

Bariatric Surgery and Chronic Kidney Disease



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Goals



- **Obesity and CKD (Dr. Gill)**
- **Introduction to bariatric surgery**
- **Is there a role for bariatric surgery in pre-transplant patients?**

Body Mass Index (BMI)



BMI Formula = $\text{Weight(kg)} / \text{Height(m)}^2$

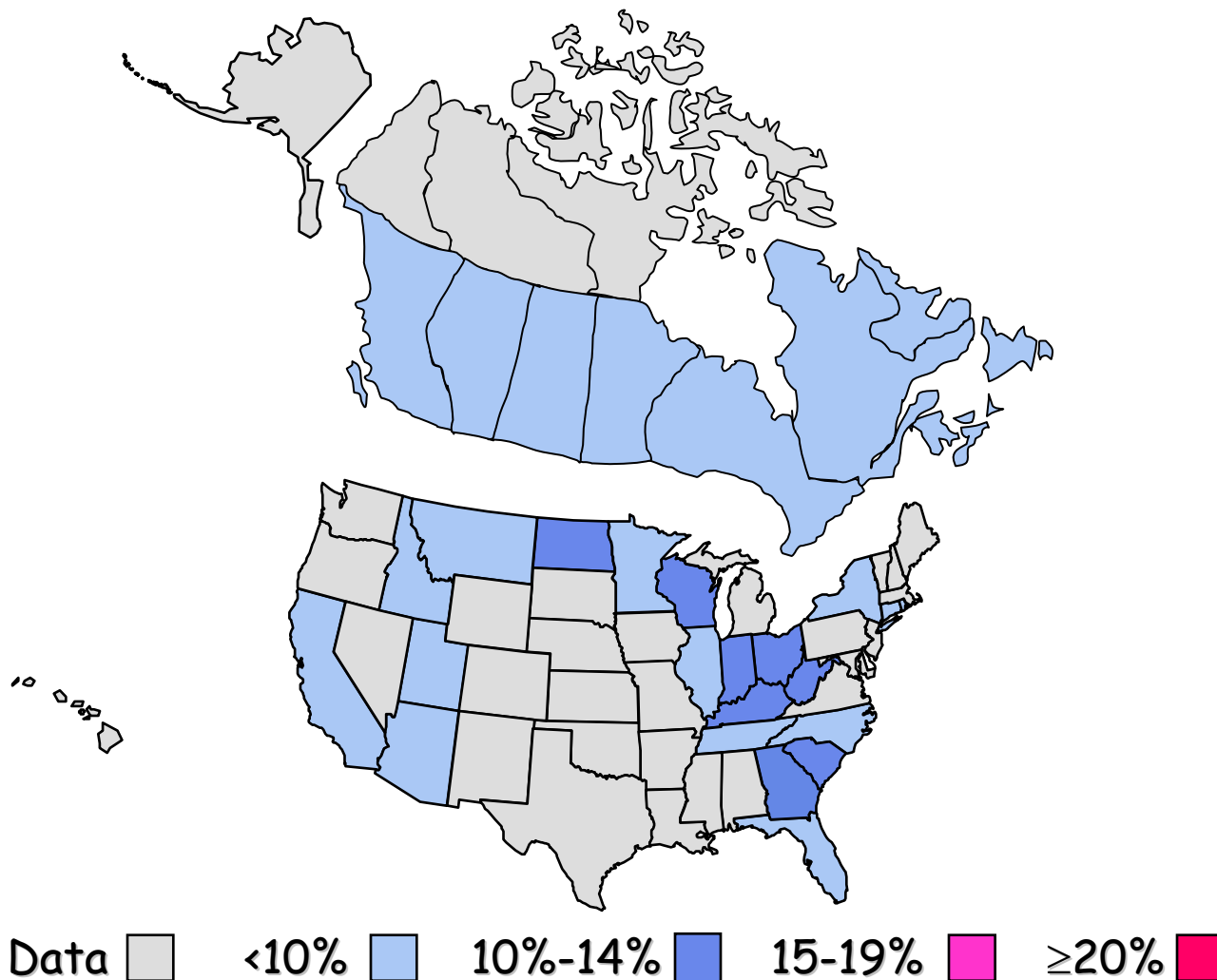
- **BMI 20 – 25 = Normal**
- **BMI > 30 = Obese**
- **BMI > 40 = Morbidly obese**

How bad is it to be Obese?



- Framingham and NHANES – significant M&M
- 2nd largest health-related cause of mortality (after smoking)
- BMI > 40 = ↓ life expectancy
 - 20 years men
 - 5 years women

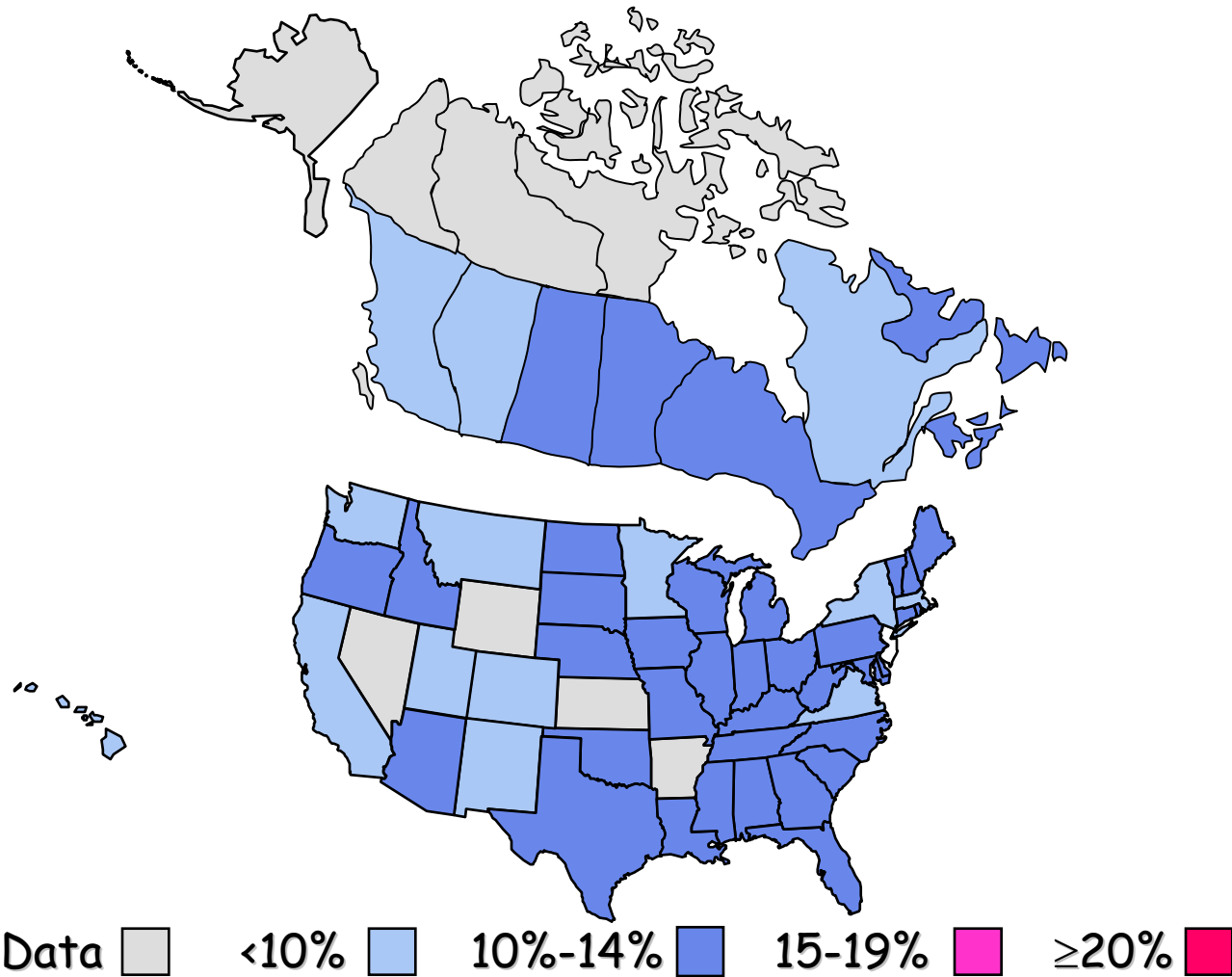
Obesity Trends Among Canadian and U.S. Adults, 1985



AH Mokdad et al, JAMA 289:76-79, 2003

PT Katzmarzyk, Can Med Assoc J 166:1039-1040, 2002

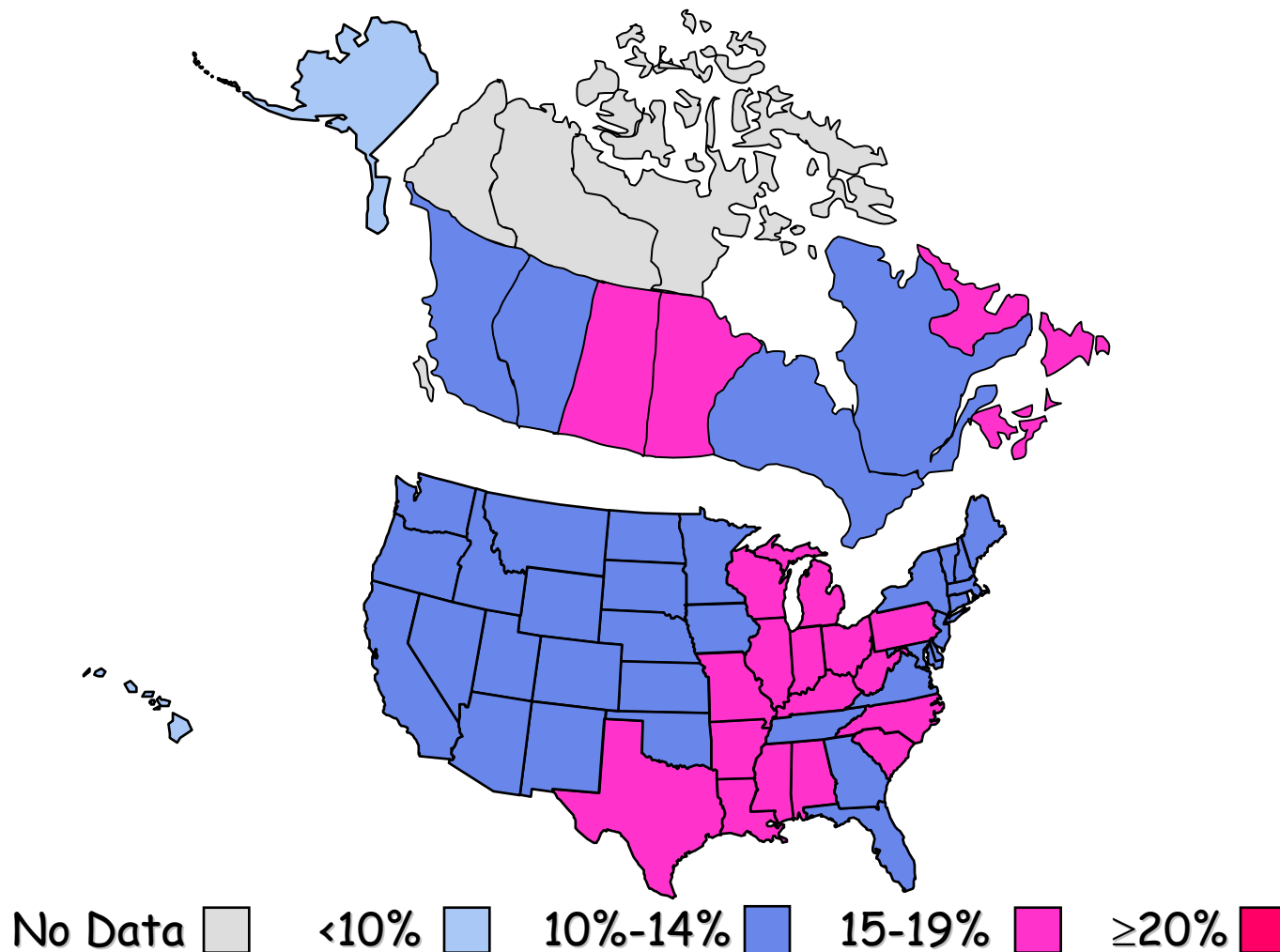
Obesity Trends Among Canadian and U.S. Adults, 1990



