The Management of Diabetes Related Emergencies

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Consultant in Diabetes and Endocrinology

Norfolk and Norwich University Hospitals

RCP 30 October 2013

Who is this Man?

- I am a consultant in diabetes and endocrinology in Norwich
- I am an executive officer of the Association of British Clinical Diabetologists
- I am the medical secretary for the SCE in diabetes and endocrinology
- I am on the steering committee of the Joint British Diabetes Societies Inpatient Care group and am an author on several national guidelines

The Format

- A few SCE type questions to get the juices flowing
- These are a ‘best of 5’ – NOT multiple ‘true / false’
- 15 seconds to answer each one
- You mark yourself
- There are no prizes

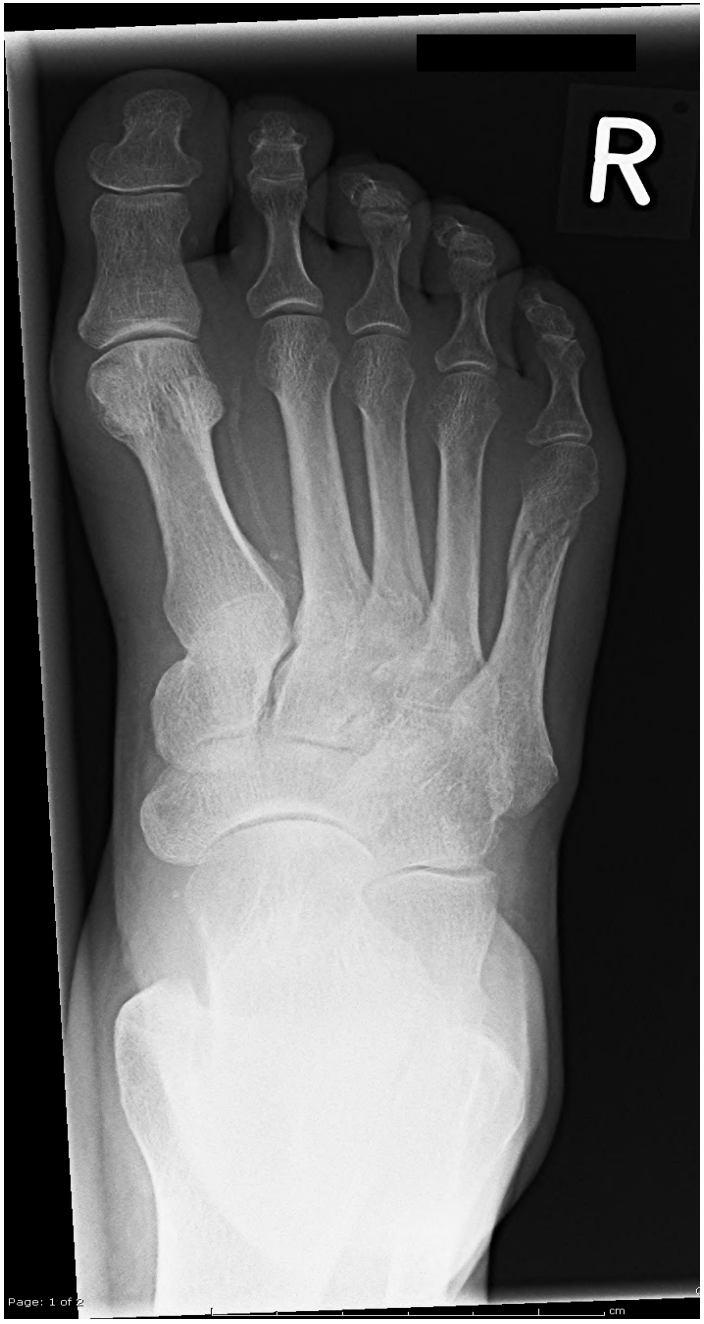
Question 1

- Please identify your grade

A Consultant
B Specialty registrar
C Core Trainee
D Foundation Year Trainee
E Other

