

Obesity & Metabolic (Diabetes) Surgery

Sherif Awad PhD, FRCS

**Consultant Obesity Surgeon & Clinical Lead
East-Midlands Bariatric & Metabolic Institute (EMBMI),
Derby Teaching Hospitals**

BARS Conference, Leeds, Sept 17

sherif.awad@nhs.net

Outline

- Effects of obesity
- NICE guidance & referral
- Metabolic procedures
- Clinical outcomes

Why Offer Metabolic (Diabetes) Surgery?

Demographics of Obesity

Figure 1 OECD data: The rise in the proportion of the population that are overweight²

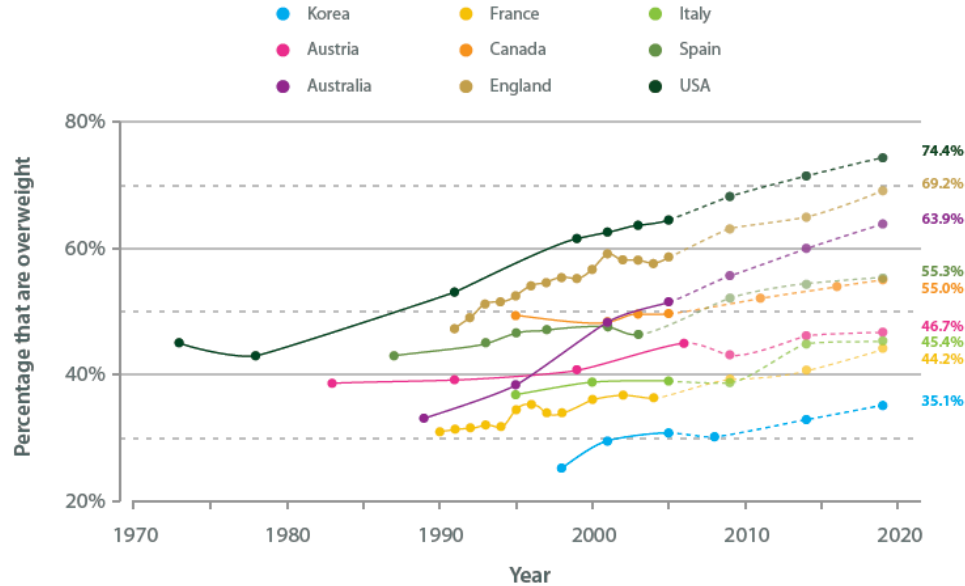


Figure 2 Changes in obesity in England over time³

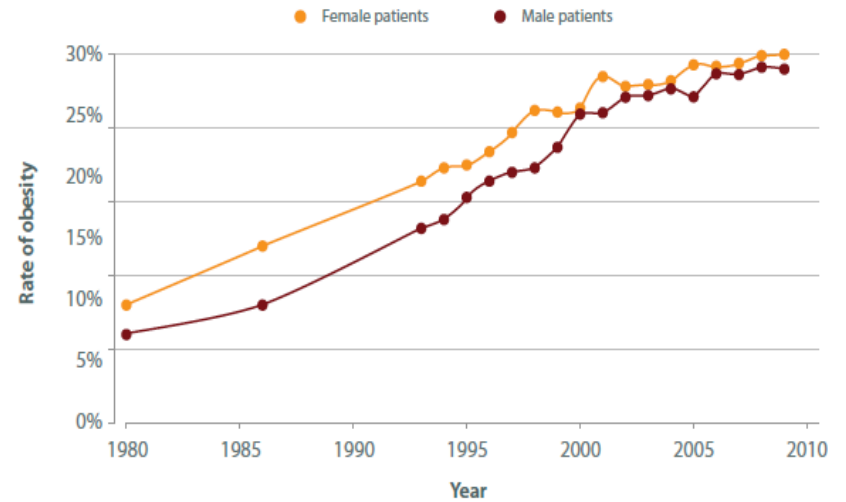


Figure 3 Age-adjusted risk of diabetes by BMI group^{9,10}

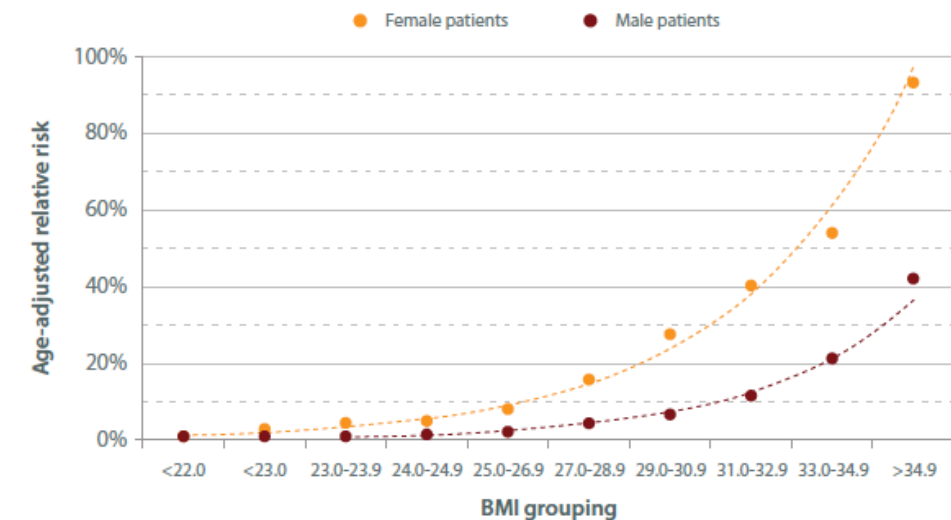
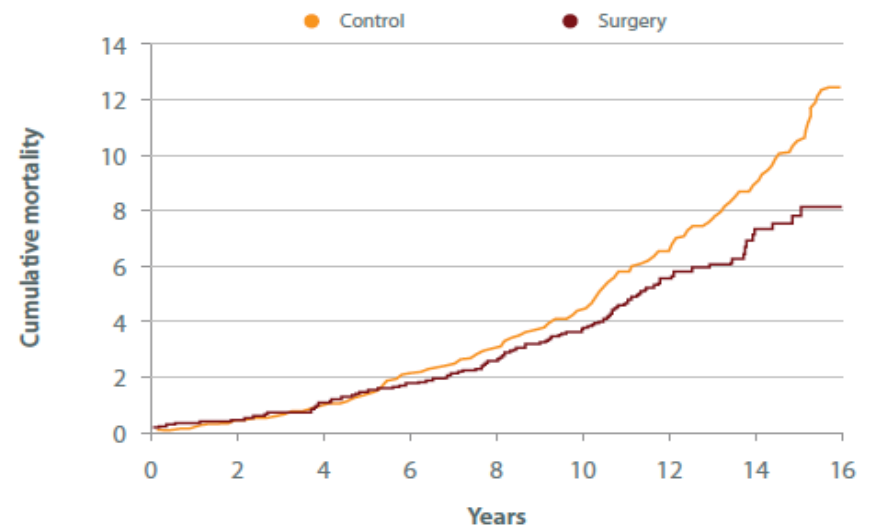


