University of East Anglia | Norwich Medical School

Norfolk and Norwich University Hospitals NHS
NHS Foundation Trust

The Management of Hospital In-patients with Diabetes Mellitus

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Consultant in Diabetes and Endocrinology, NNUH

Honorary Reader in Medicine, UEA

Before I Forget

- Thank you to
  - Prof Mike Sampson, Prof Gerry Rayman, Prof Jeremy Turner
  - Catherine Gooday and Rachel Murchison et al
  - Chris Jones, Nick Levy, Guillermo Umpierrez and the JBDS
  - Esther Walden and the nursing team in the diabetes clinic, NNUH
  - The multitude of medical students
    - Alec Beaney, Coral Stark, Harriet Daultrey, Thomas Murray, Zahra Essackajee, Elizabeth Swan, Edwin Li Ping Wah-Pun Sin, Francesca Li, Joyce Cheng, Anson Yue, Will Fry, Sean McCafferty, David Maxey, Nishchay Kakkar, Meera Patel, and Maithili Varadarajan, etc

JBDS, Joint British Diabetes Societies for Inpatient Care
NNUH Norfolk and Norwich University Hospitals

Who is This Strange Man?

- I qualified in 1991
- I trained in Diabetes & Endocrinology and General (Internal) Medicine
- I worked in general practice for 2 years
- I worked in ITU / anaesthetics for a year
- I researched at the Mayo Clinic (DHEA anyone?)
- I have been in Norwich since 2004 – Hon SL since 2004, Hon Reader since 2017
- Current / former national roles are
  - Currently Honorary Secretary of the Diabetes and Endocrinology Section of the Royal Society of Medicine
  - Previously Executive Officer of the Association of British Clinical Diabetologists (meetings secretary)
  - Currently Chair of the Specialist Clinical Exam in Diabetes and Endocrinology (MRCP (D&E) – the UK 'Board exam')
  - Currently JBDS-IP group member (inpatient diabetes guidelines)
    - Peri-operative, diabetic ketoacidosis, hypoglycaemia, HHS, enteral feeding, self management, e-learning on safe use of IV insulin, renal unit, peri-partum management, steroid induced hyperglycaemia, etc,

DHEA, dehydroepiandrosterone; HHS, hyperosmolar hyperglycaemic state; ITU, intensive therapy unit; IV, intravenous;
JBDS – IP, Joint British Diabetes Societies for Inpatient Care.

Outline

- Objectives
- A brief history of diabetes and it's treatment
  - Diabetes related emergencies
  - Inpatient diabetes care
  - Variations in care

Outline

- Admissions avoidance
- General management
- Outcomes of inpatient hyperglycaemia
- Diabetic ketoacidosis

What is Diabetes?

"A complex metabolic disorder characterised by chronic hyperglycaemia resulting from defects in insulin secretion or insulin action, or both"

First described in 1550 BC

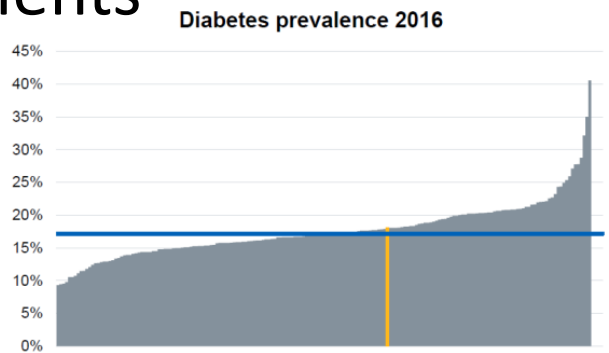
Hypothesis

- That some of the work that I have done and contributed to have helped to improve the care of adult inpatients with diabetes

Admissions Avoidance

Inpatients With Diabetes

- Approximately 18% of all hospital inpatients have diabetes
- Most are in hospital *<u>with</u>* their diabetes rather than *<u>because</u>* of it
- The most common reason for a diabetes specific hospital admission is the ‘diabetic foot’ with £1Bn spent on this complication every year



National Diabetes Audit – 2015-2016 NHS Digital http://www.content.digital.nhs.uk/catalogue/PUB23241 Accessed 7/6/17
Kerr M https://www.diabetes.org.uk/Upload/Shared%20practice/Diabetic%20footcare%20in%20England,%20An%20economic%20case%20study%20(January%202017).pdf Accessed 7/6/17

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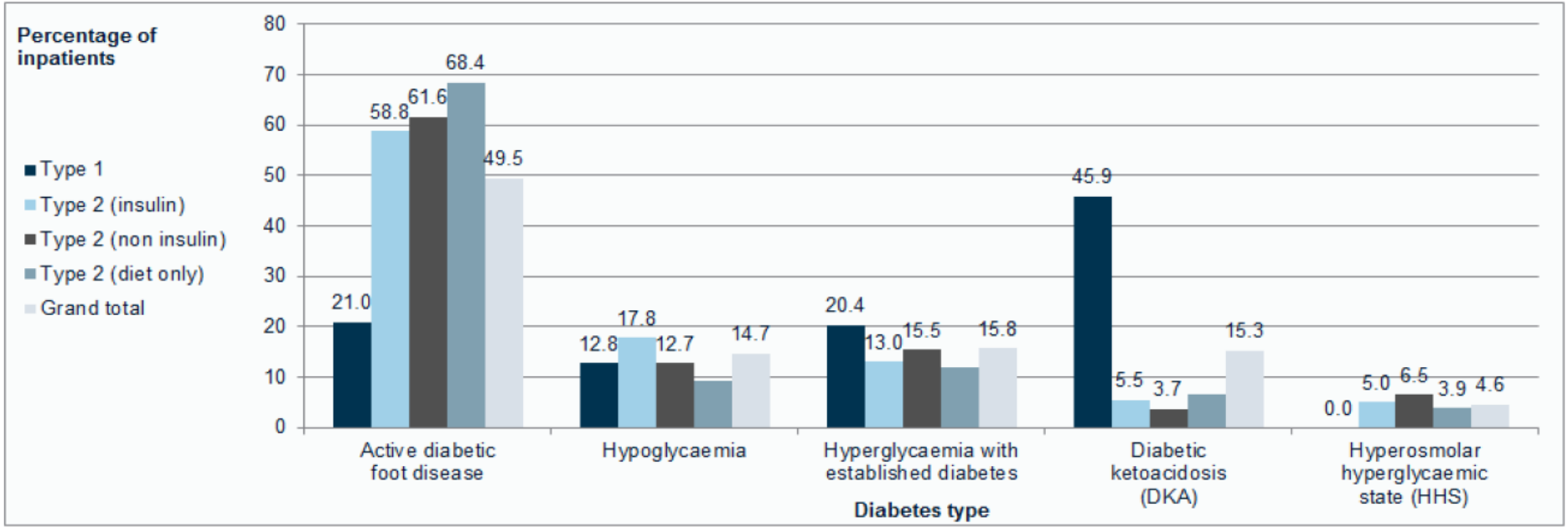
Reasons for Acute Admission

