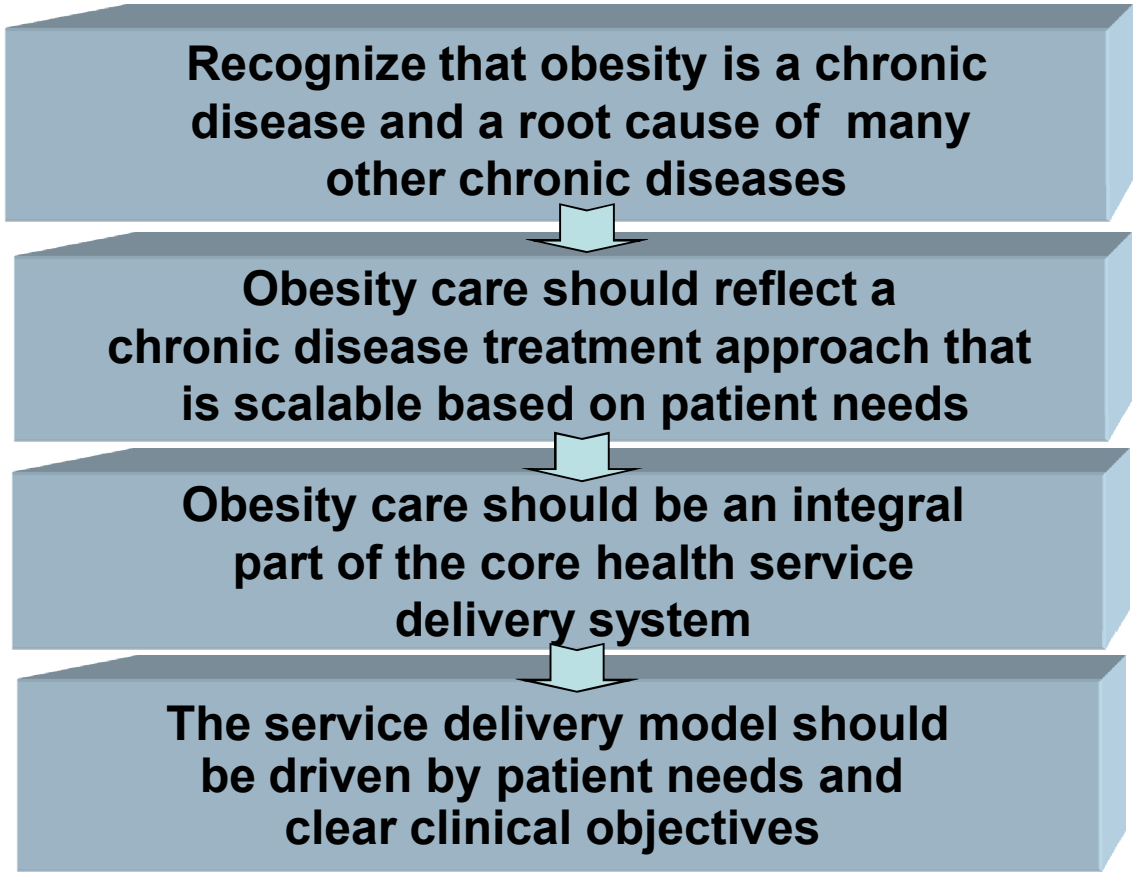
OBJECTIVE: To systematically review 1. the clinical efficacy and safety, 2. cost-effectiveness of bariatric surgery, and 3. the association between number of

CONCLUSIONS: Contemporary bariatric surgery appears to result in sustained weight reduction with acceptable costs but rigorous, longer-term (≥5 year)