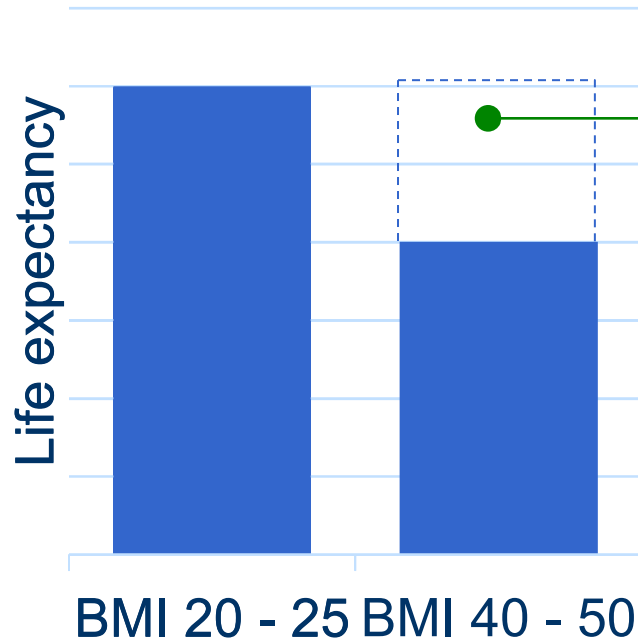
Figure 4 Unadjusted cumulative mortality⁵



Burden of Obesity: Life expectancy



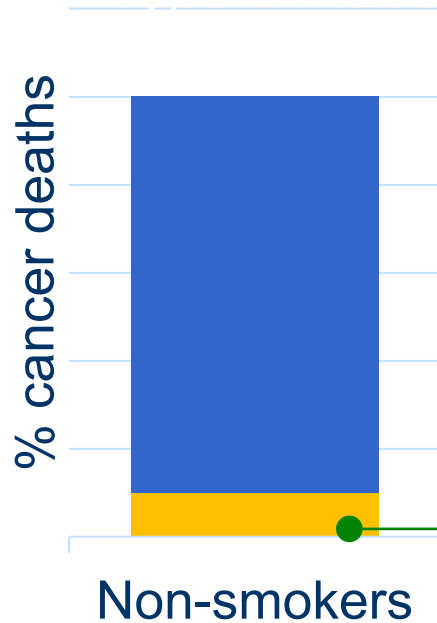
Life expectancy: Reduced by 8 – 10 years at BMI 40 – 50



Burden of Obesity: Cancer



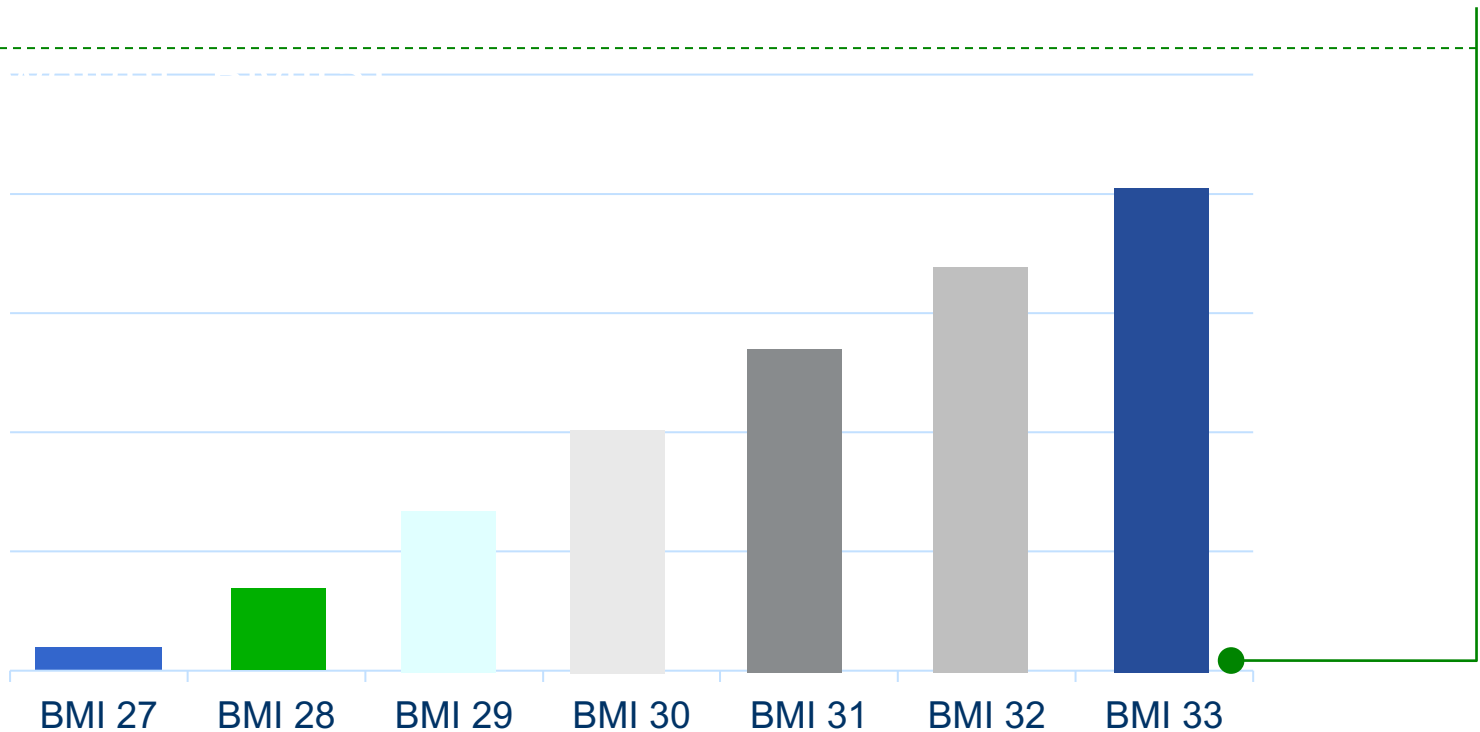
Cancer deaths in non-smokers: 10% are obesity related ⁽⁵⁾