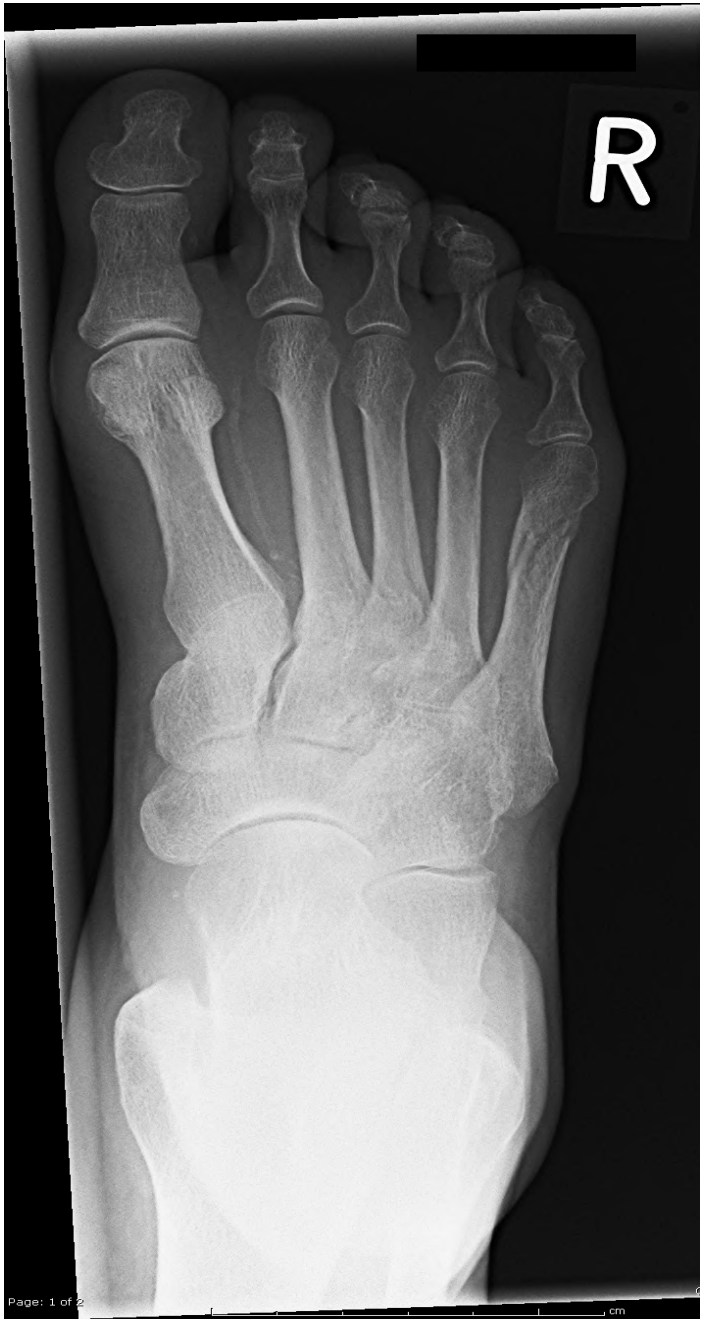
Question 2

- A 59-year-old woman with a 52 year history of well controlled type 1 diabetes on an insulin pump presented with right foot discomfort. She had tripped over a kerb 6 days previously.
- On examination her right foot showed some swelling but was painless on palpation.
- An X-ray was taken



How should this lesion be managed?

A. routine fracture clinic appointment
B. toe strapping and GP follow up
C. total contact plaster cast and routine orthopaedic follow up
D. urgent referral to the orthopaedic surgeons
E. urgent referral to the specialist diabetic foot team



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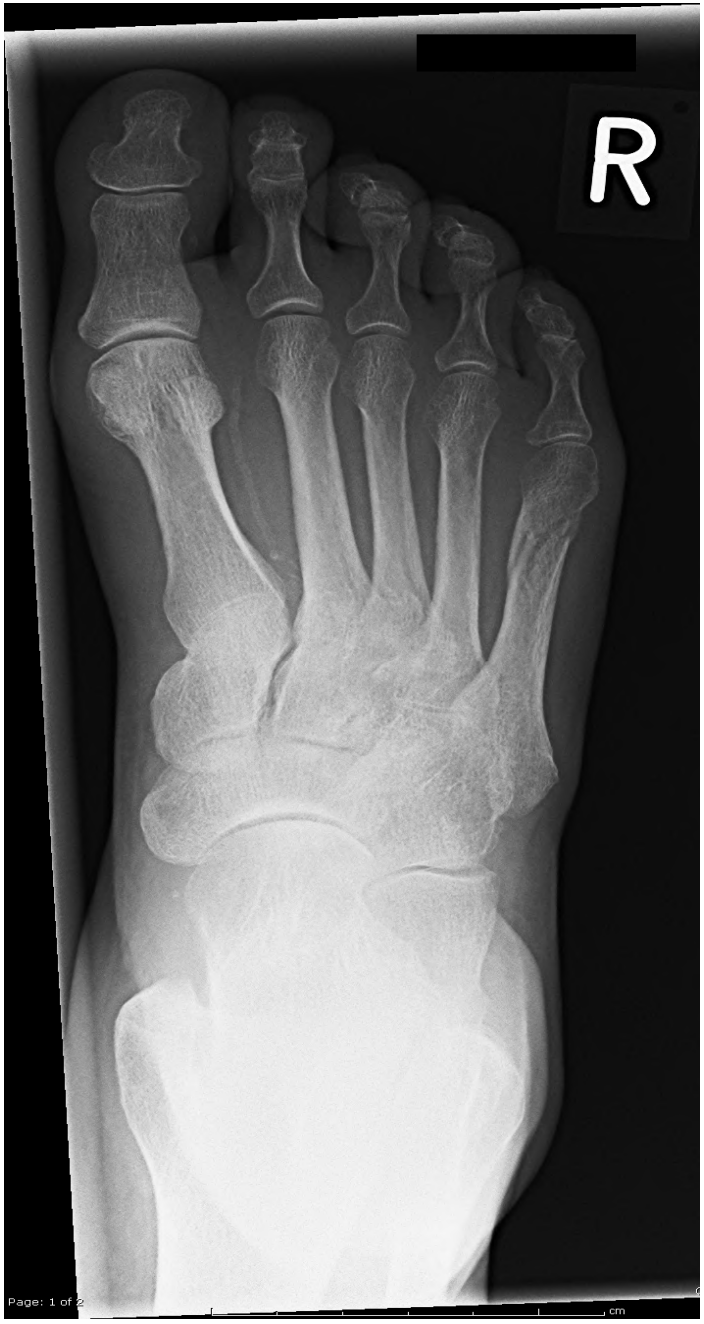
The answer is E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Question 3

- A 24-year-old man with a 5 year history of poorly controlled type 1 diabetes attended was admitted with a 24 hour history of vomiting.
- On examination he looked unwell.
- Investigations
  - random plasma glucose 10 mmol/L
  - pH 7.15 (7.35–7.45)
  - bicarbonate 9 (21–29)
  - base excess -18 mmol/L (±2)
  - plasma β hydroxybutyrate 6.4 mmol/L (<0.3)

Does He Have DKA?

