



# Peri-operative Glucose Control

## Is it Important?

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# Do Peri-Operative High Glucose Levels Cause Harm?

- High pre-operative glucose or HbA1c has been related to adverse outcomes following
  - spinal surgery
  - vascular surgery
  - colorectal surgery
  - cardiac surgery
  - trauma

Walid MS et al 2010 Journal of Hospital Medicine 5:E10-E14

O'Sullivan CJ et al 2006 European Journal of Vascular and Endovascular Surgery 32:188-197

Gustafsson UO et al 2009 British Journal of Surgery 96:1358-1364

Halkos ME et al 2008 Annals of Thoracic Surgery 86:1431-1437

Kreutziger J et al 2009 J Trauma 67(4):704-8

## Excess Mean Length of Stay in Diabetes Inpatients Aged 18 – 60 Years

### 269,265 Diabetes Discharges and 4,411,593 Matched Controls

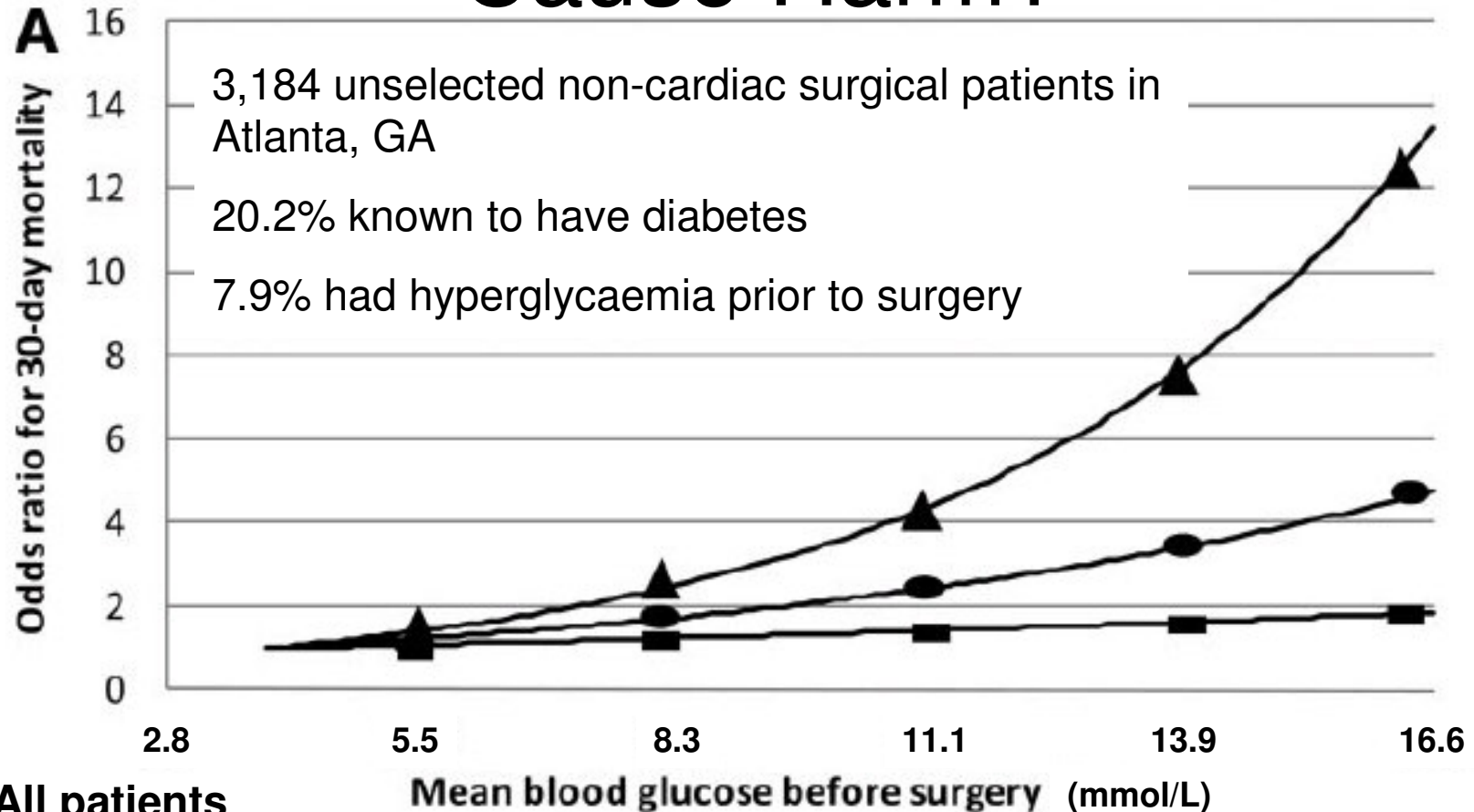
|                  | Mean LOS (days) |           |           | Excess LOS (days) |     |        | n      |           |  |
|------------------|-----------------|-----------|-----------|-------------------|-----|--------|--------|-----------|--|
|                  | E10             | E11       | C         | E10               | E11 | E10    | E11    | C         |  |
| <b>Surg.</b>     | 5.4 (0.1)       | 5.1 (0.1) | 4.2 (0.2) | 1.2               | 0.9 | 18,032 | 32,135 | 1,501,453 |  |
| <b>T &amp; O</b> | 4.8 (0.1)       | 5.3 (0.2) | 4.6 (0.1) | 0.2               | 0.7 | 8,178  | 12,203 | 885,606   |  |
| <b>GM</b>        | 4.8 (0.2)       | 5.4 (0.2) | 4.4 (0.1) | 0.4               | 1.0 | 70,988 | 82,446 | 1,709,553 |  |
| <b>Card.</b>     | 4.2 (0.1)       | 4.2 (0.1) | 3.8 (0.1) | 0.4               | 0.4 | 5,307  | 15,009 | 229,784   |  |
| <b>MFE</b>       | 4.8 (0.2)       | 5.6 (0.2) | 4.7 (0.1) | 0.1               | 0.1 | 2,444  | 4,549  | 85,197    |  |