Burden of Obesity: Heart disease

Coronary artery disease: Risk increases 3.6x from each unit increase in BMI ⁽⁵⁾

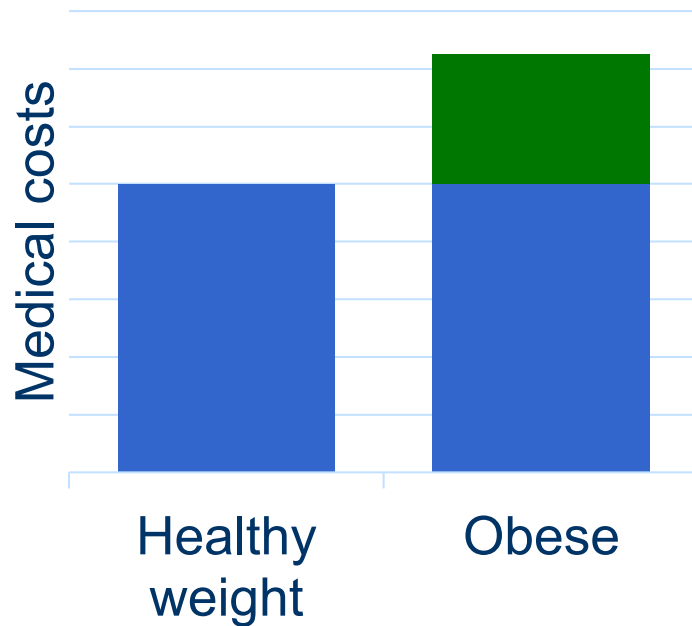
RR of coronary artery disease



Burden of Obesity: Costs

Obese patients' medical costs are **up to 45% more** than those of normal weight ^(J)

Financial impact of obesity on the NHS is £4.3bn ⁽⁵⁾



Burden of Obesity: Co-morbidities

	RR in obesity compared normal weight in MEN	RR in obesity compared to normal weight in WOMEN
Type 2 Diabetes Mellitus	5	12.7
Hypertension	2.6	4.2
Ischaemic heart disease	3.3	5.0
Colon cancer	3.0	2.7

Burden of Obesity: Other illnesses

Obesity is a **risk factor** for:

- DM
- OSA
- Asthma
- Stroke
- IHD
- Hypertension
- Phlebitis
- Osteoarthritis
- Degenerative joint disease
- Gout
- Cancer
- Liver disease
- Gall bladder disease
- Pancreatitis
- Gastroesophageal reflux
- PCOS
- Erectile dysfunction
- Cataracts
- Migraine
- Depression

Non-surgical outcomes

UK CASE STUDY 1:

Primary care based Tier 3:

102/230 (**44%**) achieved

5% weight loss at **1 year**

UK CASE STUDY 2:

2014/15 = **5019** referrals to this Tier 3 service:

18% patients achieved

>10% weight loss

UK CASE STUDY 3:

50% participants completed the **12 month** programme:

Average weight loss = 11Kg

(8%)

Average BMI from 44.1 – 41

Conventional treatments (including pharmacotherapy, exercise & psychological interventions) only **minimally effective** for patients with a **BMI between 30 and 40kg/m²**

There is a **lack of data** on treatment options for patients with **BMI over 40kg/m²**

Long-term **multicomponent weight management** interventions resulted in **small weight changes**, and **weight regain** was common

MDT programmes result in **moderate weight losses** compared to other interventions

Medical vs Surgical treatment

7%

Average weight loss from medical management
or pharma

MEDICALLY MANAGED WEIGHT LOSS

Little evidence for effect of MEDICALLY
MANAGED WEIGHT LOSS on associated
disease states

25-35%

Average weight loss at 1 year

15-20%

Average weight loss at 20 years

BARIATRIC/METABOLIC SURGERY

BARIATRIC (METABOLIC) SURGERY proven
to improve existing disease, or reduce the
risk of associated disease states
developing

