

Obesity in the ICU

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Outline

- A little bit of basic science
- Some clinical data from the literature
- What happens in the real world

Obesity - the size of the problem

In the USA: 40 million adults

In the UK

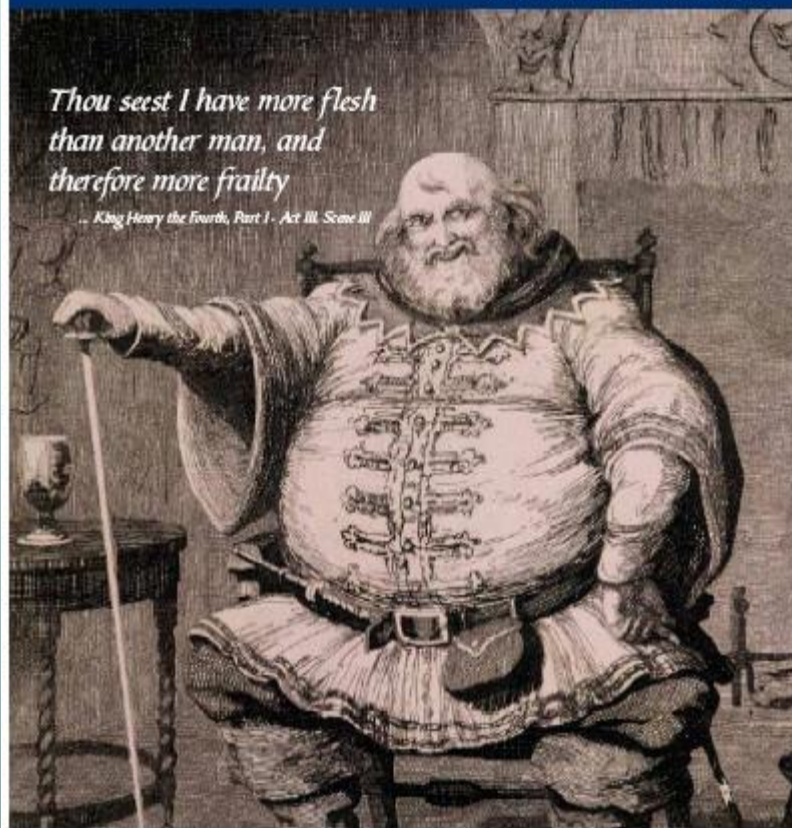
- Overweight (BMI > 27)
 - 43% of men
 - 29% of women
- Obese (BMI > 30)
 - 13% of men
 - 16% of women
- Morbidly Obese (BMI > 40)
 - Comorbidity

Tackling Obesity in England

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
HC 220 Session 2000-2001: 15 February 2001