E10 = Type 1 diabetes      E11 = Type 2 diabetes      c = controls

English Hospitals, 4 consecutive years of discharges 2000-2004

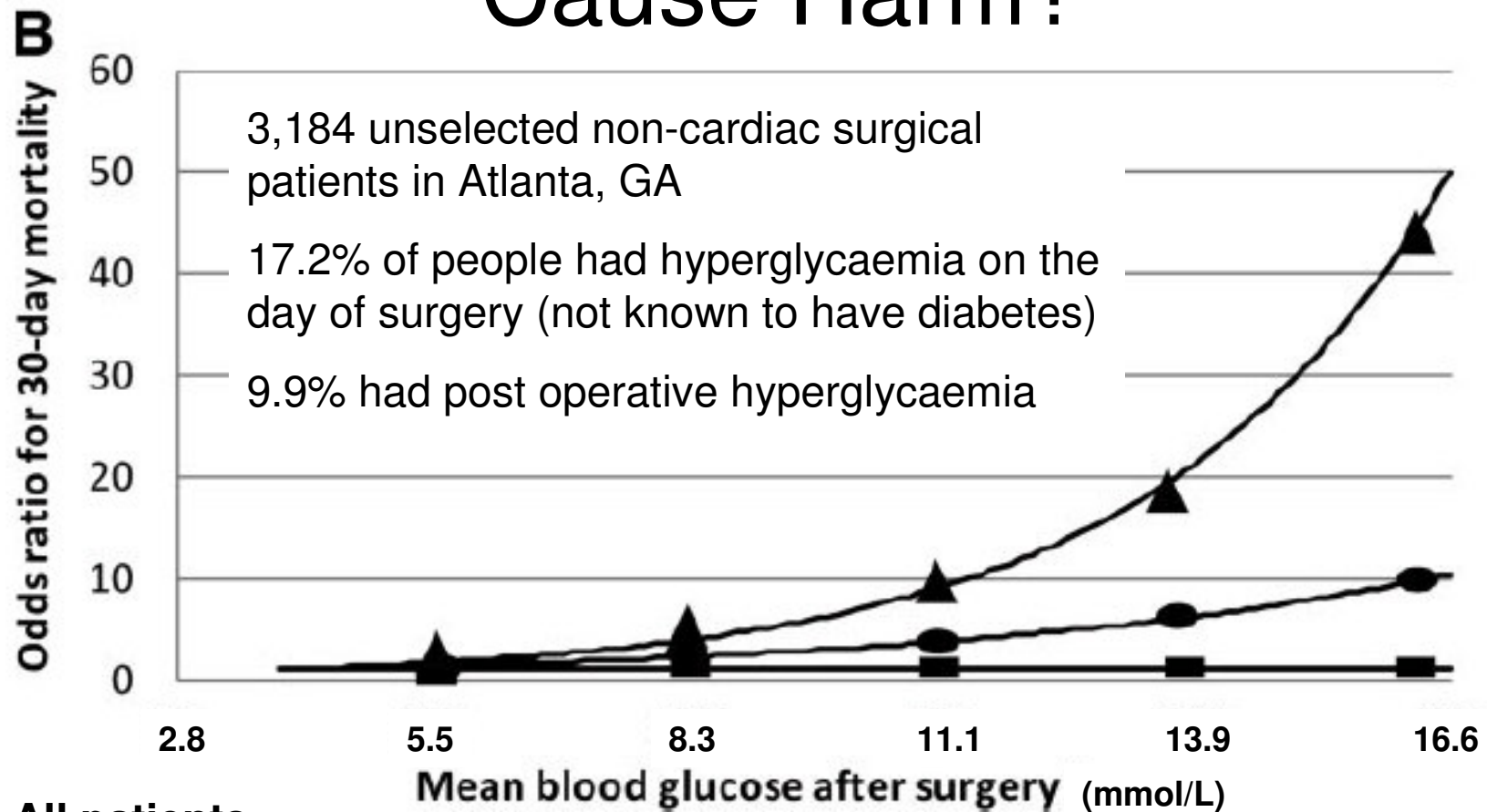
Sampson MJ et al Diabetes Research & Clinical Practice 2007;77(1):92-98