AH Mokdad et al, JAMA 289:76-79, 2003

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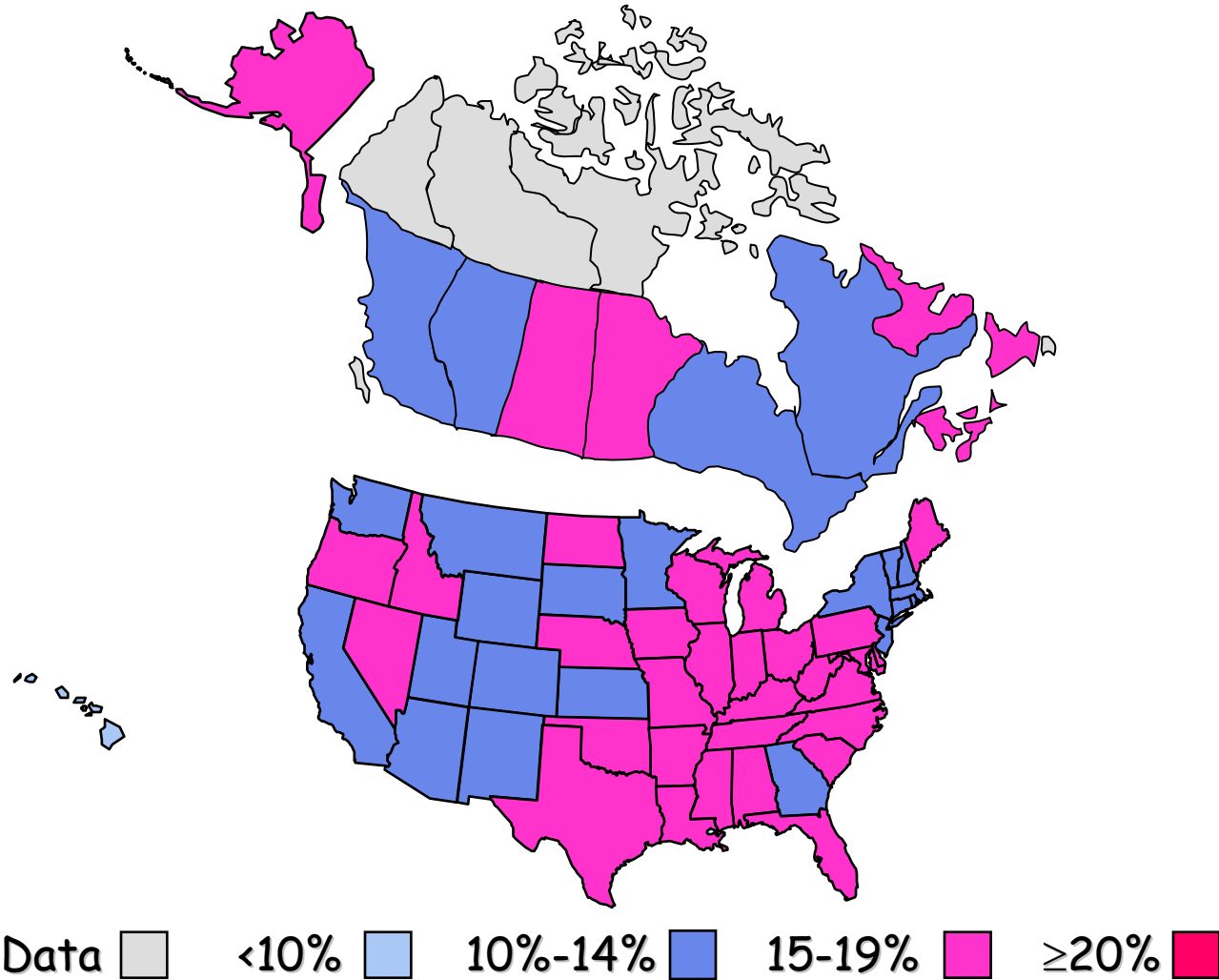
Obesity Trends Among Canadian and U.S. Adults, 1994



AH Mokdad et al, JAMA 289:76-79, 2003

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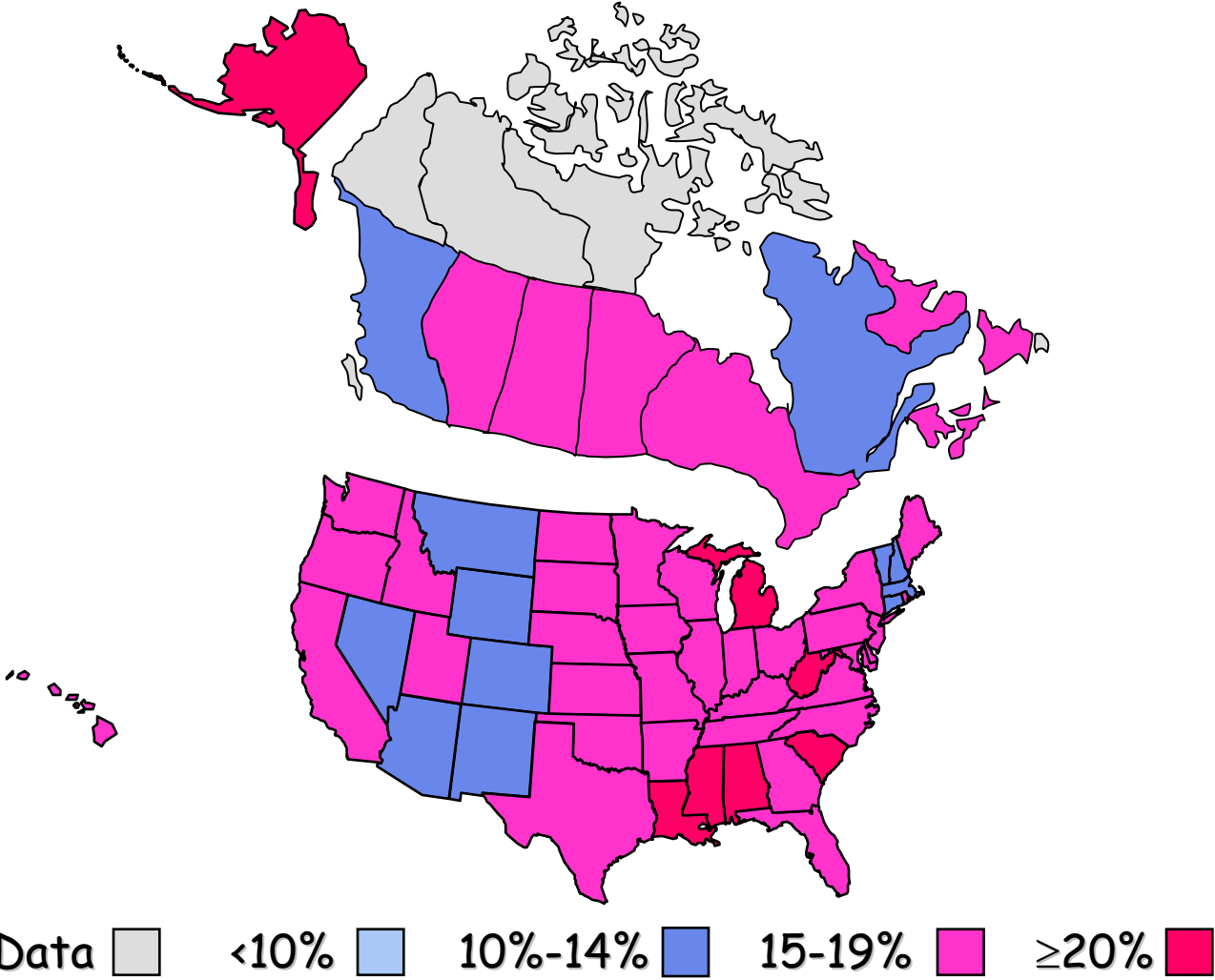
Obesity Trends Among Canadian and U.S. Adults, 1996



