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INFORMATION CENTRE OF IRELAND

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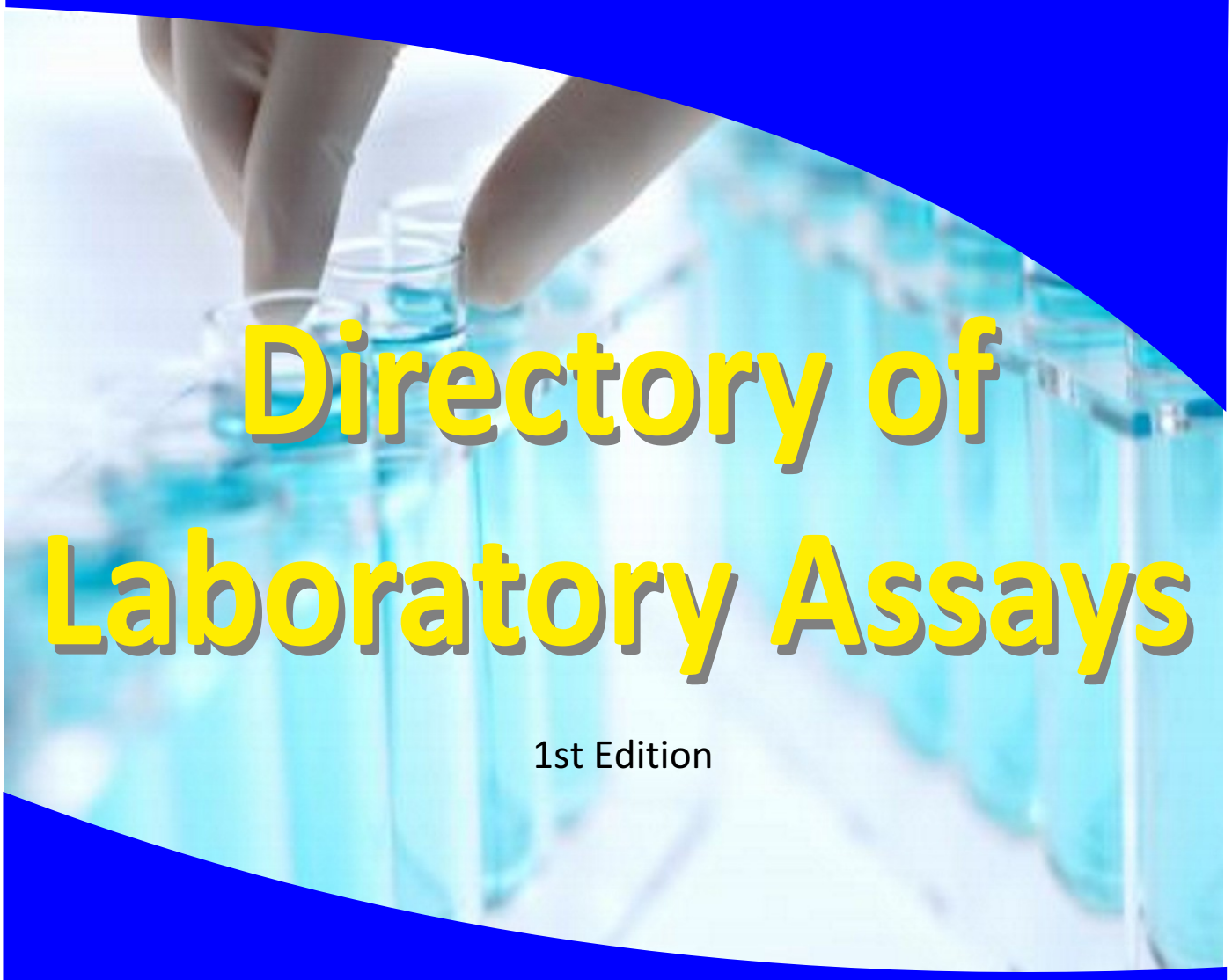

Directory of Laboratory Assays

1st Edition

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The National Poisons Information Centre operates 24-hours/day and is available for advice regarding the management of poisoned patients.

Additional copies of this booklet can be downloaded from the publication section of our website.

IMPORTANT

Some laboratories will use different reporting units to others. It is vital to record the units when a result is communicated. It is recommended that when laboratory results are verbally reported by telephone the recipient should 'read-back' the result to the laboratory personnel to ensure correct communication.

Foreword

When doctors or nurses contact the National Poisons Information Centre (NPIC) for assistance in managing patients who have been poisoned, the advice they receive will often include recommended toxicological analyses. The caller may then enquire where the appropriate test(s) can be performed.

John Herbert and Nicola Cassidy have carried out an enormous task in surveying all the acute hospital laboratories and in getting a 100% response rate. This was the first comprehensive survey of toxicological laboratory testing in acute hospitals in Ireland. The results of this survey are presented in this booklet.

This booklet also contains 15 monographs on quantitative toxicological analyses recommended by the National Poisons Information Service and the Association of Clinical Biochemists in the United Kingdom and the American Guidelines from the National Academy of Clinical Biochemistry Laboratory Medicine.

It is hoped that the NPIC will be able to sustain an up-to-date online version by maintaining the good contacts they have established with all the hospital laboratories.

I would like to thank the staff of all 39 laboratories who have contributed and hope that with their cooperation we can maintain this valuable database.

Again, many thanks to Nicola and John for all their hard work.

Dr. Joseph A. Tracey.

Medical Director
National Poisons Information Centre

ALCOHOL (ETHANOL)

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes +	mg/dL	Fluoride oxalate
Cavan General Hospital	Yes +	mg/L	Fluoride
Cork University Hospital	Yes*	mg/L	Sodium Fluoride
Kerry General Hospital	Yes+	mg/dL	Urine
Letterkenny General Hospital	Yes+	mg/dL	Serum and urine
Mater Misericordiae University Hospital	Yes+	mg/dL	Fluoride
Mayo General Hospital	Yes+	mg/dL	Serum
Mid Western Regional, Limerick	Yes+	mg/dL	Not specified
Midland Regional Hospital, Mullingar	Yes+	mg/dL	Fluoride / fresh clotted
Midland Regional Hospital, Portlaoise	Yes+	mg/dL	Serum
Midland Regional Hospital, Tullamore	Yes+	mg/dL	Serum
Midwestern Regional, Nenagh	Yes+	mg/dL	Serum
Naas General Hospital	Yes+	mg/dL	Serum
Nenagh General Hospital	Yes+	mg/dL	Serum
Portiuncula Hospital, Ballinasloe	Yes+	mg%	Serum / Plasma
Sligo General Hospital	Yes+	mg/dL	Serum / Plasma
St. James's Hospital	Yes+	mg/dL	Serum / Plasma
St John's Hospital	Yes+	mg/dL	Fluoride oxalate
St Luke's Hospital	Yes+	mg/dL	Fluoride oxalate
Tallaght (AMNCH) Hospital	Yes+	mg/dL	Serum / Plasma
University College Hospital, Galway	Yes+	mg/dL & mg%	Serum

+ Available on-call
* Not available on-call

Alcohol (Ethanol)

Ethanol ingestion causes dose-related CNS depression and potentiates the CNS depressant effects of other co-ingested agents. In adults, mild to moderate toxicity is associated with a blood ethanol concentration between 1.5-3g/L and severe toxicity is associated with concentrations of 3-5g/L.(Sanap) Following overdose, clinical management is symptomatic and supportive care. Ethanol concentrations are not routinely indicated but may be helpful to facilitate a diagnosis of poisoning if there is severe CNS depression.