# Do High Admission Glucose Levels Cause Harm?



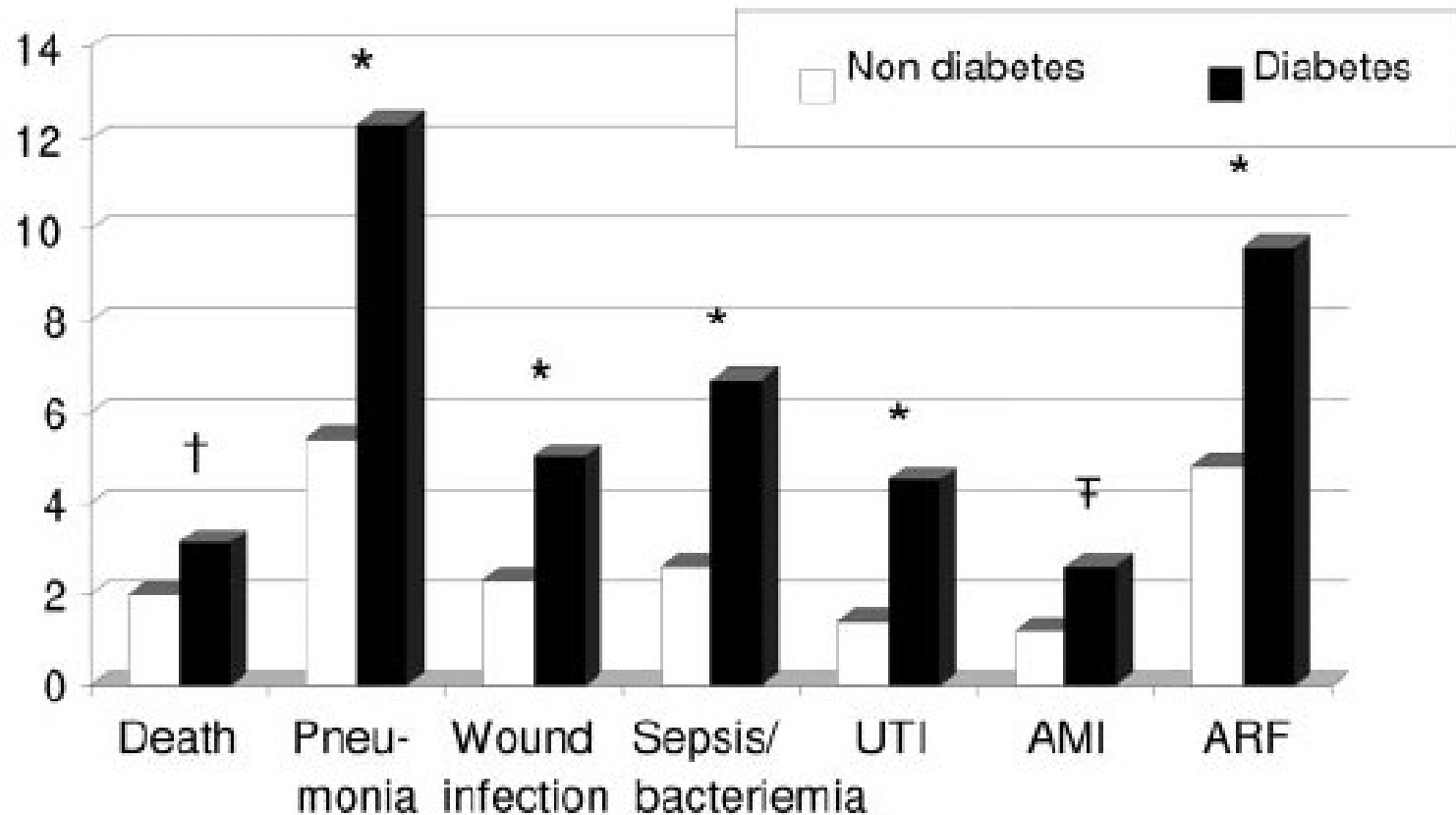
- All patients
- Patients with diabetes
- ▲ Patients without diabetes