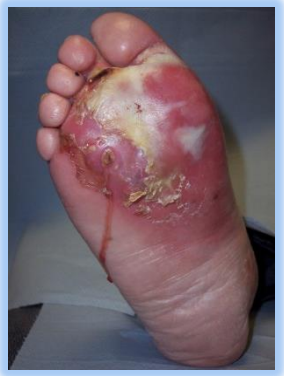
Chart 8: Percentage of inpatients admitted for management of diabetes or a diabetes complication by diabetes type, England and Wales, 2015



National Diabetes Inpatient Audit 2015 - http://digital.nhs.uk/catalogue/PUB20206 Last accessed 7th June 2017

Foot Disease

- A combination of infection, ischaemia and pressure on the wound
- Ulcers precede almost 80% of all lower limb amputations – most are infected



The Most Common Guideline

IDSA GUIDELINES

2012 Infectious Diseases Society of America Clinical Practice Guideline for the Diagnosis and Treatment of Diabetic Foot Infections[a]

Benjamin A. Lipsky,[1] Anthony R. Berendt,[2] Paul B. Cornia,[3] James C. Pile,[4] Edgar J. G. Peters,[5] David G. Armstrong,[6] H. Gunner Deery,[7] John M. Embil,[8] Warren S. Joseph,[9] Adolf W. Karchmer,[10] Michael S. Pinzur,[11] and Eric Senneville[12]

Clinical Infectious Diseases 2012;54(12):e132-e173

IDSA / IWGDF Classification

Clinical Description	IDSA	IWGDF
No symptoms or signs of infection	Uninfected	1
Local infection involving only the skin and the subcutaneous tissue (without involvement of deeper tissues and without systemic signs as described below). If erythema, must be >0.5 cm to ≤2 cm around the ulcer.	Mild	2
Local infection (as described above) with erythema > 2 cm, or involving structures deeper than skin and subcutaneous tissues (e.g., abscess, osteomyelitis, septic arthritis, fasciitis), and no systemic inflammatory response signs (as described below)	Moderate	3
Local infection (as described above) with the signs of SIRS, as manifested by ≥2 of the following: • Temperature >38°C or <36°C • Heart rate >90 beats/min • Respiratory rate >20 breaths/min or PaCO2 <32 mm Hg • White blood cell count >12 000 or <4000 cells/µL or ≥10% immature (band) forms	Severe	4

IWGDF – International Working Group for the Diabetic Foot

Lipsky BA et al Clin Infect Dis 2012;54(12):e132-173

Admissions Avoidance

Clinical Description	IDSA	IWGDF
No symptoms or signs of infection	Uninfected	1
Local infection involving only the skin and the subcutaneous tissue (without involvement of deeper tissues and without systemic signs as described below). If erythema, must be >0.5 cm to ≤2 cm around the ulcer.	Mild	2
Local infection (as described above) with erythema > 2 cm, or involving structures deeper than skin and subcutaneous tissues (e.g., abscess, osteomyelitis, septic arthritis, fasciitis), and no systemic inflammatory response signs (as described below)	Moderate	3
Cellulitis > 2 cm around the ulcer associated with lymphangitis or foot failing to respond to oral antibiotics alone and not systemically unwell	Moderate infection - borderline admission	
Local infection (as described above) with the signs of SIRS, as manifested by ≥2 of the following: • Temperature >38°C or <36°C • Heart rate >90 beats/min • Respiratory rate >20 breaths/min or PaCO2 <32 mm Hg • White blood cell count >12 000 or <4000 cells/µL or ≥10% immature (band) forms	Severe	4

Gooday C et al Diabet Med 2013;30(5):581-589

Norfolk and Norwich University Hospitals NHS
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Quick Reference Guideline Table 2: Antibiotic Management of Diabetes Related Foot Infections In Adults

	FIRST CHOICE		PENICILLIN ALLERGY		
	PARTIAL OR FULL THICKNESS	*EXTENDING TO UNDERLYING SOFT TISSUE/ BONE*	*PARTIAL OR FULL THICKNESS*	*EXTENDING TO UNDERLYING SOFT TISSUE/ BONE*	DURATION
MILD#	Co-amoxiclav 625mg tds PO	Co-amoxiclav 625mg tds PO	Clarithromycin 500mgs bd PO	Clarithromycin 500mgs bd PO Metronidazole 400mgs tds PO	Review after 1-2 weeks. May require an additional 1-2 weeks of treatment. See guidance below re LFT monitoring if treatment continues beyond 2 weeks
MODERATE#	Co-amoxiclav 625mgs tds PO If co-amoxiclav has previously been used with no success then consider using Clindamycin 150mg-300mg qds PO instead	Co-amoxiclav 625mgs tds PO +/- Ciprofloxacin 500mgs bd PO If co-amoxiclav has previously been used with no success then consider using Clindamycin 150mg-300mg qds PO instead of co-amoxiclav See guidance note 2 & 5 re adding in ciprofloxacin	Clindamycin 150mg - 300mg qds PO	Clindamycin 150mg-300mg qds PO +/- Ciprofloxacin 500mgs bd PO (see guidance note 2 & 5 below re adding in ciprofloxacin)	2-4 weeks
SEVERE BORDERLINE ADMISSION (this regimen will be reviewed regularly as to whether admission is necessary)	Ceftriaxone 1-2g od IM* (see notes below re IM administration) Ciprofloxacin 500mgs bd PO Metronidazole 400mg tds PO If MRSA positive use teicoplanin in place of ceftriaxone.		Ceftriaxone 1-2g od IM* (see notes below re IM administration) Ciprofloxacin 500mgs bd PO Metronidazole 400mg tds PO See guidance note 1 below re penicillin allergy. In true penicillin allergy or if MRSA positive use Teicoplanin IM* 400mg od (see notes below re IM administration) Ciprofloxacin 500mg bd PO Metronidazole 400mg tds PO		2-4 weeks
SEVERE NEEDS ADMISSION	Tazocin 4.5g tds IV If polymicrobial infection suspected with MRSA then add in vancomcyin 1g bd IV to the above. (see guidance notes 3 below)		Clarithromycin 500mg bd IV Metronidazole 400mg tds IV Ceftazidime 1g tds IV (2g tds IV if very severe). Substitute with Ciprofloxacin 500mg bd PO in true penicillin allergy. (see guidance note 1) If polymicrobial infection suspected with MRSA then add in vancomcyin 1g bd IV to the above regimen (omitting clarithromycin). See guidance note 3.		2-4 weeks

*IM antibiotics should only be given where there are appropriate facilities available to treat anaphylaxis. Ceftriaxone 2g IM should be given as two separate 1g injections in different sites.