Ethanol can also be administered as antidotal therapy for the management of ethylene glycol and methanol poisoning. Serial measurement of blood ethanol concentrations is essential to ensure the inhibition of the toxic metabolites is achieved.(Jacobsen)

References

Sanap M, Chapman MJ. Severe ethanol poisoning: A case report and brief review. *Critical Care and Resuscitation* 2003;5:106-108

Jacobsen D, McMartin KE. Methanol and ethylene glycol poisonings. Mechanism of toxicity, clinical course, diagnosis and treatment. *Med Toxicol.* 1986;1(5):309-34

AMIKACIN

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	mg/L	Plasma
Mid Western Regional, Limerick	Yes+	mg/L	Serum
University College Hospital, Galway	Yes*	mg/L	Serum/Plasma

AMPHETAMINE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	N/A	Urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Mid Western Regional, Limerick	Yes+	N/A	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine

+ Available on-call
* Not available on-call
N/A = Not applicable

ASPIRIN (Acetylsalicylic acid)

	Availability	Units	Specimen type
Bantry General Hospital	Yes+	mmol/L	Serum
Beaumont Hospital	Yes+	mg/L	Serum
Cavan General Hospital	Yes+	mg/L	Serum
Cork University Hospital	Yes+	mmol/L	Clotted
Kerry General Hospital	Yes+	mg/L	Serum
Letterkenny General Hospital	Yes+	mg/dL	Serum
Louth County Hospital	Yes+	mg/dL	Serum
Mallow General Hospital	Yes+	mmol/L	Serum
Mayo General Hospital	Yes+	mmol/L	Serum
Mercy University Hospital	Yes+	mmol/L	Serum/Plasma
Mid Western Regional Hospital, Limerick	Yes+	mmol/L	Not specified
Midland Regional Hospital, Mullingar	Yes+	mg/dL	Clotted
Midland Regional Hospital, Portlaoise	Yes+	mg/dL	Serum
Midland Regional Hospital, Tullamore	Yes+	mg/dL	Serum/Plasma
Midwestern Regional Hospital, Ennis	Yes+	mg/dL	Serum
Midwestern Regional Hospital, Nenagh	Yes+	mg/dL	Serum
Naas General Hospital	Yes+	mg/dL	Serum
Our Lady of Lourdes Hospital, Drogheda	Yes+	mg/dL	Serum
Portiuncula Hospital, Ballinasloe	Yes+	Not specified	Serum/Plasma
Sligo General Hospital	Yes+	mg/L	Serum
St Colmcille's Hospital, Loughlinstown	Yes+	mg/L	Serum
St James's Hospital	Yes+	mg/dL	Serum/Plasma
Tallaght (AMNCH) Hospital	Yes+	mg/L	Serum/Plasma
University College Hospital, Galway	Yes+	mmol/L	Serum
Waterford Regional Hospital	Yes+	mg/dL	Serum

+ Available on-call
* Not available on-call

Aspirin (Salicylate) is a non-steroidal anti-inflammatory agent with analgesic and anti-pyretic properties. Aspirin undergoes saturation kinetics when taken in acute overdose and peak plasma concentrations can be delayed,(Rivera, Proudfoot) especially if enteric-coated aspirin tablets are ingested. Following acute overdose, salicylate concentrations should be carried out every 2 hours until the peak plasma concentration has passed and subsequent concentrations are consistently decreasing. Chronic toxicity can occur, especially in older adults, but toxicity does not correlate with salicylate concentrations.(Krenzelok, Temple)

Following acute overdose, management is a combination of symptomatic and supportive care guided by measurement of serial plasma salicylate concentrations. In cases of severe poisoning, plasma salicylate concentrations can guide subsequent management decisions. Urinary alkalinisation increases salicylate excretion via intravenous administration of sodium bicarbonate.(Proudfoot, Krenzelok) Haemodialysis is indicated for patients with serious CNS depression, renal impairment, convulsions, acidemia, and a salicylate concentration >700mg/L.(dePont) Following urinary alkalinisation and haemodialysis, salicylate concentrations should be continued to be monitored in case of rebound increases.

References

Rivera W, Kleinschmidt KC, Velez LI, Shephead G, Keyes DC. Delayed salicylate toxicity at 35 hours without early manifestations following a single salicylate ingestion. *The Annals of Pharmacotherapy* 2004;38:1186-88

Proudfoot AT, Krenzelok EP, Vale JA. Position Paper on urine alkalinization. *J Toxicol Clin Toxicol* 2004;42(1):1-26

Krenzelok EP, Kerr F, Proudfoot AT. Salicylate toxicity. In Clinical Management of Poisoning and Drug Overdose, 3rd Edition. Haddad LM, Shannon MW, Winchester JF, Eds. WB Saunders 1998; p675-686.

Temple AR. Acute and chronic effects of aspirin toxicity and their treatment. *Arch Intern Med* 1981;141:364-369

De Pont AC. Extracorporeal treatment of intoxications. *Curr Opin Crit Care* 2007;13(6):668-73

BARBITURATE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	N/A	Serum or urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny Hospital	Yes*	ng/mL	Serum and Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Mid Western Regional, Limerick	Yes*	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	Urine	Urine Dip stick test

BENZODIAZEPINES

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	N/A	Serum or urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny Hospital	Yes*	ng/mL	Serum and Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Mid Western Regional, Limerick	Yes*	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Our Lady of Lourdes Hospital, Drogheda	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine dipstick test

CAFFEINE

Hospital name	Availability	Units	Specimen type
Limerick Regional Hospital	Yes +	umol/L	Not specified

+ Available on-call
* Not available on-call
N/A = Not Applicable

CANNABINOIDS

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	N/A	Urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny Hospital	Yes*	N/A	Urine
Mid Western Regional, Limerick	Yes+	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Our Lady of Lourdes Hospital, Drogheda	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine dipstick

CARBAMAZEPINE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	mg/L	Serum
Children's University Hospital, Temple Street	Yes+	ug/mL	Serum/Plasma
Cork University Hospital	Yes+	umol/L	Clotted
Kerry General Hospital	Yes+	umol/L	Serum
Letterkenny General	Yes*	ug/mL	Serum
Mater Misericordiae, Dublin	Yes+	mg/L	Serum/Plasma
Mercy University Hospital	Yes+	umol/L	Serum/Plasma
Mid Western Regional, Limerick	Yes+	umol/L	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Monaghan General Hospital	Yes+	ug/mL	Clotted
Our Lady of Lourdes Hospital, Drogheda	Yes+	umol/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes*	umol/L	Li heparin
Portiuncula Hospital, Ballinasloe	Yes+	ug/mL	Serum/Plasma
Sligo General Hospital	Yes+	ug/mL	Serum/Plasma
St James's Hospital	Yes+	umol/L	Serum/Plasma
St Vincent's University Hospital, Elm Park	Yes+	mg/L	Serum
University College Hospital, Galway	Yes+	ug/mL	Serum
Waterford Regional Hospital	Yes*	ug/mL	Not specified

+ Available on-call
* Not available on-call
N/A = Not applicable

Carbamazepine is an anti-convulsant prescribed for the treatment of generalised tonic-clonic and partial seizures, for pain associated with trigeminal neuralgia, and as prophylaxis for bipolar disorders. Therapeutic concentrations of carbamazepine range from 4-12 mg/L (17-51 µmol/L). Severe toxicity is associated with concentrations >20mg/L (85µmol/L), and life-threatening toxicity is associated with concentrations above 40mg/L (>168µmol/L).(Spiller, Montgomery)

Toxicity can occur following acute, acute-on-chronic, and chronic exposure. Generally, urgent measurement of carbamazepine concentration is not routinely required unless there is doubt regarding the diagnosis of poisoning. Concentrations are useful to determine when to re-start prescribed therapeutic dosing for patients.