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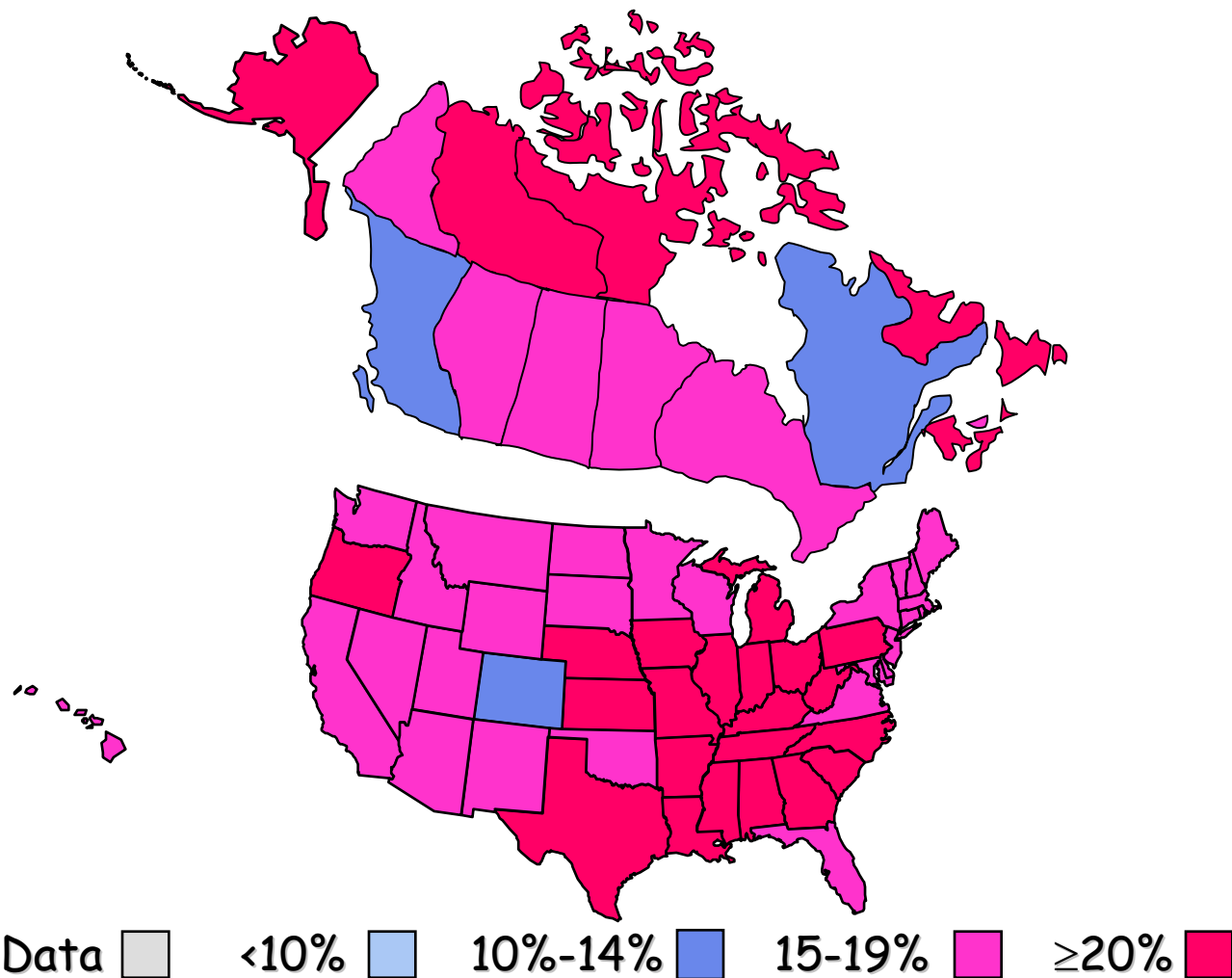
Obesity Trends Among Canadian and U.S. Adults, 1998



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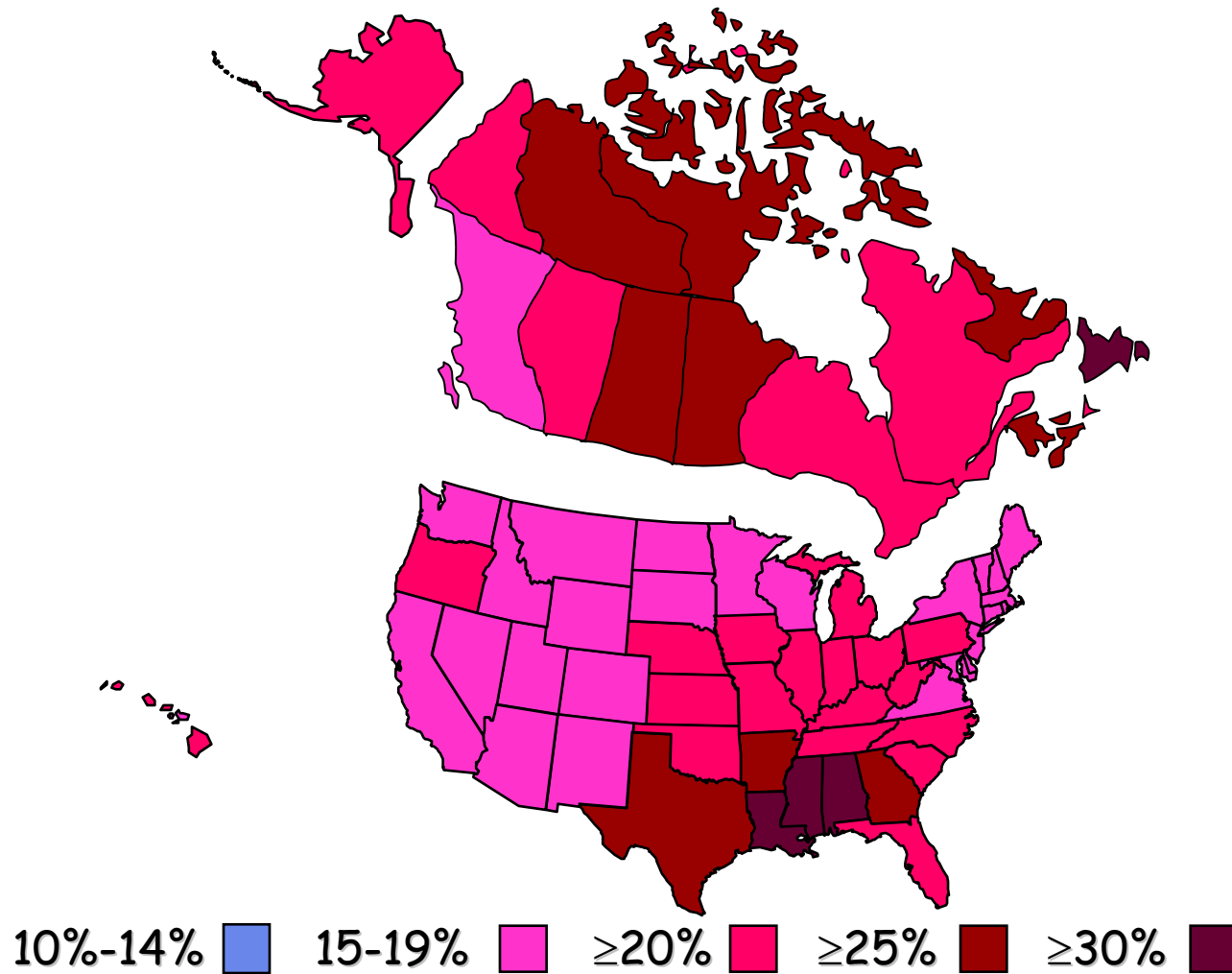
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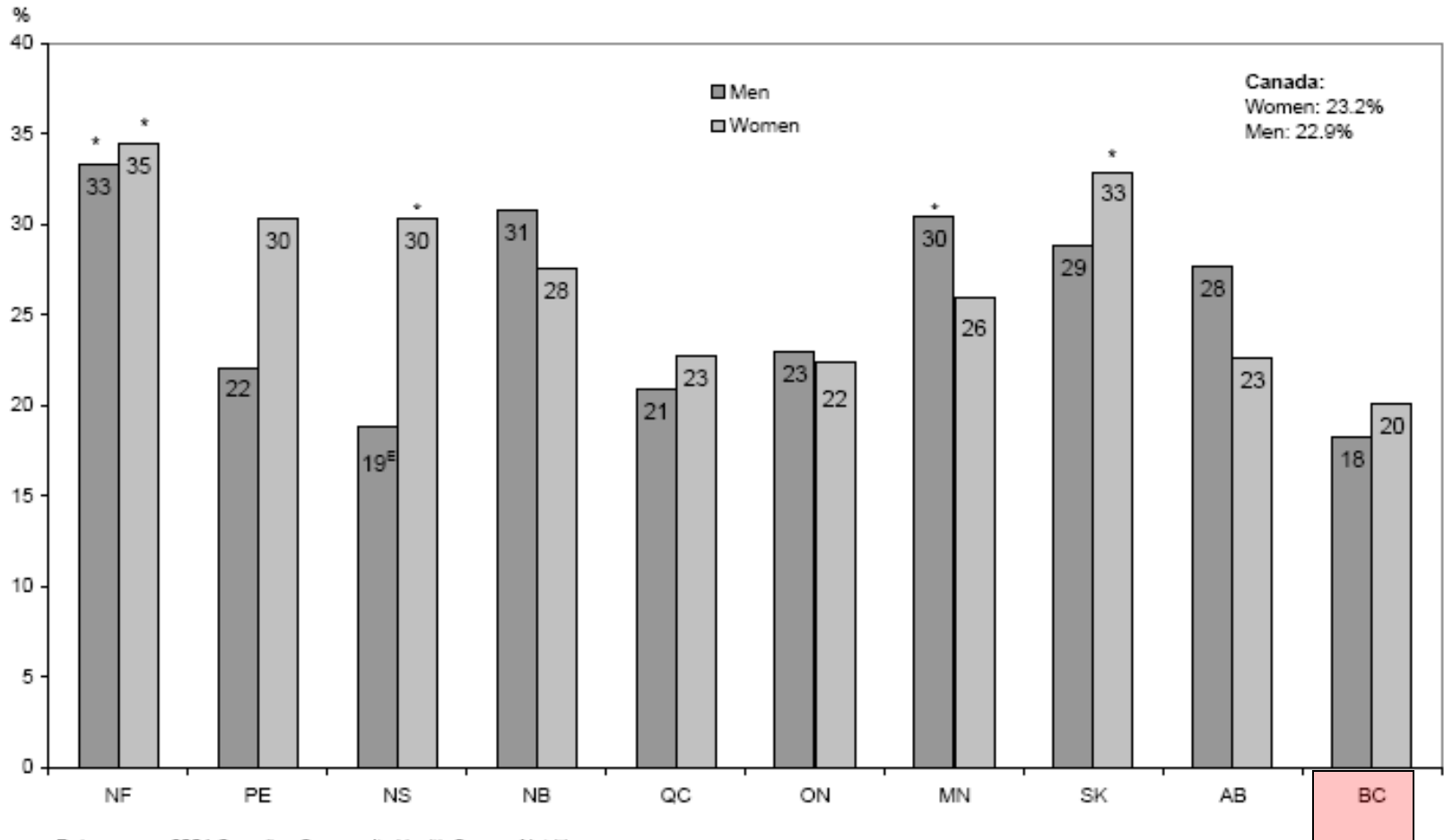
Obesity Trends Among Canadian and U.S. Adults, 2004



AH Mokdad, CDC

M Shields, Statistics Canada, 2005

Canadian Obesity rates according to Province



Data source: 2004 Canadian Community Health Survey: Nutrition

* Significantly different from estimate for Canada ($p < 0.05$)

^E Coefficient of variation 16.6% to 33.3% (interpret with caution)

B.C.'s burden of disease



NIH Guidelines

- **BMI 35-40 with co-morbidities (OSA, DM, HT, etc.)**
- **BMI > 40**
- **Ages 20-65**

= 130 000+ patients in B.C.!