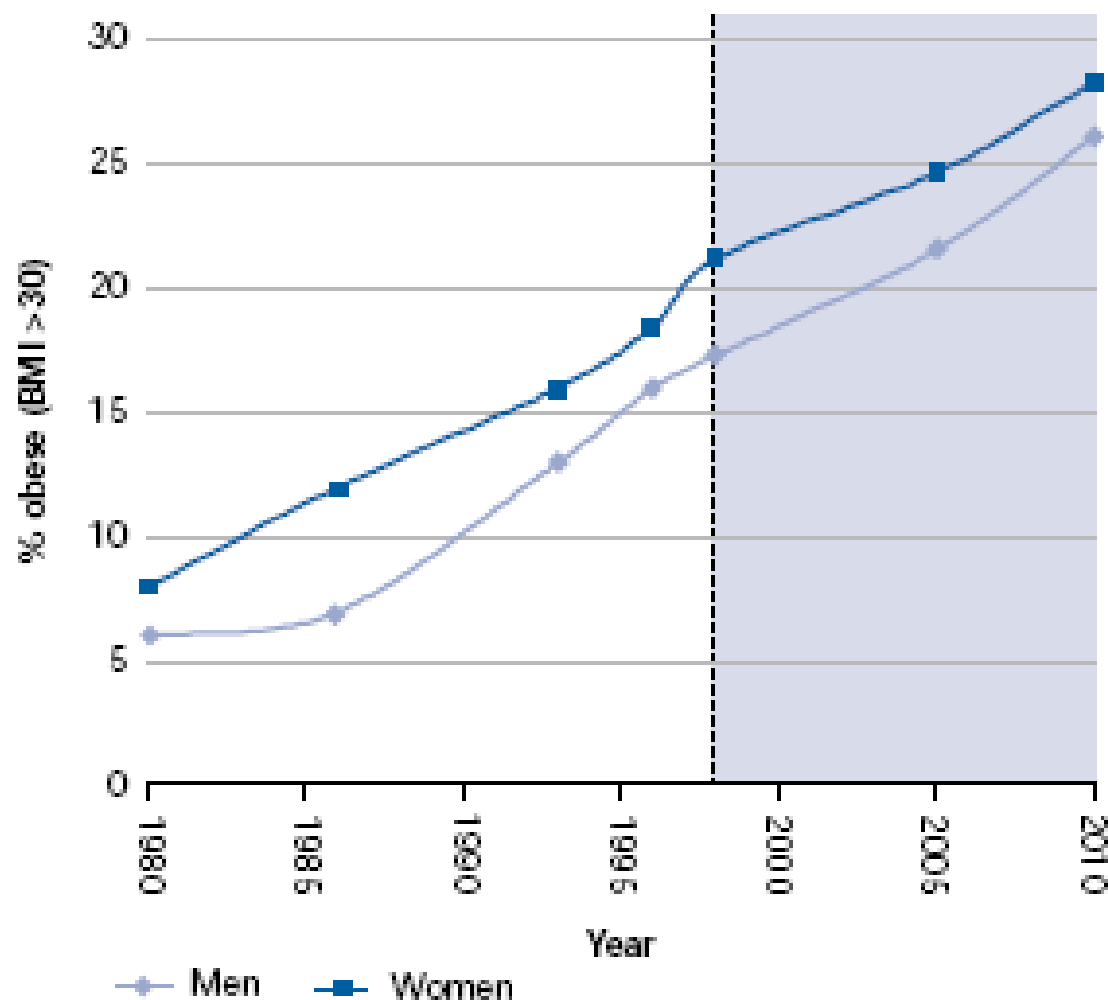
*Thou seest I have more flesh
than another man, and
therefore more frailty*

... King Henry the Fourth, Part 1 - Act III, Scene III



4

Trends in the prevalence of obesity amongst men and women in England extrapolated to 2010



Increased Risk

- Males
- Older
- Diabetes Mellitus (DM)
- Hypertension (HTN)

E.H. Livingston, S. Huerta and D. Arthur *et al.*, Male gender is a predictor of morbidity and age a predictor of mortality for patients undergoing gastric bypass surgery, *Ann Surg* 125 (2002), pp. 576–582.

E.H. Livingston and C.Y. Ko, Assessing the relative contribution of individual risk factors on surgical outcome for gastric bypass surgery; a baseline probability analysis, *J Surg Res* 105 (2002), pp. 48–52

Respiratory

- BMR (N) - BSA
- VO_2 , VCO_2 higher than normals
- Increased WOB
- Arterial hypoxaemia
- Obesity hypoventilation syndrome, OSA
- Effects on tissue oxygenation

Kabon B et al. Obesity decreases perioperative tissue oxygenation
Anesthesiology. 2004 Feb;100(2):274-80

“Metabolic syndrome”

- Central obesity
- Insulin resistance
- Fatty liver
- Hypertension
- OSA / OHVS



Who comes to ICU?

- Bariatric surgery
- Other
 - Acute v elective



Characteristics and outcome of patients admitted to ICU following bariatric surgery

- Database of bariatric surgery procedures from 2003 until 2006
- Tertiary level, mixed medical and surgical, adult ICU
 - van den Broek RJ, Buijs MP, van Dielen FM, Bindels AJ, van Zundert AA, Smulders JF. Characteristics and outcome of patients admitted to the ICU following bariatric surgery. *Obes Surg.* 2009 May;19(5):560-4

- 265 patients undergoing bariatric surgery (mainly gastroplasties and Roux-en-Y gastric bypasses)
- 22 (8%) were admitted to the ICU
- 14 (64%) elective
- 8(36%) emergency

- Hospital length of stay (LOS) for all patients 4.5 days
- Elective admissions
 - obstructive sleep apnea (OSA)
 - super obesity
- Median ICU stay of 1 day

- Emergency admissions after emergency surgery due to surgical complications
- Median ICU stay of 8 days
- No deaths during ICU stay