- Investigations
  - random plasma glucose 10 mmol/L
  - pH 7.15 (7.35–7.45)
  - bicarbonate 9 (21–29)
  - base excess -18 mmol/L (±2)
  - plasma β hydroxybutyrate 6.4 mmol/L (<0.3)

1 = Yes 2 = No

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1 = Yes 2 = No

Yes

Ketonaemia 3 mmol/L and over **or** significant ketonuria (more than 2+ on standard urine sticks)
Blood glucose over 11 mmol/L or known diabetes mellitus
Bicarbonate (HCO3-) below 15 mmol/L **and**/**or** venous pH less than 7.3

Savage MW et al Diabet Med 2011;28(5):508-515

What is the Fluid Replacement of Choice?

A 0.45% sodium chloride solution
B 0.9% sodium chloride solution
C 5% dextrose solution
D Hartmann's solution
E Ringers lactate

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The answer is B

Dhatariya KK BMJ 2007;334(7607):1284-1285
Van Zyl DG et al QJM 2012;105(4):337-343
Mahler SA et al Am J Emerg Med 2011;29(6):670-674

Insulin

- He weighed 80Kg
- What is the dose of insulin he should be started on in his Fixed Rate Intravenous Insulin Infusion (FRIII)?

A 4
B 6
C 8
D 10
E 12

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B 6
C 8
D 10
E 12

The answer is C

At 24 Hours

- He was ready to eat and drink normally
- Investigations at 24 hours
  - serum sodium 141 mmol/L (137–144)
  - serum potassium 3.8 mmol/L (3.5–4.9)
  - serum chloride 121 mmol/L (95–107)
  - serum bicarbonate 14 mmol/L (20–28)
  - serum urea 3.1 mmol/L (2.5–7.0)
  - serum creatinine 60 µmol/L (60–110)
  - random blood glucose 9.3 mmol/L
  - blood ketones 0.1 mmol/L (<0.3)

What is the Calculated Anion Gap?

- Investigations
  - serum sodium 141 mmol/L (137–144)
  - serum potassium 3.8 mmol/L (3.5–4.9)
  - serum chloride 121 mmol/L (95–107)
  - serum bicarbonate 14 mmol/L (20–28)
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  - random blood glucose 9.3 mmol/L
  - blood ketones 0.1 mmol/L (<0.3)

A 6.0
B 8.2
C 9.8
D 11.2
E 14.3

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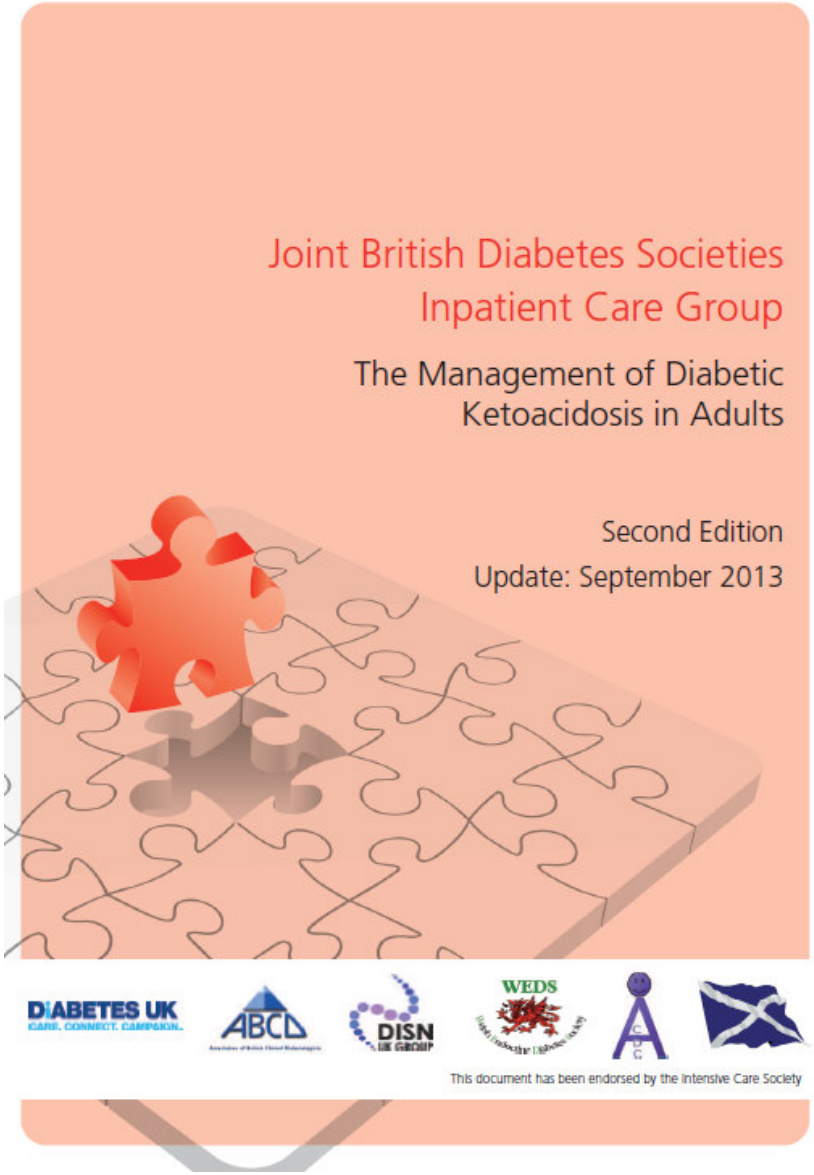
A 6.0
B 8.2
C 9.8
D 11.2
E 14.3