References

Spiller HA, Krenzelok EP, & Cookson E. Carbamazepine overdose: a prospective study of serum levels and toxicity. *J Toxicol Clin Toxicol.* 1990a; 28:445-458

Montgomery VL, Richman BJ, & Goldsmith LJ. Severity and carbamazepine level at time of initial poison center contact correlate with outcome in carbamazepine poisoning. *Clin Toxicol.* 1995; 33:311-323

CARBOXYHAEMOGLOBIN

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	%	Not specified
Cavan General Hospital	Yes+	Not specified	Heparinised blood
Children's University Hospital, Temple Street	Yes+	%	Blood gas
Cork University Hospital	Yes+	%	Li Heparin
Kerry General Hospital	Yes+	%	ABG
Letterkenny General Hospital	Yes*	%	Whole Blood
Mater Misericordiae University Hospital	Yes+	%	Blood gas
Mercy University Hospital	Yes+	%	Heparinised syringe
Mid Western Regional Hospital, Limerick	Yes+	%	Unspecified
Midland Regional Hospital, Mullingar	Yes+	%	Blood gas
Midland Regional Hospital, Portlaoise	Yes+	%	Arterial blood gas
Our Lady of Lourdes Hospital, Drogheda	Yes+	%	Whole Blood
Our Lady's Hospital for Sick Children, Crumlin	Yes*	%	Syringe
Portiuncula Hospital, Ballinasloe	Yes+	%	Blood
Sligo General Hospital	Yes+	%	Blood
St James's Hospital	Yes+	%	Blood
St John's Hospital, Limerick	Yes+	%	Blood gas
St Vincent's University Hospital	Yes+	%	Li Heparin
Tallaght (AMNCH) Hospital	Yes+	%	Blood
University College Hospital, Galway	Yes+	%	Blood
Waterford Regional Hospital	Yes+	%	Not specified

+ Available on-call
* Not available on-call

Carboxyhaemoglobin and Methaemoglobin

Carboxyhaemoglobin (COHb) is a stable complex of carbon monoxide and haemoglobin that forms in red blood cells when carbon monoxide is inhaled, hindering delivery of oxygen to the body. Carbon monoxide (CO) is produced as a by-product of combustion and poisoning often occurs when heating appliances or stoves are malfunctioning or improperly vented. Elevated blood CO concentrations can occur following smoking or exposure to dichloromethane.(Hughes) CO poisoning is responsible for over 40 deaths per year in Ireland.(Crowley)

An increased fraction of COHb in the blood inhibits oxygen transport and decreases oxygen delivery to the tissues by shifting the oxygen dissociation curve to the left. Non-smokers can have a COHb concentration up to 2% (smokers up to 9%). An early diagnosis of carbon monoxide toxicity is necessary for prompt institution of oxygen therapy which is the mainstay of treatment. Hyperbaric oxygen therapy is controversial and is not routinely recommended following CO poisoning.

Methaemoglobin (MetHb) is a form of the haemoglobin in which the iron in the heme group is oxidised from its normal Fe^{2+} to the Fe^{3+} (ferric) state, making it incapable of transporting oxygen. MetHb can be caused by medications such as amyl nitrite, benzocaine, dapsone, and sulphonamides, as well as chemical agents, aniline dyes, nitrates, and chlorobenzynes. Normal MetHb concentrations are 1-2%. Methylthioninium chloride (methylene blue) can be administered as antidotal treatment as it reduces the Fe^{3+} iron of MetHb back to ferrous state of normal haemoglobin. Antidotal treatment is usually indicated if the MetHb concentration is >30% but is occasionally recommended at concentrations below this if there is evidence of tissue hypoxia.

Pulse oximeters can only measure absorbance at two wavelengths and will gives erroneous results in the presence of elevated COHb and MetHb. For this reason, laboratory analysis using a co-oximeter (measuring absorbance

at multiple wavelengths) has traditionally been used to estimate both COHb and MetHb in blood. It should be noted however that a new pulse co-oximeter has been developed which can provide accurate non-invasive estimation of COHb and MetHb. This may obviate the need for formal laboratory assays.

References

Hughes NJ and Tracey JA. A case of methylene chloride (Nitromors) poisoning, effect on Carboxyhaemoglobin levels. *Hum Exp Toxicol*. 1993; 12: 159-60.

Crowley D, Scallan E, Herbert J, Staines A, Herity B, Tracey J. Carbon monoxide poisoning in the Republic of Ireland. *Ir Med J*. 2003;96(3):83-6.

CHOLINESTERASE (PLASMA)

Hospital name	Availability	Units	Specimen type
St. James's Hospital	Yes*	IU/L	Plasma

COCAINE

Hospital name	Availability	Units	Specimen type
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Mid Western Regional, Limerick	Yes+	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Our Lady of Lourdes Hospital, Drogheda	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine

CYANIDE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	mg/L	Lithium heparin or EDTA blood

CYCLOSPORIN

Hospital name	Availability	Units	Specimen type
Cork University Hospital	Yes*	ug/L	EDTA
Mater Misericordiae University Hospital	Yes+	ug/L	EDTA
Our Lady's Hospital for Sick Children, Crumlin	Yes*	ug/L	EDTA blood
St James's Hospital	Yes+	ug/mL	Plasma/serum
St Vincent's University Hospital	Yes*	ng/mL	Not specified
University College Hospital, Galway	Yes*	ng/mL	EDTA whole blood

+ Available on-call
* Not available on-call
N/A = Not applicable

DIGOXIN

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	nmol/L	Serum
Beaumont Hospital	Yes+	ug/L	Serum
Cork University Hospital	Yes+	nmol/L	Clotted
Kerry General Hospital	Yes+	nmol/L	Serum
Letterkenny Hospital	Yes+	Not specified	Serum
Louth County Hospital	Yes+	nmol/L	Serum
Mater Misericordiae University Hospital	Yes+	ug/L	Serum/plasma
Mercy University Hospital	Yes+	nmol/L	Serum/Plasma
Mid Western Regional Hospital, Limerick	Yes+	nmol/L	Not specified
Midland Regional Hospital, Mullingar	Yes+	nmol/L	Clotted
Monaghan General Hospital	Yes+	nmol/L	Clotted
Our Lady of Lourdes Hospital, Drogheda	Yes+	nmol/L	Serum/Plasma
Our Lady's Hospital for Sick Children, Crumlin	Yes*	nmol/L	Li Heparin
Our Lady's Hospital, Navan	Yes*	Not specified	Not specified
Portiuncula Hospital, Ballinasloe	Yes+	nmol/L	Serum/Plasma
Sligo General Hospital	Yes+	nmol/L	Serum/Plasma
St Colmcille's Hospital, Loughlinstown	Yes+	nmol/L	Serum
St James's Hospital	Yes+	nmol/L	Serum/Plasma
St John's Hospital, Limerick	Yes+	nmol/L	Serum
St Michael's Hospital	Yes*	nmol/L	Serum/Plasma
St Vincent's University Hospital	Yes+	nmol/L	Not specified
Tallaght Hospital (AMNCH)	Yes+	ug/L	Serum/Plasma
University College Hospital, Galway	Yes+	nmol/L	Serum
Waterford Regional Hospital	Yes+	nmol/L	Not specified

+ Available on-call
* Not available on-call

Digoxin is a cardiac glycoside prescribed for the management of chronic atrial fibrillation, atrial flutter, paroxysmal atrial tachycardia, and congestive heart failure. Cardiac glycosides (Digitoxin and Digitalin) are also found in Digitalis plant species although toxicity associated with plant material is uncommon.