Non-surgical treatment NOT effective

The NEW ENGLAND JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

AUGUST 23, 2007

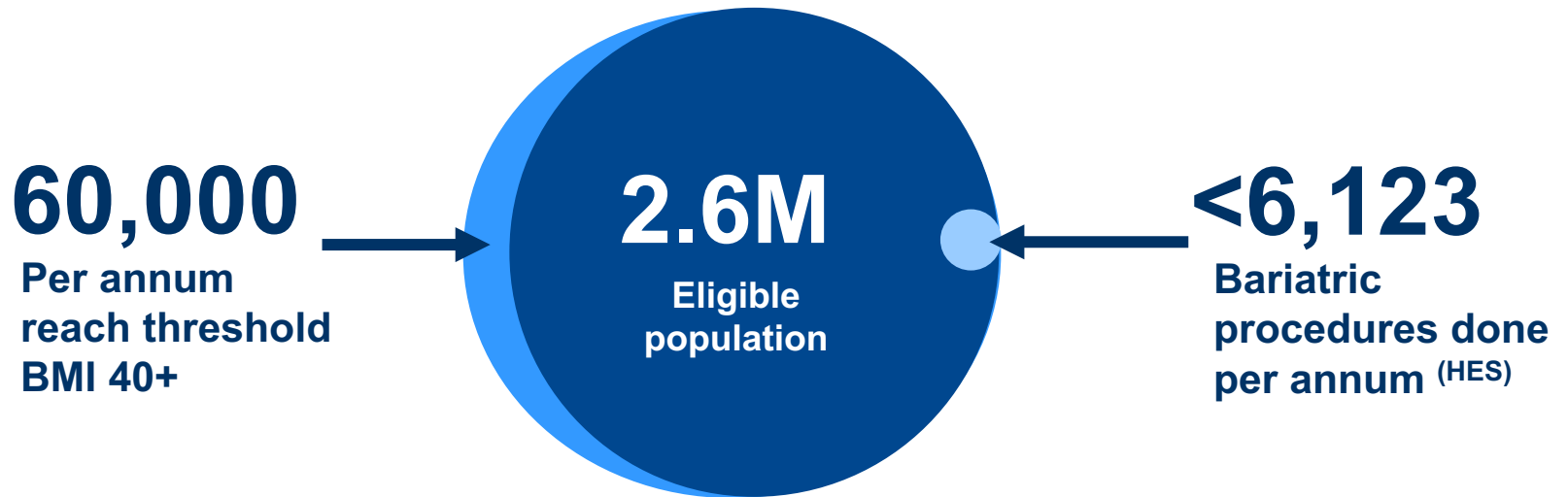
VOL. 357 NO. 8

Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects

- 2010 patients surgery arm (open & laparoscopic)
2037 conventional treatment (advice, very low calorie diet, pharmacological Rx)
- At 2 years - weight loss 23% surgery vs 0% control
- At 10 years – weight loss 25% surgery vs +1.6% control

Who to refer?

Unmet meet



NICE Clinical Guideline 189 (2014)

Indications for referral

- **BMI ≥ 50**
- **BMI ≥ 40 or BMI 35-40** with co-morbidities (e.g. diabetes, hypertension, cardiovascular disease, sleep apnoea, dyslipidaemia, PCOS, fatty liver disease, severe arthritis)
- **BMI 30-35** (poorly controlled diabetes)
- $< 2.5 \text{ kg/m}^2$ for Asian & Afrocarribean patients
- Willing to comply with postop follow-up
- Fit for anaesthesia & surgery

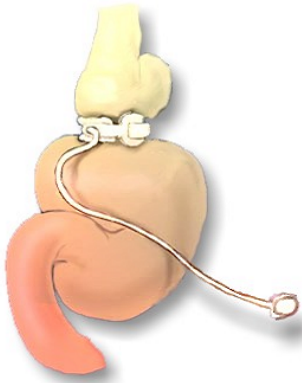
Tier 3 Medical Weight Management Service

- Metabolic physician, dietician, psychologist, specialist nurse, MDT
- Comorbidity identification & medical optimisation
- Onwards referral to Tier 4 (Surgery)
- VLCD (non surgical candidates)

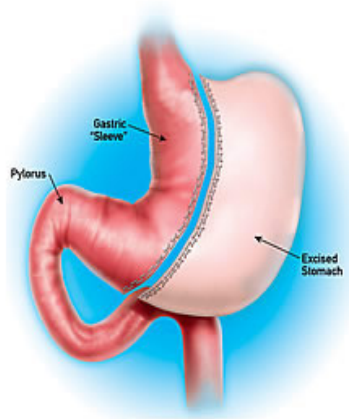
- BMI 35-49.9 → 12-months T3
- BMI ≥ 50 → 6-months T3

Commonly performed procedures

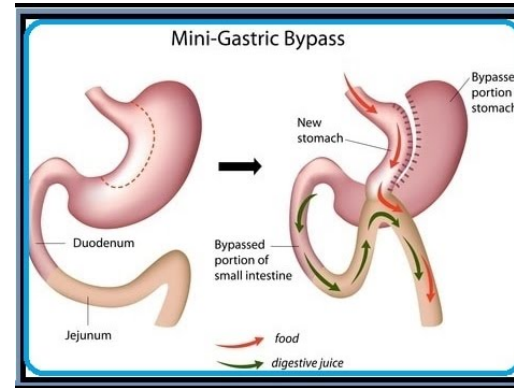
Surgical Procedures



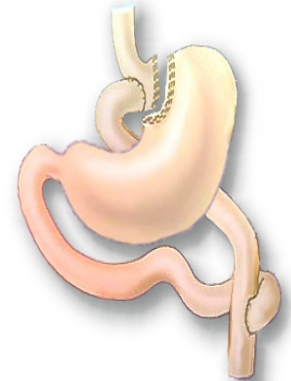
Gastric Band



Sleeve Gastrectomy



Mini Bypass



Gastric Bypass

>99% successfully completed laparoscopically

Surgical Procedures

	Band	Sleeve	Mini Bypass	Bypass
Operative time	45 min	45 min	45 min	70 min
Length hospital stay	Daycase	1-2 days	1-2 days	1-2 days
Overall Mortality	1:2000	1:1000	1:500	1:300
30-day complications	1%	2%	1%	3%
Long-term complications	Up to 40%	15%	10%	10%
Total body weight loss %	15%	25%	30%	35%

Expected Mortality – Common Surgical Procedures

Hip Replacement	Lap Chole	Lap Bypass	CABG	Aortic Aneurysm	Oesophagectomy
0.3%	0.2-0.4%	0.3%	3.5%	3.9%	3-5%

