



Treatment Approach for Clinicians on Chemical Poisoning

Dr Cindy Stephen
13 November 2024

Overview


Approach to poisons treatment

Chemical poisonings

Resources

Case studies


Poison Information Helpline [0861 555 777]

 Western Cape Government

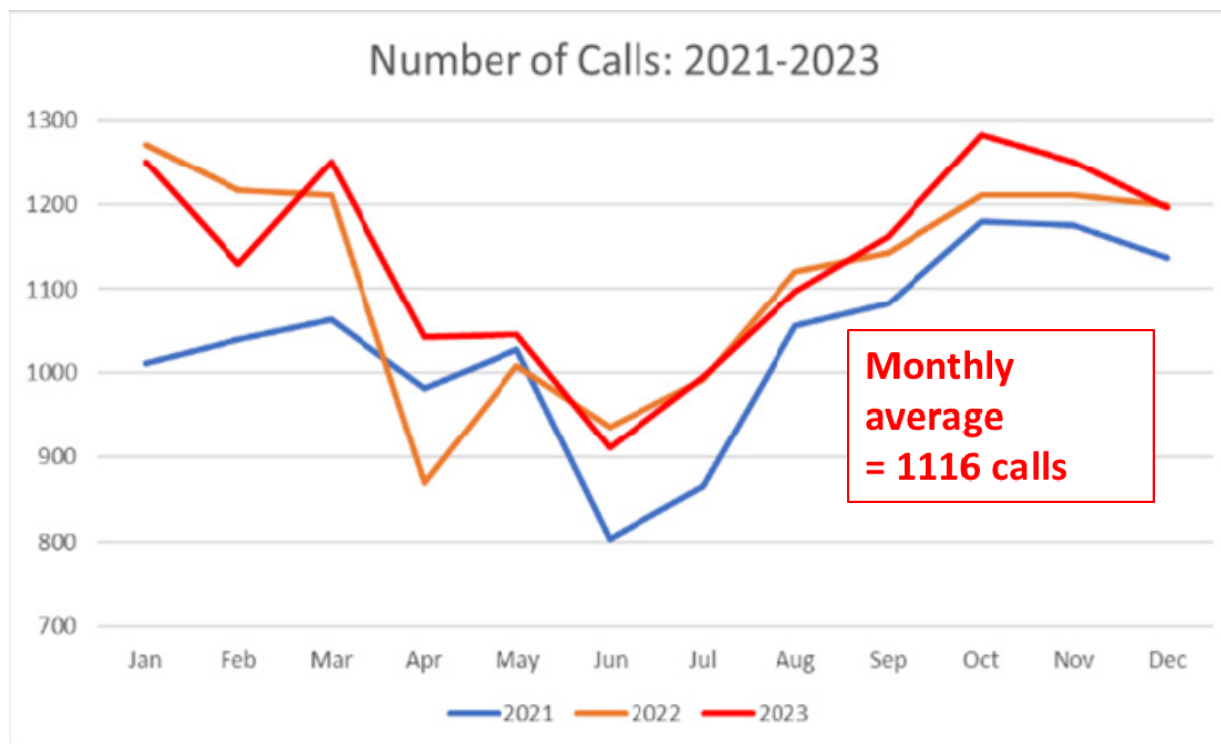
**POISONS INFORMATION
HELPLINE**

0861 555 777

Supported by the
Western Cape Government

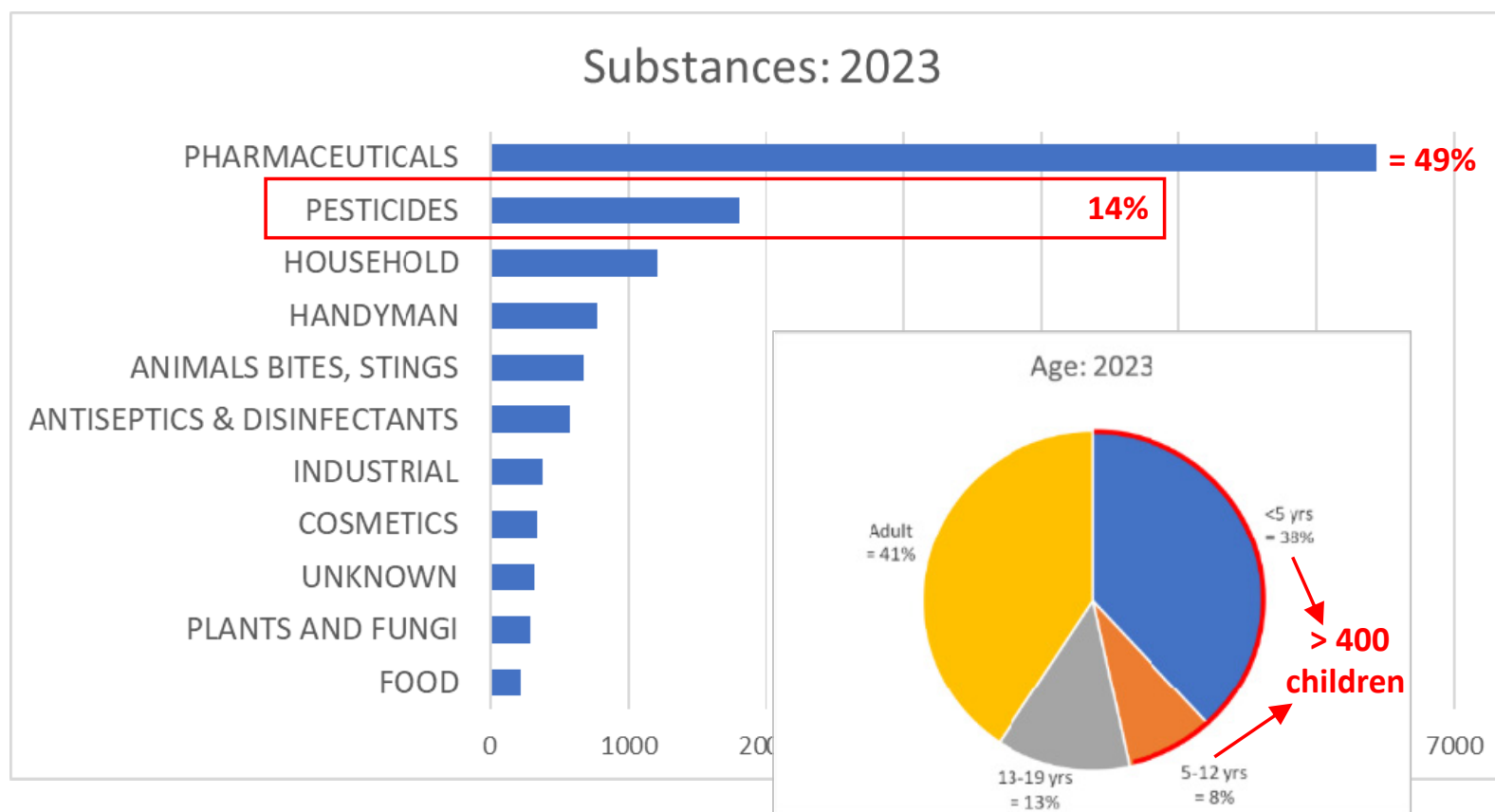


For
Members of the Public
and Health Practitioners
throughout South Africa

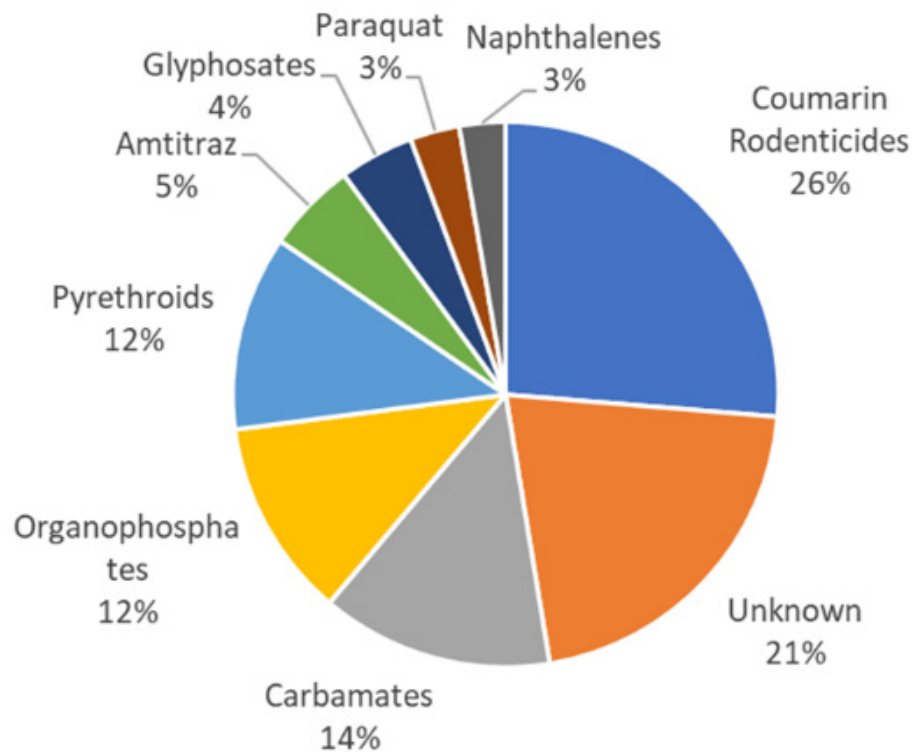


- Poison Centre collaboration
- 2/3 health workers
- All provinces and beyond
- 24-hour service