Digoxin has a narrow therapeutic index and toxicity can result following acute, acute-on-chronic, and chronic exposure. Elderly patients have an increased risk of toxicity even with therapeutic doses.(Marik,Hauptman) Management is based on clinical findings in combination with measurement of serum digoxin concentrations. Digoxin–specific Fab-antibody therapy is effective at reversing toxicity and indicated if the digoxin concentration is >10ng/mL or if the patient has life-threatening symptoms.(Antman) Following the administration of digoxin–specific Fab-antibodies, plasma digoxin concentrations may be falsely elevated as immunoassay techniques measure total digoxin.(Dasqupta)

References

Marik PE, Fromm L. A case series of hospital patients with elevated Digoxin levels. *The American Journal of Medicine* 1998;105-110-115

Hauptman PJ, Kelly RA. Digitalis. *Circulation* 1999;99:1265-70

Antman EM, Wenger TL, Butler Jr VP, Haber E, Smith TW. Treatment of 150 cases of life-threatening digitalis intoxication with digoxin-specific Fab antibody fragments. *Circulation* 1990; 81: 1744-1752

Dasqupta A. Therapeutic drug monitoring of digoxin: impact of endogenous and exogenous digoxin-like immunoreactive substances. *Toxicol Rev.* 2006;25(4):273-81.

ETHYLENE GLYCOL

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	mg/L	Serum

+ Available on-call

Ethylene glycol and **methanol** are metabolised by alcohol dehydrogenase and aldehyde dehydrogenase to several toxic metabolites. Treatment for both agents is principally aimed at blocking the action of alcohol dehydrogenase with either ethanol or 4-methylpyrazole (Fomepizole)[(Pietruszko, Poldelski)], allowing renal excretion of the unmetabolised toxic parent compound. Serum ethylene glycol/methanol concentrations are the ideal tests to perform when a toxic alcohol ingestion is suspected.

Antidotal therapy is indicated if there is a strong suspicion or clinical evidence of toxic alcohol ingestion along with a raised osmolar gap or anion gap. Haemodialysis is indicated if the ethylene glycol concentration is >500mg/L (8.0mmol/L) or if the methanol concentration is >500mg/L (16.0 mmol/L).[(Barceloux X 2)] The measurement of ethylene glycol and methanol concentrations are also important in deciding when to cease antidotal treatment. Haemodialysis and/or antidotal therapy should be continued until the ethylene glycol concentration is <50mg/L (0.8mmol/L) or methanol concentration is <50mg/L (1.56mmol/L) and the patient is asymptomatic with a normal pH. Blood ethanol concentrations are of critical importance if ethanol is used as an antidote. An ethanol concentration of >100mg/dL is recommended to block toxic alcohol metabolism. [(Jacobsen)]

References

Pietruszko R, Voigtlander K, Lester D; Alcohol dehydrogenase from human and horse liver-substrate specificity with diols. *Biochem Pharmacol*. 1978;27(8):1296-7

Poldelski V, Johnson A, Wright S, Dela Rosa V, Zager RA. Ethylene glycol-mediated tubular injury: Identification of critical metabolites and injury pathway. *Am J Kidney Dis*. 2001;38(2):339-348

Barceloux DG, Krenzelok EP, Olson K, Watson W. American Academy of Clinical Toxicology Practice Guidelines on the Treatment of Ethylene Glycol Poisoning. Ad Hoc Committee. *J Toxicol Clin Toxicol*. 1999;37(5):537-60.

Barceloux DG, Bond GR, Krenzelok EP, Cooper H, Vale JA; American Academy of Clinical Toxicology Ad Hoc Committee on the Treatment Guidelines for Methanol Poisoning. American Academy of Clinical Toxicology practice guidelines on the treatment of methanol poisoning. *J Toxicol Clin Toxicol*. 2002;40(4):415-46.

Jacobsen D, McMartin KE. Methanol and ethylene glycol poisonings. Mechanism of toxicity, clinical course, diagnosis and treatment. *Med Toxicol.* 1986;1(5):309-34

GENTAMICIN

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	mg/L	Serum
Beaumont Hospital	Yes*	mg/L	Plasma
Cavan General Hospital	Yes+	mg/L	Serum
Children's University Hospital, Temple Street	Yes+	mg/L	Serum/Plasma
Connolly Hospital, Blanchardstown	Yes*	mg/L	Serum
Cork University Hospital	Yes+	mg/L	Clotted
Kerry General Hospital	Yes+	ug/mL	Serum
Mid Western Regional Hospital, Limerick	Yes+	mg/L	Serum
Louth County Hospital	Yes+	mg/L	Serum
Mater Misericordiae University Hospital	Yes*	ug/L	Serum
Mayo General Hospital	Yes*	Not specified	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Midland Regional Hospital, Tullamore	Yes+	ug/mL	Serum
Our Lady of Lourdes Hospital, Drogheda	Yes*	mg/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes*	Not specified	Not specified
Our Lady's Hospital, Navan	Yes*	Not specified	Not specified
Portiuncula Hospital, Ballinasloe	Yes+	ug/mL	Serum/Plasma
Sligo General Hospital	Yes+	ug/mL	Serum/Plasma
St. James's Hospital	Yes+	mg/L	Serum/Plasma
St Vincent's University Hospital	Yes*	ug/L	Not specified
University College Hospital, Galway	Yes*	mg/L	Serum
Waterford Regional Hospital	Yes+	ug/mL	Not specified

GLYCOLIC ACID

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	mg/L	Serum

HALOPERIDOL

Hospital name	Availability	Units	Specimen type
Kerry General Hospital	Yes+	Not specified	Serum

+ Available on-call
* Not available on-call

IRON

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	umol/L	plasma
Cavan General Hospital	Yes*	umol/L	Serum
Connolly Hospital, Blanchardstown	Yes+	umol/L	Serum
Cork University Hospital	Yes+	umol/L	Clotted
Kerry General Hospital	Yes+	umol/L	Serum
Letterkenny General Hospital	Yes+	umol/L	Serum
Louth County Hospital	Yes+	umol/L	Serum
Mater Misericordiae University Hospital	Yes+	umol/L	Serum/Plasma
Mercy University Hospital	Yes+	umol/L	Serum/Plasma
Mid Western Regional Hospital, Limerick	Yes+	umol/L	Not specified
Midland Regional Hospital, Portlaoise	Yes+	umol/L	Serum
Monaghan General Hospital	Yes+	mmol/L	Clotted
Our Lady of Lourdes Hospital, Drogheda	Yes+	umol/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes+	umol/L	Not specified
Our Lady's Hospital, Navan	Yes*	Not specified	Not specified
Portiuncula Hospital, Ballinasloe	Yes+	umol/L	Serum/Plasma
Sligo General Hospital	Yes+	umol/L	Serum
St Colmcille's Hospital, Loughlinstown	Yes*	umol/L	Serum
St James's Hospital	Yes	umol/L	Serum/Plasma
St Michael's Hospital	Yes*	umol/L	Serum
St Vincent's University Hospital	Yes+	umol/L	Serum
Tallaght Hospital (AMNCH)	Yes+	umol/L	Serum/Plasma
University College Hospital, Galway	Yes+	umol/L	Serum
Waterford Regional Hospital	Yes*	umol/L	Not specified

+ Available on-call
* Not available on-call

Iron

Iron concentrations should be determined in patients who have ingested >20mg elemental iron per kilogram bodyweight or who have symptoms suggestive of toxicity. Iron concentrations do not correlate well with symptoms but serum concentrations taken approximately 4 hours after ingestion can be used as a guide: Iron concentrations taken more than 6 hours post ingestion may be misleadingly low due to the distribution of iron from the vascular compartment into tissues. Mild toxicity occurs with concentrations <3mg/L (55 micromol/L), moderate toxicity is associated with 3-5mg/L (55-90 micromol/L), and severe toxicity occurs with concentrations >5mg/L (90 micromol/L).