# Do High Admission Glucose Levels Cause Harm?

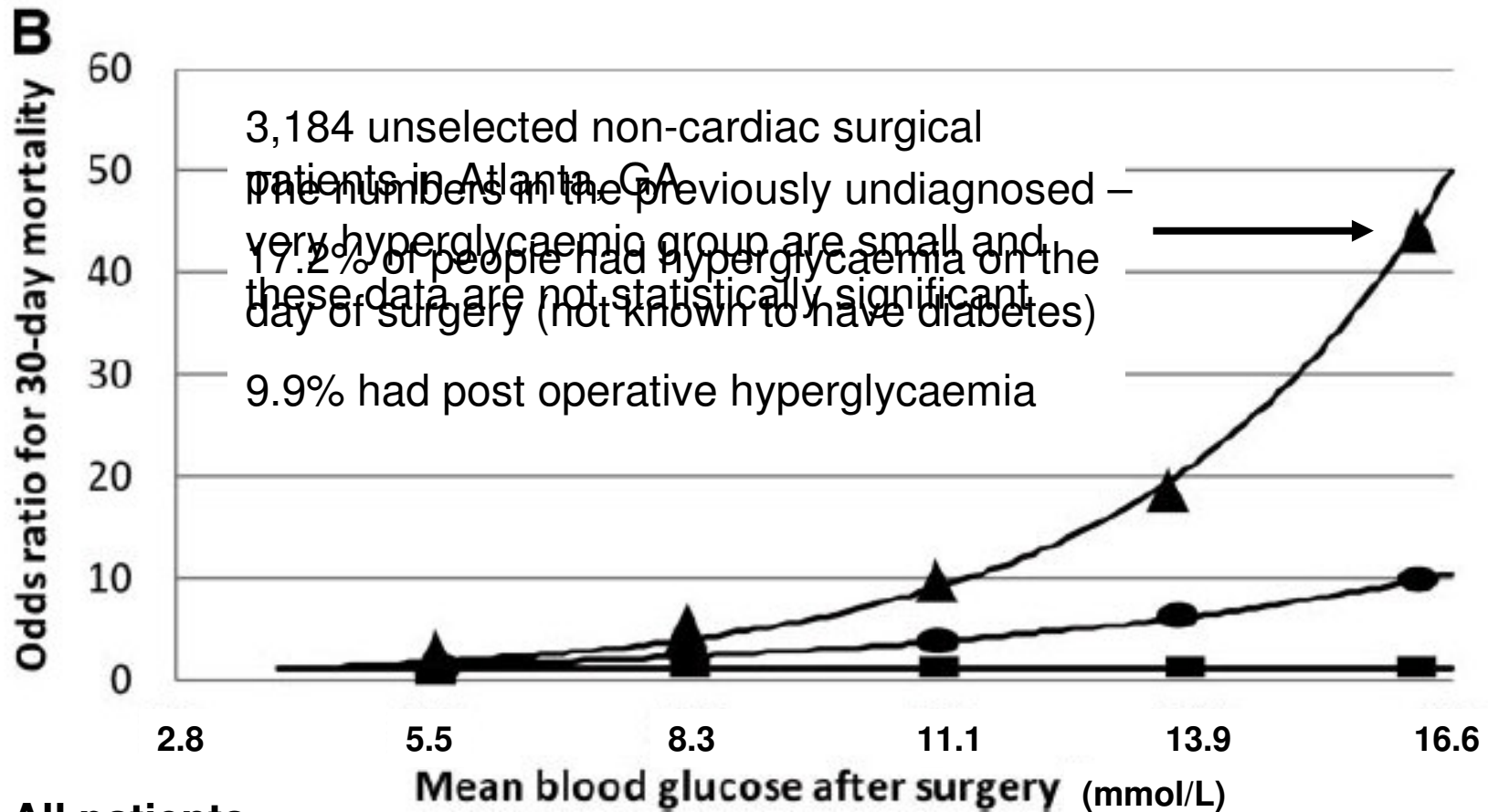


- All patients
- Patients with diabetes
- ▲ Patients without diabetes

# Do High Glucose Levels Cause Harm?



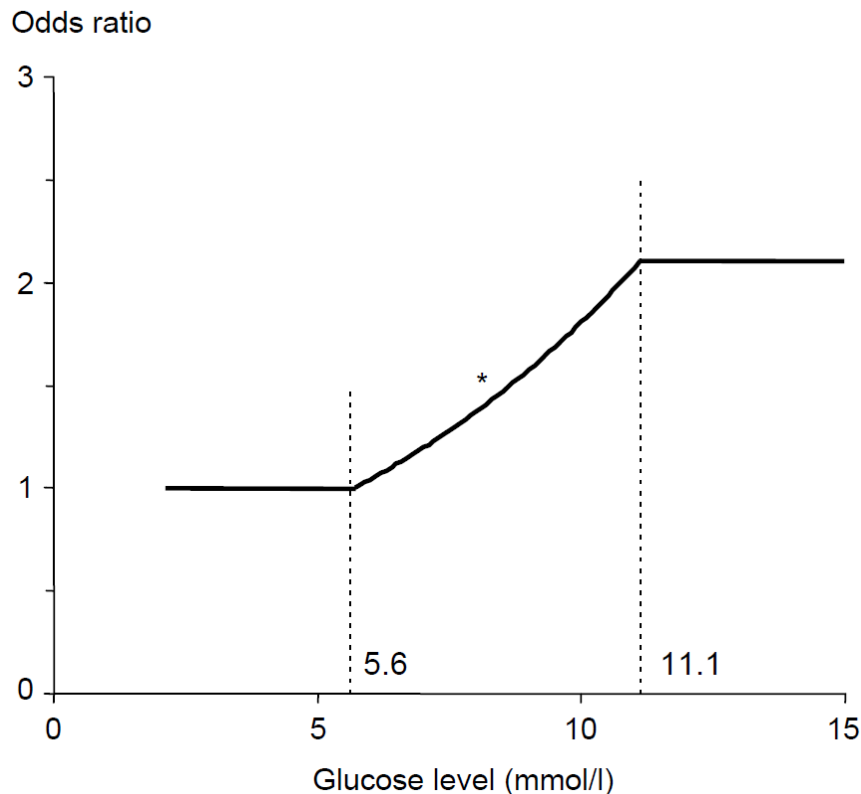
# An Admission



- All patients
- Patients with diabetes
- ▲ Patients without diabetes

# However.....

- Other data has confirmed the harm of high pre-operative glucose levels in non-cardiac, non vascular surgery



30 day mortality rates for 989 patients with diabetes – for each mmol/L increase in blood glucose, OR for mortality rose by 1.19 (CI 1.1 - 1.3)