What Causes Obesity?



- **Disordered Eating**

- Availability of low-cost, high-calorie food
- 500 extra calories/day = 1lb/week

- **Hormone/Genetics**

- **Addiction**

- Alcohol and drugs  Abstinence

- Food  Moderation

How much do we know?



- **Genetics/Metabolism**
 - Obese patients metabolize food differently
- **GI Hormones**
 - Appetite stimulant hormones - Ghrelin
 - Diabetes – Incretins
- **Summary**
 - Obesity is a Disease
 - But the pathophysiology is ???

The Mother of All Diseases



- Heart disease
- Type 2 diabetes
- Hypertension
- Stroke
- Hyperlipidemia
- Arthritis
- Sleep Apnea
- Cancer

Cost of Obesity-related Conditions



- Direct cost of obesity in Canada in 1997 was estimated to be over **\$1.8 billion**
- The 3 largest contributors were
 - Hypertension (\$656.6 million)
 - Type 2 diabetes (\$423.2 million)
 - Coronary artery disease (\$346.0 million)
- Canadian costs in 2008 was **\$4.6-7.1 billion** (CIHI)
- B.C. estimates **\$1 billion** in 2011

Treatment Options



- Diet
- Exercise
- Counselling
- Pharmacotherapy

EPIC FAIL!

Long-Term Weight Loss after Bariatric Surgery

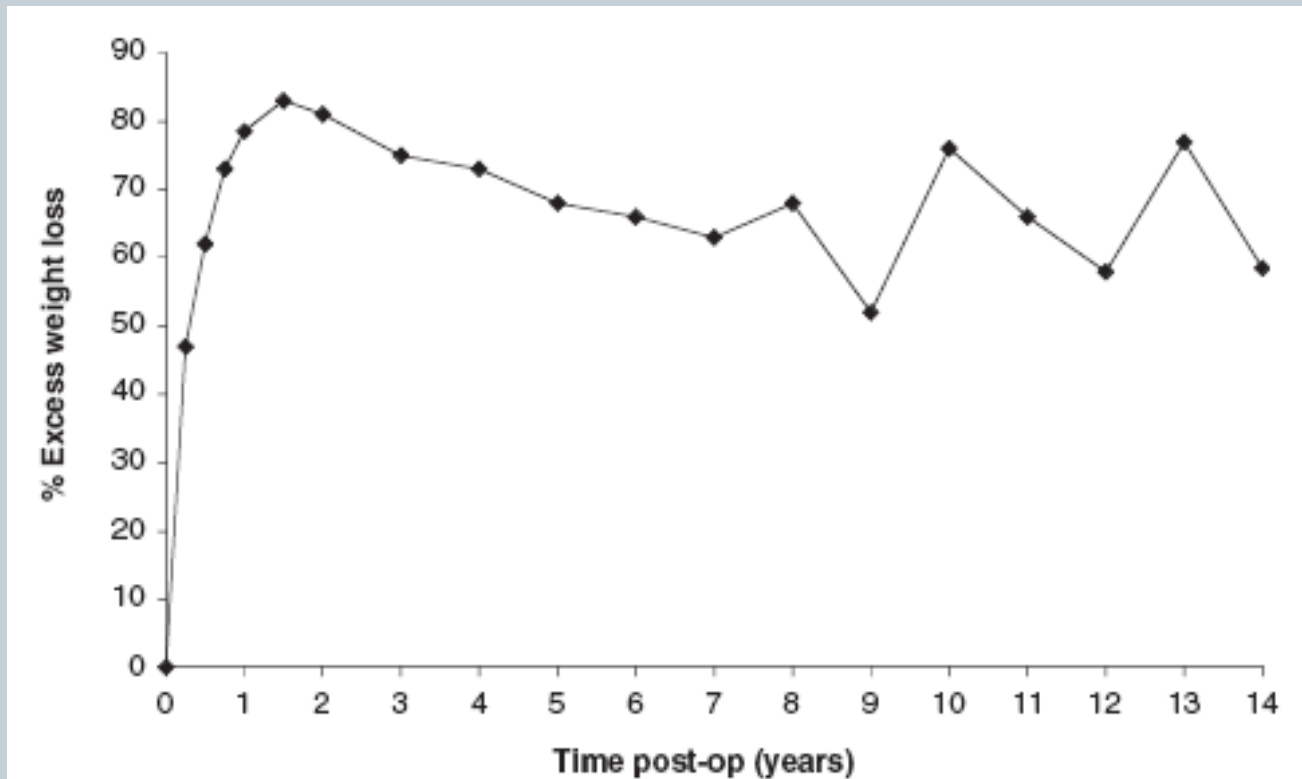
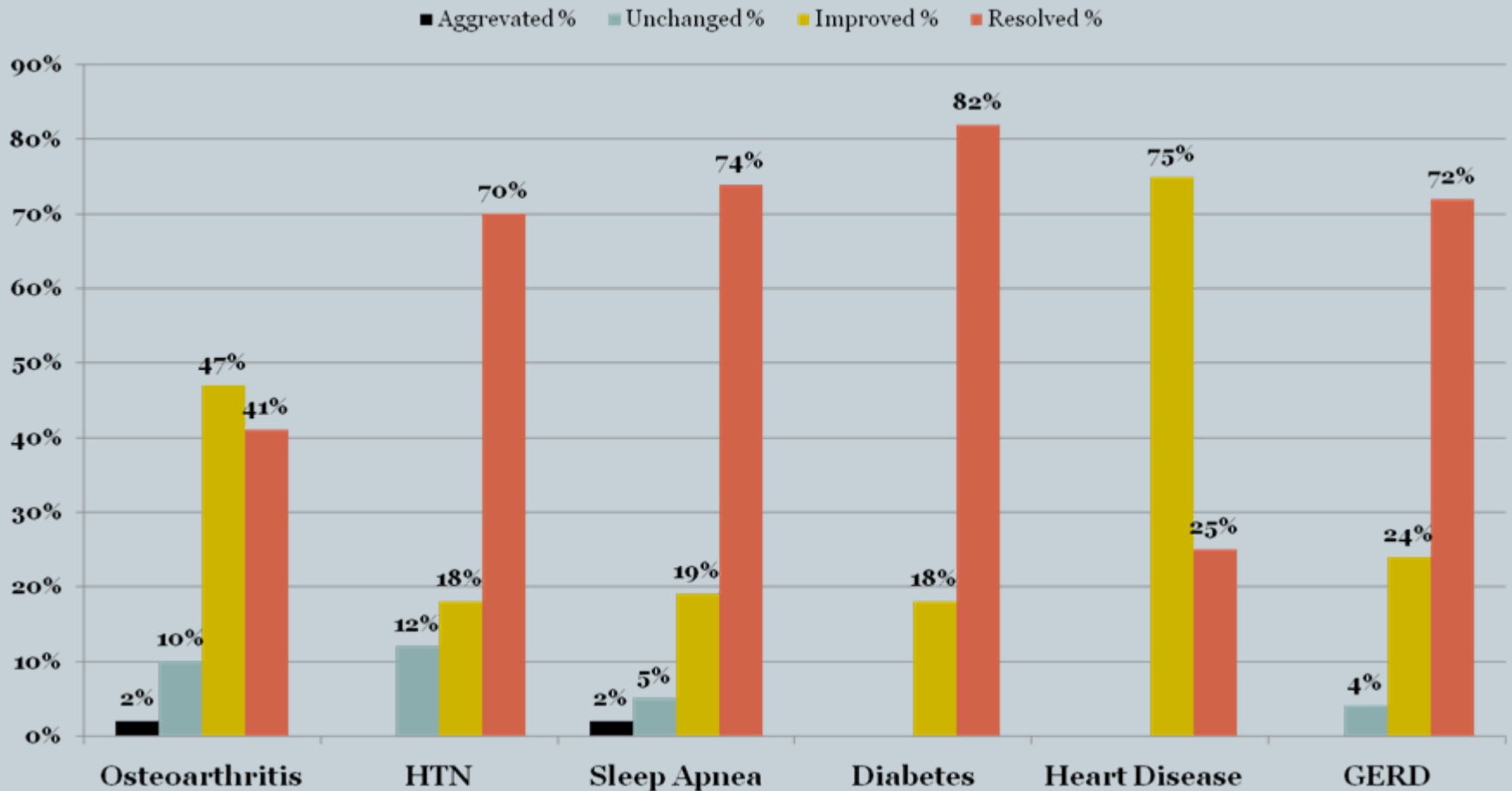


Figure 4. Graph showing median % excess weight loss after gastric bypass in 342 patients.

Co-morbidity reduction



30 month f/u

Schauer et al., Ann Surg, 2000



Table 9. CHANGE IN QUALITY OF LIFE

	%
Greatly improved	58
Improved	37
No change	5
Diminished	0
Greatly diminished	0

Mortality



- **NEJM 2007**
 - 40% decrease mortality over 7 years
 - 56% ↓ CAD
 - 92% ↓ DM
 - 60% ↓ Cancer
- **Christou 2004**
 - 1035 Sx vs. 5746 controls
 - 5yrs – death rate 0.68% vs. 6.17%

History of Bariatric Surgery in B.C.