The answer is C

Anion gap = $(Na^+ + K^+) - (Cl^- + HCO_3^-)$

National DKA Guideline



Moving On - Question 5

- A 64-year-old man with a 5 year history of poorly controlled type 2 diabetes attended was admitted with a 24 hour history of vomiting.
- On examination he looked unwell.
- Investigations
  - random plasma glucose 78 mmol/L
  - pH 7.35 (7.35–7.45)
  - bicarbonate 19 (21–29)
  - base excess -3 mmol/L (±2)
  - plasma β hydroxybutyrate 1.4 mmol/L (<0.3)
  - serum osmolality 336 mosmol/kg (278–300)

Question 5

- A diagnosis of HHS was made
- What is the initial treatment of choice?

A intravenous insulin only

B intravenous 0.9% sodium chloride solution only

C a fixed rate intravenous insulin infusion and intravenous 0.9% sodium chloride solution

D a variable rate intravenous insulin infusion and intravenous 0.9% sodium chloride solution

E a variable rate intravenous insulin infusion and intravenous 0.45% sodium chloride solution

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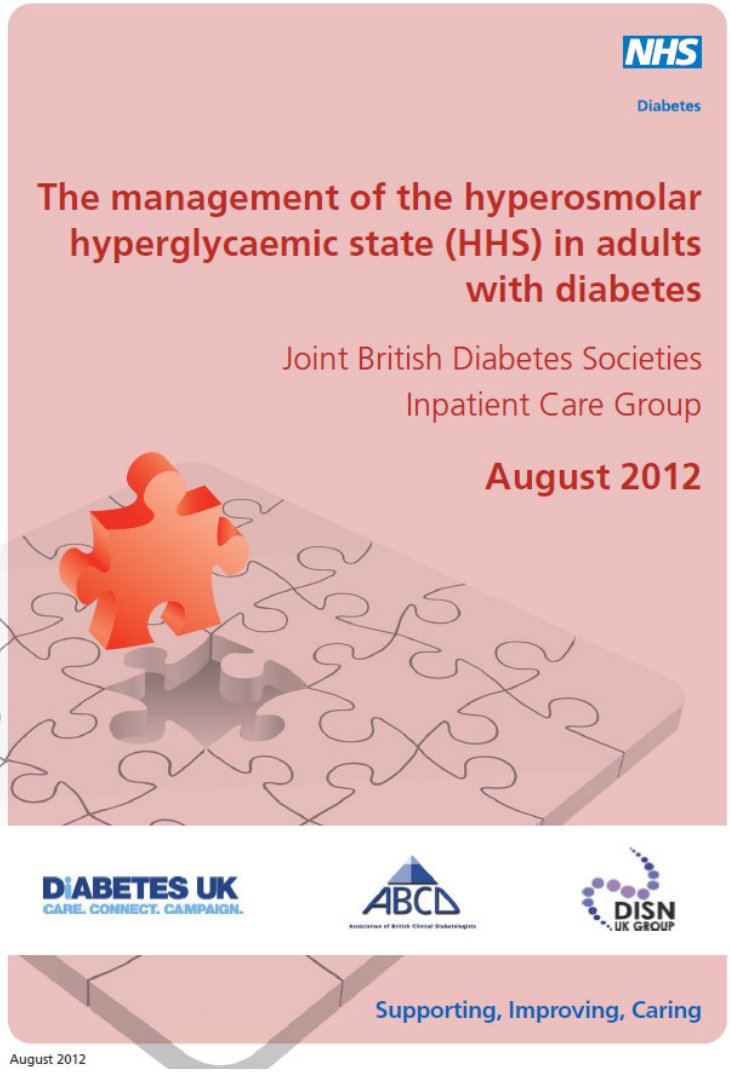
E a variable rate intravenous insulin infusion and intravenous 0.45% sodium chloride solution

The answer is B

National HHS Guideline



Question 6

- A 34-year-old man with a 17 year history of type 1 diabetes was admitted with diabetic ketoacidosis. He recovered well, and restarted subcutaneous insulin after 48 hours.

- Later that day, he suddenly became unwell with loss of consciousness. His blood glucose had been 2.1 mmol/L 3 hours after his last injection of insulin.