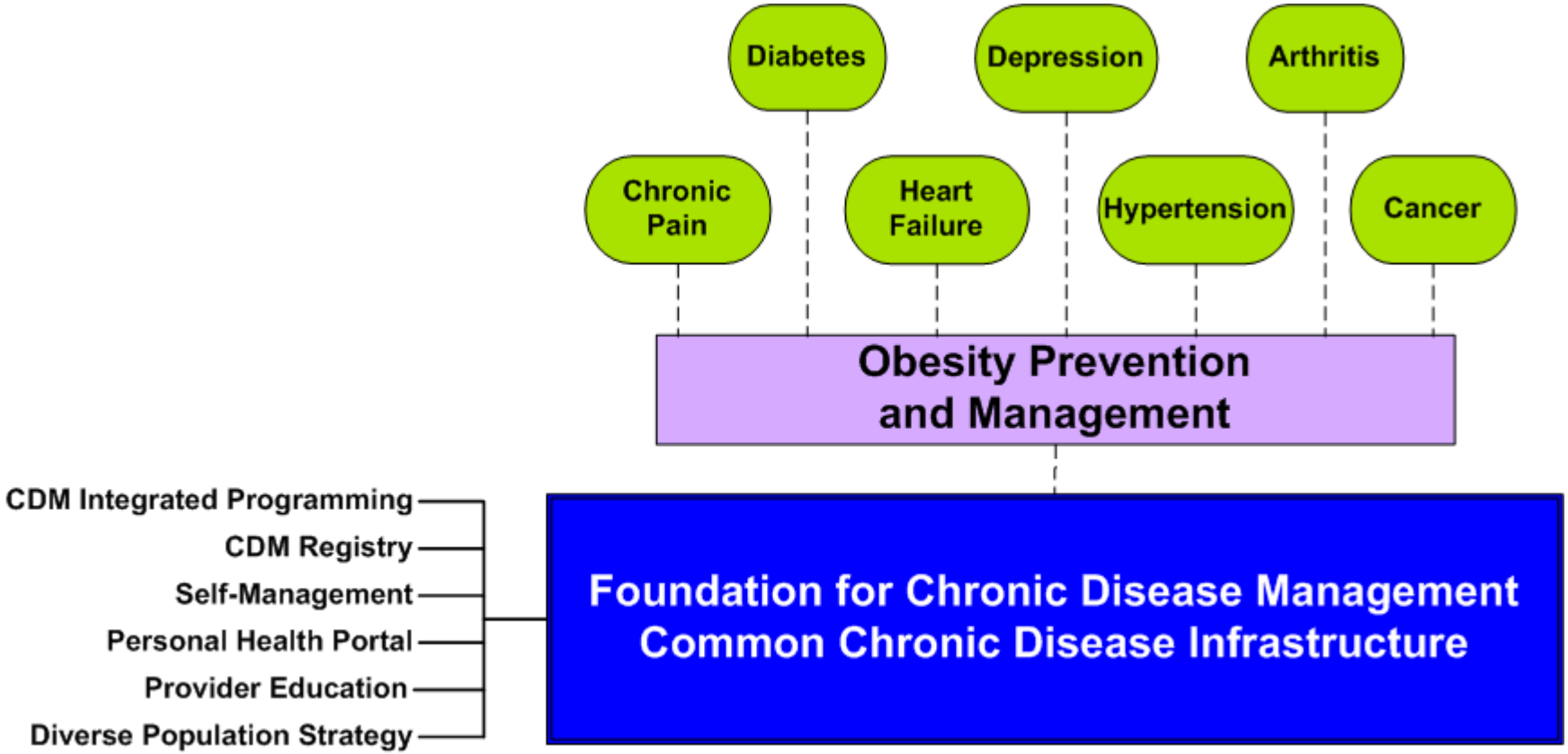

Esophagus
Bypassed Portion of Stomach
Proximal Pouch of Stomach
"Short" Intestinal Roux Limb
Pylorus
Duodenum