If patient is MRSA positive then prescribe according to sensitivities (combination of 2 of the following oral antibiotics, doxycycline, trimethoprim, rifampicin, fusidic acid (but do not use fusidic acid in combination with rifampicin). Discuss with a Medical Microbiologist on 4588 if sensitivities not available.
Co-amoxiclav may cause cholestatic jaundice if use is prolonged, especially in patients over 65 years. If treatment continues over 2 weeks liver function tests (LFTs) should be carried out. Cholestatic jaundice may occur up to 6 weeks after treatment is stopped.

Gooday C et al Diabet Med 2013;30(5):581-589

Results

- We rationalised antibiotic prescribing
- We avoided or delayed acute hospital admissions
- The use of outpatient once daily intramuscular antibiotics
  - avoided admission in more that 50% of cases
  - saved almost £6500 per patient compared to those who did not receive them

Gooday C et al Diabet Med 2013;30(5):581-589

BMJ Quality Improvement Reports

BMJ Quality Improvement Reports 2013; u201211.w729 doi: 10.1136/bmjquality.u201211.w729

Admission avoidance using intramuscular antibiotics for the treatment of borderline foot infections in people with diabetes in a tertiary care foot clinic

Ketan Dhatariya

FINALIST
Diabetes Team of the Year
BMJ AWARDS

Proposed Update to IDSA Guideline

Open Forum Infectious Diseases

REVIEW ARTICLE

A Proposed New Classification of Skin and Soft Tissue Infections Modeled on the Subset of Diabetic Foot Infection

Benjamin A. Lipsky,[1] Michael H. Silverman,[2] and Warren S. Joseph[3]

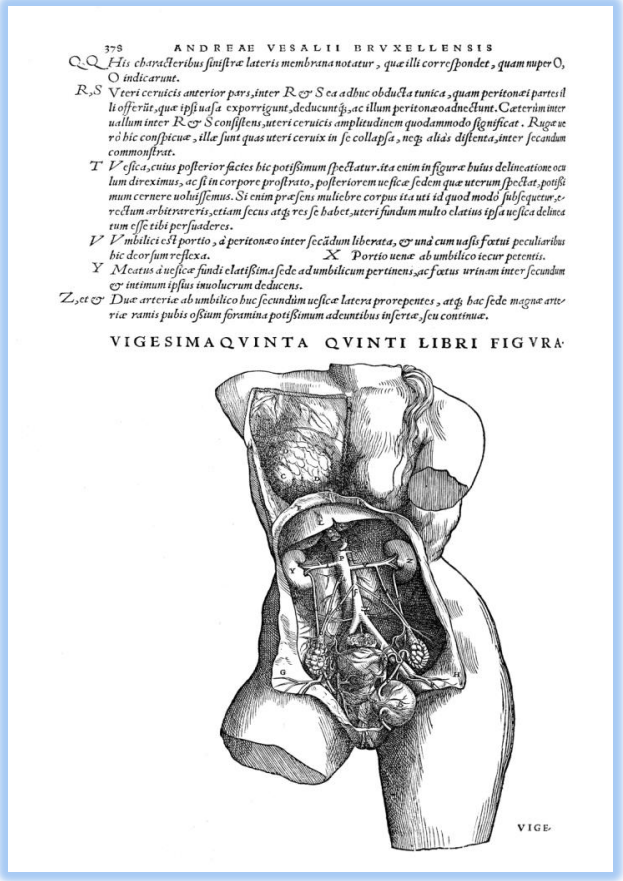
[1]University of Oxford, United Kingdom; [2]BioStrategics Consulting Ltd, Marblehead, Massachusetts; [3]Roxborough Memorial Hospital, Philadelphia, Pennsylvania

