

# Hypos & driving



Clare MacArthur  
Anne Phillips  
Tara Kadis

# This talk

Easy hypo quiz

Driving and hypoglycaemia

DVLA guidelines

“What we know about hypos”

Factors that lead to hypoglycaemia

Avoiding hypos

# Some questions:

What do you know about hypos and driving?



# Hypo Quiz

## 1. What are the likely causes of a hypo?

Too much insulin ☒ Not enough insulin

Strenuous exercise without increasing carbohydrate or reducing insulin ☒

Too much food Not enough food ☒



# More hypo questions

## 2. What are some of the possible symptoms of hypoglycaemia?

Thirst

Sweating/looking pale



Passing a lot of urine

Tremor



Smell like pear drops on the breath

Tingling of lips and tongue



Inability to concentrate



Vomiting

Sudden change in behaviour



Palpitations



## More hypo questions

### 3. Overnight hypoglycaemia could be due to:

- a. Too much quick-acting/bolus insulin at teatime
- b. Over correction of high result at bedtime
- c. Too much basal/long-acting insulin overnight
- d. A 10 mile hike during the day



### 4. When in doubt:

- a. Treat as a hypo
- b. Don't treat at all



### 5. Cognitive recovery from a hypo i.e. when it is safe to drive:

- a. Straight away after glucose
- b. After a few minutes
- c. After 45 minutes (DVLA)



# Problems

People who bought:





# Also bought:





# Hospital admissions

- In 2012/13 there were **20,250** admissions with hypoglycaemia as main diagnosis – this does not include self-managed hypos, emergency A & E attendance, calls to GPs & paramedics or the burden for relatives/carers – and depends on coding practice
- In 2012/13 there were **25,200** admissions for diabetes with ketoacidosis in England

Source: Hospital Episode Statistics  
<http://www.hscic.gov.uk/searchcatalogue>  
(Diabetes is from the E10 group onwards)

# Do you agree?

**Hypos are a side effect of some  
treatments for diabetes**

**Do you agree?**

**Hypos are not an aim of treatment**

# Treatments that can cause hypos?

- **Insulin**
- **Sulphonylureas** – gliclazide, glipizide, glimepiride, glibenclamide, tolbutamide – as they increase insulin secretion
- So, if metformin is the only treatment for diabetes
  - ...it can't cause hypos!



# What we know about hypos

- Even in cases of less severe hypoglycaemia a substantial reduction of cognitive and motor function as well as hormonal counter regulation is observed (Cox et al., 2002)
- **Repeated hypoglycaemia blunts symptomatic and hormonal responses** to subsequent episodes leading to impaired awareness of hypoglycaemia (Amiel, 2008)
- Intensified blood glucose lowering has been associated with an increase in the rate of hypoglycaemia (Cryer, 2011)



# Group work

*Brainstorm your ideas*

# Group A

**Mary** takes gliclazide 80mg bd and metformin 850mg bd. Her HbA1c is 48mmol/mol (6.5%), she drives and she is very keen to avoid eye problems from diabetes, but has only just heard about hypos from a friend – what would you discuss with her?





# Group B

**John** takes Insulatard 30 units at night and metformin 850mg bd.

His HbA1c is 40mmol/mol (5.8%) and nearly a year ago he was found to have CKD (chronic kidney disease) stage 3. He drives a car.

Would you have any concerns here? How you would you discuss these with John? What would you suggest, if anything?



# Group C

**Lisa** has type 1 diabetes. She takes Novorapid 6 units at breakfast, 6 units lunch, 10 units evening meal and Lantus 20 units at bedtime. Her BMI is 32 and her HbA1c is 66mmol/L (8.2%)

She wants to lose weight & drives to the gym twice a week

Her fasting results now vary from 3.4 – 12.7mmol/L

Would you have any concerns here? What would you discuss with Lisa and what might you suggest?