# Thus....

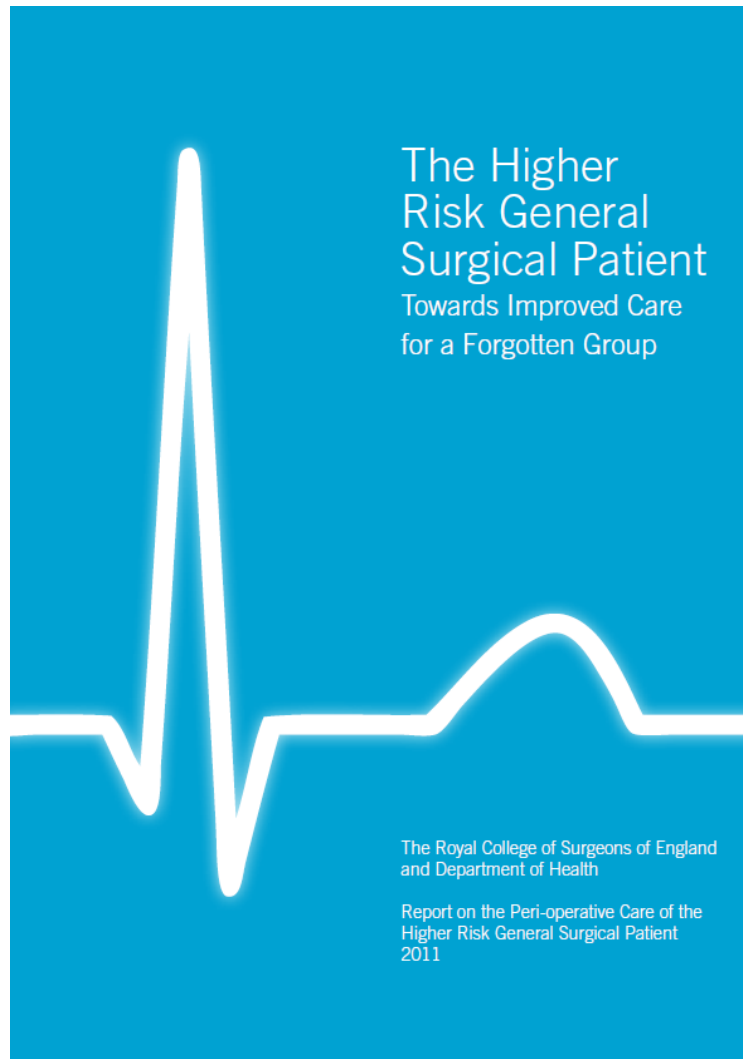
- Whilst there is data to show that poor glycaemic control is associated with poor outcomes
- There is no consistent data to show that improving control also improves outcomes

(A bit like diabetes care in general until the mid 1990's)