ONTARIO
Bariatric Network

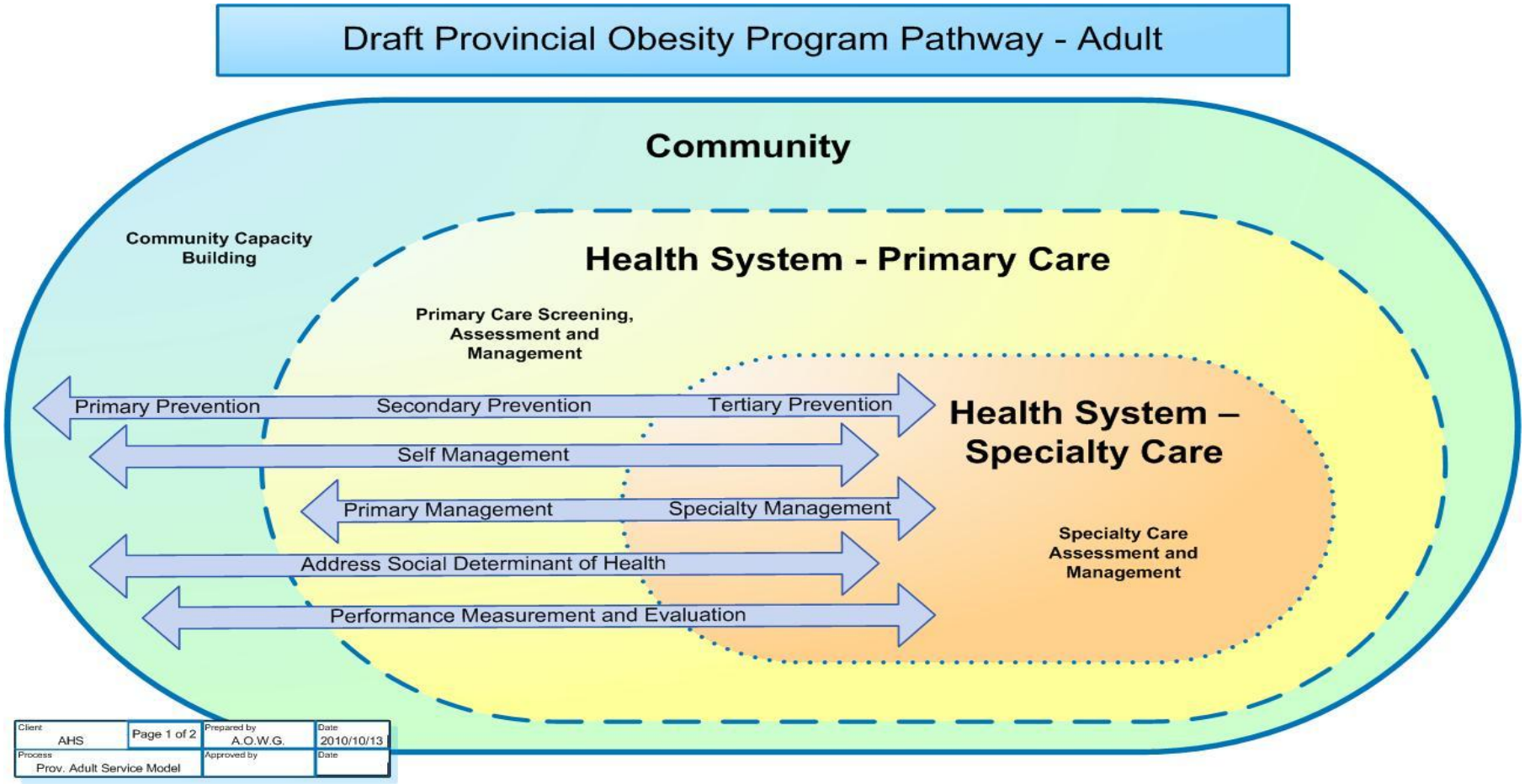
Obesity is a Chronic Disease