Open Forum Infectious Disease 2017;4(1):ofw255

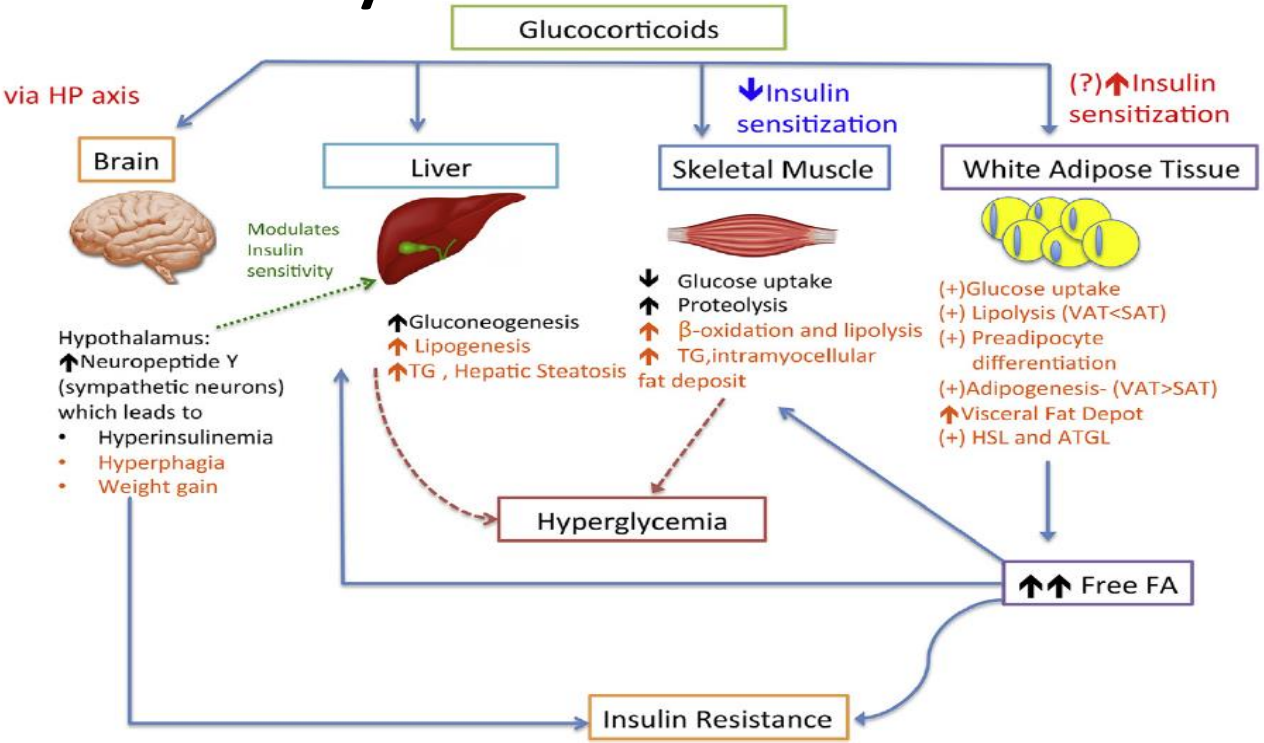
General Management

Glucocorticoids and Diabetes

- Is it a problem?
- How to control hyperglycaemia associated with glucocorticoid use?



How do Glucocorticoids Affect Carbohydrate Metabolism?



Geer EB et al Endocrinol Metab Clin North Am 2014;43(1):75-102

A Bit Of Background

- At any one time, ~0.75% of the UK population is on oral glucocorticoids (0.2% in 20-29 year olds, 2.5% in 70-79 year olds)
- 40% of glucocorticoid use is for respiratory disease, with most of the rest being musculoskeletal and cutaneous diseases and conditions requiring immunosuppression
- Most use is for <5 days, but 22% is for > 6 months and 4.3% for > 5 years

Royal College of Physicians 2002 Glucocorticoid guidelines https://cdn.shopify.com/s/files/1/0924/4392/files/glucocorticoid-induced-osteoporosis-guideline.pdf?2801907981964551469 Last accessed 6/6/17
Fardet L et al Rheumatology 2011;50(11):1982-1990

NNUH Prevalence Data

- All adult wards (excluding A+E, CCU, ITU/HDU)
- 120 out of 940 (12.8%) patients were receiving glucocorticoids – of whom 16 had pre-existing diabetes
- Only 25 (13 with diabetes) had their BG checked regularly
- 3 people with diabetes on glucocorticoids had no BG checked
- 95 patients had no evidence of BG checking

Swafe L et al Clinical Medicine 2014;14(3):327-328

Surgical Considerations

British Journal of Anaesthesia **110** (5): 674–5 (2013)
doi:10.1093/bja/aet010

EDITORIAL II

Does dexamethasone-induced hyperglycaemia contribute to postoperative morbidity and mortality?

K. Dhatariya*

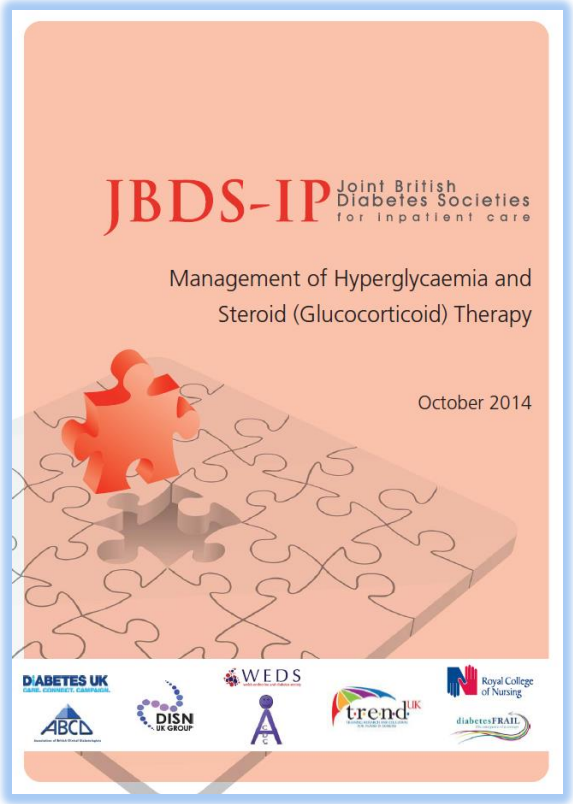
STATISTICAL GRAND ROUNDS

Limitations of Significance Testing in Clinical Research: A Review of Multiple Comparison Corrections and Effect Size Calculations with Correlated Measures

Terrie Vasilopoulos, PhD,* Timothy E. Morey, MD,* Ketan Dhatariya, MD, FRCP,† and Mark J. Rice, MD‡