# The ITU Story

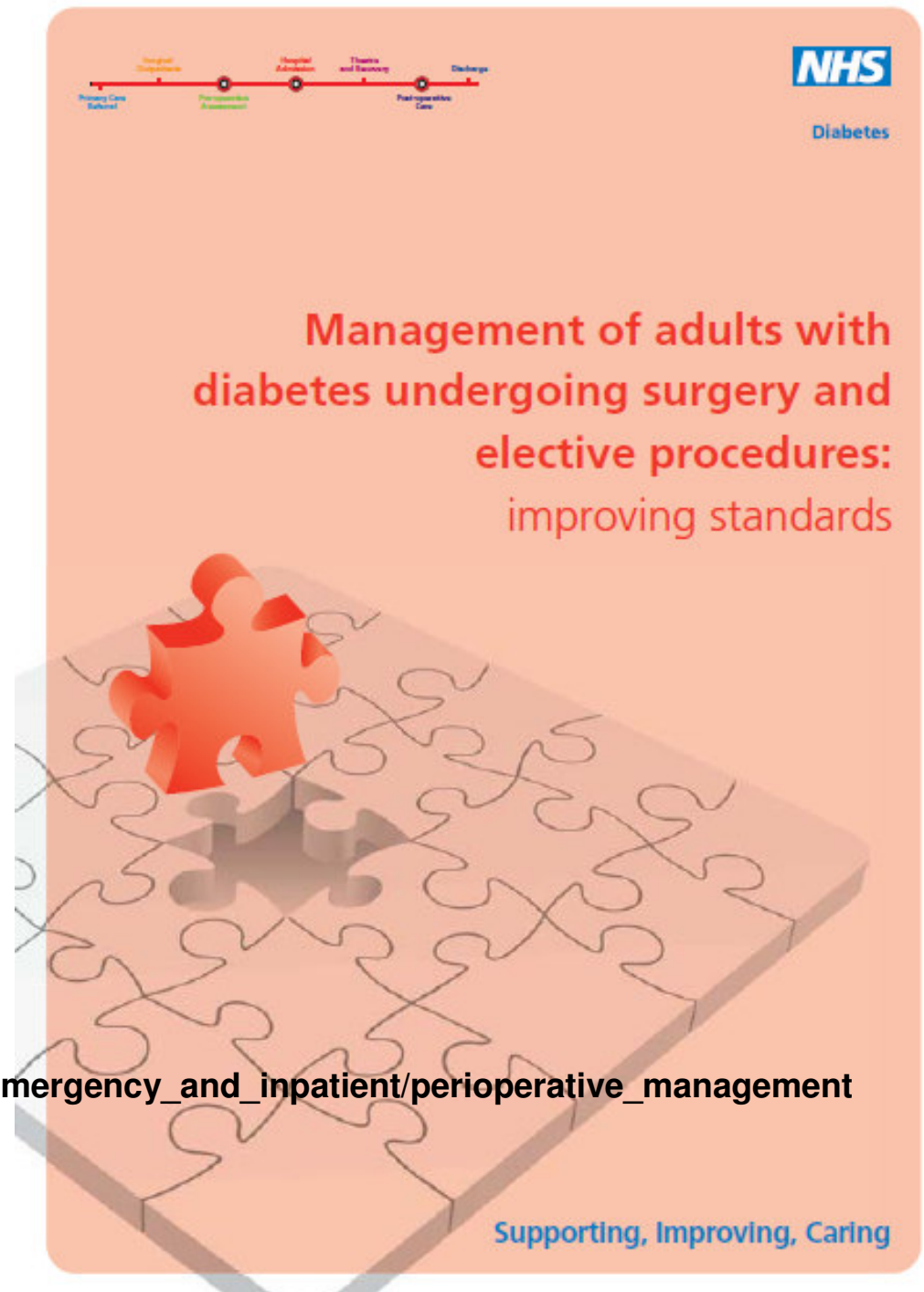
- 2001 Leuven (Surgical) 1548 **Positive**  
Van den Berghe G et al NEJM 2001;345:1359-1367
- 2006 Leuven (Medical) 1200 **Neutral / Positive**  
Van den Berghe G et al NEJM 2006;354:449-461
- 2008 VISEP (Septic) 537 **Stopped early**  
Brunkhorst FM et al NEJM 2008;358:125-139
- 2008 De la Rosa (General) 504 **Neutral**  
De La Rosa G et al Critical Care 2008;12:R120
- 2009 GluControl 1078 **Stopped early / Neutral**  
Preiser J-C et al Intensive Care Medicine 2009 35:1738-1748
- 2009 Leuven (PICU) 700 **Positive**  
Vlasselaers D et al Lancet 2009;373:547-556
- 2009/12 NICE-SUGAR 6104 **Harmful (especially hypos)**  