Question 6

- What is the most appropriate management of his hypoglycaemia?

A glucagon 1 mg intramuscularly
B glucose 20% 80 mL intravenously
C glucose 50% 20 mL intravenously
D glucose 50% 50 mL intravenously
E Lucozade® original 100 mL orally

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The answer is B

Question 7

- An 28-year-old man with type 1 diabetes mellitus was seen on a general surgical ward. He was reported to be confused and aggressive.
- On examination, he was disorientated in place and time, and was intermittently aggressive towards ward staff. He was drinking water from the bedside table.
- Investigations:
- random capillary glucose 2.4 mmol/L

Question 7

- What is the most appropriate management of his hypoglycaemia?

A 1 slice of toast

B 2 tubes of oral glucose gel 40%

C 50 mL pure fruit juice

D glucose 10% 100 mL intravenously

E glucose 20% 75 mL intravenously

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- What is the most appropriate management of his hypoglycaemia?

A 1 slice of toast

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C 50 mL pure fruit juice

D glucose 10% 100 mL intravenously

E glucose 20% 75 mL intravenously

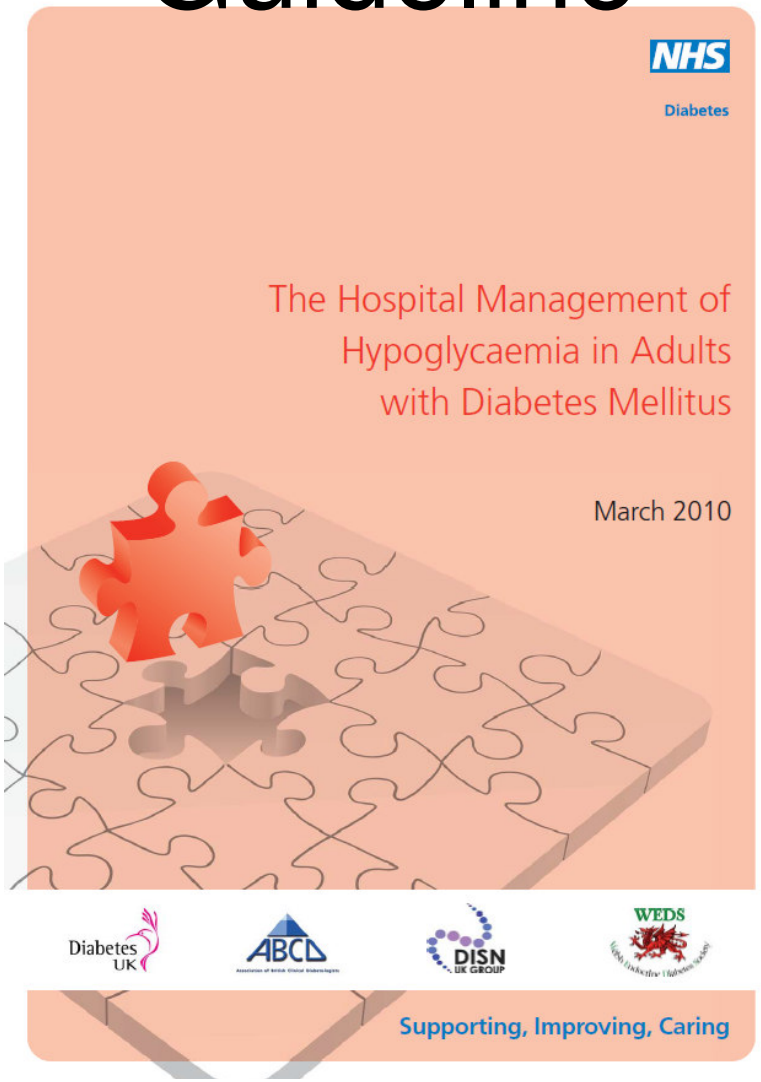
The answer is B

The Impact of Hypoglycaemia

- Almost 10% of patients with diabetes have at least 1 episode of hypoglycaemia in AMU
- Having an episode of hypoglycaemia is associated with
  - Increased length of stay by approximately 1 day
  - Higher rates of in-hospital mortality
- In ITU, hypoglycaemia (<4.9 mmol/L in people without diabetes or <3.5 mmol/L with) is associated with higher mortality – OR 2.5

Tan HK et al Diabetic Med 2013
Sechterberger MK et al Critical Care 2013;17:R52

National Hypoglycaemia Guideline



Question 8

- A 56-year-old man presented with a small plantar ulcer. He had a 14 year history of poorly controlled type 2 diabetes
- An X-ray was taken

Which joint has been disrupted?

A. calcaeo-cuboid
B. navicular-cuboid
C. navicular-cuneiform
D. subtalar
E. talo-navicular

Which joint has been disrupted?

A. calcaeo-cuboid
B. navicular-cuboid
C. navicular-cuneiform
D. subtalar
E. talo-navicular

The answer is E

Question 9

- A 56 year-old woman with a 10 year history of type 2 diabetes mellitus was due to undergo an elective cholecystectomy.

Question 9

- According to the Joint British Diabetes Societies Inpatient Care Group document on the perioperative management of patients with diabetes, what is the maximum HbA1c value recommended for people undergoing elective surgery?