Anesthesia & Analgesia 2016;122(3):825-830

Joint British Diabetes Societies



Outcomes of Inpatient Hyperglycaemia

Acute Admissions

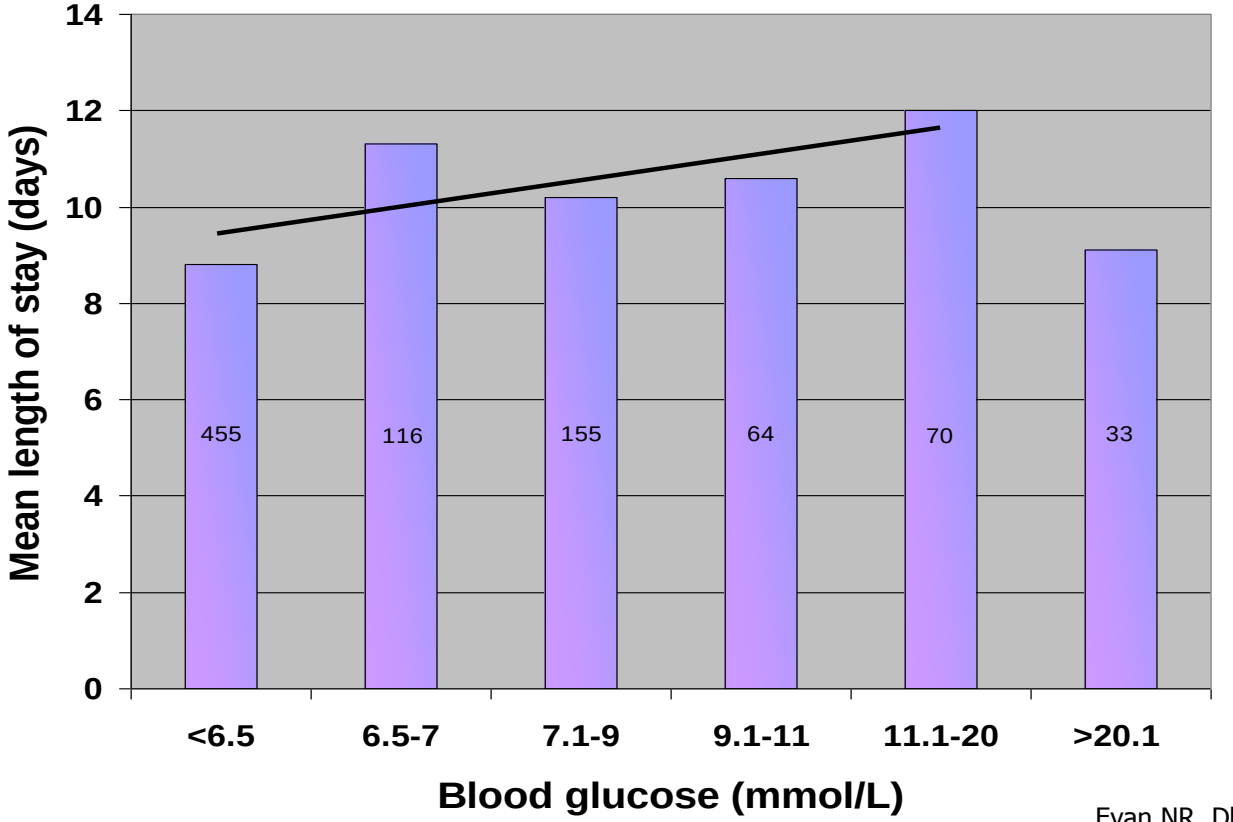
- To investigate the relationship between a single glucose concentration at the time of acute hospital admission and outcomes
  - length of stay
  - 28 day readmission rates
  - mortality

Acute Admissions

- We analysed data from all 1502 patients admitted through the Acute Medical Unit at NNUH in February 2010
- 893 had a glucose concentration measured

Evan NR, Dhatariya KK Clinical Medicine 2012;12(2):137-139

LOS vs Admission Glucose



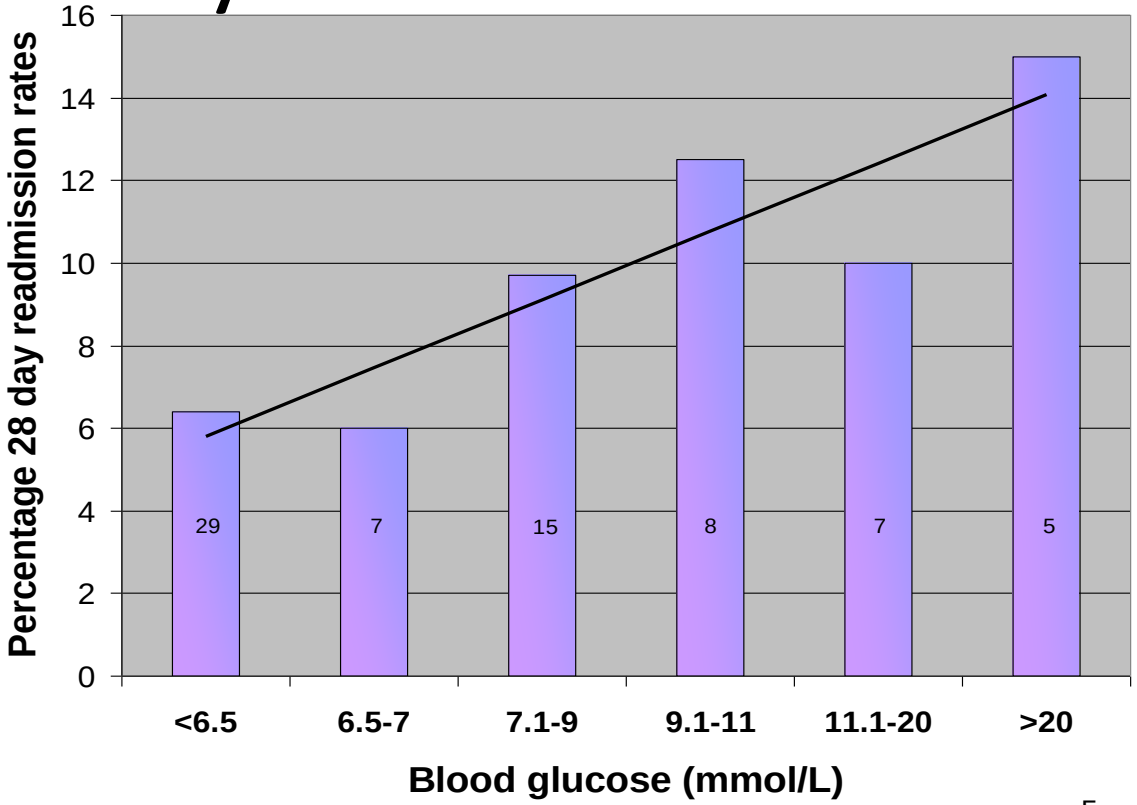
Trend $R^2 = 0.5556$

P=0.002

Those above 20mmol/L excluded (most under the diabetes team)