The NICE-SUGAR Study Investigators NEJM 2009;360:1283-1297  
NEJM 2012;367:1108-1118
- 2012 Boston Children's 980 **Neutral**  
Agus MS et al NEJM 2012 epub 7/9/12

# Something Some of You May Have Seen



- Disappointingly, the word 'diabetes' appears only once, 'hyperglycaemia' and 'glucose' do not appear at all in this document

# Along Came This.....



[http://www.diabetes.nhs.uk/areas\\_of\\_care/emergency\\_and\\_inpatient/perioperative\\_management](http://www.diabetes.nhs.uk/areas_of_care/emergency_and_inpatient/perioperative_management)

# And This.....

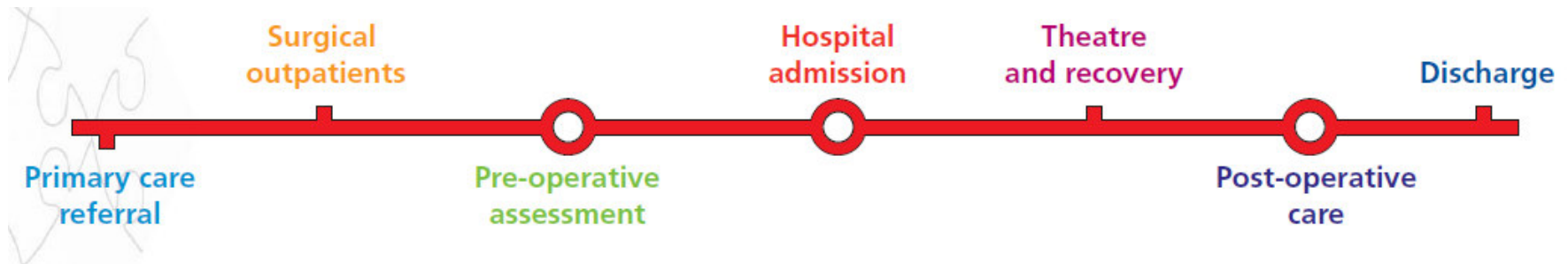
## **Diabetes UK Position Statements and Care Recommendations**