Patients Reoperated For Severe Intraabdominal Sepsis (IAS) After Bariatric Surgery

- Surgical intensive care unit (ICU) for organ failure
- French observational study in a 12-bed adult surgical intensive care unit in a 1,200-bed teaching hospital with expertise in bariatric surgery

- January 2001 to August 2006, 27 morbidly obese patients (18 transferred from other institutions) developed severe postoperative IAS (within 45 days)
- Time to reoperation, characteristics of IAS, demographic data, and disease severity scores recorded

- Respiratory signs led to an incorrect diagnosis in more than 50%
- BMI > 50 kg/m² and multiple reoperations were associated with a poorer prognosis in the ICU
- ICU mortality rate was 33% and increased with the number of organ failures at reoperation

– Kermarrec N, Marmuse JP, Faivre J, Lasocki S, Mognol P, Chosidow D, Muller C, Desmonts JM, Montravers P. High mortality rate for patients requiring intensive care after surgical revision following bariatric surgery. *Obes Surg.* 2008 Feb;18(2):171-8

- Limiting ICU admission after laparoscopic gastric bypass to patients with a body mass index $>60 \text{ kg/m}^2$ and severe OSA did not increase the overall incidence of postoperative respiratory complications or hospital stay

– El Shobary H, Backman S, Christou N, Schricker T.
Use of critical care resources after laparoscopic gastric bypass: effect on respiratory complications.
Surg Obes Relat Dis. 2008 Nov-Dec;4(6):698-702



Just laying about?

- In 49 patients included in the study 13 developed RML (26.5%)
- Surgery >4 hours
- diabetes
- ASA III or IV identified as risk factors
 - Lagandré S, Arnalsteen L, Vallet B, Robin E, Jany T, Onraed B, Pattou F, Lebuffe G. Predictive factors for rhabdomyolysis after bariatric surgery. Obes Surg. 2006 Oct;16(10):1365-70

The kidney paradox

- Hospital patients overall
- Obesity associated with better survival from renal failure
- Is this also true of AKI in critical illness?





- Druml W, Metnitz B, Schaden E, Bauer P, Metnitz PG.
- Impact of body mass on incidence and prognosis of acute kidney injury requiring renal replacement therapy.
 - Intensive Care Med. 2010 Mar 16. [Epub ahead of print]

- 5,232 patients with AKI requiring renal replacement therapy from 53 Austrian ICUs analysed
- Multivariate analysis
- Corrected for SAPS II, diagnosis, sex, comorbidity
- Greater risk of AKI with increasing BMI