Chemical Exposures: 2023 PIH data



Pesticides: 2023



Deaths = 7

Paraquat

- 25 yr M – Intentional – Hlabeni, KZN
- 45 yr F – Intentional – KwaMhlanga, MP
- 23 yr M – Accidental – Seshego, LP
- 16 yr F – Intentional – Polokwane, LP
- 12 yr M – Intentional – Estcourt, KZN

Organophosphates

- 1yr 4month F – Accidental – Cape Town, WC

Aluminium Phosphide

- Adult M – Intentional – Gqeberha, EC



General approach to managing the poisoned patient

Acute care is critical

Treat the patient not the poison!

- ABCDE - Recognise
 - respiratory failure
 - shock
- Provide
 - oxygen, secure the airway, ventilation
 - IV fluids
 - inotropes, anti-arrhythmics, if needed
- Treat
 - hypoglycemia: 10% dextrose IV bolus
 - convulsions: benzodiazepines



1. Take a good history

- It is SO important
- Calculate the **TOXIC DOSE**
= dose at which most people will experience toxicity



ONE PILL CAN KILL

Tricyclic antidepressants	Quinolones	Sulphonylureas
Amphetamines	Calcium channel blockers	Opioids
Theophylline	Propranolol	

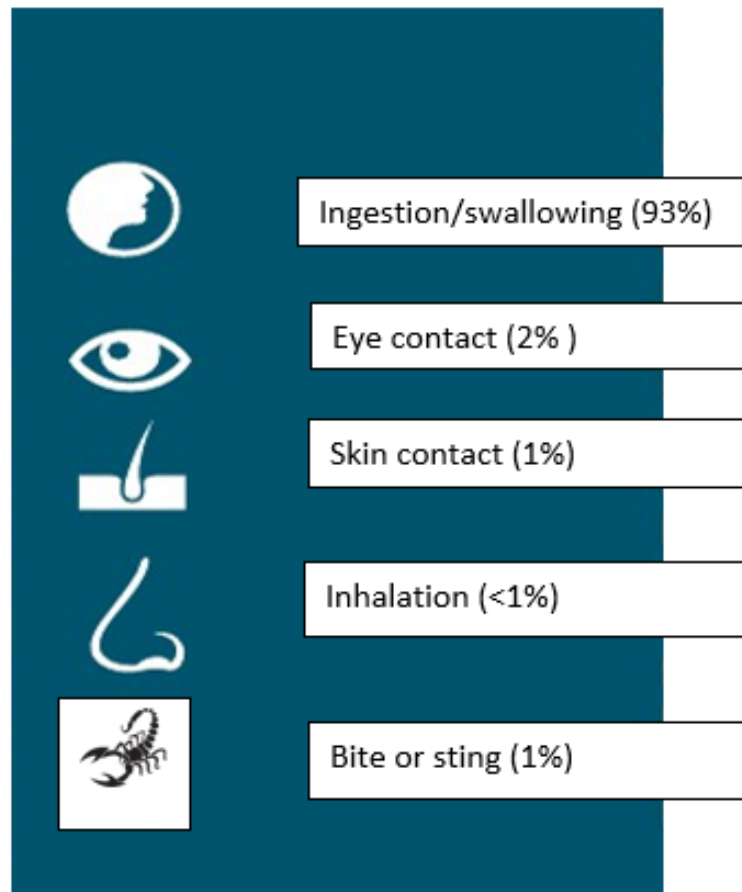
Don't know what it is?
Ask the **family** if there are any known medications...
Ask the **paramedic** if there was anything at the scene...
Ask the **GP** if there's any known prescriptions for the family...