- **Surgery-only model**
- **Several centers**
- **No quality control**
- **Aggressive surgical procedures**
- **Limited follow-up/Poor patient selection**

Old techniques



- Open surgery
 - Vertical banded gastroplasty
 - Distal gastric bypass
 - Ileogastric bypass

Challenges and Complications



- **Weight loss failure**
- **Malabsorption**
 - Severe / life threatening nutritional deficiencies
 - Dehydration
- **Open Surgery**
 - > 30% risk of hernia
 - fistulas
 - Strictures

Conception



- Goal of creating a multidisciplinary center of excellence
- Long-term follow-up
- Laparoscopic, evidence based surgery

Program Research



- Site visits in Canada, U.S. and Europe
- International training
- Care delivery models in Ontario and Alberta
- Recruit and train a team

North American Standards



CAPBS, ASMBS, NSQIP – minimum requirements

- Minimum 2 surgeons
- Minimal volumes 120 cases per center and 50 cases per surgeon
- Multidisciplinary team
- ICU, interventional radiology, therapeutic endoscopy
- Long-term follow-up

Team



- **Medicine – Surgeons, Anesthesia, Internal Medicine, Respirology, Endocrine (new), Psychiatry, Plastic Surgeon, Intensivists**
- **Nursing – O.R., ward nursing, nurse co-ordinator (new)**
- **Allied Health – dietitian, occupational therapist, exercise physiologist, unit clerk**
- **Partnership - Medical and Hospital Admin**

Infrastructure



- Ward beds, stretchers, commodes, transfer lifts
- Interventional radiology capability
- Therapeutic endoscopy equipment
- Testing and monitoring capability for OSA patients

Equipment



- Bariatric length laparoscopic sets
- Bariatric safety equipment, O.R. beds, patient transfer systems
- Bariatric stapling and energy devices
- D.I.

Hospital Readiness - Education



- ED – complications
- Ward – patient management, safety and sensitivity
- O.R. – patient transfer, equipment use and maintenance
- Worksafe compliance
- Buy in – DI, anesthesia, medicine

Wait list



1) wait list for admission to RH bariatric surgery program

- 1000 (18 referrals per week)

2) Volumes

2011/12 – 48

2012/13 – 86

2013/14 – 200

2014/15 – 200 - 250

Pre-operative Assessment



- Allied Health
- Surgeon
- Laboratory
- Endoscopy
- OSA
- Imaging
- IM/Anesthesia/Endocrine

Patient Expectations



- **Non-smoker**
- **No issues with alcohol/drug addiction**
- **Lifestyle modifications**
 - **Diary**
 - **Readings**
 - **Attendance at classes and assessments**

Contra-indications



- Untreated Axis 1-2 disorder
- Suicide attempt within 2 years
- Smoker
- Alcohol/Drug addiction (active)
- IBD
- Connective tissue disease
- Anesthetic risk

- **Previous bariatric surgery**

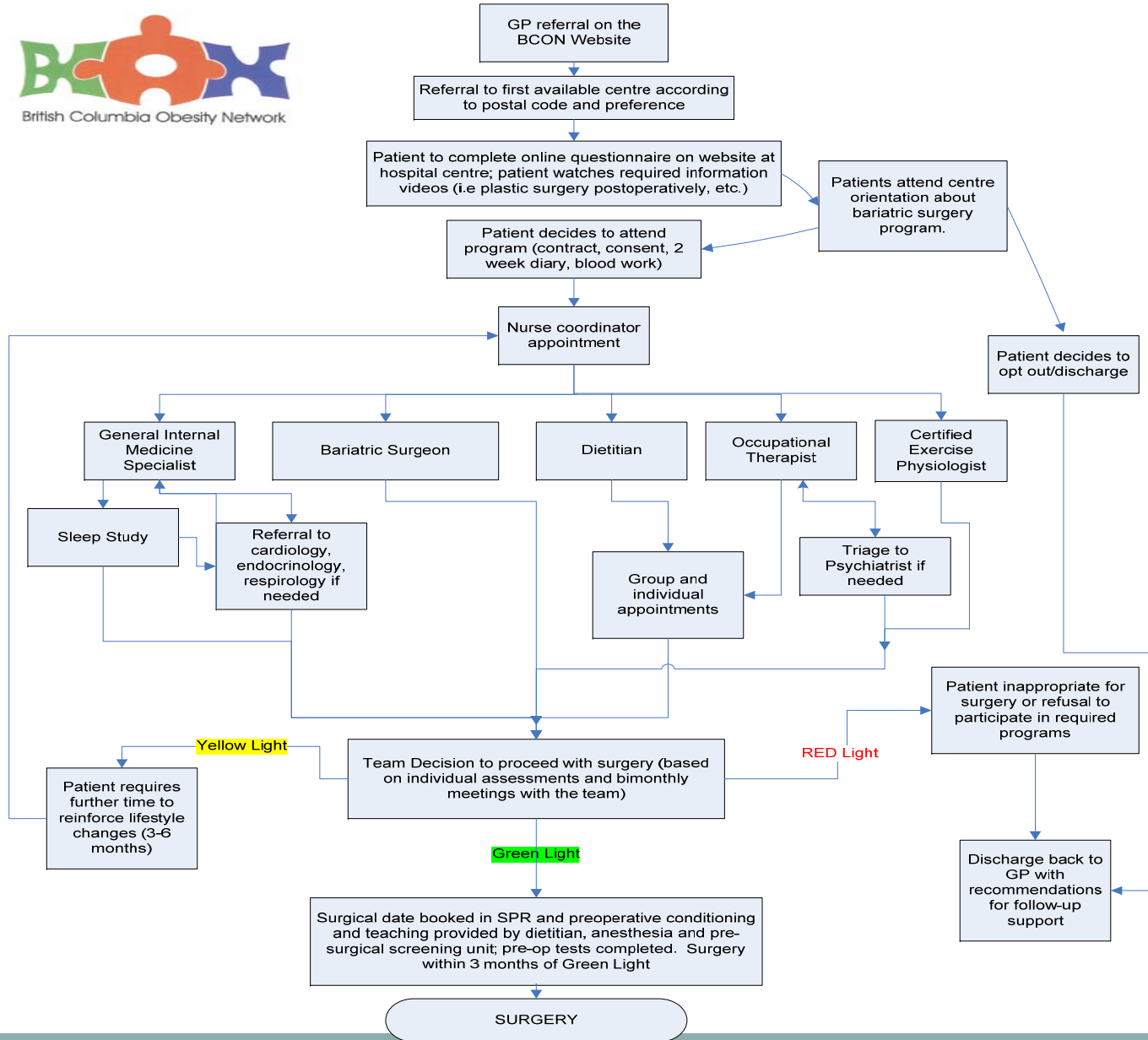
Courses



- **Orientation session**
- **Winning at Losing – 7 weeks**
- **Bariatric Cooking Class – 4 weeks**
- **Changeways – 8 weeks with monthly follow-up**

Bariatric Surgery Patient Flow Chart (Pre-surgical)

BC Obesity Network



Multidisciplinary Rounds



- **Twice monthly meetings**
- **Review and discuss patient readiness**
- **Develop patient care protocols**
- **Quality improvement and research initiatives**

Research



- **Approved ongoing projects**
 - Sleep apnea resolution
 - Co-morbidity reduction
 - Patient experience
 - Effect of Changeways program on patient outcomes
- **Future Projects**
 - Grhelin
 - Adipose tissue and Inflammation (Dr. M. Levings)

Patient Advocacy



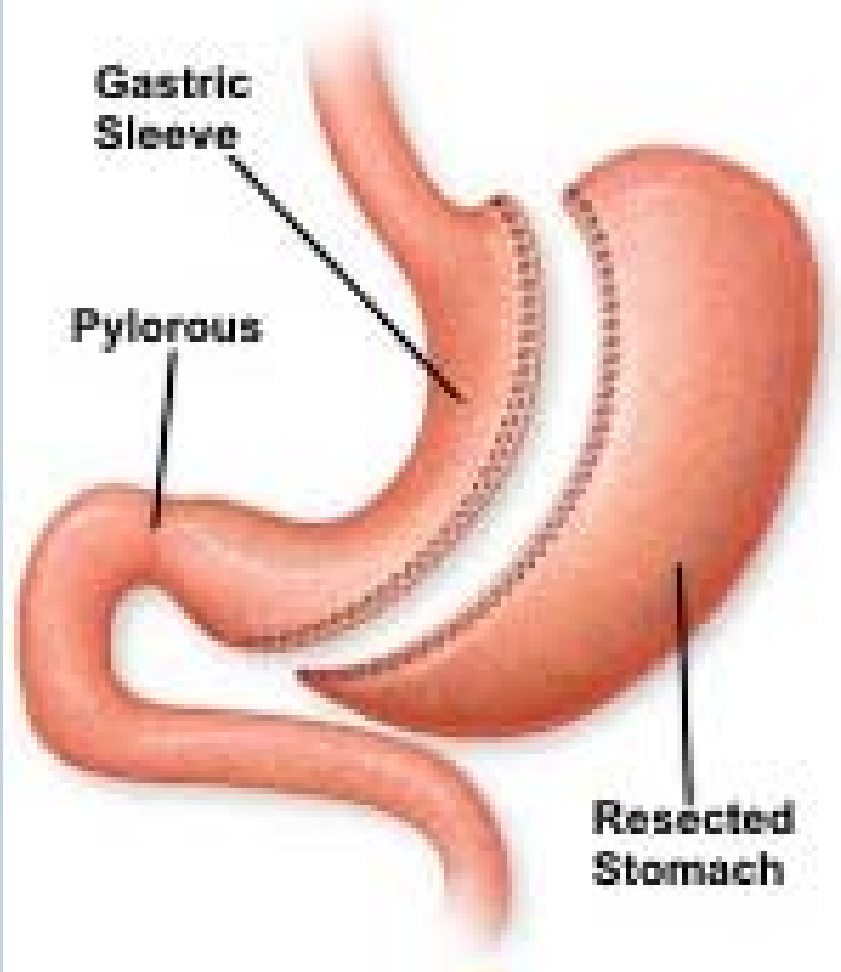
British Columbia Obesity Network

Provincial Advocacy



- **Creation of BCON**
- **Annual Meetings**
- **Education**
- **Policy Guidance**