# Mild or severe hypo?

## Severe hypo definition

- **Requiring** the assistance of another person
- *“DO NOT count episodes where you were given help but could have helped yourself”*  
(DVLA, 2012)
- The actual blood glucose result is irrelevant here

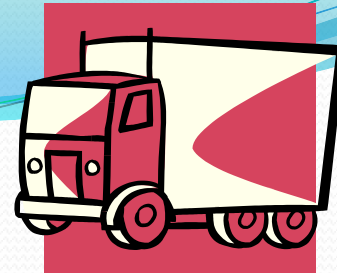
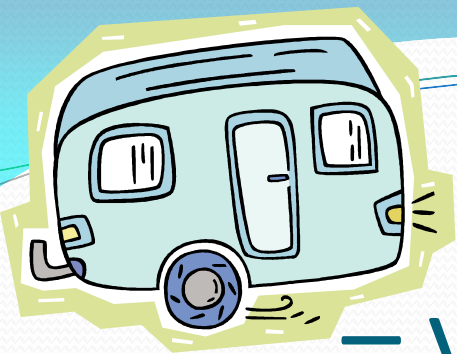
## Mild hypo

- Any other kind of hypo



# Driving and diabetes

- People taking **insulin** must inform the DVLA and their insurance, and licence will last 1-3 years maximum
- **For other medication that may cause hypos – inform DVLA if a severe hypo occurs**
- Application form asks about fitness to drive and diabetes management including blood glucose testing
- Group 1 – cars and motorbikes – licence not issued:
  - If two episodes of severe hypoglycaemia in 12 months (advise not to drive in this case)
  - If all awareness of hypos lost



# New since 2011

## – you need to tell the DVLA

- If you take insulin – both cars and larger vehicles
- If you have a two severe hypos in 12 months – licence revoked
- **Bus, coach or lorry licences** - Group 2 - if taking any kind of tablets or injectables for diabetes
  - If you have **one** severe hypo in 12 months – licence revoked
  - Must have 3 months of glucose readings in memory meter(s)
- N.B. Some licence categories such as small lorries up to 7.5 tonnes, mobile homes, minibuses (C1 - DE category) are now **classed as larger Group 2 vehicles if person taking insulin** – check still covered – may need to fulfil stricter criteria as above

# Also you must tell the DVLA if:

- You or your carer feels you are at high risk of developing disabling hypoglycaemia (regardless of treatment)
- Or you suffer disabling hypoglycaemia **while driving**
- Or you develop impaired awareness of hypoglycaemia (difficulty in recognising the warning symptoms of low blood sugar)
- And any other reasons why you might be a dangerous driver
  - Eyesight
  - Circulation/sensation problems in legs



# To inform DVLA go to:

[www.direct.gov.uk/driverhealth](http://www.direct.gov.uk/driverhealth)  
& download medical questionnaire from Medical Rules  
page

Or email: [eftd@dvla.gsi.gov.uk](mailto:eftd@dvla.gsi.gov.uk)

Tel: 0300 790 6806



Write: Drivers Medical Group, DVLA, Swansea. SA99 1TU



# Driving and hypoglycaemia

- Driving with a blood glucose below 4 mmol/L is very dangerous
- Impaired judgement, assessment of speed, slow reaction time etc
- Written advice should be given
  - **Test before driving and at least every two hours (meter)**
  - 'Don't drive below 5' – take action – a carb snack
  - If below 4 – see below
  - Inform DVLA (Swansea) & insurance
  - Will receive a safety leaflet from DVLA also



# If hypo when driving



- STOP and test blood glucose
- Pull over where safe (even if hard shoulder)
- Take keys out from ignition and move into passenger seat if possible/ out of vehicle safely
- Take hypo treatment and wait until blood glucose above 5 mmol/l
- Waiting 45 minutes is necessary for cognitive function



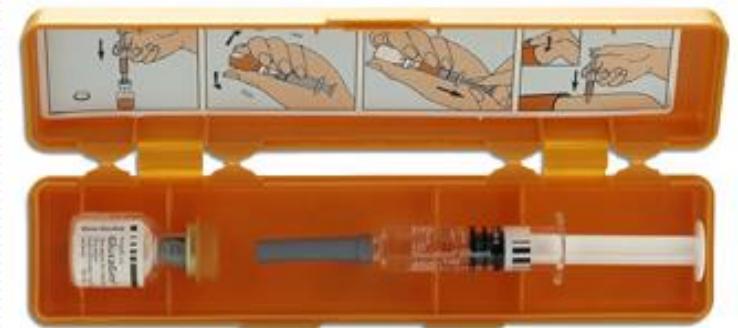
# Hypoglycaemia management

- **Prevention:** Understanding of patterns of blood glucose and situations where hypos occur.
- Symptom recognition – **check blood glucose**
- Being prepared! Identification card/jewellery
- Self-management: dextrose/glucose tablets or sugary drink ***followed by longer acting carbohydrate snack (keep supply in car)***
- Glucogel or IV dextrose
- Glucagon injection
- **Prevention**