## **NHS Diabetes guideline for the perioperative management of the adult patient with diabetes\***

K. Dhatariya<sup>1</sup>, N. Levy<sup>2</sup>, A. Kilvert<sup>3</sup>, B. Watson<sup>4</sup>, D. Cousins<sup>5</sup>, D. Flanagan<sup>6</sup>, L. Hilton<sup>7</sup>, C. Jairam<sup>8</sup>, K. Leyden<sup>3</sup>, A. Lipp<sup>1</sup>, D. Lobo<sup>9</sup>, M. Sinclair-Hammersley<sup>10</sup> and G. Rayman<sup>11</sup>  
for the Joint British Diabetes Societies

# National Guidelines

- Document divided into sections:
  - Primary care
  - Surgical outpatients
  - Pre-operative assessment clinic
  - Hospital admission
  - Theatre and recovery
  - Post-operative care
  - Discharge



# Aims and Responsibilities

- Each section is divided into these subheadings

# Primary Care Responsibilities

- Duration and type of diabetes
- Place of usual diabetes care (primary or secondary)
- Other co-morbidities
- Treatment
  - for diabetes oral agents/ insulin doses and frequency
  - for other co-morbidities
- Complications
  - At risk foot
- Renal impairment
- Cardiac disease
- Relevant measures
- BMI
- BP
- HbA1c
- eGFR





# Does Anyone Use The Guidelines?

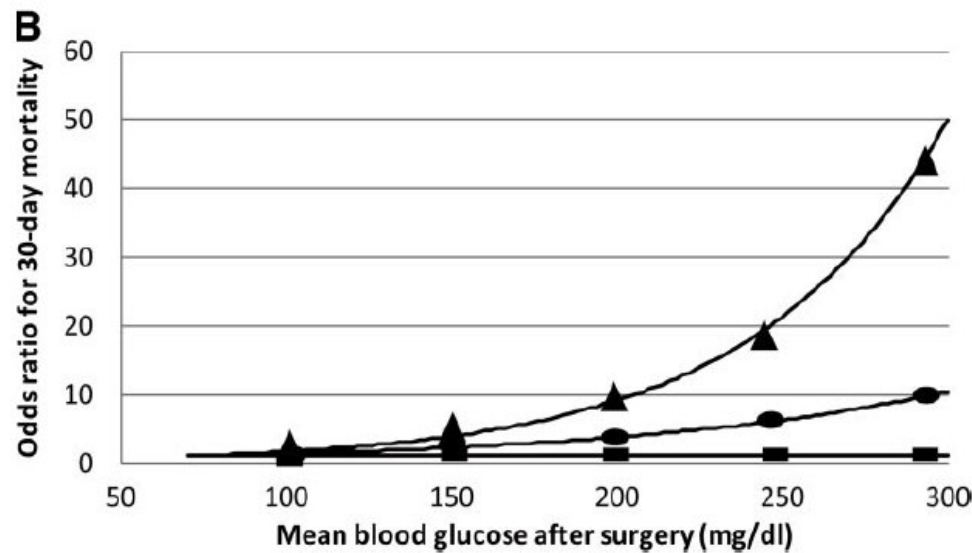
- Recently collected data from 135 out of 180 DSU across England, Wales and Scotland
- 24% of all DSUs do not routinely manage patients with T1DM
- 44% and 28.8% do not have care pathways for managing T1DM and T2DM respectively
- 41% of all DSUs said that they use VRIII's, but only 13% reported using a GIK regimen if required

# Does Anyone Use The Guidelines?

- Most units manage T2DM by minimally modifying the patients' usual regime, and 20% of all units do not alter the patient's diabetic regime at all apart from ensuring that they are scheduled first on the operating list
- 13 units reported having managed T2DM in their DSUs for a longer time period than that for T1DM

# It's a Minefield

- Remember, if you knew that without you even TOUCHING the patient you could *potentially* reduce their peri-operative mortality by 40 fold would you do that first?





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