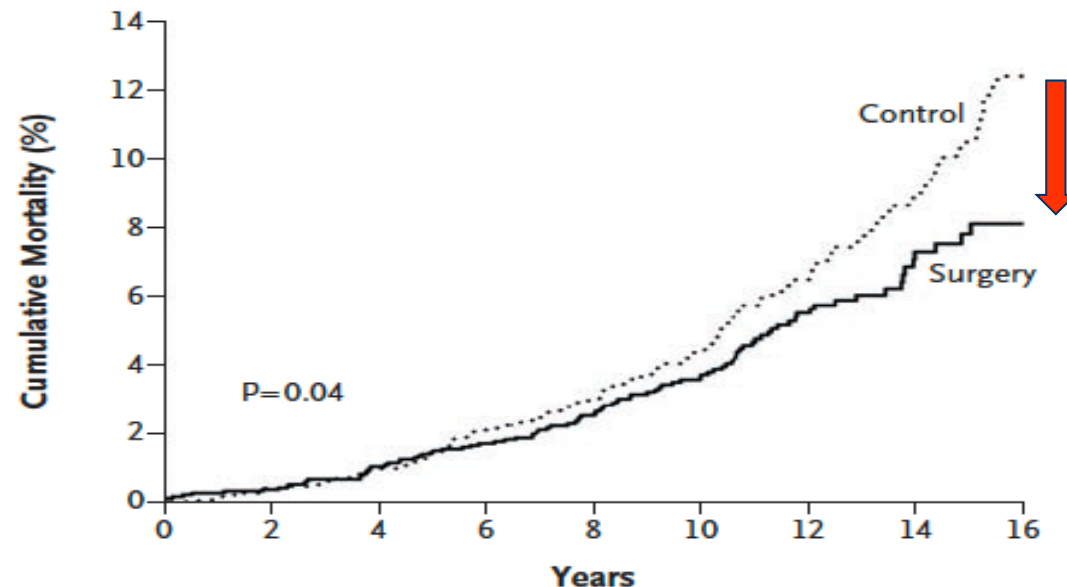
Dimick *et al* JAMA 2004; 292: 847-51

Outcomes of Metabolic Surgery

1. LONG-TERM MORTALITY

Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects

Lars Sjöström, M.D., Ph.D., Kristina Narbro, Ph.D., C. David Sjöström, M.D., Ph.D., Kristjan Karason, M.D., Ph.D., Bo Larsson, M.D., Ph.D., Hans Wedel, Ph.D., Ted Lystig, Ph.D., Marianne Sullivan, Ph.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Calle Bengtsson, M.D., Ph.D., Sven Dahlgren, M.D., Ph.D., Anders Gummesson, M.D., Peter Jacobson, M.D., Ph.D., Jan Karlsson, Ph.D., Anna-Karin Lindroos, Ph.D., Hans Lönroth, M.D., Ph.D., Ingmar Näslund, M.D., Ph.D., Torsten Olbers, M.D., Ph.D., Kaj Stenlöf, M.D., Ph.D., Jarl Torgerson, M.D., Ph.D., Göran Ågren, M.D., and Lena M.S. Carlsson, M.D., Ph.D., for the Swedish Obese Subjects Study



No. at Risk

Surgery	2010	2001	1987	1821	1590	1260	760	422	169
Control	2037	2027	2016	1842	1455	1174	749	422	156

Variable

Matching Examination

Hazard Ratio (95% CI) Chi-Square P Value

Bariatric surgery

0.73 (0.56–0.95)

5.45

0.02

N Engl J Med 2007; 357: 741-52

2. RESOLUTION CO-MORBIDITIES

Who would have thought it? An operation proves to be the most effective therapy for adult-onset diabetes mellitus.

W J Pories, M S Swanson, K G MacDonald, S B Long, P G Morris, B M Brown, H A Barakat, R A deRamon, G Israel, J M Dolezal

- 14-year study, 604 patients, 97% follow-up
- 54% patients diabetic or had impaired glucose tolerance
- 1.5% mortality, 8.5% complications
- Normal levels of glucose, insulin and HbA1C in 91% for as long as 14 years

Bariatric Surgery

A Systematic Review and Meta-analysis **FREE**

Henry Buchwald, MD, PhD; Yoav Avidor, MD; Eugene Braunwald, MD; Michael D. Jensen, MD; Walter Pories, MD;
Kyle Fahrbach, PhD; Karen Schoelles, MD

- 136 studies of **22 094** patients
- Mean excess weight loss (EWL) all procedures 61%
- **Co-morbidity remission/improvement**

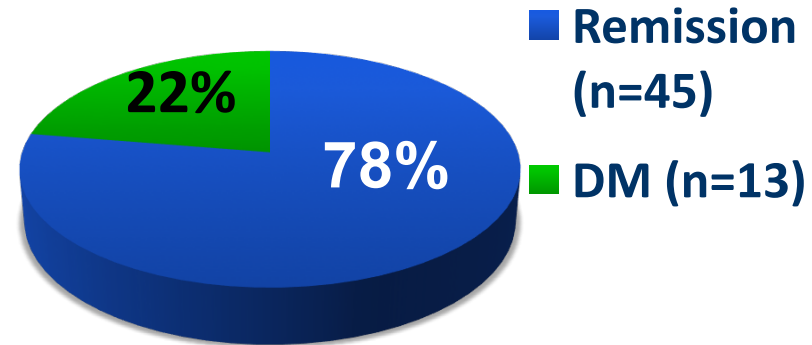
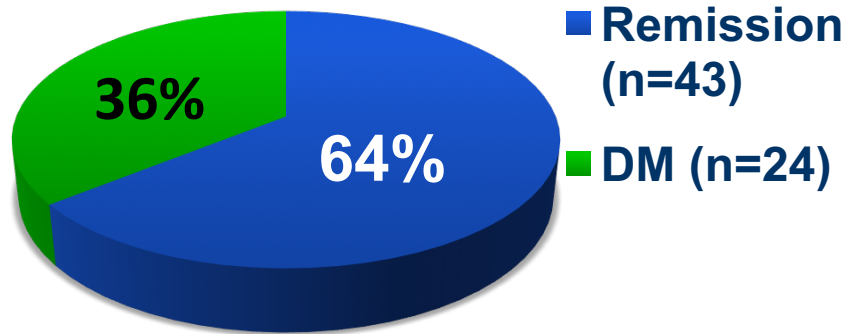
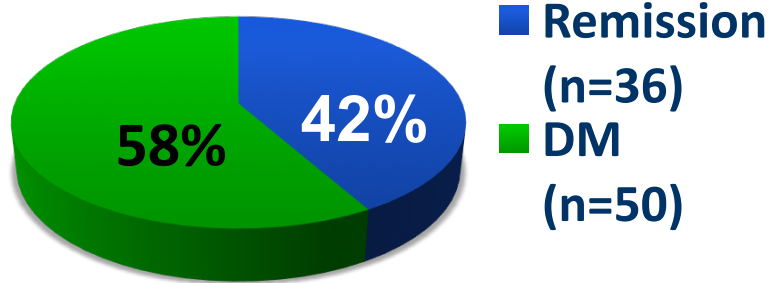
Diabetes	86%
Hyperlipdaemia	70%
Hypertension	78%
Sleep Apnoea	86%