The use of intravenous Desferrioxamine (a specific chelating agent) is indicated if a patient is symptomatic and the serum iron concentration indicates severe toxicity.(Chyka, Bosse Tennenbein) The presence of desferrioxamine in the blood may interfere with colorimetric iron assays.(Gevirtz, Helfer)

References

Chyka PA, Butler AY. Assessment of acute iron poisoning by laboratory and clinical observations. *Am J Emerg Med*. 1993;11(2):99-103

Bosse GM. Conservative management of patients with moderately elevated serum iron levels. *J Toxicol Clin Toxicol*. 1995;33(2):135-40

Tennenbein M. Benefits of parenteral desferoxamine for acute iron poisoning. *J Toxicol Clin Toxicol.* 1996;34:485-489

Gevirtz NR, Wasserman LR. The measurement of iron and iron-binding capacity in plasma containing deferoxamine. *J Pediatr*. 1966;68(5):802-4.

Helfer RE, Rodgerson DO. The effect of desferoxamine on the determination of serum iron and iron-binding capacity. *J Pediatr*. 1966;68(5):804-6.

LITHIUM

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	mmol/L	Serum
Beaumont Hospital	Yes+	mmol/L	Serum
Cavan General Hospital	Yes*	mmol/L	Serum
Connolly Hospital, Blanchardstown	Yes+	mmol/L	Serum
Cork University Hospital	Yes+	mmol/L	Clotted
Kerry General Hospital	Yes+	mmol/L	Serum
Letterkenny General Hospital	Yes+	mmol/L	Serum
Louth County Hospital	Yes+	mmol/L	Serum
Mater Misericordiae University Hospital	Yes+	mmol/L	Serum
Mayo General Hospital	Yes+	mmol/L	Not specified
Mercy University Hospital	Yes+	mmol/L	Serum
Midland Regional Hospital, Mullingar	Yes+	mmol/L	Clotted
Mid Western Regional Hospital, Limerick	Yes+	mmol/L	Not specified
Midland Regional Hospital, Portlaoise	Yes+	mmol/L	Serum
Monaghan General Hospital	Yes+	mmol/L	Clotted
Naas General Hospital	Yes+	mmol/L	Serum
Our Lady of Lourdes Hospital, Drogheda	Yes+	mmol/L	Serum
Portiuncula Hospital, Ballinasloe	Yes+	mmol/L	Serum
Sligo General Hospital	Yes+	mmol/L	Serum
St Colmcille's Hospital	Yes+	mmol/L	Serum
St James's Hospital	Yes+	mmol/L	Serum
St John's Hospital, Limerick	Yes+	mmol/L	Serum
St Michael's Hospital	Yes*	mmol/L	Serum
St Vincent's University Hospital	Yes+	mmol/L	Serum
Tallaght Hospital (AMNCH)	Yes+	mmol/L	Serum
University College Hospital, Galway	Yes+	mmol/L	Serum
Waterford Regional Hospital	Yes+	mmol/L	Not specified

+ Available on-call
* Not available on-call

Lithium salts are prescribed in the management of mania, bipolar disorder, and unipolar depression. Lithium has a narrow therapeutic index and regular monitoring of plasma concentrations are required to maintain levels within the therapeutic range (0.6-1.2 mmol/L). An acute overdose in a lithium-naïve patient is generally associated with mild toxicity despite potentially high blood lithium concentrations.(Jabobsen, Bosse, Horowitz) An acute-on-chronic overdose can lead to serious toxicity, even after a modest overdose, as the extravascular tissues of the patient are already saturated. Chronic accumulation can occur due to an excessive dose, dehydration, renal impairment, or the presence of an interacting drug.(Okusa)

The treatment of lithium toxicity should be based on the clinical manifestations rather than lithium plasma concentrations alone. Haemodialysis is the treatment of choice for severe toxicity, particularly in patients with neurological features. Haemodialysis should also be considered if the lithium concentration is >7.5mmol/L following an acute exposure, or in acute-on-chronic overdose, or chronic toxicity when the concentration is >4.0mmol/L.

References

Jacobsen D, Aasen G, Frederichsen P: Lithium intoxication: pharmacokinetics during and after terminated hemodialysis in acute intoxications. *Clin Toxicol*. 1987; 25:81-94

Bosse GM & Arnold TC: Overdose with sustained-release lithium preparations. *J Emerg Med.* 1992;10:719-721

Horowitz LC, Fisher GU. Acute lithium toxicity. *N Engl J Med*. 1969;11;281(24):1369

Okusa MD and Crystal LJT. Clinical manifestations and management of acute lithium intoxication. *Am J Med.* 1994;97:383-389

MDMA
(Methylenedioxymethamphetamine)

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	N/A	Urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Our Lady of Lourdes Hospital, Drogheda	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine

METHADONE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	N/A	Urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Mid Western Regional, Limerick	Yes+	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine

METHADONE METABOLITES

Hospital name	Availability	Units	Specimen type
Letterkenny General Hospital	Yes*	N/A	Urine

+ Available on-call
* Not available on-call
N/A = Not applicable

METHAEMOGLOBIN

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	%	Not specified
Children's University Hospital, Temple Street	Yes+	%	Blood gas
Cork University Hospital	Yes+	%	Li Hep
Letterkenny General Hospital	Yes*	Not specified	Whole Blood
Mater Misericordiae University Hospital	Yes+	%	Whole Blood gas
Mercy University Hospital	Yes+	%	Blood heparinised syringe
Mid Western Regional Hospital, Limerick	Yes	%	Not specified
Midland Regional Hospital, Mullingar	Yes+	%	Blood gas
Midland Regional Hospital, Tullamore	Yes+	%	Whole blood
Our Lady of Lourdes Hospital, Drogheda	Yes+	%	Whole blood
Our Lady's Hospital for Sick Children, Crumlin	Yes*	%	Syringe
Portiuncula Hospital, Ballinasloe	Yes+	%	Blood
Sligo General Hospital	Yes+	%	Blood
St James's Hospital	Yes+	%	Blood
St John's Hospital, Limerick	Yes+	%	Blood gas
St Vincent's University Hospital	Yes+	%	ABG
Tallaght Hospital (AMNCH)	Yes+	%	Blood
University College Hospital, Galway	Yes*	%	Not specified
Waterford Regional Hospital	Yes+	%	Not specified

METHAEMOGLOBIN MONOGRAPH - SEE PAGES 15-16

METHAMPHETAMINE

Hospital name	Available	Units	Specimen type
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Urine
Mallow General Hospital	Yes+	ng/mL	Urine
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Our Lady of Lourdes Hospital, Drogheda	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine

+ Available on-call
* Not available on-call
N/A = Not applicable

METHANOL

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	mg/dL	Clotted serum

METHANOL MONOGRAPH - SEE PAGES 20-21

METHOTREXATE

Hospital name	Availability	Units	Specimen type
Cork University Hospital	Yes*	umol/L	Clotted
Mater Misericordiae University Hospital	Yes+	umol/L	Serum
Mid Western Regional Hospital, Limerick	Yes*	umo/L	Not specified
Our Lady's Hospital for Sick Children, Crumlin	Yes*	umol/L	Li Heparin
Sligo General Hospital	Yes*	umol/L	Serum/Plasma
St James's Hospital	Yes+	umo/L	Serum/Plasma
Tallaght (AMNCH) Hospital	Yes+	umol/L	Serum/Plasma
University College Hospital, Galway	Yes+	umol/L	Serum

MORPHINE

Hospital name	Availability	Units	Specimen type
Midland Regional Hospital Tullamore	Yes+	N/A	Urine

OPIATES

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	N/A	Urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Urine
Mid Western Regional, Limerick	Yes*	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Our Lady of Lourdes Hospital, Drogheda	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes+	N/A	Urine

OPIATES (SYNTHETIC)

Hospital name	Availability	Units	Specimen type
Kerry General Hospital	Yes+	N/A	Urine