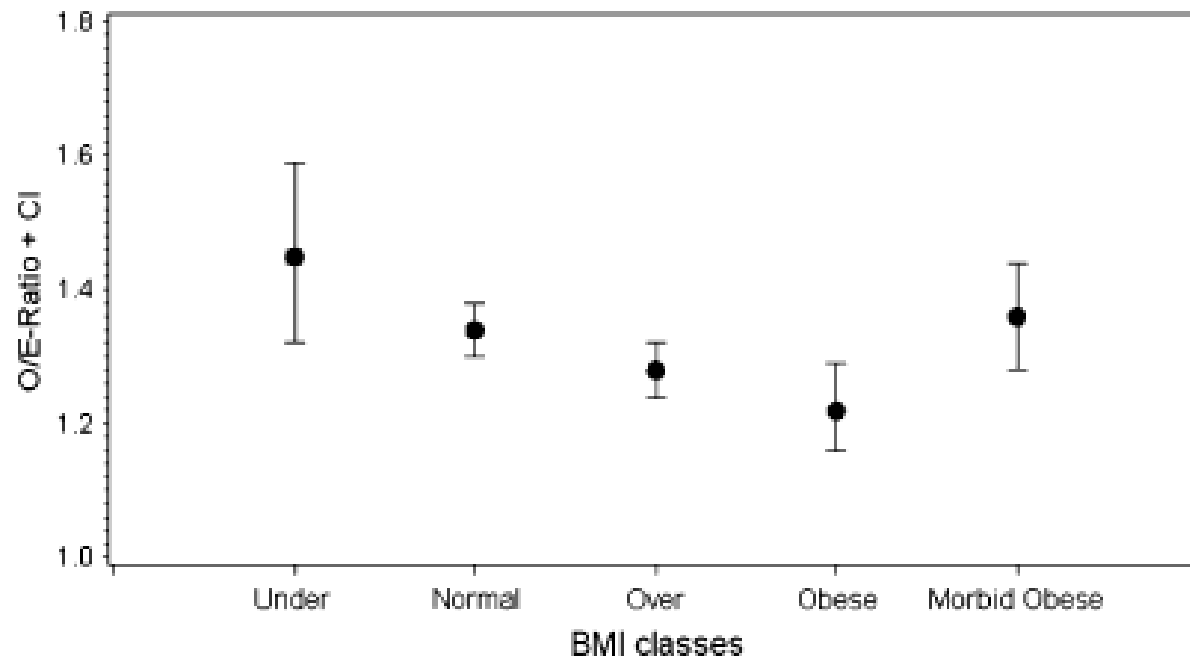


Fig. 2 Risk-adjusted mortality rates (O/E ratios) for the five BMI classes (*filled circles*). *CI* 95% confidence interval

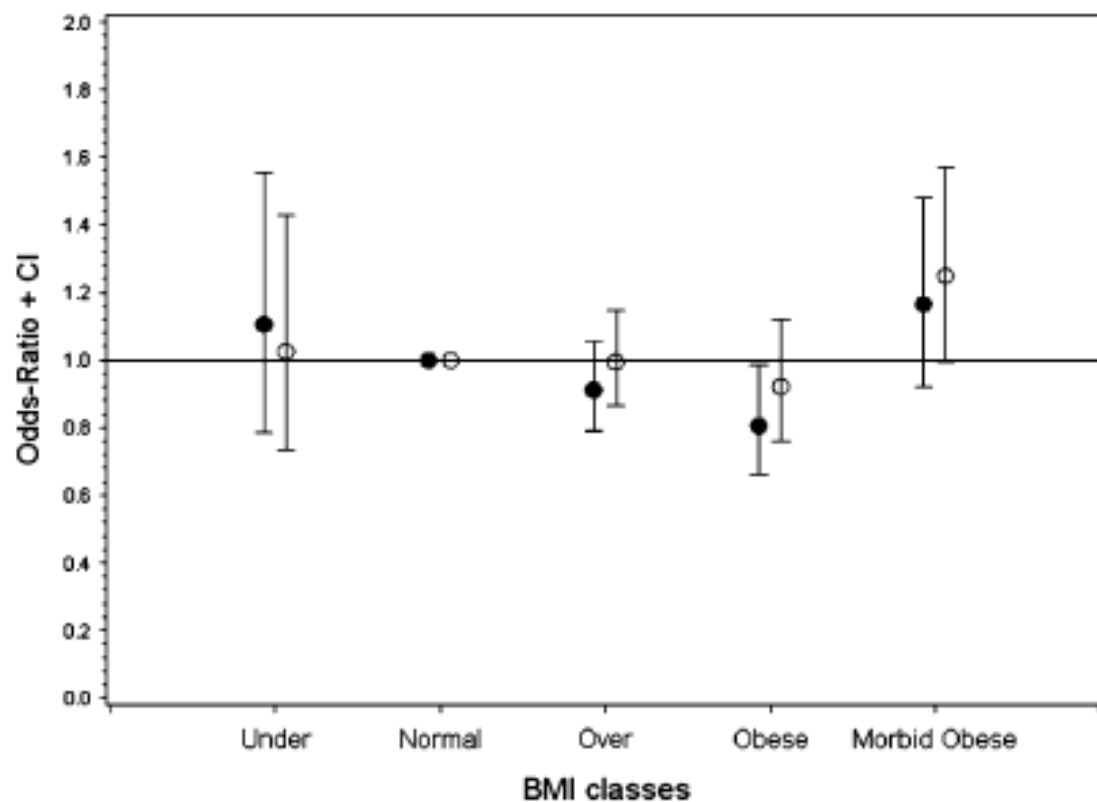


Fig. 3 Adjusted odds ratios for hospital and ICU mortality in the classes of body mass index compared to the reference group (normal weight). *Filled circles* hospital mortality, *open circles* ICU mortality, *CI* 95% confidence interval



Mortality in critically ill trauma patients

- Greater mortality overall in MO
- Mortality associated with
 - Age, Injury severity score (ISS), hyperglycemia (HGL) at admission
- Obesity not an independent factor *per se*
 - Diaz JJ Jr, Norris PR, Collier BR, Berkes MB, Ozdas A, May AK, Miller RS, Morris JA Jr. Morbid obesity is not a risk factor for mortality in critically ill trauma patients. J Trauma. 2009 Jan;66(1):226-31