# Unconscious patient

- Protect Airway – nothing orally
- If established IV access give:
  - 10% glucose 150-200mls over 15 minutes
    - Can be repeated 3 times if necessary
  - OR give 1 mg Glucagon IM (if not Nil By Mouth, emaciated, or severe hepatic disease)



# TREATMENT OF HYPOGLYCAEMIA

- CONSCIOUS PATIENT

- Immediately give 4-5 Glucotabs or 2 tubes Glucogel or 120mls original lucozade
- NG or PEG fed patients 50-70mls Fortijuce via tube
- Check blood glucose after 10-15 minutes; if still below 4mmols/l repeat treatment up to 3 times. Then consider 10% Glucose IV at 100ml/hr (and follow up)

# Hypos

## Rapid acting carbohydrate



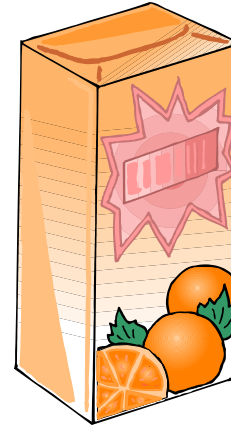
4-5 tabs



6 jelly  
babies



100 – 120mls



200mls



'Mixer tin'  
150mls

Semi-liquid glucose - orally:  
2 x Glucogel (formerly Hypostop)

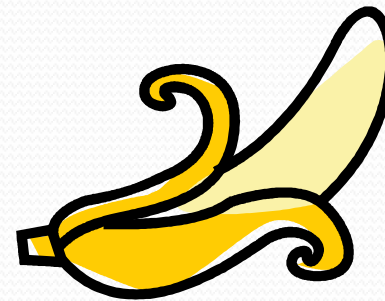


No major benefit over Lucozade!



# Longer-acting carbohydrate

- Recheck blood glucose level after 10-15 minutes (then regularly for 24-48hrs)
- When BG above 4mmols/L:
  - Thick slice toast with spread
  - Two biscuits
  - Banana
  - Small chocolate bar
- Consider cause... and prevent reoccurrence
- Usually reduce medication (possibly short-term)



*Remember hypos are **not** an aim of treatment!*

# Do you agree?

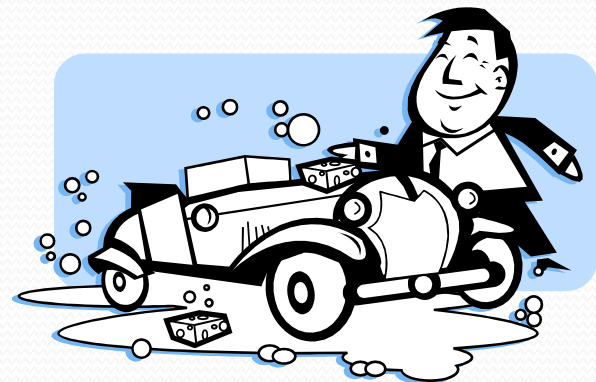
**What actually leads to hypos is our rather ineffective treatment options for people with diabetes**

# What leads to hypos on these treatments?

- **Lipohypertrophy in insulin users** – there is around **50%** prevalence of lipohypertrophy!