+ Available on-call
* Not available on-call
N/A = Not applicable

PARACETAMOL

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	mmol/L	Serum
Beaumont Hospital	Yes+	mg/L	Serum
Cavan General Hospital	Yes+	mg/L	Serum
Cork University Hospital	Yes+	mg/L	Clotted
Kerry General Hospital	Yes+	ug/mL	Serum
Letterkenny General Hospital	Yes+	mg/L	Serum
Louth County Hospital	Yes+	mg/L	Serum
Mallow General Hospital	Yes+	mmol/L	Serum
Mater Misericordiae University Hospital	Yes+	mg/L	Serum/Plasma
Mayo General Hospital	Yes+	mmol/L	Serum
Mercy University Hospital	Yes+	mmol/L	Serum
Mid Western Regional Hospital, Limerick	Yes+	ug/mL	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Midland Regional Hospital, Portlaoise	Yes+	ug/mL	Serum
Midland Regional Hospital, Tullamore	Yes+	mg/L	Serum/Plasma
Midwestern Regional Hospital, Ennis	Yes+	mg/L	Serum
Midwestern Regional Hospital, Nenagh	Yes+	mg/L	Serum
Naas General Hospital	Yes+	ug/mL	Serum
Our Lady of Lourdes Hospital, Drogheda	Yes+	mg/L	Serum
Portiuncula Hospital, Ballinasloe	Yes+	mg/L	Serum/Plasma
Sligo General Hospital	Yes+	mg/L	Serum/Plasma
St Colmcille's Hospital	Yes+	mg/L	Serum
St James's Hospital	Yes+	ug/mL	Serum/Plasma
St John's Hospital, Limerick	Yes+	mg/L	Serum
St Luke's Hospital, Kilkenny	Yes+	mmol/L	Serum/Plasma
Tallaght Hospital (AMNCH)	Yes+	mg/L	Serum/Plasma
University College Hospital, Galway	Yes+	mmol/L	Serum
Waterford Regional Hospital	Yes+	mmol/L	Not specified
Wexford General Hospital	Yes+	mmol/L	Clotted/Li heparin

+ Available on-call
* Not available on-call

Paracetamol is a common analgesic that is frequently taken in overdose. Plasma paracetamol concentrations are used to determine potential hepatotoxicity and the need for treatment with N-acetylcysteine, based on the Prescott paracetamol nomogram.(Prescott) Paracetamol concentrations should be determined between 4-15 hours after acute overdose. **Beyond 15 hours post ingestion, paracetamol concentrations are unreliable** and the need for antidotal treatment must be considered based on history, reported ingested dose, and liver function abnormalities. **Plasma paracetamol concentrations cannot be interpreted following a staggered overdose** or chronic exposures. Clinicians should have a high index of suspicion in patients who present to the ED with intentional overdose / suicidal intent and a plasma paracetamol concentration should be determined for all these patients.(Sporer, Lucanie)

References

Prescott LF, Wright N, Roscoe P, Brown S. Plasma paracetamol half-life and hepatic necrosis in patients with paracetamol overdose. *Lancet* 1971;519-522

Sporer KA, Khayam-Bashi H. Acetaminophen and salicylate serum levels in patients with suicidal ingestion or altered mental status. *Am J Emerg Med.* 1996;14(5):443-6

Lucanie R, Chiang WK, Reilly R. Utility of acetaminophen screening in unsuspected suicidal ingestions. *Vet Hum Toxicol.* 2002;44(3):171-3

PARAQUAT (Serum)

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	mg/L	Serum or Li Heparin plasma

PARAQUAT (URINE)

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	N/A	Urine
Cork University Hospital	Yes+	N/A	Urine
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes+	N/A	Urine
Mayo General Hospital	Yes+	N/A	Urine
Mid Western Regional, Limerick	Yes+	Positive/negative	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Sligo General Hospital	Yes+	N/A	No additives
Waterford Regional Hospital	Yes+	N/A	Urine

+ Available on-call
* Not available on-call
N/A = Not applicable

Paraquat is a highly toxic quaternary bipyridyl non-specific contact herbicide. Ingestion of paraquat is associated with high mortality. All paraquat products were removed from the European market following a judgement of the European Court of First Instance in 2007.(Court of First Insance)

Plasma paraquat concentrations are useful prognostically and ideally should be carried out within 24-hours of ingestion. Quantitative analyses are usually provided by specialist laboratories, however a simple, inexpensive, fast, qualitative test can be carried out on urine samples.(Braithwaite) The qualitative urine test can assist with the diagnosis of paraquat poisoning especially if a patient presents with a history of poisoning with an unknown agrochemical.

INSTRUCTIONS FOR THE PARAQUAT URINE SPOT TEST

If the reagents are available, this spot test can be carried out in any laboratory.

FRESH REAGENTS MUST BE USED.

1. Add 0.1g Sodium Dithionite to 10mls of 1 Molar Sodium Hydroxide solution. (**NB:** this should be freshly prepared)
2. Add 1mL of this solution to 1 mL of urine.

If the solution turns:

- Blue within seconds – paraquat present (the darker the blue the greater the concentration.
- Pale green – low concentrations of paraquat or diquat are present.

References

Judgment of the Court of First Instance in Case T-229/04; Kingdom of Sweden v Commission of the European Communities.
http://curia.europa.eu/jurisp/cgi-bin/form.pl?lang=EN&Submit=rechercher&numaff=T-229/04

Braithwaite RA. Emergency analysis of paraquat in biological fluids. *Hum Toxicol.* 1987;6(1):83-6.

PHENCYCLIDINE (PCP)

Hospital name	Availability	Units	Specimen type
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine

NB: Please note that a PCP positive result may be a false-positive. Some dipstick assays may produce false positive results due to cross reactivity between substances.

PHENOBARBITONE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes+	mg/L	Serum
Children's University Hospital, Temple Street	Yes+	ug/mL	Serum/Plasma
Cork University Hospital	Yes+	umol/L	Clotted
Kerry General Hospital	Yes+	Not specified	Serum
Letterkenny General Hospital	Yes*	mg/L	Serum
Mater Misericordiae University Hospital	Yes+	mg/L	Serum /plasma
Mid Western Regional Hospital, Limerick	Yes*	Not specified	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Our Lady of Lourdes Hospital, Drogheda	Yes+	umol/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes*	umol/L	Li Heparin
Portiuncula Hospital, Ballinasloe	Yes+	ug/mL	Serum/Plasma
Sligo General Hospital	Yes+	ug/mL	Serum/Plasma
St James's Hospital	Yes+	umol/L	Serum/Plasma
Tallaght Hospital (AMNCH)	Yes+	mg/L	Serum/Plasma
Waterford Regional Hospital	Yes*	Not specified	Not specified

+ Available on-call
* Not available on-call

Phenobarbitone is a long-acting barbiturate with sedative-hypnotic and anticonvulsant properties. A therapeutic concentration can range from 15-40 µg/mL (65-170 µmol/L) but concentrations above 30-40 µg/mL are often associated with toxic symptoms.[Hvidberg, Gallagher] Tolerance can develop following chronic use and abuse. Serial plasma concentrations may be useful in the management of phenobarbitone overdose, especially when using methods of enhanced elimination (e.g. multiple dose activated charcoal, charcoal haemoperfusion).