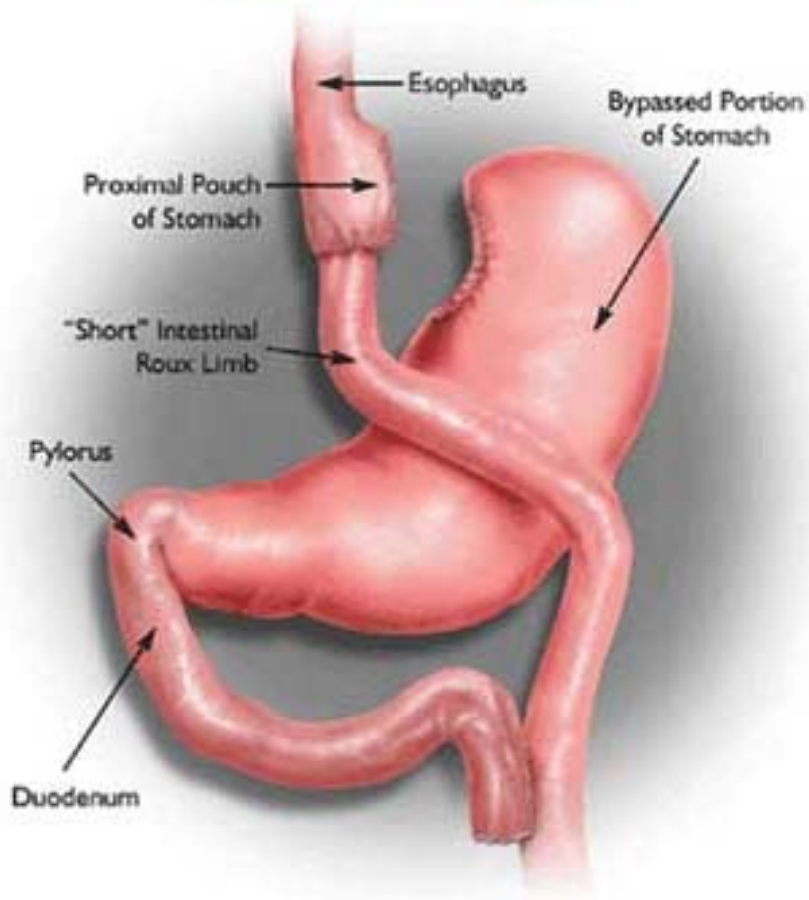
Laparoscopic Sleeve Gastrectomy



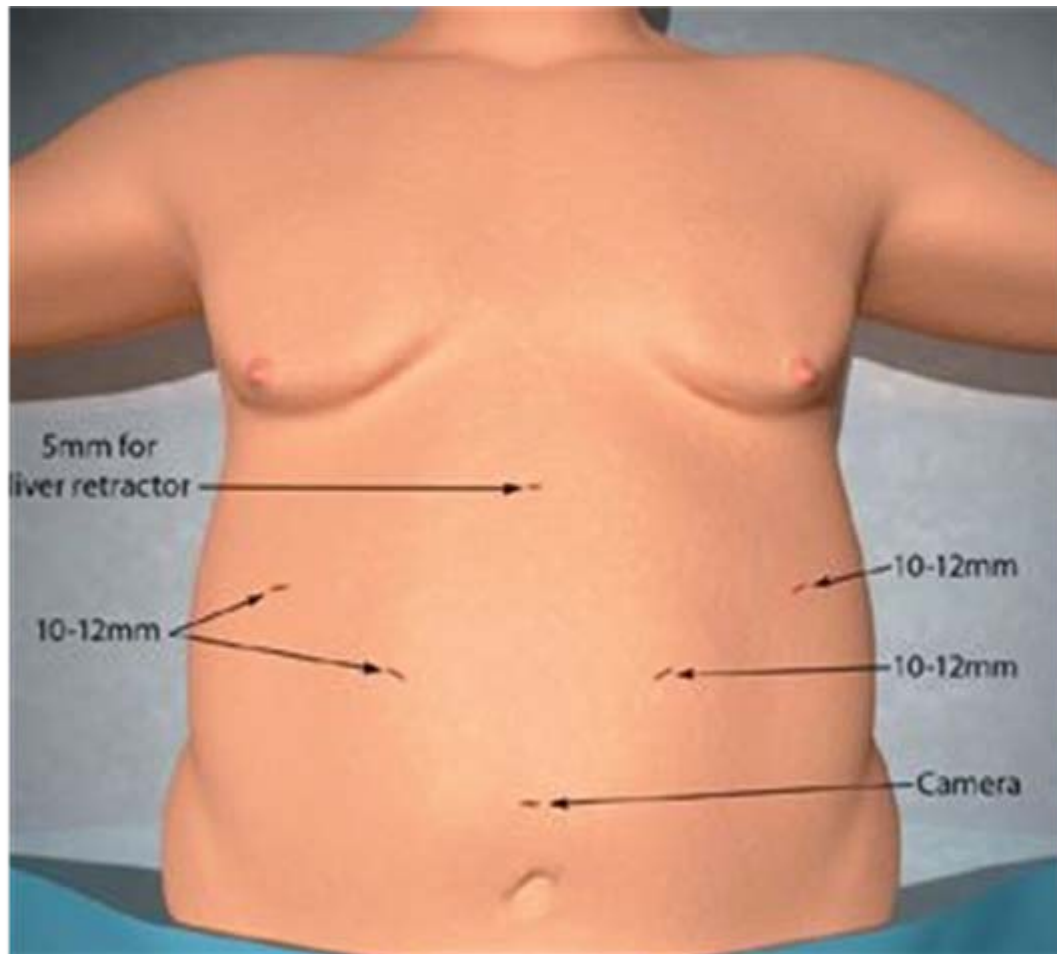
- Restrictive
- Resective
 - Ghrelin secreting cells
 - Appetite stimulant
- MSP covered

Gastric Bypass

Roux-en-Y Gastric Bypass



- Early satiety
- Altered nutrient absorption
- Powerful hormone changes
- MSP covered





Gastric Pouch

© N. Nguyen



Splitting the Omentum

© N. Nguyen



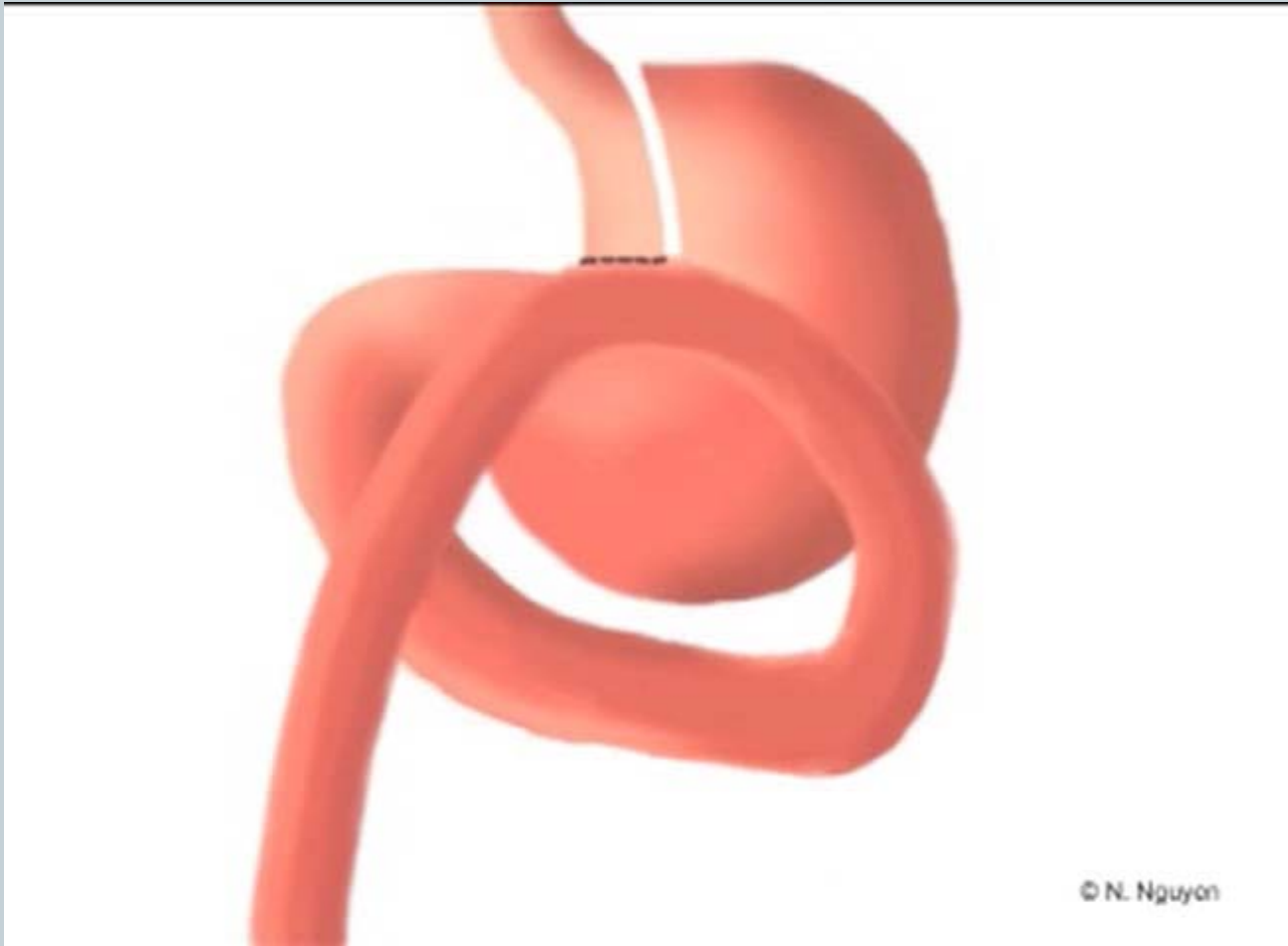
Gastroenterostomy

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Gastroenterostomy

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Entero-enterostomy



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Complications

Early

- Cardiopulmonary
- Leak
- Bleed

Late

- Malnutrition
- Stricture
- Weight loss failure
- Hernia
- Kidney stones
- Internal Hernia

Renal Stones



- Calcium Oxalate
- Simulated “short-gut” – calcium reabsorption
- Common in extensive bypass
- Our bypass – 100-130cm

Follow-up



- **Surgeon/Garratt– 2 weeks, 6 weeks, 6 months, yearly**
- **GP communication**
- **Bloodwork/Supplements**
- **OSA re-testing**
- **IM – monitors co-morbidity resolution and medication changes**

You fix them... you bought them



- 2 surgeons participate in each case
- 1:1 call coverage for post-op complications
- Transfers from B.C. / Out of province / out of country complications

Preliminary Results at 1 year



- 1st 91 patients (sleeve and bypass)
- Excess weight loss – 74%
- Diabetes remission 76%
- HT (50%)

Schauer et al.