Evan NR, Dhatariya KK Clinical Medicine 2012;12(2):137-139

28 Day Readmission vs Admission Glucose

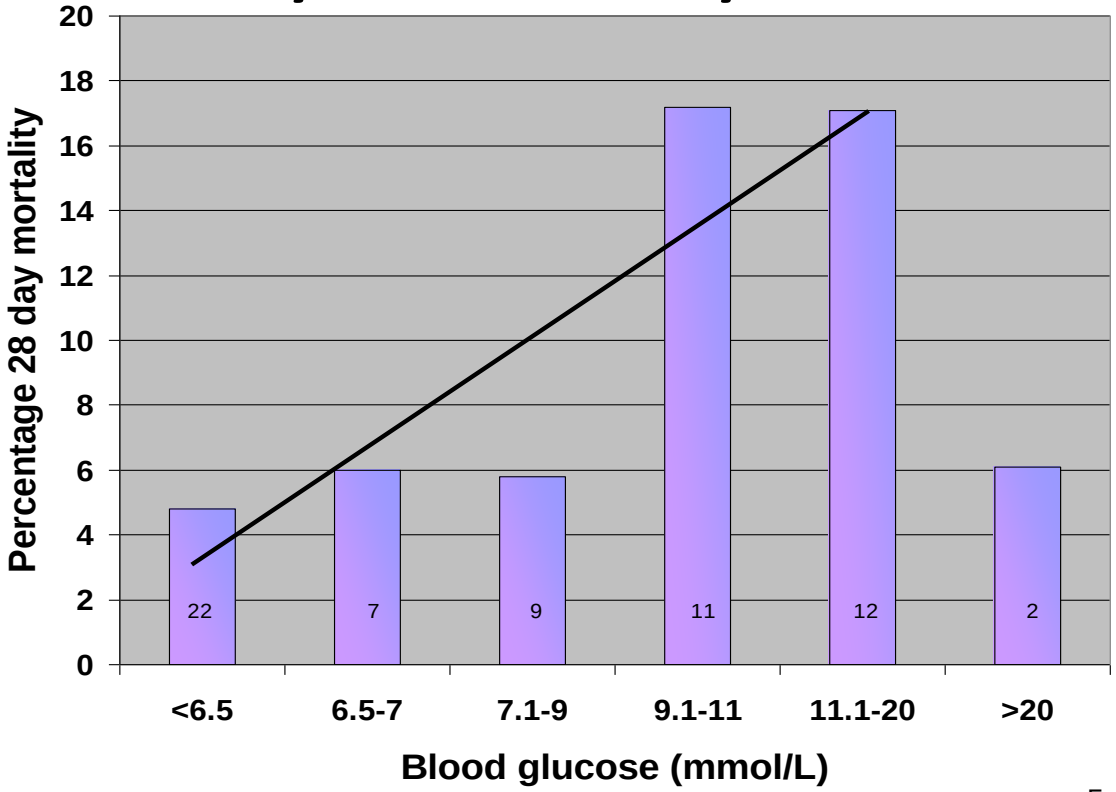


Trend $R^2 = 0.7918$

Of the 1,502 admissions in February 2010, 71 (4.73%) were readmitted within 28 days

Evan NR, Dhatariya KK Clinical Medicine 2012;12(2):137-139

28 Day Mortality vs Admission Glucose



Trend $R^2 = 0.7874$

P<0.0001

Of the 1,502 admissions in February 2010, 63 (4.19%) died within 28 days

Evan NR, Dhatariya KK Clinical Medicine 2012;12(2):137-139

But What About Longer Term Outcomes?

- We looked at 1 and 2 year outcomes in this same cohort to see if that index glucose concentration could predict mortality

Blood glucose (mmol/l)	For death within 28 days				For death within 1 year				For death within 2 years			
	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value	Crude odds ratio (95% CI)	p-value	Adjusted odds Ratio (95% CI)	p-value	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
< 6.5	1.52 (0.78–2.99)	0.22	1.61 (0.81–3.19)	0.174	1.43 (0.9–2.28)	0.129	1.63 (0.99–2.66)	0.053	1.06 (0.69–1.61)	0.797	1.18 (0.75–1.85)	0.482
6.5–7	1		1		1		1		1		1	
7.1–9	1.71 (0.79–3.68)	0.171	1.53 (0.7–3.33)	0.281	1.5 (0.87–2.59)	0.143	1.3 (0.74–2.31)	0.366	1.23 (0.75–2.03)	0.418	1.04 (0.61–1.77)	0.875
9.1–11	2.83 (1.2–6.66)	**0.018**	2.75 (1.15–6.59)	**0.023**	2.01 (1.04–3.89)	**0.037**	2.04 (1.01–4.11)	**0.047**	1.5 (0.8–2.79)	0.206	1.48 (0.76–2.88)	0.254
11.1–20	2.91 (1.28–6.61)	**0.011**	3.23 (1.4–7.45)	**0.006**	2.07 (1.11–3.87)	**0.023**	2.57 (1.31–5.02)	**0.006**	1.49 (0.82–2.69)	0.186	1.8 (0.95–3.41)	0.071
> 20	1.09 (0.33–3.63)	0.887	1.41 (0.41–4.82)	0.585	1.39 (0.63–3.07)	0.417	2.24 (0.94–5.37)	0.07	1.06 (0.5–2.25)	0.873	1.69 (0.74–3.88)	0.214

Haddadin F et al Int J Clin Pract 2014;69(6):643-648

But - Where is the Evidence?

BMJ

BMJ 2013;346:f134 doi: 10.1136/bmj.f134 (Published 17 January 2013)

PRACTICE

UNCERTAINTIES

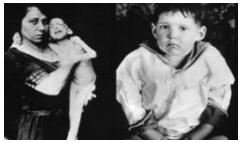
Should inpatient hyperglycaemia be treated?

Ketan Dhatariya *consultant in diabetes and endocrinology*

Elsie Bertram Diabetes Centre, Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich NR4 7UY, UK

Diabetic Ketoacidosis

Timeline



Howard Root in Boston reports reduction in mortality from 12% to 1.6% between 1940 and 1944 – using up to 1770 units of insulin in the first 24 h after admission

Malins and Black in Birmingham used between 140 and 1400 units of insulin in the first 24 h depending on severity in 170 consecutive cases

The first UK national guideline for managing DKA published

Updated in 2013

Survey of current management

2014

1922

1945

1949

2010

?

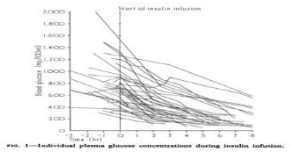
1948

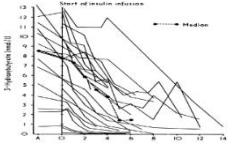
1973

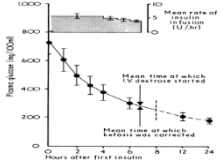
Type 1 diabetes universally fatal

In 1925, Joslin reports that 31 out of 33 patients with DKA survive – with gentle fluid replacement

Micks in Dublin used 100 units for those in 'pre-coma' and 100 units every 15 minutes – between 500 and 2000 units, depending on severity of coma







RD Lawrence advocates very aggressive fluid management

Three consecutive papers in the *BMJ* showed that low-dose insulin infusions (5–6 units/h) work just as well as high-dose in lowering glucose and ketones

Adapted from Dhatariya K Brit J Diab Vasc Dis 2015;15(1):31-33

Diabetic ketoacidosis

Saline should be used for fluid replacement rather than Hartmann's solution

Ketan K Dhatariya consultant in diabetes and endocrinology Norfolk and Norwich University Hospital NHS Trust, Elsie Bertram Diabetes Centre, Norwich NR4 7U
ketan.dhatariya@nnuh.nhs.uk

Competing interests: None declared.