*Hambridge K (2007) The management of lipohypertrophy in diabetes care. Br J Nurs.;16(9):520-4.*

- **Hypo unawareness** – patient and professional
- **Inappropriate adjustment** – patient and professional!
  - Chasing lower HbA1c despite hypos/low results
  - Food / exercise issues
  - Alcohol in excess
  - Daily life



# Food, activity and hypos

- Missing/late meals
- Trying to lose weight
- Eating less carbohydrate than usual
- Exercising more than usual



# Other factors making hypoglycaemia more likely

- **Age and duration of diabetes** affects and reduces symptomatic and hormonal responses to hypoglycaemia
- **Renal failure**, adrenocortical insufficiency, autonomic neuropathy and mental disorders including dementia, depression, anxiety and affective disorders (Kostev et al., 2013)
- Older people also report different symptoms and responses to hypoglycaemia with **less autonomic and more prominent cognitive symptoms**
  - In this group, hypoglycaemia can be misdiagnosed as dementia or even neurological events (*Admitted ?stroke*)

# A review – insulin initiation

- Barnett A. (2007) Dosing of insulin glargine in the treatment of type 2 diabetes. *Clin Ther.*; 29(6):987-99.
- “Greater reductions in HbA1c were found with **patient-** versus **clinic-managed** titration (-1.22% vs -1.08%;  $P < 0.001$ )”
- “but fewer patients experienced hypoglycemia with **clinic-managed** titration (29.8% vs 33.3%;  $P < 0.01$ ).”

# Hypos mean more hypos likely

- Other predictors of hypoglycaemia:
  - Reports hypoglycaemia x 4
  - Insulin x 3
  - Depression x 1.8 (Tschöpe et al (2012))
- Intensive control in type 2 diabetes if target HbA1c below 48mmol/mol (6.5%)
  - risk of **severe** hypoglycaemia x 2.4 (Hemmingsen, 2011)
- HbA1c and risk of a crash: a 26% increase in the relative risk of a car crash for each 11mmol/mol (1%) reduction in HbA1c



# In addition: other medications

- Possible masking of symptoms:
  - Angiotensin-converting enzyme (ACE) inhibitors and beta-blockers
- Possible increase in circulating concentrations of sulphonylurea:
  - Aspirin, allopurinol, warfarin, sulphonamide, trimethoprim, mono-amine oxidase inhibitors and fibrates
  - (*Amiel et al., 2008*)



# What we know about hypos & type 1 diabetes



- Fasting capillary blood glucose was lower after nights with hypoglycaemia, than without
- When fasting capillary blood glucose is  $< 5$  mmol/l, there was evidence of nocturnal hypoglycaemia on 94% of nights
- **Fasting capillary blood glucose  $\leq 5$  mmol/l appears an important indicator of preceding silent nocturnal hypoglycaemia**

# What about driving and hypos?



# Do people think they're ok to drive while hypo?

- Cox et al (2000) measured people's driving ability on driving simulators while their glucose levels were **below 4mmol/L before driving**
- “Driving was significantly impaired, and subjects were aware of their impaired driving. However, corrective actions did not occur until BG was  $<2.8$  mmol/l.”
- Hence the need to test.



# Accidents in people with type 2 diabetes resulting in hospitalisation – **not on insulin**

- Hypoglycaemia was associated with significantly increased hazards for:
  - any accident resulting in a hospital visit
  - accidental falls
  - motor vehicle accidents
- In age-stratified analyses, hypoglycaemia was associated with:
  - **driving-related accidents** in people younger than age 65
  - **falls** in people aged 65 or older

**Do you agree?**

**People who have hypos have accidents**

# Severe hypos and death

- Retrospective study of 1000 people, over five years
- 3.4 x increased risk of death in those who had reported severe hypoglycaemia **five years previously – all ages**
- Adjusted for co-morbidities, age, sex, diabetes type and duration, HbA1c, and report of severe hypoglycaemia compared to those who reported none or only mild hypos

McCoy RG, Van Houten HK, Ziegenfuss JY, et al. (2012) Increased mortality of patients with diabetes reporting severe hypoglycemia. *Diabetes Care*; 35: 268– 901.

# Do you agree?

**Avoiding hypos is important so people can drive safely (amongst other reasons!)**



# Summary: avoiding hypos

- Avoid over-tight control – don't aim for HbA1c below **48mmol/mol** (6.5%) (except in pregnancy)
- For blood glucose levels 'Make 4 the Floor'
- If around 3 – that's way too low! Any such low result without a very good reason – reduce medication, particularly if a fasting result
- People need to know that hypos are possible, not expected, and how to avoid and treat them
- Be aware of complications that increase the risks – especially kidney disease



# Any questions?



# References

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