The **NEW ENGLAND**
JOURNAL *of* **MEDICINE**

ESTABLISHED IN 1812

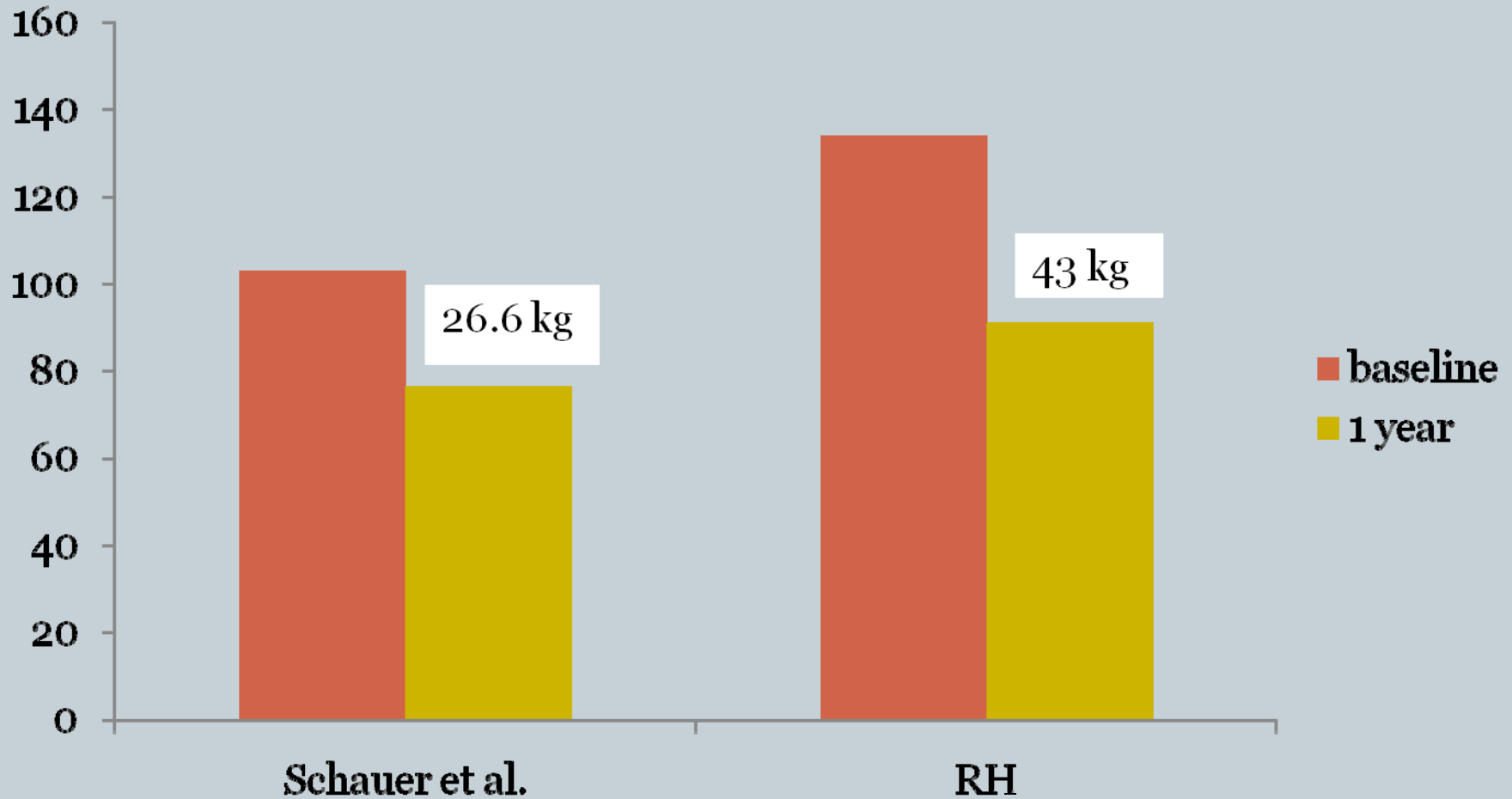
APRIL 26, 2012

VOL. 366 NO. 17

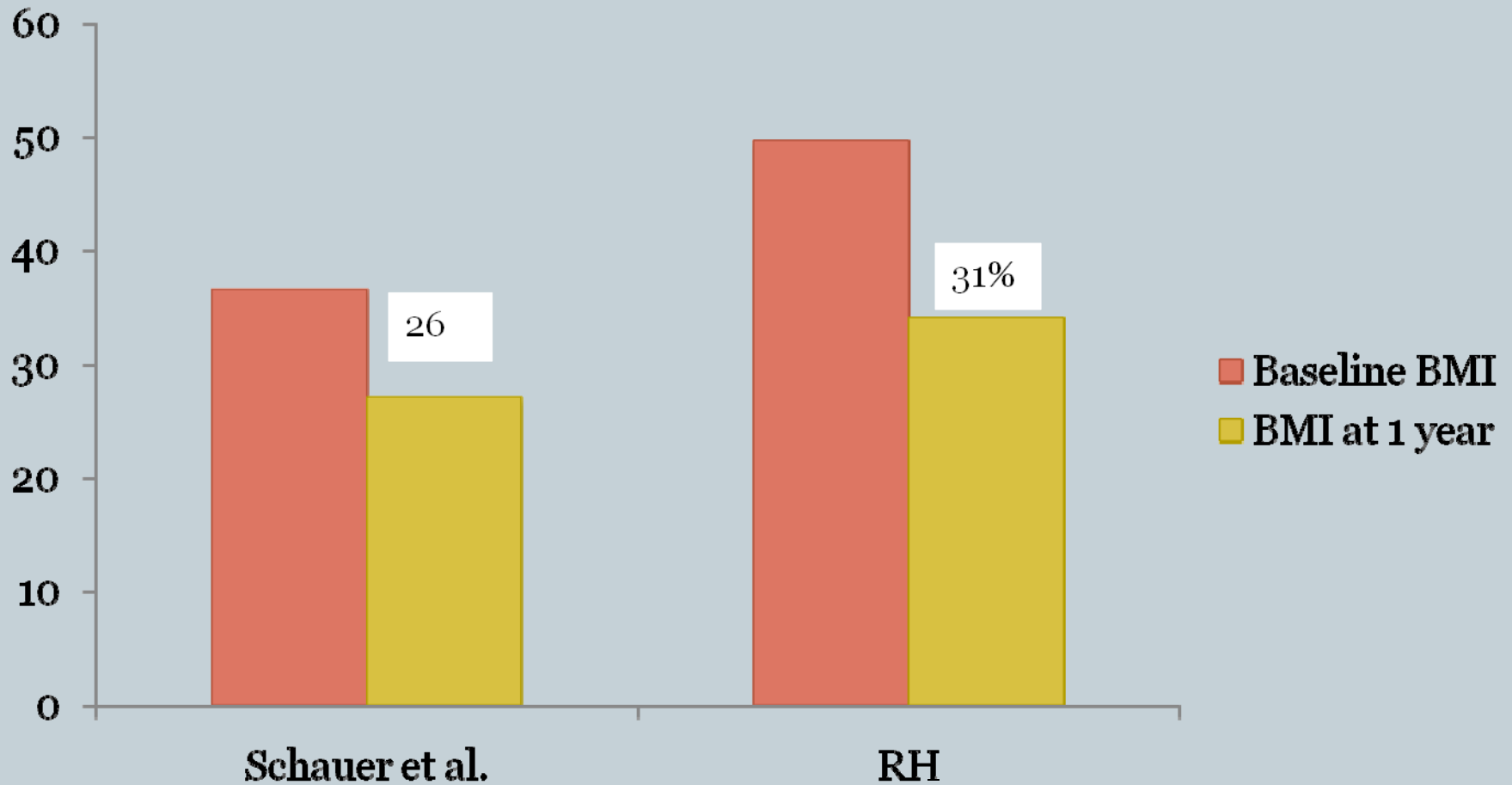
**Bariatric Surgery versus Intensive Medical Therapy
in Obese Patients with Diabetes**

Philip R. Schauer, M.D., Sangeeta R. Kashyap, M.D., Kathy Wolski, M.P.H., Stacy A. Brethauer, M.D.,
n P. Kirwan, Ph.D., Claire E. Pothier, M.P.H., Susan Thomas, R.N., Beth Abood, R.N., Steven E. Nissen, M
and Deepak L. Bhatt, M.D., M.P.H.

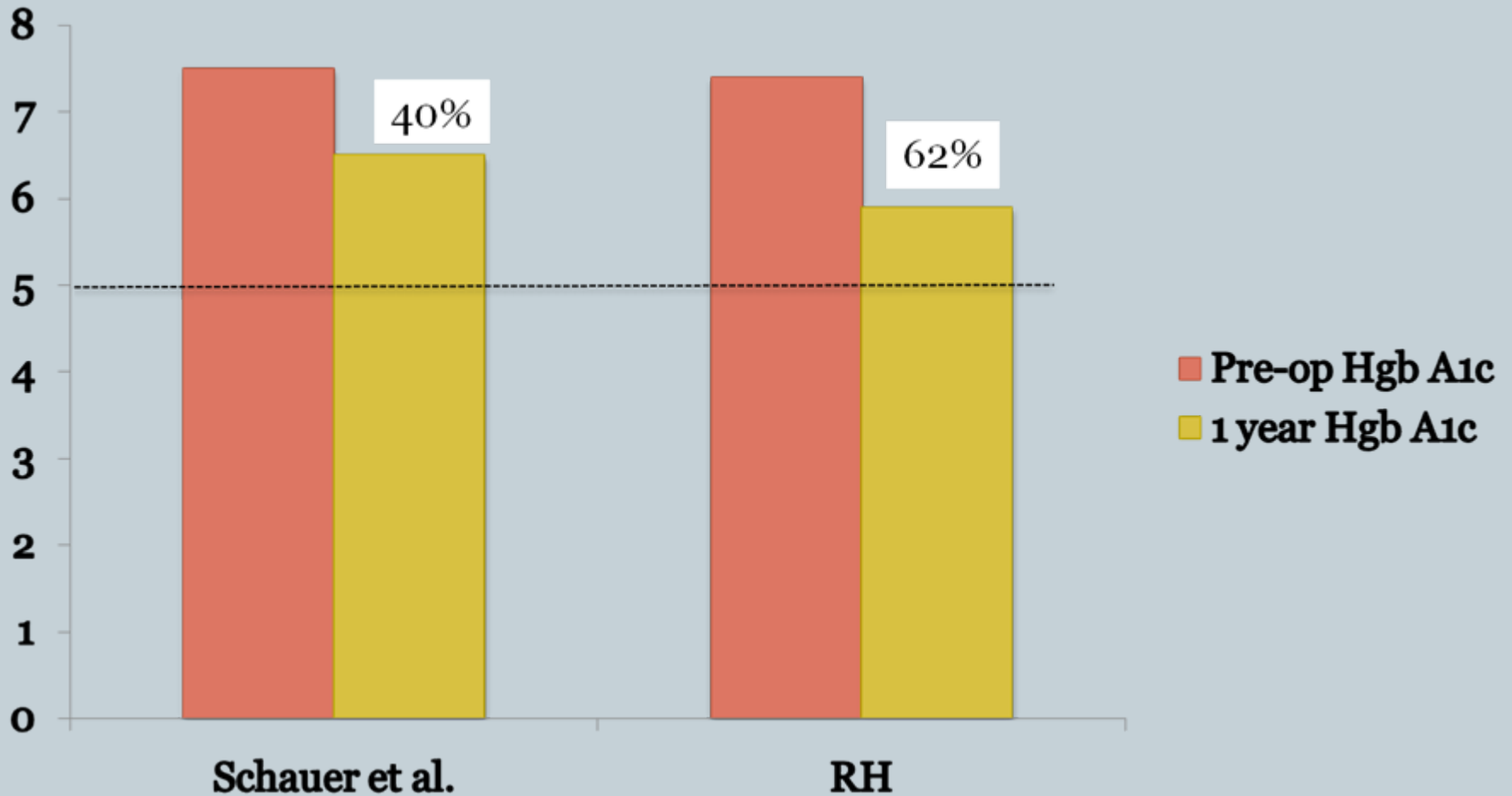
Results - Weight loss at 1 year (kg)



