Poisoning (see also Deliberate self harm, legal issues)

THE LAB CAN SCREEN FOR MANY COMMON POISONS BUT YOU MUST SPECIFY WHAT YOU ARE LOOKING FOR –SEEK SENIOR ADVICE IF IN DOUBT, A NON-SPECIFIC SCREEN IS NEVER HELPFUL. DO NOT REQUEST BENZODIAZEPINE OR SERUM ALCOHOL SCREENING IN ADULTS WITH SUSPECTED POISONING; THE RESULT IS MEANINGLESS

Always consult the Poisons Computer and follow its advice about poisoning, do not assume that you know what to do - 'Toxbase' advice regularly changes.

Paracetamol poisoning has a significant mortality and morbidity – Most patients requiring inpatient care should be admitted to Observation ward You must be aware of the following key points:

Most paracetamol tablets contain 0.5 grammes of Paracetamol

Consenting Patients attending within one hour of ingestion should take oral activated charcoal immediately

Do not erect Parvolex or check Serum Paracetamol until 4 hours after ingestion irrespective of dose ingested.

Time when 4-hour paracetamol level is due should be clearly marked on flimsey (24-hour clock) and otherwise well can go to the Observation ward to await results and psych review
Patients presenting between 8-15 hours require immediate administration of "Parvolex".
The treatment dose of Parvolex is by weight and there are tables available on the shop floor to guide you on the dosages.

Patients who have taken a 'staggered' paracetamol overdose (often accidentally for severe pain) must have Parvolex erected immediately. Serum paracetamol, LFTs, coag and glucose should be monitored but the Parvolex treatment should normally continue for 24 hours.

Vomiting is an early sign of Paracetamol toxicity – monitor LFTs etc

An exhaustive list of poisons management is beyond the scope of this book – this is available to you on Toxbase

IMMEDIATELY LIFE-THREATENING POISONS

Life-threatening Ecstasy Poisoning

Often presents with hyperpyrexia(>39) and collapse. Be vigilant about this diagnosis – there will often be muscle rigidity and hyper-reflexia as well. Get Consultant/senior anaesthetic help immediately. Start vigorous cooling measures immediately.

Cyanide

Cyanide is produced in a local factory and may also contaminate ships' cargoes etc. Cyanide poisoning presents with agitation, headache, coma, pulmonary oedema, arrhythmias and shock. There is no time to lose. Use the Cyanide treatment kit that is kept in resuscitation, starting with inhaled amyl nitrate to buy a few extra moments – Get senior help AT ONCE. Consider in cardiac arrest following smoke inhalation.

Diabetic patients

These notes are from the Trust protocol - use the Intranet and follow the TRUST PROTOCOL

* NB everyone <18yrs presenting in DKA should be treated on the paediatric protocol.

Guideline for treatment of diabetic ketoacidosis (DKA) and hyperosmolar non-ketotic state (HONK) in adults

This document is also the prescription, administration and monitoring record. See also treatment guidelines available on the trust intranet.

HSC Northern Health and Social Care Trust

Diabetic Ketoacidosis (DKA) treatment protocol (≥18 years)

For patients <18 years use BSPED guideline: www.bsped.org.uk/professional/guidelines/docs/DKAGuideline.pdf or see hospital intranet

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First names: _____

H & C No: _____ Check identity

DOB: _____

Diagnostic criteria and management guidance

DIABETIC KETOACIDOSIS
Laboratory blood glucose > 11 mmol/L or known diabetes mellitus
Venous pH<7.3 and/or venous bicarbonate < 15 mmol/L;
Capillary/serum hydroxybutyrate (ketones) >3 mmol/L; or significant ketonuria 2+ or more. (Note: urine ketones can be falsely negative in early stages)
Measure arterial blood gases in reduced GCS or respiratory distress.

Treatment aims:
Fall in blood glucose 3 mmol/L/hour;
Fall in blood ketones 0.5 mmol/L/hour (or increase venous bicarbonate 3 mmol/L/hour);
Keep potassium in normal range;
Avoid hypoglycaemia.