Still don't know?
Use an online pill checker like at www.drugs.com
e.g. Amphetamines? Search for Pill Imprint - cor 132, Colour = blue, Shape = round

What's next?
Check www.TOXBASE.org for further directions
Disclaimer: this is NOT a comprehensive list of all potentially fatal one-dose drugs.

em3.org.uk @EM3FOAMed

2. Routes of exposure



3. Examination - Toxidromes

ANTICHOLINERGICS e.g. antihistamines, atropine, Amanita pantherina

"hot as a hare, blind as a bat, dry as a bone and mad as a hatter."

Agitation, hallucination, dilated pupils, fever, flushing, **dry mouth/skin**, urinary retention

SYMPATHOMIMETICS e.g. cocaine, amphetamine, nasal decongestants

Agitation, hallucination, dilated pupils, **sweating**, tremor, seizures, tachycardia, hypertension

OPIATES e.g. narcotics

Coma, pin-point pupils, hypothermia, hypotension

SEDATIVES e.g. benzodiazepines, alcohol

Coma, dilated pupils, hypothermia, hypotension

CHOLINERGICS e.g. organophosphates/carbamates

Pin-point pupils, bradycardia, fasciculations, salivation, wheezing, bronchorrhoea, incontinence

4. Reduce absorption

- External decontamination
 - Skin
 - Eyes
- Gut decontamination
 - **NEVER** induce vomiting
 - Single-dose activated charcoal
 - In **rare** circumstances:
 - Gastric aspiration/lavage
 - WBI (whole bowel irrigation)



5. Supportive care, Investigations & Antidotes

- **Supportive care**

- Respiratory, CVS
- Kidney, Liver
- Seizures

- **Investigations:** as directed by presentation!



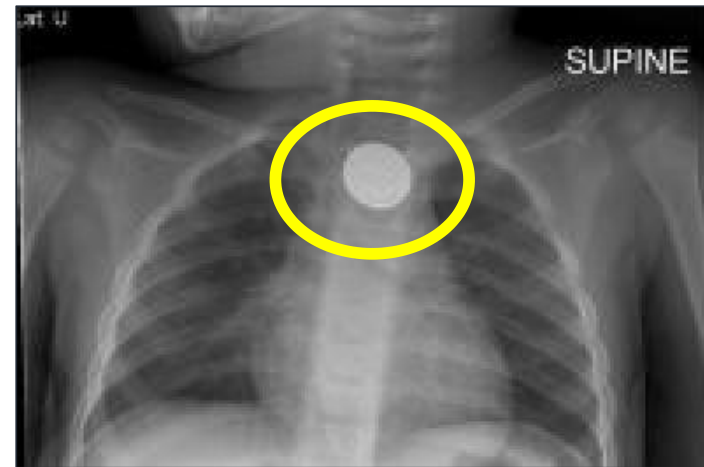
- **Antidotes: in minority of poisonings... only if indicated**

Drug	Antidote
Anti-cholinesterase	atropine
Benzodiazepines	flumazenil
Cardiodepressants	glucagon (BBs), calcium (CCBs)
Iron	desferroxamine
Isoniazid	pyridoxine
Lead	D-penicillamine, BAL, calcium EDTA
Opioids	naloxone
Paracetamol	N-Acetyl cysteine (NAC)

Chemical poisonings

- Household products
 - Paraffin
 - Corrosives
 - Button batteries
- Heavy metals
 - Lead and mercury
- PESTICIDES