References:

Hvidberg EF, Dam M. Clinical pharmacokinetics of anticonvulsants. *Clin Pharmacokinet.* 1976;1:161

Gallagher BB, Mattson RH. Primidone, diphenylhydantoin and phenobarbital. Aspects of acute and chronic toxicity. *Neurology* 1973;23:145

PHENYTOIN

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	umol/L	Serum
Beaumont Hospital	Yes+	mg/L	Serum
Children's University Hospital, Temple Street	Yes+	ug/mL	Serum/Plasma
Cork University Hospital	Yes+	umol/L	Clotted
Kerry General Hospital	Yes+	umol/L	Serum
Letterkenny General Hospital	Yes*	ug/mL	Serum
Louth County Hospital	Yes+	umol/L	Serum
Mater Misericordiae University Hospital	Yes+	mg/L	Serum
Mercy University Hospital	Yes+	umol/L	Serum
Mid Western Regional Hospital, Limerick	Yes*	umol/L	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Our Lady of Lourdes Hospital, Drogheda	Yes+	umol/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes*	umol/L	Li Heparin
Portiuncula Hospital, Ballinasloe	Yes+	ug/mL	Serum/Plasma
Sligo General Hospital	Yes+	ug/mL	Serum/Plasma
St James's Hospital	Yes+	umol/L	Serum/Plasma
St Vincent's University Hospital	Yes+	mg/L	Serum
Tallaght (AMNCH) Hospital	Yes+	mg/L	Serum/Plasma
University College Hospital, Galway	Yes+	umol/L	Serum
Waterford Regional Hospital	Yes+	ug/mL	Not specified

+ Available on-call
* Not available on-call

SODIUM VALPROATE

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	umol/L	Serum
Beaumont Hospital	Yes*	mg/L	Serum
Children's University Hospital, Temple Street	Yes+	mg/L	Serum/Plasma
Cork University Hospital	Yes+	umol/L	Clotted
Kerry General Hospital	Yes+	umol/L	Serum
Letterkenny General Hospital	Yes*	ug/mL	Serum
Mater Misericordiae University Hospital	Yes+	mg/L	Serum /Plasma
Mercy University Hospital	Yes+	umol/L	Serum
Mid Western Regional Hospital, Limerick	Yes*	umol/L	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Monaghan General Hospital	Yes+	umol/L	Clotted
Our Lady of Lourdes Hospital, Drogheda	Yes+	umol/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes*	umol/L	Li Heparin
Portiuncula Hospital, Ballinasloe	Yes+	umol/L	Serum/Plasma
Sligo General Hospital	Yes+	ug/mL	Serum/Plasma
St James's Hospital	Yes+	umol/L	Serum/Plasma
St Vincent's University Hospital	Yes+	mg/L	Serum
Tallaght Hospital (AMNCH)	Yes+	mg/L	Serum/Plasma
University College Hospital, Galway	Yes+	ug/mL	Serum
Waterford Regional Hospital	Yes*	ug/mL	Not specified

+ Available on-call
* Not available on-call

Sodium valproate (Valproic acid) is used as an anti-epileptic medication and also for the treatment of migraine headache and bipolar depression. Therapeutic concentrations range from 50-100 mg/L.

Some tablet formulations are slow-release so peak concentrations and toxicity can be delayed. Following overdose, there is poor correlation between serum concentrations and clinical features, however, severe toxicity is associated with concentrations >850mg/L.(Spiller) Clinical management is based on symptomatic and supportive care. Serum concentrations are not recommended routinely following overdose, however, patients should only be medically discharged if the valproic acid concentration is within the therapeutic range and there is resolution of clinical features.(Sztajnkrycer)

References:

Spiller HA, Krenzelok EP, Klein-Schwartz W, Winter ML, Weber JA, Sollee DR, Bangh SA, Griffith JR. Multicenter case series of valproic acid ingestion: serum concentrations and toxicity. *J Toxicol Clin Toxicol*. 2000;38(7):755-60

Szatajnkrycer MD. Valproic acid toxicity: overview and management. *J Toxicol Clin Toxicol*. 2002;40(6):789-801

TACROLIMUS

Hospital name	Availability	Units	Specimen type
Children's University Hospital, Temple Street	Yes+	ug/L	EDTA sample
St. James's Hospital	Yes+	ug/L	Serum/Plasma

TEICOPLANIN

Hospital name	Availability	Units	Specimen type
Mid Western Regional, Limerick	Yes+	mg/L	Serum

THEOPHYLLINE

Hospital name	Availability	Units	Specimen type
Bantry Hospital	Yes+	umol/L	Serum
Beaumont Hospital	Yes+	mg/L	Serum
Cork University Hospital	Yes+	umol/L	Not specified
Kerry General Hospital	Yes+	umol/L	Serum
Letterkenny General Hospital	Yes*	ug/mL	Serum
Louth County Hospital	Yes+	umol/L	Serum
Mater Misericordiae University Hospital	Yes+	mg/L	Serum/Plasma
Mercy University Hospital	Yes+	umol/L	Serum
Mid Western Regional Hospital, Limerick	Yes+	umol/L	Not specified
Midland Regional Hospital, Mullingar	Yes+	ug/mL	Clotted
Midland Regional Hospital, Portlaoise	Yes+	ug/mL	Serum
Our Lady of Lourdes Hospital, Drogheda	Yes+	umol/L	Serum
Portiuncula Hospital, Ballinasloe	Yes+	umol/L	Serum/Plasma
Sligo General Hospital	Yes+	ug/mL	Serum/Plasma
St James's Hospital	Yes+	umol/L	Serum/Plasma
St John's Hospital, Limerick	Yes+	ug/mL	Serum
St Vincent's University Hospital	Yes+	mg/L	Serum
Tallaght Hospital (AMNCH)	Yes+	mg/L	Serum/Plasma
University College Hospital, Galway	Yes+	ug/mL	Serum
Waterford Regional Hospital	Yes+	ug/mL	Not specified

+ Available on-call
* Not available on-call

Theophylline is used as a bronchodilator in the treatment of asthma, chronic obstructive airway disease, emphysema, and for neonatal apnoea in pre-term infants. Theophylline has a narrow therapeutic index and poisoning may be acute, chronic, or acute-on-chronic. A therapeutic concentration is 5-20µg/mL.

Theophylline is available as a slow release preparation so peak serum concentrations can be delayed. Mild toxicity is associated with concentrations between 20-40µg/mL, and severe toxicity occurs with concentrations >100µg/mL. Poisoning severity cannot be assessed on serum theophylline concentrations alone as clinical manifestations are variable and there are wide inter-individual differences in pharmacokinetics and pharmacodynamics.(Minton)

Plasma theophylline concentrations are useful for therapeutic drug monitoring and for providing diagnostic assistance and guiding management decisions following overdose, especially if the history is uncertain or the patient has severe toxicity.

Reference:

Minton NA, Henry JA. Acute and chronic human toxicity of theophylline. *Human and Experimental Toxicology* 1996;15:471-481

THYROXINE

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	pmol/L	Serum
Cavan General Hospital	Yes*	pmol/L	Serum
Children's University Hospital, Temple Street	Yes*	pmol/L	Serum
Connolly Hospital, Blanchardstown	Yes*	pmol/L	Serum
Cork University Hospital	Yes*	pmol/L	Clotted
Kerry General Hospital	Yes*	Not specified	Serum
Letterkenny General Hospital	Yes*	pmol/L	Serum
Louth County Hospital	Yes*	pmol/L	Not specified
Mater Misericordiae University Hospital	Yes*	pmol/L	Serum
Mid Western Regional Hospital, Limerick	Yes*	pmol/L	Not specified
Midland Regional Hospital, Mullingar	Yes*	Not specified	Clotted
Naas General Hospital	Yes*	pmol/L	Serum
Our Lady of Lourdes Hospital, Drogheda	Yes+	pmol/L	Serum
Our Lady's Hospital for Sick Children, Crumlin	Yes*	pmol/L	Li Heparin
Sligo General Hospital	Yes*	pmol/L	Serum/Plasma
St Colmcille's Hospital	Yes*	pmol/L	Serum
St James's Hospital	Yes*	nmol/L	Serum/Plasma
St Michael's Hospital Dun Laoghaire	Yes*	nmol/L	Serum/Plasma
St Vincent's University Hospital	Yes*	Not specified	Not specified
Tallaght Hospital (AMNCH)	Yes+	pmol/L	Serum/Plasma
University College Hospital, Galway	Yes*	pmol/L	Serum
Waterford Regional Hospital	Yes*	pmol/L	Not specified