Provenance and peer review: Non-commissioned; externally peer reviewed.

BMJ 2007;334:1284-5
doi: 10.1136/bmj.39237.661111.80

Diabetic ketoacidosis is a life threatening condition caused by insulin deprivation or inadequate use of insulin in people with type 1 (or occasionally type 2) diabetes mellitus. Precipitants include deliberate insulin omission, intercurrent illness, surgery, trauma, alcohol, late presentation of previously undetected type 1 diabetes, and the use of drugs that alter carbohydrate metabolism.[1] People with diabetic ketoacidosis need swift intervention by specialists because of the substantial morbidity and mortality arising from the acid-base imbalance, profound fluid loss, and electrolyte disturbances.

Current guidelines written by diabetes specialists from the United States and the United Kingdom recommend initial replacement of fluids and electrolytes and intravenous insulin.[1 2] The fluid advocated in these guidelines is 0.9% saline. However, people may be treated by emergency and intensive care doctors as well as diabetes specialists, and the type of fluid used can vary.

During the first few hours of hospital admission many people with diabetic ketoacidosis are treated by emergency or intensive care doctors who commonly prefer to use Hartmann's solution (sodium lactate intravenous infusion).[3] Subsequent care is usually delivered by the diabetes team, who prefer to use 0.9% saline. The conflict arises because guidelines for fluid replacement in the acute setting are written by diabetes specialists,[1 2] whereas no widely accepted guidelines have been written by emergency or intensive care doctors for fluid replacement in diabetic ketoacidosis.

For decades, 0.9% saline has been the fluid of choice for diabetic ketoacidosis, and its use continues to be advocated in modern textbooks on diabetes.[4] Early studies on diabetic ketoacidosis in the 1970s used 0.9% saline,[5] and this approach was reinforced a decade later.[6] However, giving patients large amounts of chloride can cause a hyperchloraemic metabolic acidosis,[3 7] so administration of 0.9% saline for diabetic ketoacidosis could potentially worsen the metabolic acidosis. Thus, 0.9% saline may be the fluid of choice simply because evidence for the efficacy of other fluids is lacking. The question of which fluid replacement is optimal in patients with acute diabetic ketoacidosis is, therefore, still unanswered.

What is a Guideline?

- *'A principle put forward to set standards or determine a course of action'*

Collins English Dictionary – Complete and Unabridged, 12th Edition, Glasgow, Collins. 2014

List of Published JBDS Guidelines (so far)

- Hospital management of hypoglycaemia in adults with diabetes
- The management of DKA in adults
- Management of adult patients with diabetes undergoing surgery
- Glycaemic management during enteral feeding in stroke
- Management of HHS
- Self-management of diabetes in hospital
- Admissions avoidance in diabetes
- Variable rate insulin infusion (VRII) for medical inpatients with diabetes
- Steroid use for inpatients with diabetes
- Management of adults with diabetes on the haemodialysis unit
- Managing diabetes during and after delivery
- New diagnosis of diabetes in inpatients
- Diabetes in inpatients with mental health issues

JBDS, Joint British Diabetes Societies.
Association of British Clinical Diabetologists. JBDS – IP. Available from: http://www.diabetologists-abcd.org.uk/JBDS/JBDS.htm. Accessed 21 May 2017.

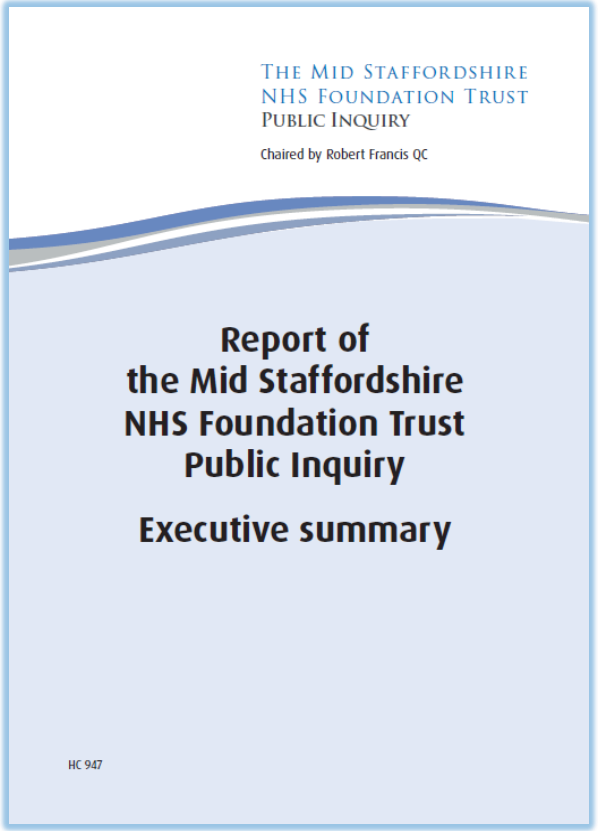
Why Are They Needed?

- To standardise and improve the quality of care people receive and outcomes
- A bit of history…..
- It used to be the incoming registrar's job to 'rewrite the DKA guideline'
- Why? Because every hospital did something slightly different, which led to variations in care

DKA, diabetic ketoacidosis.