Household products



Heavy metals – lead & mercury

Chemical form

Route of exposure

- Neurotoxin
- Diagnosis = simple
- TREATMENT

- Prevent further exposure

= lead- & mercury-free environment

- Supportive care
- Chelation



Pesticides

- Regulated

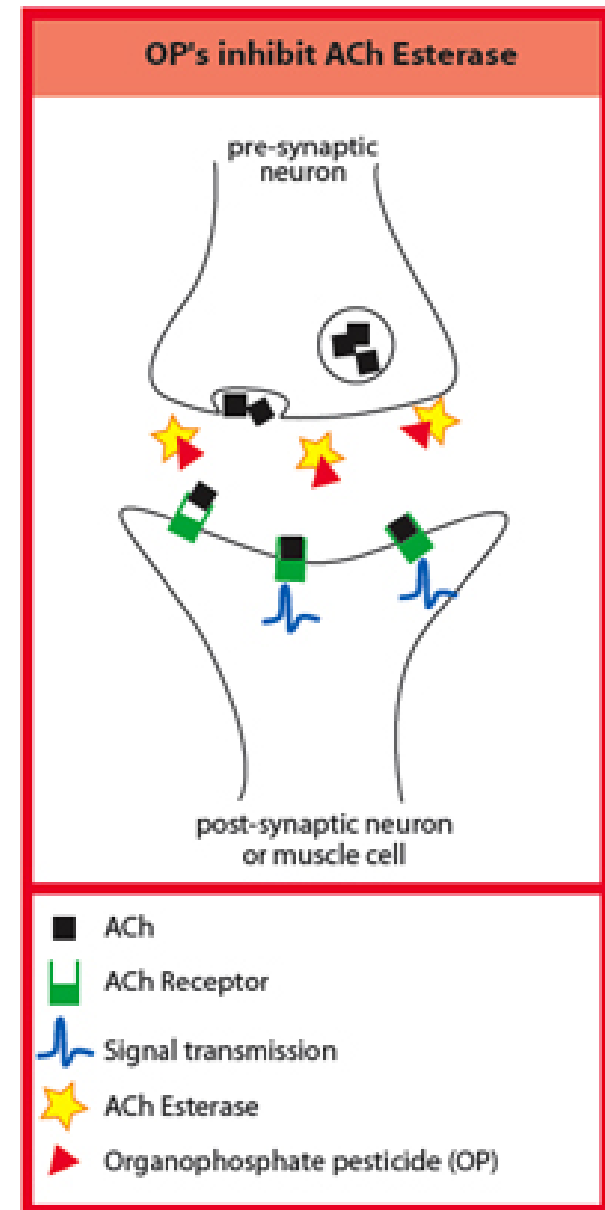


- “Street” pesticides



Cholinergic poisoning

- Organophosphates and carbamates
- Central effects
 - coma, confusion, convulsions
- Peripheral effects
 - *Muscarinic overstimulation*:
salivation, lacrimation, vomiting, diarrhoea,
increased bronchial secretions, bronchospasm,
bradycardia, hypotension and pin point pupils
 - *Nicotinic overstimulation*:
muscle weakness and fasciculations,
tachycardia, hypertension, dilated pupils.



Organophosphates & Carbamates

NB: respiratory support and atropine

- Respiratory support
 - Mechanical ventilation
 - When intubating, do NOT use suxamethonium or mivacurium
- Atropine
 - Boluses: adult 2mg, child 0.05mg/kg
 - Assess drying of respiratory secretions, dry skin, increasing heart rate and BP, pupil dilatation (often delayed)
 - Incremental dosing: no response, double dose; some response, same dose
 - E.g. adult: 2mg, 4mg, 8mg, 16mg, 32mg (no maximum dose)
 - Infusion: 20% of total bolus dose to achieve atropinisation per hour

Organophosphates

- decontamination

- Staff
 - Resuscitate in a well-ventilated room
 - Universal precautions – gloves, gowns, eye protection
 - Exposure to body fluids, wash off immediately
- Patient
 - Remove clothes and double bag
 - Wash body with soap and water



Amitraz

- Insecticide used for livestock dipping
- Toxicity can be confused with OPP, and patients may be given toxic amounts of atropine.
- Respiratory depression due to a reduced level of consciousness requires urgent supportive care.



Paraquat

- One of the most toxic poisons!
- Poisoning characterised by
 - early gastrointestinal symptoms - vomiting, mouth lesions
 - later - pulmonary fibrosis, renal failure, hepatotoxicity
- Diagnosis = urine test
- Activated charcoal early
- Supportive care but mortality remains high

Aluminium phosphide

- Protects grain stores from rodents and insects
- Rapid multi-organ failure

Aluminium phosphide (tank pill) poisoning in the Transkei region of South Africa: a case report

B L Meel MD MPhil HIV/AIDS Management

Clinical Toxicology (2009) 47, 89–100
Copyright © Informa UK, Ltd.
ISSN: 1556-3650 print / 1556-9519 online
DOI: 10.1080/15563650802520675

REVIEW ARTICLE

Aluminium and zinc phosphide poisoning

ALEX T. PROUDFOOT

National Poisons Information Service (Birmingham Unit), City Hospital, Birmingham, UK

Resources

Resources

What to do when

0861 555 777

POISONS
INFORMATION
HELPLINE



KnowledgeHub

Your Professional Development Platform

[Home](#) \ [Standard Treatment Guidelines and Essential Medicines List](#)

Standard Treatment Guidelines and Essential Medicines List

AfriTox

Red Cross Hospital Poisons
Information Centre
poisonsinformation@uct.ac.za



Search



Toxic Groups



Standard Guidelines



Toxic Groups |



Toxic Groups | Pesticides - Unidentified

Pesticides - Unidentified

This is a Toxic Group.