INFUSION FLUIDS (prescribe on fluid balance chart)

- 0.9% sodium chloride 1000ml over first hour, then
  1000ml with potassium chloride over 2 hours, then
  1000ml with potassium chloride over 2 hours, then
  1000ml with potassium chloride over 4 hours, then
  1000ml with potassium chloride over 4 hours, then
  1000ml with potassium chloride over 6 hours.

If serum sodium rises > 155 mmol/l can switch to sodium chloride 0.45%

Hyponatraemia in a patient with elevated blood glucose is largely dilutional and will correct as the glucose falls. **(Corrected sodium = serum sodium + [0.4 x (plasma glucose - 5.5)]**

- **More cautious rates for young people (18-25y), pregnant, elderly, heart or renal failure. See note on cerebral oedema below.**
- **Systolic BP below 90mmHg** likely to be due to low circulating volume, but consider other causes eg heart failure, sepsis. Give 500mL 0.9% sodium chloride over 10-15mins. If SBP remains < 90mmHg repeat and request senior input. Consider HDU. Once SBP is >100mmHg, give 1000ml 0.9% sodium chloride.

- **ADD 10% glucose 125ml/hr when blood glucose falls to < 14 mmo/L** until ketoacidosis resolved (see 'Insulin' section below).
- **When ketoacidosis resolved** but not eating/drinking then change glucose infusion to 5% at 125ml/hr with variable rate insulin infusion (see prescription record). Continue 0.9% sodium chloride & potassium as needed to correct circulating volume & maintain electrolyte balance.

POTASSIUM (prescribe on fluid balance chart)
- Change to potassium-containing 0.9% sodium chloride after first blood results.

Potassium replacement: mmol/L of infusion

> 5.5	Nil
3.5-5.5	40 mmol/L
< 3.5	Senior review

If K <3.5mmol/L check hourly, additional potassium required. Stop insulin temporarily. Consider HDU advice and central line infusion for higher concentration

Consider HDU advice: Young people aged 18-25 years, pregnant, elderly, heart or renal failure or other serious co-morbidities or Severe DKA: (Initial results: ketones > 6, bicarbonate <5, pH <7.1, Potassium < 3.5, GCS <12, SBP <90, HR >100 or <60bpm, Anion Gap>1 Refer also if suspect cerebral oedema (see below).

INSULIN (see overleaf)
- Prescribe Actrapid® infusion 'as per DKA Protocol' on the main drug prescription chart.
- Commence insulin infusion (50 units / 50 ml 0.9% sodium chloride) via syringe driver at **fixed rate of 0.1 unit/kg/hour** based on estimate of weigh
- In the event of a delay in starting IV insulin, then give 0.1 unit/kg/hour IM. If cannot obtain IV access seek senior aid and consider HDU.
- If patient normally takes long-acting insulin analogue (Lantus®, Levemir®, Tresiba®) continue at usual dose and time.
- **Continue fixed rate insulin infusion until ketoacidosis is resolved (see bottom box).**
- Once resolved:- if still not eating then prescribe continued fluids as above with **variable rate insulin infusion** (VRII) (See reverse of sheet). - If eating then change to subcutaneous insulin at a meal time (preferably guided by diabetes team). Continue IV insulin and glucose until at least 30-60 minutes after first subcutaneous insulin is administered.

MONITORING
- Baseline capillary ketones, laboratory blood glucose, venous pH, U&E, Mg, PO4, FBC
- Hourly capillary blood glucose and capillary ketones (until ketones <0.5).
- If no capillary ketones are available monitor venous bicarbonate until >18
- Venous pH, bicarbonate, glucose and potassium (point-of-care test) at T=0, 1hr and 2hr, then 2 hourly until venous pH >7.3 and/or venous bicarbonate >18
- **Always use laboratory glucose if point of care result is out of range.**
- **Monitor Laboratory serum U&E 4 hourly**
- Monitor GCS 4 hourly in ALL cases; if it falls assess for cerebral oedema
- Cardiac Monitoring (severe DKA, hypokalaemia or concerns about cardiac status)
- Continuous pulse oximetry if required

ADDITIONAL MEASURES
- Assess ABCDE and consider precipitating causes
- Nasogastric tube with airway protection if obtunded or persistently vomiting
- Thromboprophylaxis
- Aim urine output > 0.5ml/kg/hr. Consider urinary catheter if incontinent or anuric (no urine output by 60mins).
- IV bicarbonate is NOT recommended
- Check phosphate. Carefully correct phosphate only if < 0.3mmol/L, cardiac dysfunction, haemolytic anaemia or respiratory despression.
- Manage patient only in agreed wards/units.