+ Available on-call
* Not available on-call

TOBRAMYCIN

Hospital name	Availability	Units	Specimen type
Mid Western Regional, Limerick	Yes+	mg/L	Serum
University College Hospital, Galway	Yes*	mg/L	Serum/Plasma

TRICYCLIC ANTIDEPRESSANTS

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	Not specified	Not specified
Kerry General Hospital	Yes+	N/A	Urine
Letterkenny General Hospital	Yes*	N/A	Serum
Mallow General Hospital	Yes+	ng/mL	Urine
Mid Western Regional, Limerick	Yes*	Positive/negative	Not specified
Midland Regional Hospital, Portlaoise	Yes+	ng/mL	Urine
Midland Regional Hospital, Tullamore	Yes+	N/A	Urine
Portiuncula Hospital, Ballinasloe	Yes*	Not specified	Not specified

VANCOMYCIN

Hospital name	Availability	Units	Specimen type
Beaumont Hospital	Yes*	mg/L	PLASMA
Louth County Hospital	Yes+	mg/L	Serum
Mid Western Regional, Limerick	Yes+	mg/L	Serum
Midland Regional Hospital, Tullamore	Yes+	ug/mL	Serum
University College Hospital, Galway	Yes*	mg/L	Serum/Plasma

+ Available on-call
* Not available on-call
N/A = Not applicable

HEAVY METALS

ALUMINIUM

Hospital name	Availability	Units	Specimen type
Tallaght (AMNCH) Hospital	Yes*	umol/L	Serum

COPPER

Hospital name	Availability	Units	Specimen type
Cork University Hospital	Yes*	umol/L	Clotted
Tallaght (AMNCH) Hospital	Yes*	umol/L	Plasma
University College Hospital, Galway	Yes*	umol/L	EDTA blood

LEAD

Hospital name	Availability	Units	Specimen type
University College Hospital, Galway	Yes*	umol/L	EDTA blood

ZINC

Hospital name	Availability	Units	Specimen type
Cork University Hospital	Yes*	umol/L	Clotted (metal free)
Tallaght (AMNCH) Hospital	Yes*	umol/L	Plasma
University College Hospital, Galway	Yes*	umol/L	Whole blood/EDTA

+ Available on-call
* Not available on-call

CHEMICALS

The following quantitative chemical assays are all provided by the Toxicology Laboratory at Beaumont Hospital.

Assay	Units	Specimen type
Acetone	mg/dL	Plain serum clotted
Chloroform	mg/dL	Plain serum clotted
Ethyl acetate	mg/dL	Plain serum clotted
2-Propanol	mg/dL	Plain serum clotted
Toluene	mg/dL	Plain serum clotted

SOLVENTS

The following qualitative assays are all provided by the Toxicology Laboratory at Beaumont Hospital.

Assay	Units	Specimen type
Acetaldehyde	N/A	Plain serum clotted
1,2 Butanediol	N/A	Plain serum clotted
1,3 Butanediol	N/A	Plain serum clotted
1,4 Butanediol	N/A	Plain serum clotted
2,3 Butanediol	N/A	Plain serum clotted
Diethylene glycol	N/A	Plain serum clotted
3 Methyl 1,3 propanediol	N/A	Plain serum clotted
Methyl petanediol	N/A	Plain serum clotted
1,2 Propanediol	N/A	Plain serum clotted
1,3 Propanediol	N/A	Plain serum clotted
Triethylene glycol	N/A	Plain serum clotted

ASSAYS NOT CURRENTLY AVAILABLE IN HOSPITAL LABORATORIES.

Acyclovir
Baclofen
BZP (Benzylpiperazine)
Chloral hydrate
Clonidine
Clozapine
Hydroxybutyrate
Lignocaine
Lysergic acid (LSD)
Isoniazid
Phenothiazine screen
Primidone
Quinine
Serotonin
Streptomycin
Vibramycin
Thiocyanate
Cadmium
Chromium
Mercury
Thallium
Aniline

HOSPITAL CONTACT DETAILS

Bantry General Hospital Bantry, Co. Cork.	027 50133
Beaumont Hospital Beaumont Road, Dublin 9.	01 809 3000
Cavan General Hospital Lisdarn, Cavan.	049 437 6000
Connolly Hospital Blanchardstown, Dublin 15.	01 646 5000
Cork University Hospital Wilton, Cork.	021 454 6400
Kerry General Hospital Tralee, Co. Kerry.	066 718 4000
Letterkenny General Hospital Letterkenny, Co. Donegal.	074 912 5888
Louth County Hospital Dublin Road, Dundalk, Co. Louth.	042 933 4701
Mallow General Hospital Mallow, Co. Cork.	022 21251
Mater Misericordiae University Hospital, Eccles Street, Dublin 7.	01 803 2000
Mayo General Hospital Castlebar, Co. Mayo.	094 902 1733
Midland Regional Hospital, Tullamore Arden Road, Tullamore, Co. Offaly.	057 932 1501
Midwestern Regional Hospital Ennis Ennis, Co. Clare.	065 682 4464
Midwestern Hospital Regional Hospital Dooradoyle, Limerick.	061 301 1111
Midwestern Regional Hospital Mullingar Mullingar, Co. Westmeath.	044 93 40221
Midwestern Regional Hospital Portlaoise Portlaoise, Co. Laois.	057 862 1364

Mercy University Hospital Grenville Place, Cork.	021 427 1971
Monaghan General Hospital Monaghan, Co. Monaghan.	047 81811
Naas General Hospital Naas, Co. Kildare.	045 849 5000
Nenagh General Hospital Nenagh, Co. Tipperary.	067 31491
Our Lady's Hospital Navan, Co. Meath.	046 902 1210
Our Lady's Children's Hospital Crumlin, Dublin 12.	01 409 6100
Our Lady of Lourdes Hospital Drogheda, Co. Louth.	041 983 7601
Portiuncla Hospital Ballinasloe, Co. Galway.	090 964 8200
Roscommon County Hospital Roscommon Town.	090 662 6200
Sligo General Hospital The Mall, Sligo Town, Co. Sligo.	071 917 1111
St. Colmcille's Hospital Loughlinstown, Co. Dublin.	01 282 5800
St. James's Hospital P.O. Box 580, James's Street, Dublin 8.	01 410 3000
St. John's Hospital, St. John's Square, Limerick.	061 462 222
St. Luke's Hospital Freshford Road, Kilkenny.	056 778 5000
St. Michael's Hospital Dun Laoghaire, Co. Dublin.	01 280 6901

St. Vincent's University Hospital Elm Park, Dublin 4.	01 221 4000
South Infirmary / Victoria Hospital Old Blackrock Road, Cork.	021 492 6100
South Tipperary General Hospital Clonmel, Co. Tipperary.	052 617 7000
Tallaght Hospital (Adelaide & Meath Hospital incorporating the National Childrens Hospital) Tallaght, Dublin 24.	01 414 2000
Temple Street Children's University Hospital, Temple Street, Dublin 1.	01 878 4200
University Hospital Galway, Newcastle Road, Galway.	091 524 222
Waterford Regional Hospital Dunmore Road, Waterford.	051 848 000
Wexford General Hospital Wexford Town, Co. Wexford.	053 914 1910

SUGGESTED READING

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Laboratory analyses for poisoned patients: joint position paper. Thomas SH. Watson I. National Poisons Information Service and Association of Clinical Biochemists. *Ann Clin Biochem.* 2002; 39(4): 328-339

National academy of clinical biochemistry laboratory medicine practice guidelines: recommendations for the use of laboratory tests to support poisoned patients who present to the emergency department. Wu AH, McKay C, Broussard LA *et al*. *Clin Chem*. 2003;49(3):353-4.

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Hard copies of this document are available to download at;

www.poisons.ie

DISCLAIMER

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The National Poisons Information Centre operates 24-hours/day and is available for advice regarding the management of poisoned patients.

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