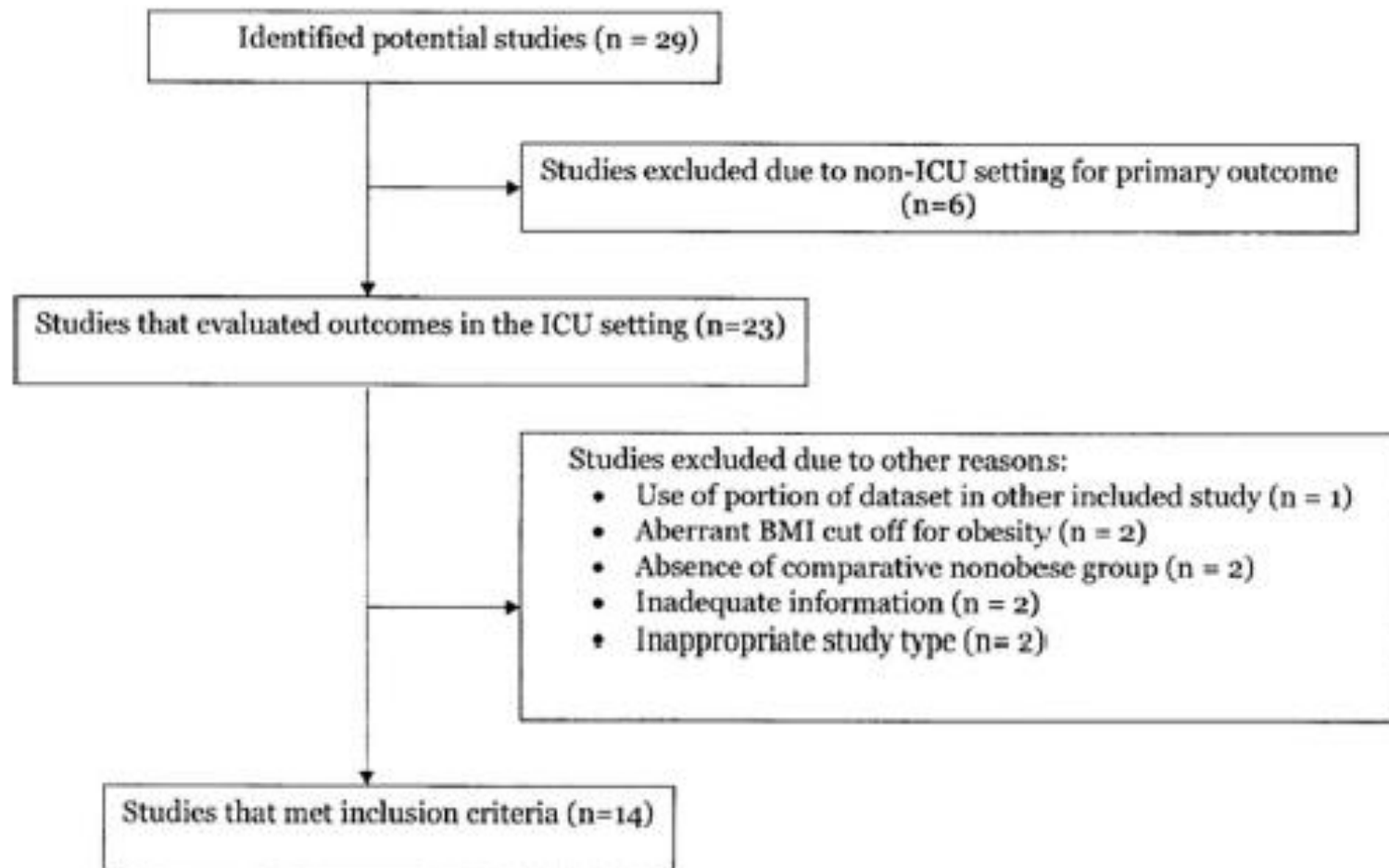


Effect of obesity on intensive care morbidity and mortality: A meta-analysis*

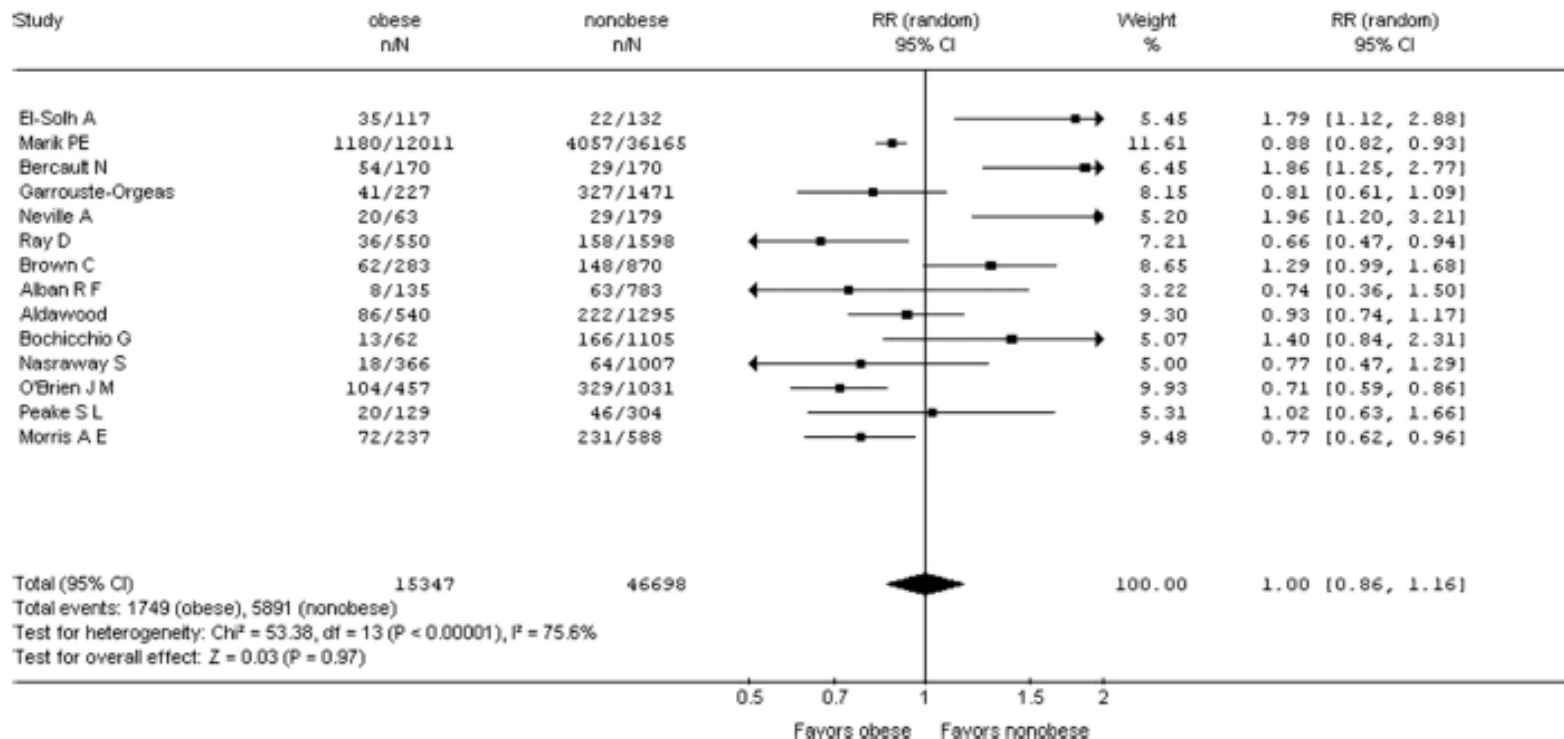
Morohunfolu E. Akinnusi, MD; Lilibeth A. Pineda, MD; Ali A. El Solh, MD, MPH

Crit Care Med. 2008 Jan;36(1):151-8

- **Meta-analysis of studies comparing outcomes in obese (body mass index of >30 kg/m²) and nonobese (body mass index of <30 kg/m²) critically ill patients in ICU**
- **14 studies met inclusion criteria**
- **62,045 critically ill subjects**
- **15,347 obese patients**
 - **25% of the pooled study population**



Outcome: mortality



So what do we need?

- Kit
- Enough people
- Expertise
- The right colleagues











Questions?