Cerebral Oedema:
- potentially fatal in young adults
- features usually develop 4-12h after start of DKA treatment.
- **Early:** headache, seizure, GCS drop, vomiting, lethargy, DBP >90.
- **Late:** Abnormal response to pain, cranial palsy, fluctuating GCS, decerebrate, neurogenic respiratory pattern, sustained bradycardia
- If suspect: inform most senior clinician on duty, request ICU & urgent CT brain. **Do NOT delay management while await CT.**
- **Mannitol** 1g/kg IV over 20mins.If no response, repeat in 30-120mins
- Reduce fluid infusion rate by 33%
- Elevate the head of the bed

If glucose and ketones not falling as expected (see 'aims'):
1. Insulin pump working & connected? Correct residual insulin vol?.
2. Check cannula, infusion set & intravenous fluids pump.
3. Increase insulin infusion each hour by 1 unit/hr increments until target falls achieved: see aims, prescribe dose change overleaf.

Expect resolution of ketoacidosis by 12 hours, if not then review fluid requirements and continue fixed rate insulin, 10% glucose and 0.9% sodium chloride as needed. Discuss with senior and diabetes clinicians.
Criteria for ketoacidosis resolution: ketones <0.5 mmol/l, venous pH over 7.3 and/or venous bicarbonate > 18mmol/L (after 6-12hrs bicarbonate is NOT useful as a marker of ketoacidosis resolution).

Intravenous insulin infusion prescription

1. Fixed rate insulin infusion (until ketoacidosis resolved)

Standard rate = weight (kg) x 0.1 = units/hr		Alternate rate =	Alternate rate =	Alternate rate =
Signature				
Date				
Time				

2. Variable Rate Insulin Infusion (VRII)

(start when ketoacidosis resolved until eating/drinking: see notes over)

Capillary blood glucose mmol/L	Standard insulin infusion rate units/hour	Alternative insulin infusion rate units/hour
>16	6	
12.1 – 16	4	
10.1 -12	3	
7.1 – 10	2	
4.1 – 7	1	
<4.0	0	
Signature		
Date		
Time		

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DOB: _____

Hospital: ..... Ward: .....

Consultant: .....

- Measure 50 units Actrapid® from vial using insulin syringe.
- Draw up 50 ml sodium chloride 0.9% into 50 ml syringe.
- Pull plunger back to make an air space and remove needle.
- Add 50 units Actrapid® insulin through top of 50 ml syringe, cap syringe with needle or hub cap, invert to mix, expel excess air and label syringe. Prime infusion line.
- Insulin may be infused in same line as fluid using Y-connector with one-way anti-siphon valve and large-bore cannula.

	Date	Time	Prepared by	Checked by
1.				
2.				
3.				

Administration and monitoring record

- Start recording at the start time of the infusion. Protocol chart is valid from 8am until 8am the following day.
- Measure capillary blood glucose every hour and record here. Check ketones (meter or laboratory) 1-2 hourly until <0.5.
- **Venous pH, bicarbonate, glucose & potassium (point-of-care test) at T = 0, 1 hour, 2 hours then 2 hourly until ketones <0.5, venous pH >7.3 and/or venous bicarbonate >18mmol/L. Check serum electrolytes (laboratory) 4 hourly.**

Don't forget that DKA may present as a hyperventilation attack or abdominal pain in adults or children with no history of Diabetes.

Hyperglycaemia without impaired consciousness

Patients (either newly or previously diagnosed DM) who present with hyperglycaemia +/- symptoms but with normal level of consciousness and no acidosis do not have DKA or HONK! They do not require admission unless there is an inter-current illness or some specific problem with diabetic control. They should be booked into next diabetic clinic (within one week). Review and manage their insulin therapy before discharge – seek help if necessary.