Weight and Type 2 Diabetes after Bariatric Surgery: Systematic Review and Meta-analysis

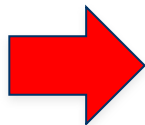
Henry Buchwald, MD, PhD,^a Rhonda Estok, RN, BSN,^b Kyle Fahrbach, PhD,^b Deirdre Banel, BA,^b
Michael D. Jensen, MD,^c Walter J. Pories, MD,^d John P. Bantle, MD,^e Isabella Sledge, MD, MPH^b

- 621 studies over 16 years. Total **135 246** patients
- **56%** Mean Excess Weight Loss all procedures
- **78%** Complete resolution diabetes
- **87%** Improvement or resolution diabetes

EMBMI – Diabetes 1-year post Bypass



4 - 6 weeks
postop

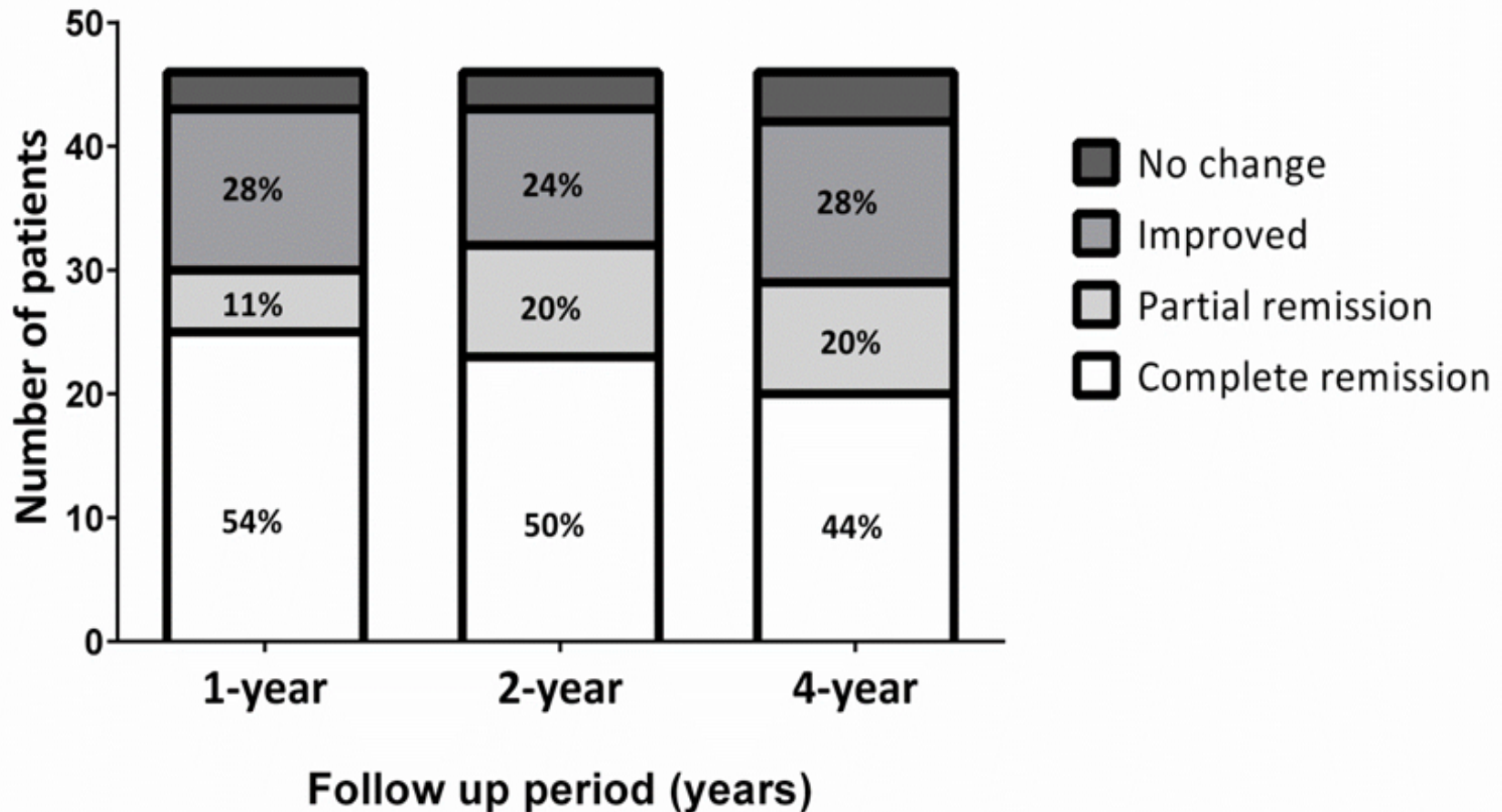


4 - 6 MONTHS
postop



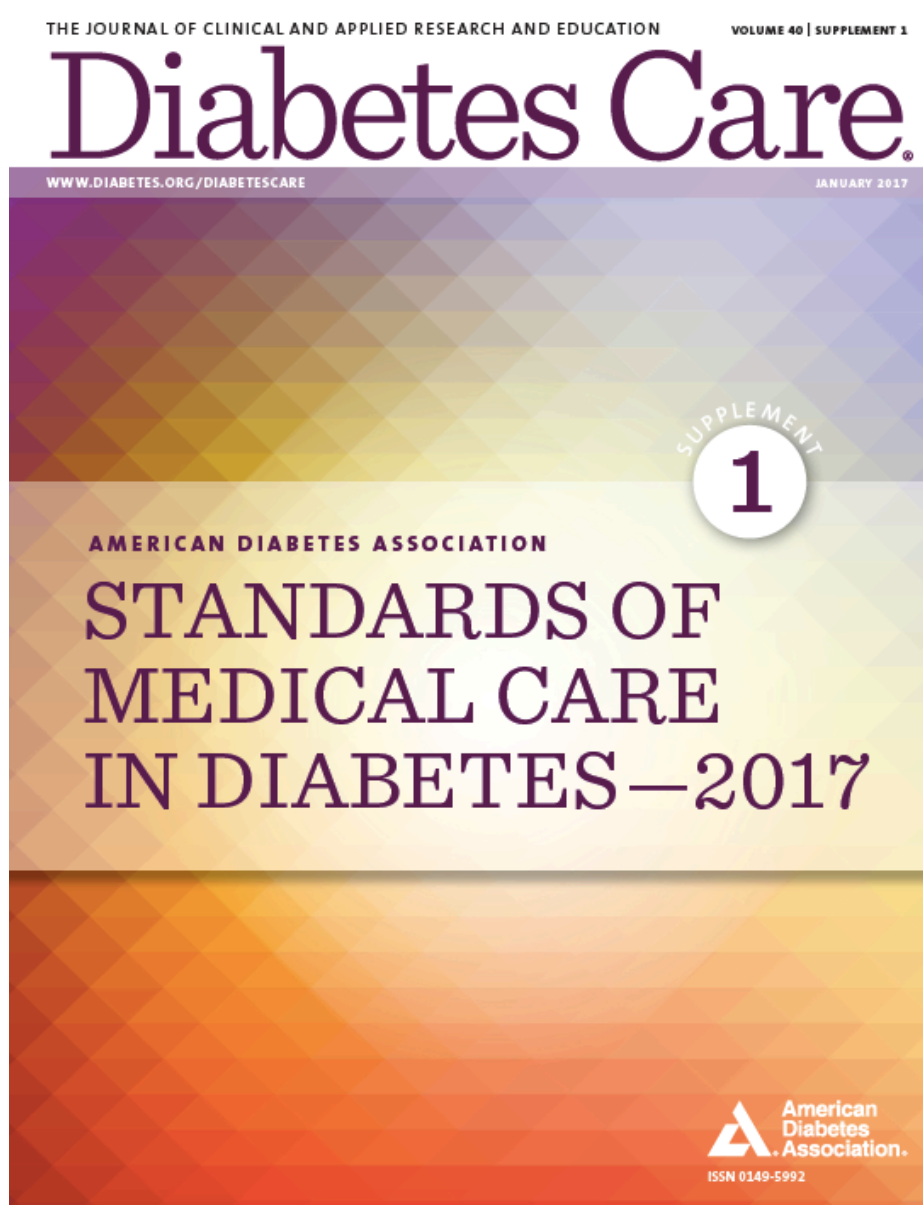
7 - 10 MONTHS
postop

EMBMI – Diabetes 4-years post bypass



Awad et al. Mid-term remission of type II diabetes after Laparoscopic RYGB.
World Journal of Surgery 2016; 40(11): 2719-2725

American Diabetes Association



METABOLIC SURGERY

Recommendations

- Metabolic surgery should be recommended to treat type 2 diabetes in appropriate surgical candidates with BMI ≥ 40 kg/m² (BMI ≥ 37.5 kg/m² in Asian Americans), regardless of the level of glycemic control or complexity of glucose-lowering regimens, and in adults with BMI 35.0–39.9 kg/m² (32.5–37.4 kg/m² in Asian Americans) when hyperglycemia is inadequately controlled despite lifestyle and optimal medical therapy. **A**