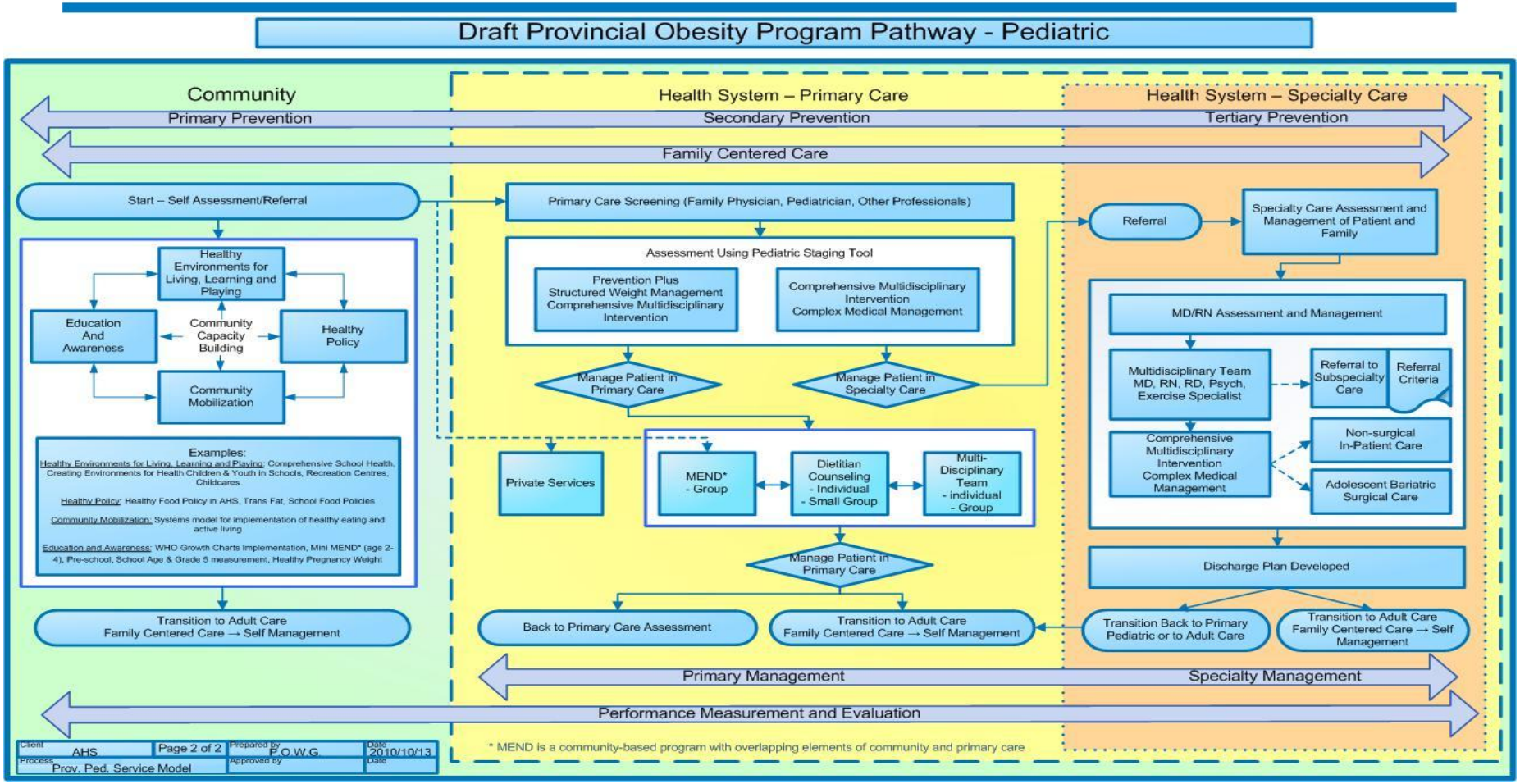
Building the Foundation for Optimal Chronic Disease Management