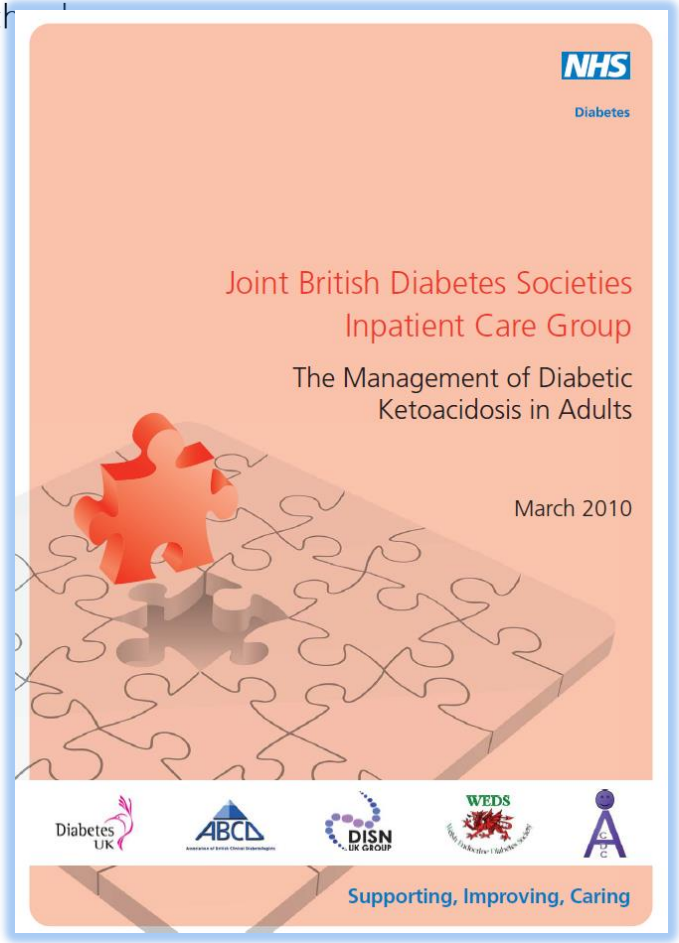
Woolf SH et al BMJ 1999;318(7182):527-530

February 2013



"Commissioners…….must insist on quality and challenge the inefficiencies of providers, particularly unevidenced variations in clinical practice"

Mid Staffordshire NHS Foundation Trust Public Inquiry. Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry. February 2013. Available from: https://www.gov.uk/government/publications/report-of-the-mid-staffordshire-nhs-foundation-trust-public-inquiry. Accessed 21 March 2017.


NHS
Diabetes
Joint British Diabetes Societies
Inpatient Care Group
The Management of Diabetic Ketoacidosis in Adults
March 2010
Diabetes UK
ABCD
DISN UK GROUP
WEDS
Supporting, Improving, Caring


Joint British Diabetes Societies
Inpatient Care Group
The Management of Diabetic Ketoacidosis in Adults
Second Edition
Update: September 2013
DIABETES UK
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University of East Anglia | Norwich Medical School

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NHS Foundation Trust

DIABETICMedicine

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Research: Care Delivery

National survey of the management of Diabetic Ketoacidosis (DKA) in the UK in 2014

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Institutional factors in the management of adults with diabetic ketoacidosis in the UK: results of a national survey

DIABETICMedicine

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Research: Care Delivery

Diabetic ketoacidosis in an adolescent and young adult population in the UK in 2014: a national survey comparison of management in paediatric and adult settings

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Dhatariya KK et al Diabetic Medicine 2016;33(2):252-260
Dhatariya K et al Diabetic Medicine 2016;33(2):269-270
Edge JA et al Diabetic Medicine 2016;33(10):1352-1359

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The Review of DIABETIC STUDIES REVIEW

Blood Ketones: Measurement, Interpretation, Limitations, and Utility in the Management of Diabetic Ketoacidosis

Ketan Dhatariya

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DOI 10.1007/s11892-017-0857-4

CrossMark

HOSPITAL MANAGEMENT OF DIABETES (A WALLIA AND JJ SELEY, SECTION EDITORS)

Treatment of Diabetic Ketoacidosis (DKA)/Hyperglycemic Hyperosmolar State (HHS): Novel Advances in the Management of Hyperglycemic Crises (UK Versus USA)

Ketan K. Dhatariya[1,3] · Priyathama Vellanki[2]

Confidence……or Arrogance?

Comment

Guidelines for management of diabetic ketoacidosis: time to revise?

Guidelines and position statements from medical organisations are widely used by clinicians to guide the care of their patients. The 2009 American Diabetes Association (ADA) position statement for diagnosis should be changed to a blood glucose concentration of 11·1 mmol/L (200 mg/dL) or higher.

The key diagnostic laboratory feature of DKA is the increase in circulating ketone concentrations.

Lancet Diabetes Endocrinol 2017
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S2213-8587(17)30093-1

Dhatariya KK & Umpierrez GE Lancet Diab Endocrinol 2017;5(5):321-323

Uptake of JBDS Guidance

Initiative type	Initiative name	Percentage of sites
JBDS[1] guidelines	• DKA and hypoglycaemia guidance (2013)	65.5
	• Hypoglycaemia management in hospital (2013)	57.7
	• Management of adults with diabetes undergoing surgery (2011)	46.3
	• Self-management of diabetes in hospital (2012)	25.9
	• Hyperosmolar Hyperglycaemia State (2012)	44.6
	• Glycaemic management of enteral-fed stroke patients (2012)	25.7
	• Admission Avoidance (front door/AMU protocols) (2013)	9.3
	• Steroid use for inpatients with diabetes (2014)	20.6
	• Discharge planning (2014)	11.5
	• Variable rate insulin infusion (VRIII) for medical inpatients (2014)	44.1

NHS Digital. National Diabetes Inpatient Audit (NaDIA) - 2016. http://www.content.digital.nhs.uk/catalogue/PUB23539 Last accessed 7/6/17

Back to the Hypothesis

- The National Diabetes Inpatient Audit (NaDIA) shows that several aspects of care have improved (statistically and clinically) between 2011 and 2016
  - More people are being seen by a member of the diabetes specialist team
  - Rates of mild and severe hypoglycaemia have fallen
  - Fewer people are on inappropriate intravenous insulin infusions
  - Fewer medication errors

NHS Digital. National Diabetes Inpatient Audit (NaDIA) - 2016. http://www.content.digital.nhs.uk/catalogue/PUB23539 Last accessed 7/6/17

But as Always

- There is a lot more to do
  - What are the costs of DKA
    - 1st paper accepted last week
  - How can the peri-operative care of patients with diabetes be improved (NCEPOD)
  - What to do with those previously undiagnosed patients who present with co-incidental hyperglycaemia
  - How can Trusts be 'encouraged' to make changes (CQC)

Watch this space!

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The Management of Hospital In-patients with Diabetes Mellitus

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