- Metabolic surgery should be considered for adults with type 2 diabetes and BMI 30.0–34.9 kg/m² (27.5–32.4 kg/m² in Asian Americans) if hyperglycemia is inadequately controlled despite optimal medical control by either oral or injectable medications (including insulin). **B**

COMMENT

PHYSICS Which next-generation neutrino facility should be funded? **p.462**

ARCHAEOLOGY Seabed trove from Ancient Egypt's long-sunk cities on show **p.466**

HEALTH A memoir of a life leading the fight against smallpox and HIV **p.468**

OBITUARY Harry Kroto, buckyball co-discoverer, remembered **p.470**



Surgery can be an effective treatment for type 2 diabetes.

Time to think differently about diabetes

New guidelines for the surgical treatment of type 2 diabetes bolster hopes of finding a cure, writes **Francesco Rubino**, but long-standing preconceptions must be put aside.

Clinical guidelines published this week¹ announce what may be the most radical change in the treatment of type 2 diabetes for almost a century. Appearing in *Diabetes Care*, a journal of the American Diabetes Association, and endorsed by 45 professional societies around the world, the guidelines propose that surgery involving the manipulation of the stomach or intestine be considered as

a standard treatment option for appropriate candidates. This development follows multiple clinical trials showing that gastrointestinal surgery can improve blood-sugar levels more effectively than any lifestyle or pharmaceutical intervention, and even lead to long-term remission of the disease¹.