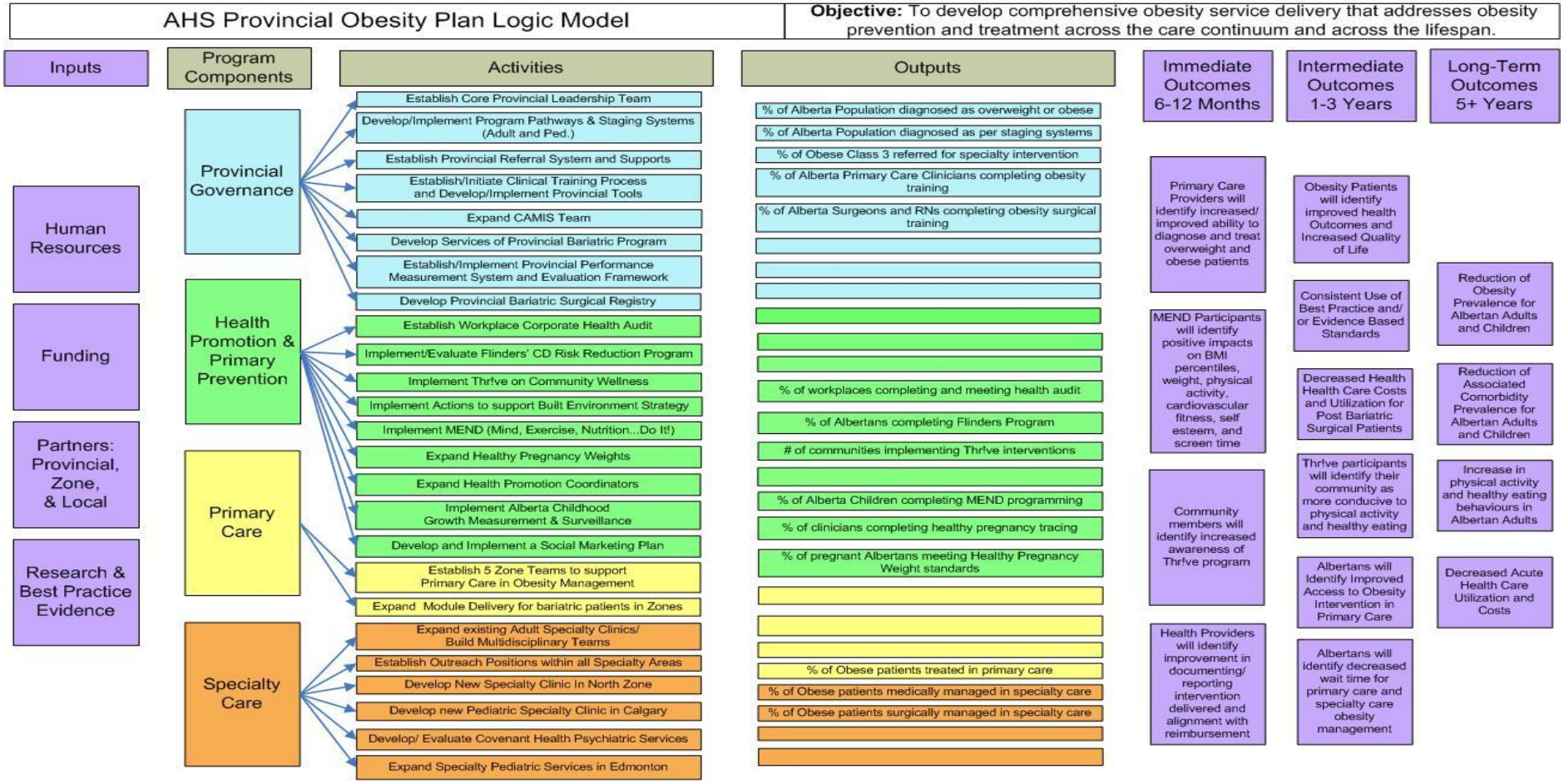
Program Pathway for Coordinating Care



Clinical Pathways for Standardization of care



Framework for Measuring Success Performance



www.obesitynetwork.ca

3RD NATIONAL OBESITY SUMMIT

Canadian Obesity Network • Réseau Canadien en Obésité

MAY 2–5,2013

Westin Bayshore, Vancouver BC

www.con-obesitysummit.ca