Audit of Laboratory Analyses for Poisoned Patients

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On behalf of ACB Scotland Audit Group

The Association for Clinical Biochemistry & Laboratory Medicine
Scotland Audit Group

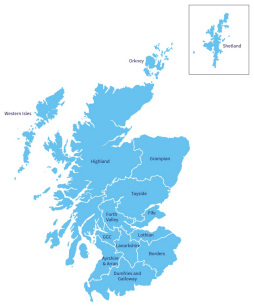
Aim of audit

- Assess adherence of Scottish laboratories to 2014 guidelines ACB and UK National Poisons Information Service
- Re-audit of laboratory practice in reporting common drugs / poisons (initial audit 2002)
- Harmonisation of units, reference intervals / therapeutic ranges, telephoning limits

Audit standards

- Labs should follow 2014 guidelines for availability of tests
  - Supportive investigations within 2 hours 24/7
  - Drug / Poison analysis 24/7
  - Urgent (next day) on request
- Documented arrangements for out of hours
- Pathology Harmony recommendations for units, Therapeutic target ranges
- Awareness of assay limitations

Methods

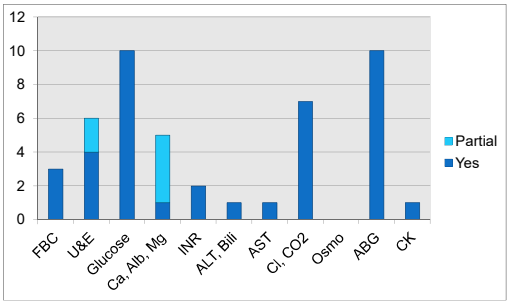


- Questionnaire sent to Clinical Lead and Audit Group representative for each Health Board
- Replies from 11 out of 14

Supportive Investigations

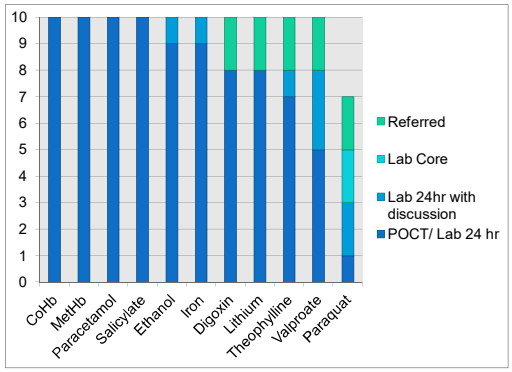
- *FBC, INR*
- *Sodium, potassium, urea, creatinine*
- *Glucose*
- *Arterial blood gases*
- *Anion gap (chloride & bicarbonate), osmolality & osmolar gap*
- *Calcium, albumin, magnesium*
- *Transaminases, bilirubin, creatine kinase*

POCT



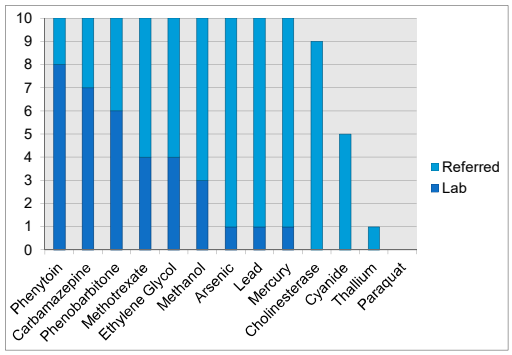
Assays requiring 24 hour availability

- *COHb, methaemoglobin*
- *Paracetamol, salicylate, ethanol,*
- *Digoxin, lithium, theophylline, valproate, iron*
- *Paraquat (qualitative urine)*



Next day – urgent if required

- *Phenobarbital, phenytoin, carbamazapine*
- *Methotrexate*
- *Ethylene glycol, methanol*
- *Thyroxine*
- *Arsenic, lead, mercury*
- *Cholinesterase*
- *Cyanide, thallium*
- *Toxicology screen*
- *Paraquat (quantitative plasma),*



Units

- All mg/L except
- % for COHb & MetHb
- ug/L for digoxin
- umol/L for methotrexate, lead, iron
- nmol/L for mercury
- nmol/mmol creatinine for (urine) arsenic
- U/L for cholinesterase

- mg/dL for ethanol – 1 HB also report mmol/L

Reference Intervals / Therapeutic ranges

	Pathology Harmony	Number of labs	Variations
Carbamazepine	4 – 12 mg/L	5	4 – 10
Phenobarbitone	10 – 40 mg/L	2	15 – 40 (3) <40 (1)
Phenytoin	5 – 20 mg/L	3	10 – 20 (4)
Lithium	0.4 – 1.0 mmol/L	6*	0.5 – 1.0 (1) *0.4 – 0.8 if >65y
Digoxin	0.5 – 1.0 ug/L	1	0.5 – 2.0 (4) 0.8 – 2.0 (1) 1.0 – 2.0 (1)
Theophylline	10 – 20 mg/L	8*	*5 – 10 if <4y

10 different ranges quoted for iron

Telephoning limits

	RCPath	Number of HBs	Variations
Digoxin	>2.5 ug/L	5	>2.0
Theophylline	>25 mg/L	6*	*>10 neonates; >35; >45 adults, >10 neonates
Phenytoin	>25 mg/L	4	>23; >30; >40
Lithium	>1.5 mmol/L	6	>1.2; >1.0
Ethanol	>400 mg/dL (?lower for paeds)	0	All (2); All paeds; >300
Paracetamol	All detectable (or agreement with A&E)	4*	*>50 for adults in A&E; All (2); >100
Salicylate	>300 mg/L	3	All (2); >70; >350; >500

Potential Assay Interference

- Not all labs have policies for reporting results or advising users if:
  - Digoxin is requested in a patient receiving digoxin-specific antibodies;
  - Iron is measured in a haemolysed sample;
  - Iron is requested in a patient on desferrioxamine;
  - There is the potential for interference by NAC/NAPQI in creatinine assays.

Recommendations

- Gaps in provision: paraquat (urine & plasma), cyanide, thallium
- Variation in reference intervals / therapeutic ranges
- Review of telephoning practice
- Awareness of assay interferences and ability to provide interpretative advice

Thanks

- Scottish ACB Audit Group
- Responders from each Health Board
- National Audit Meeting