A 58
B 64
C 69
D 74
E 86

Question 9

- According to the Joint British Diabetes Societies Inpatient Care Group document on the perioperative management of patients with diabetes, what is the maximum HbA1c value recommended for people undergoing elective surgery?

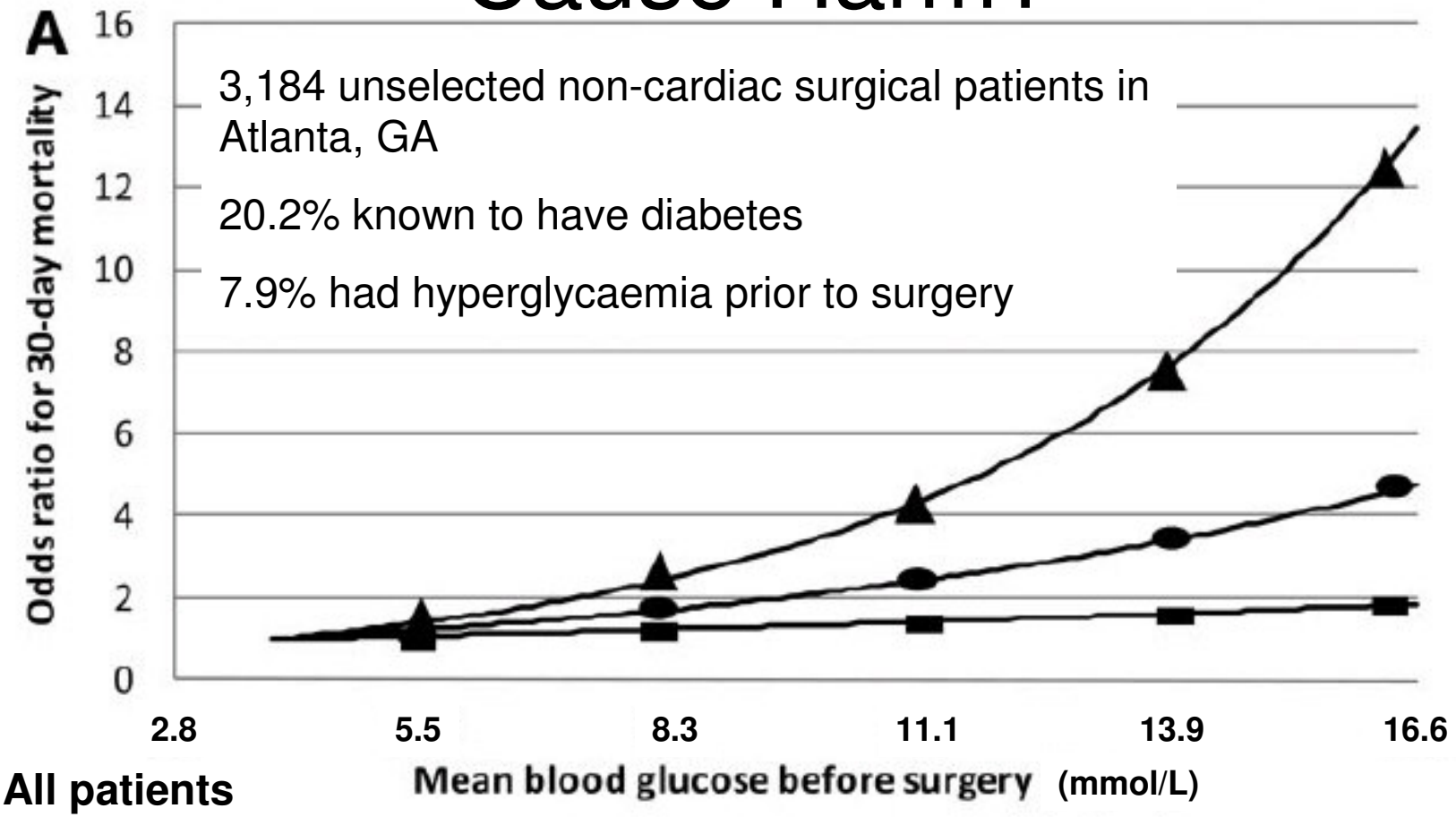
A 58
B 64
C 69
D 74
E 86

The answer is C

Ideally the HbA1c should be less than 69mmol/mol prior to elective surgery to minimise the post-operative risks

Dhatariya K et al Diabetic Medicine 2012;29(4):420-433

Do High Admission Glucose Levels Cause Harm?