Special pitfalls for diabetic patients

- All diabetic patients with foot wounds must be reviewed at treatment room or ARC. High risk of osteomyelitis. Consider immediate/ early referral to podiatrist.
- Remember silent myocardial infarction – check ecg in diabetic patients with non-specific illness
- All diabetic patients with acute abdominal pain should be admitted

Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus

18 Years and over

Hypoglycaemia is defined as a blood glucose level less than 4mmol/l

Causes

- Missed Meals
- Not enough food
- Reduced appetite
- Too much insulin or oral diabetes medications
- Mobilisation after illness
- Inappropriate use, of 'stat' or 'PRN' Insulin
- Illness –vomiting/diarrhoea
- Impaired renal function
- Severe hepatic dysfunction

Symptoms

The patient may appear to be:

- Anxious
- Excited
- Dizzy
- Sweaty
- Pale-faced
- Confused
- Aggressive
- Disoriented
- Lacking concentration
- Agitated
- Drunk

The patient may complain of:

- Feeling Hungry
- Nausea
- Headache
- Tingling around mouth
- Blurred vision
- Palpitations

Hypoglycaemia is a blood glucose of < 4mmol/l. Wherever possible, check blood glucose level prior to treatment. If patient is asymptomatic, repeat test.

4 mmol/l | 3 mmol/l | 2 mmol/l | 1 mmol/l

MILD

Patient conscious and able to swallow

Trembling, sweating, hungry, tingling, headache, anxiety, palpitations, nausea, forgetfulness

MODERATE

Patient conscious and able to swallow, but in need of assistance.

Difficulty concentrating, confusion, weakness, giddiness, drowsiness, unsteady, headache, dizziness, difficulty focusing and speaking.

SEVERE

Patient unconscious Or unable to swallow

Check - Airway - give oxygen
Breathing
Circulation
Disabilty {glucose & GCS}
Exposure

If patient on insulin infusion - stop immediately

Call for Help

STEP 1

Administer 15 - 20 G fast acting carbohydrate
- 60 mls Glucojuice
- 170-225mls lucozade
- 150 -200mls pure fruit juice (avoid in moderate to severe renal failure)
- 4-6 Glucose tablets

Administer 1.5- 2 tubes of glucose 40% gel {Ensure gag intact}

If Ineffective give 1mg Glucagon IM (See notes below)

Three Options available:

1. 75 - 100mls of 20% Glucose IV over 15 minutes, into a large vein. (Repeat capillary Glucose measurement after 10 minutes. If still < 4mmol/l, then repeat)

Or

2. Glucagon 1mg IM (See notes below)

Or

3. 150 - 200mls of 10% Glucose IV over 15 minutes

PEG/NG fed patients - Give 60 mls Glucojuice and recommence feed if stopped. If JEG tube fed - follow severe treatment

STEP 2

Wait 10 - 20 minutes and recheck glucose levels
If reading is still < 4mmol/l, and no physical improvement repeat step 1 up to 3 times.

If capillary glucose remains < 4. Consider Glucagon 1mg IM (if not already received this) or 75 - 100mls of 20% Glucose IV over 15 minutes.

Once patient is conscious, give sips of lucozade or 2 - 4 teaspoons of sugsr in water etc.

Recheck glucose every 10 minutes to ensure increase to at least 4 mmol/l.

ALWAYS FOLLOW UP WITH LONG ACTING CARBOHYDRATE

Once capillary glucose level is > 4mmol/l and patient has recovered, give:
2 plain biscuits or 1 slice of toast or next meal if due (must contain carbohydrate) or 200mls milk.
Patients given IM glucagon require a larger portion of long acting carbohydrate to replenish glycogen stores (Double the amount above)

Point to Note

- Glucagon is less effective in hepatic dysfunction and/or glycogen depletion e.g ethanol related hypoglycaemia or in sulphonylurea therapy.
- Oral Glucose (ideally food) should be given as soon as the patient is alert and conscious, if nil orally consider 10 % Glucose at 100mls/hr.
- Secondary cerebral oedema may complicate hypoglycaemia and should be considered in cases of prolonged coma despite improving glucose. Mannitol or dexamethasone may be helpful.
- Continue to check glucose levels every 30 min for 2 hours, maintaining blood glucose levels > 4mmol/l
- Determine the cause of the hypoglycaemic episode
- Review medications and adjust as necessary
- On Admission prescribe Glucagon 1mg Intra muscular (IM) on the front of the glucose monitoring chart and reference on the drug Kardex.

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