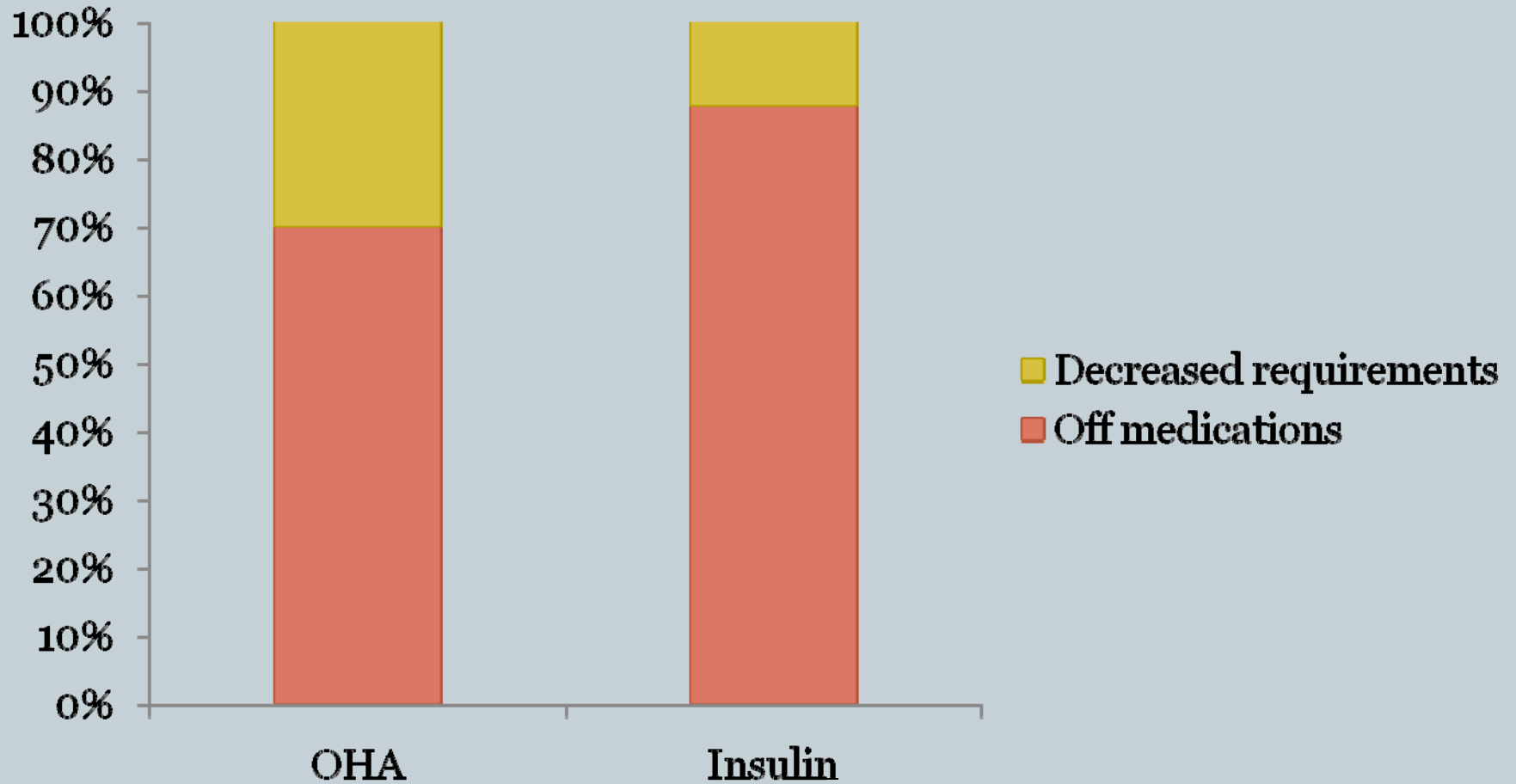
Results – BMI change



Results – Glycemic Control



Diabetic Medications



Our Complications (since 2011)

Early

- 2 post-op bleeds
- 1 subclinical leak
- 1 reintubation for OSA
- 1 PE (on prophylactic LMWH)

Late

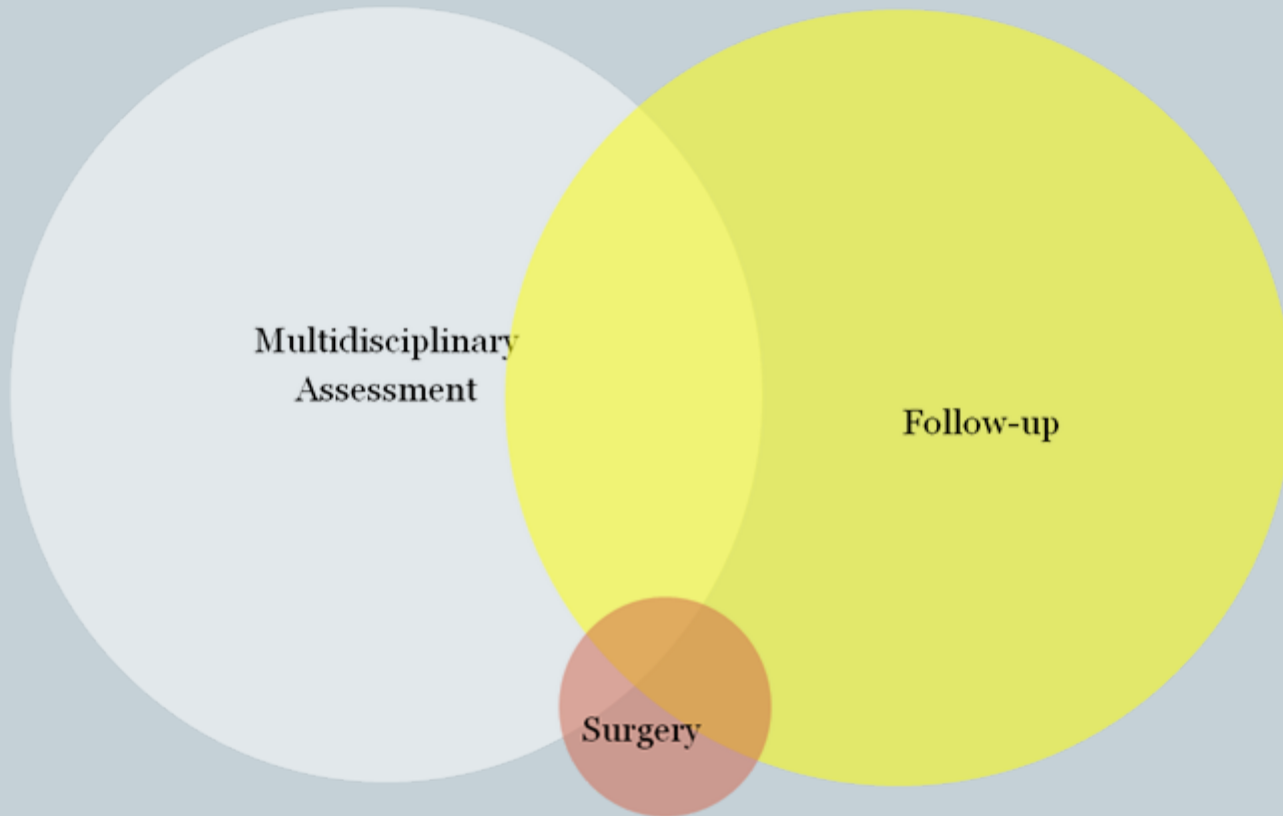
- 2 strictures – 1 required surgery
- 3 weight loss failures
- 10 readmissions for post-op dysphagia – 1-2 day stays
- 0 severe cases of malnutrition
- 0 kidney stones
- 1 hernia

Summary



- 2 years of planning before the 1st surgery
- 4 years of project development... and counting
- Buy-in from entire hospital
 - In-services
 - Educational talks
- Commitment to life-long patient follow-up

Time Commitment



Role for BS in facilitating other surgery?



- Joint replacement
- Massive incisional hernia repair
- Pre-malignant conditions
- Diverticular disease
- ? Prior to kidney transplant


Evidence for BS and Kidney Transplant



Theory

- Technically easier
- Fewer peri-op complications 2nd to obesity
- Less graft rejection

Safety – Bypass



Alex et al. 2007

41 patients

- 25 Dialysis
- 6 pre-dalysis
- 10 post transplant

1 year wt. loss 70.5%

No 30day mortality

Safety - Sleeve



Diwan et al.

- sleeve gastrectomy in 10 renal transplant candidates
- No 30 day mortality
- No peri-op complications
- LOS 3 days
- EWL at 3 months = 34%
- BMI change = 5.8

Improvement in Transplant Candidacy



Lin et al. 2013

- ESRD, ESLD
- BMI C.I. - > 40 or > 35 with DM

LSG

- 26 patients
- 12 months EWL = 50%
- All on transplant list

Bariatric Surgery and CKD



Navaneethan et al. 2009

25 patients Stage 3 CKD

- BMI 49.8; GFR 47.9

12 months post-op

- BMI 34.5; GFR 61.6

Type of surgery not specified

Summary



- **Mostly retrospective studies**
- **Acceptable safety**
- **Role of BS pre-transplant**
- **Role of BS to defer/delay dialysis**

Which CRF patients are surgical candidates?



Pre or post transplant candidates?

Patient factors

Motivation/Insight

Operability

Timelines

3-6 months pre-conditioning

3-6 months for weight loss

Questions?



References



- Schauer et al. Outcomes After Laparoscopic Roux-en-Y Gastric Bypass for Morbid Obesity. *Annals of Surgery*. 2000
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- Diwan et al. Laparoscopic Sleeve Gastrectomy in Obese Renal Transplant Candidates. Abstract