All patients

Patients with diabetes

Patients without diabetes

Frisch A et al Diabetes Care 2010;33(8):1783-1788

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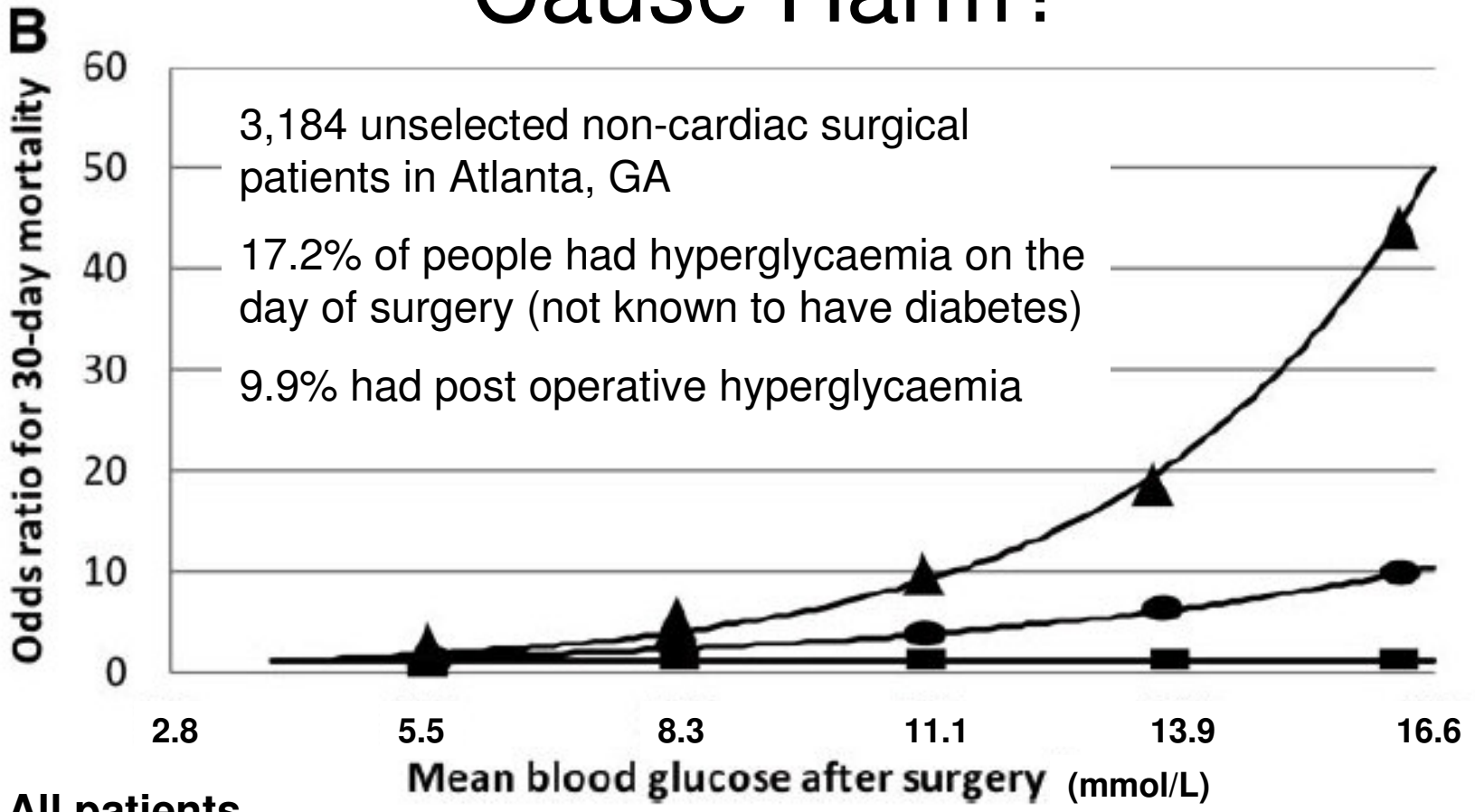

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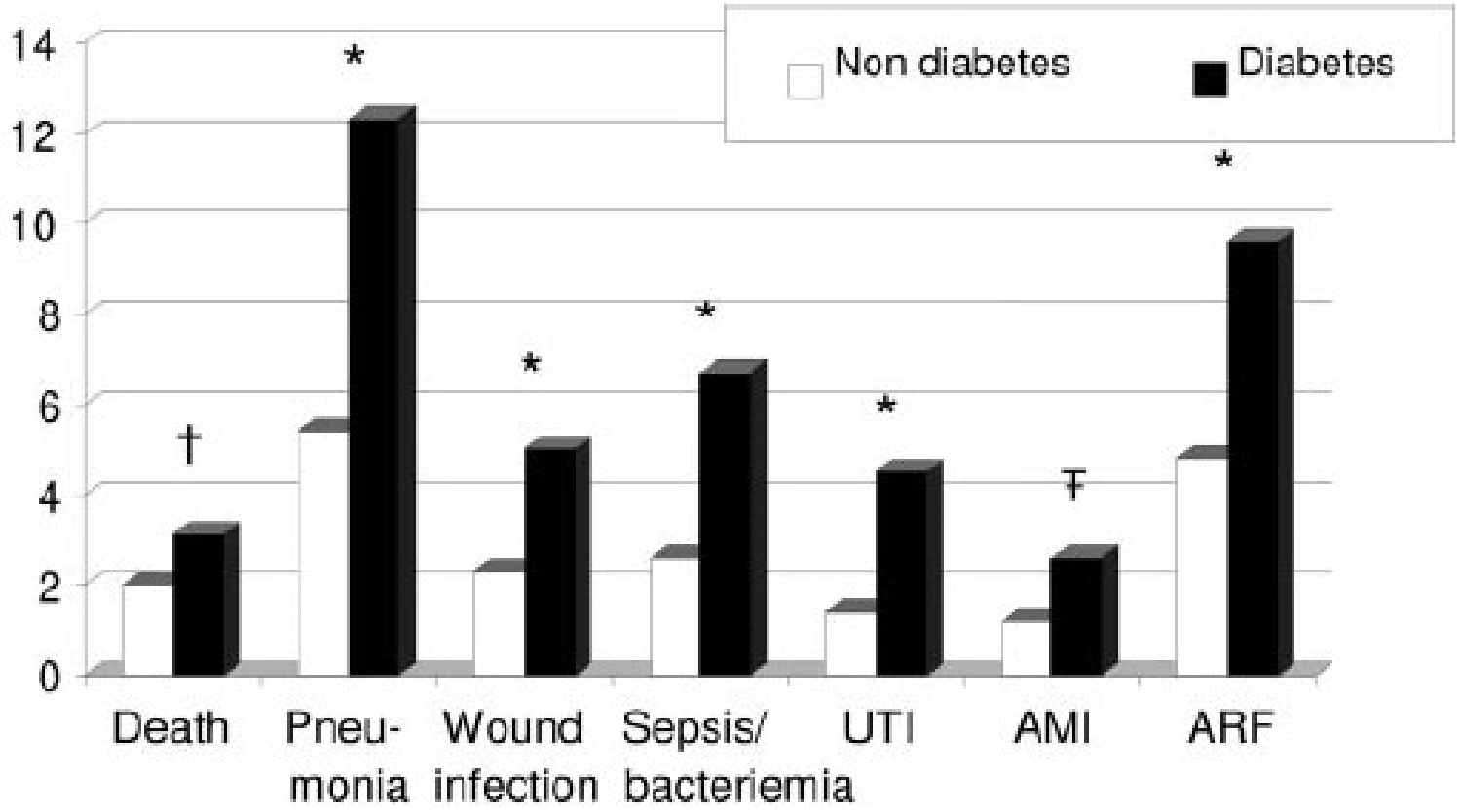