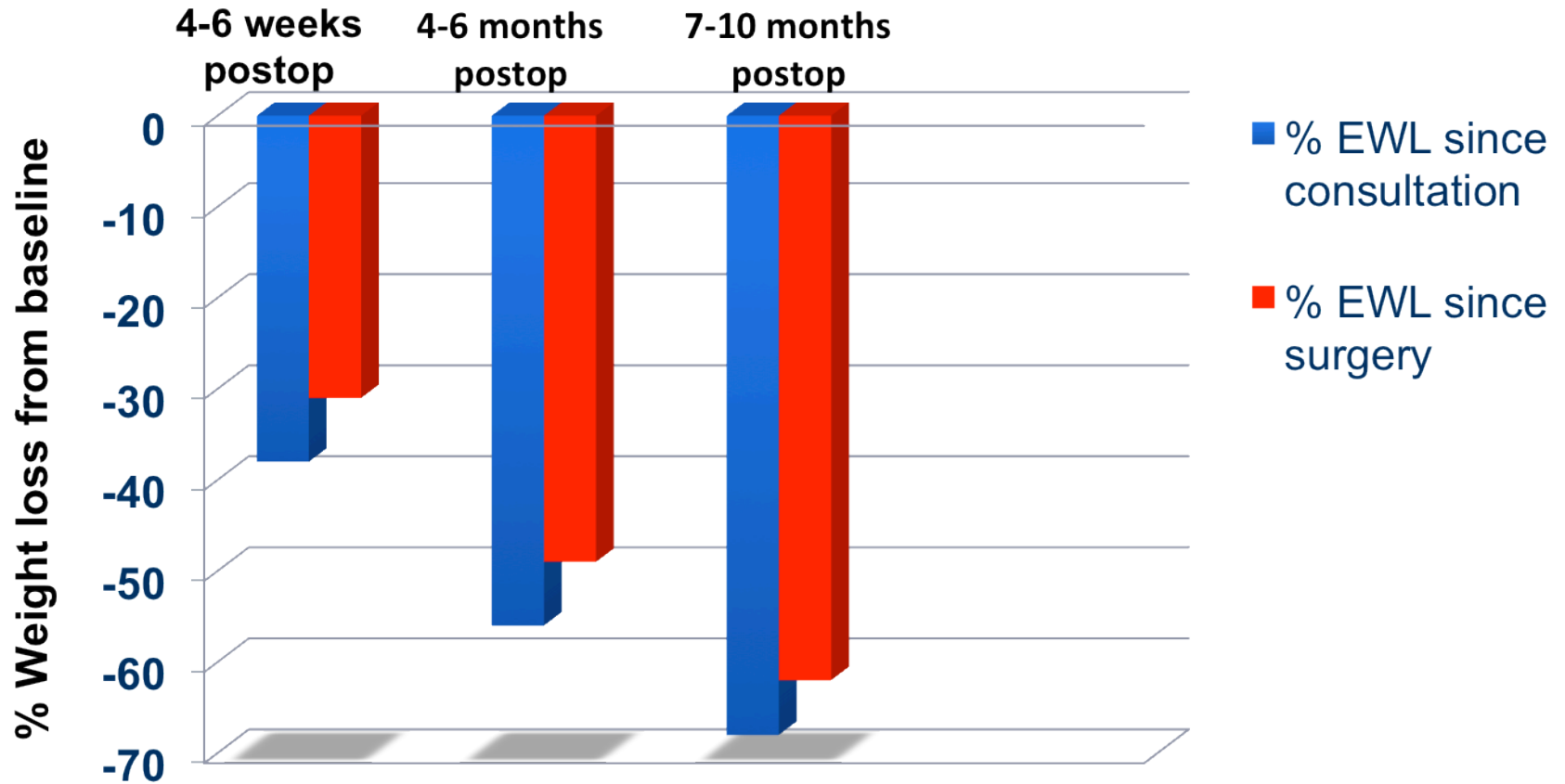
As someone who has been investigating the link between gastrointestinal surgery and glucose homeostasis since the late 1990s

(see 'Surgical breakthrough'), I have witnessed first-hand how getting to this point has required many clinical scientists to put aside long-standing preconceptions. Indeed, the guidelines come nearly 100 years after the first clinical observations that diabetes could be improved or even resolved by a surgical operation (see 'A long road')². The evidence that surgery can prompt the remission of a disease that has long been considered

Nature May 16

3. EFFICACY & SAFETY

EMBMI – Excess Weight Loss post bypass



2014/15 National Bariatric Surgery Registry Outcomes

- **20 534** operations 2012–2015 in UK
- 9526 LRYGB, 4705 bands, 3797 sleeves
- Overall in-hospital mortality **0.056%**
- Primary operation **complication rate 2.9%**
- Average **3.59 obesity-related diseases**

4. COST-EFFECTIVENESS

Cost effectiveness

Patient SY (Lincoln)

Preop

■ Exenatide 10ug BD	£2.27 daily
■ Repaglinide 12mg	£0.78 daily
■ Gliclazide 320mg	£0.16 daily
	£3.21 daily
	£1,171 annually

Postop

£0 annually

Annual saving

£1,171

Cost effectiveness

Cost/QALY gained

- **Bariatric Surgery £6289 – £8527**
- 6-months clopidogrel for acute coronary syndrome £6591
- Bisphosphonates in 70yr old woman ~£12,000
- **Orlistat for 6 months £24,431**
- Infliximab for rheumatoid arthritis £27,000 to £35,000
- Implantable defibrillators £28,000

Bariatric Surgery: cost effective treatment by all recognised criteria

Post-Surgery Retinopathy

- Present in **20%** diabetic patients preop
- Worsen in up to **20%** patients postop
- Risk factors: Younger age, males, patients with rapid changes in HbA1c
- Recommendations: regular screening postop, ?duration

Conclusions

- Metabolic surgery highly effective therapy: **Level 1 evidence**
- Sustained long term reduction in mortality, remission serious comorbidities: **Level 1 evidence**
- Cost-effective
- Life-long commitment and follow-up of patients
- Regular screening diabetic retinopathy postop

Email: sherif.awad@nhs.net