Frisch A et al Diabetes Care 2010;33(8):1783-1788

Question 10

- The surgical FY1 calls you because her consultant and registrar are in theatre with an urgent AAA repair. Their next patient is a 56 year-old lady with a 35 year history of type 1 diabetes needing an urgent carotid endarterectomy who was found on admission to have a blood glucose of 17.8 mmol/L.
- You look up her results on the computer and an HbA1c done 2 months previously by her GP was 79 mmol/mol

What Do You Tell Her?

A It's a decision for the anaesthetist

B Give her 10 units of subcutaneous Actrapid® an hour before her operation to get her glucose levels to 6-10 mmol/L

C Go ahead but start a variable rate intravenous insulin infusion aiming for 6-10mmol/L

D She must not have her operation yet because of the very high post operative risk

C Tell her to recheck her BG level in an hour and call you back

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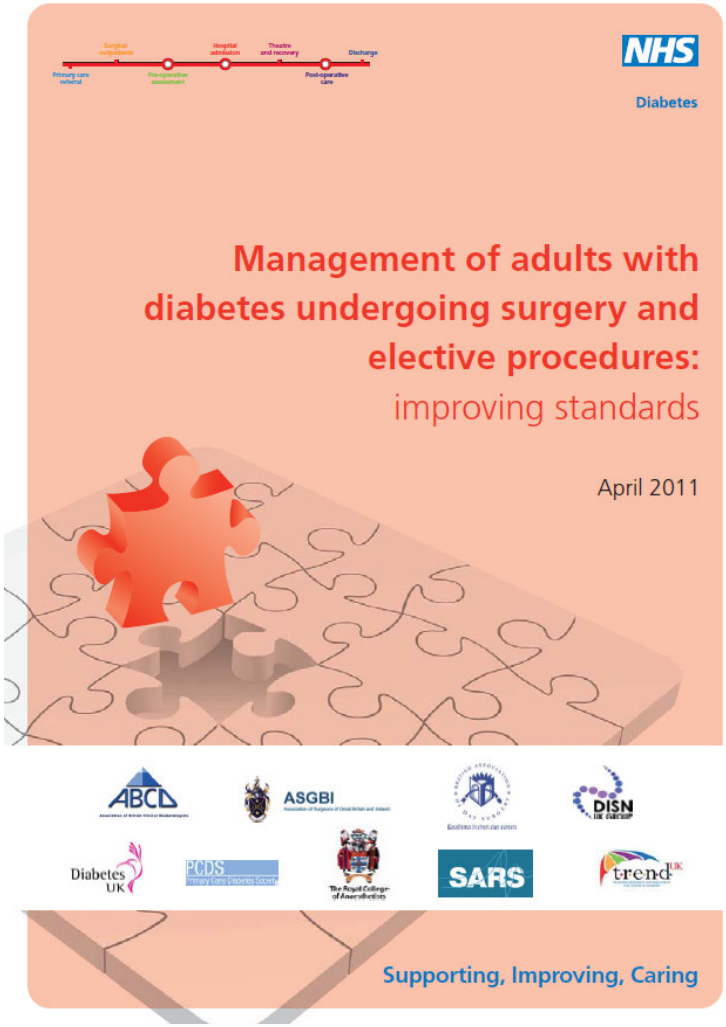
The answer is C

National Peri-op Guideline



Question 11

- What website could you go to get all of these guidelines?

www.diabetologists-abcd.org.uk/JBDS/JBDS.htm

Thank you for your attention