[Use | Type](#) | [Symptoms](#) | [Treatment](#) | [Standard Guidelines](#) | [Single Toxins](#) | [Information](#)

⊕ Toxic Group

ⓘ Use | Type



ⓘ Symptoms



ⓘ Treatment

Print



ⓘ Standard Guidelines

Print



EMGUIDANCE

ONLINE [or DESKTOP]

www.afritox.co.za

Welcome to AfriTox

Your first stop for **POISONS INFORMATION**. Supported by the Red Cross Children's Hospital.

Not every accidental ingestion of a toxic substance needs emergency treatment in hospital. AfriTox is a uniquely South African poisons information database which gives doctors immediate information about how to manage poisonings.

AfriTox is for everybody



Saving Lives

AfriTox helps doctors in Southern Africa treat patients exposed to any substance in our region. It focuses on local medicines and commercial products (using South African trade names), local plants, bites and stings. The treatment protocols are tailored to local conditions, are clearly presented and easy to interpret.



Social Responsibility

Nobody wants to be the cause of a tragedy, but accidents happen. Products can be misused and can cause harm. If manufacturers tell us what is in their products, we can tell doctors precisely how safe or toxic the products are. Very few manufacturers refuse to help us. Obviously we keep the information confidential. We've done that for 40 years.



Support

Generous financial support from individual donors, a few companies and The Children's Hospital Trust has enabled the Poisons Information Centre to grow AfriTox steadily over the years. We now serve the whole of South Africa. Donor funding is key to keeping AfriTox afloat. If you can help, ask us about our projects and email us at afritox@uct.ac.za.



Access

AfriTox poisons information database can only be used by registered health practitioners. For this reason access is limited to subscribers only. Members of the public needing advice on possible poisoning need to phone the Poisons Information Helpline of the Western Cape on +27 861 555 777 (24 hours).

<https://www.nicd.ac.za/nmc-overview/nmc-resources/>

NOTIFICATION PROCESS

NMC RESOURCES

NMC COVID-19 DOCUMENTS

NMCSS DATA
INTERPRETATION

MONTHLY SURVEILLANCE
REPORT

TUTORIAL VIDEOS

CONTACTS

PRIVACY POLICY

Comprehensive definitions of notifiable medical conditions across
along with an informative brochure for user reference.

NMC Case Definitions- Category 1

NMC Case Definitions- Category 2

NMC Case Definitions- Category 3

NMC Case Definitions- Category 4

NMC Brochure

NMC CASE REPORTING FORMS & PROCEDURES

Essential forms and standard operating procedures for reporting notifiable
conditions, along with guidance on proper completion.

CATEGORY 2 NMC



Must be reported through a written or electronic notification within 7 days of clinical or laboratory diagnosis, but preferably as soon as possible following diagnosis.

Agricultural or stock remedy poisoning

Bilharzia (schistosomiasis)

Brucellosis

Congenital syphilis

Haemophilus influenzae type B

Hepatitis A

Hepatitis B

Hepatitis C

Hepatitis E

Lead poisoning

Legionellosis

Leprosy

Maternal death (pregnancy, childbirth, puerperium)

Mercury poisoning

Soil transmitted helminths (*Ascaris Lumbricoides*,
Trichuris trichiuria, *Ancylostoma duodenale*, *Necator americanus*)

Tetanus

Tuberculosis: pulmonary

Tuberculosis: extra-pulmonary

Tuberculosis: multidrug-resistant (MDR-TB)

Tuberculosis: multidrug-resistant (MDR-TB)

Pesticides = "agricultural or stock remedy poisoning"



NOTIFIABLE MEDICAL CONDITIONS (NMC) CASE DEFINITIONS FLIPCHART

Category 2: Written or electronic notification within 7 days of diagnosing a case. The case must be notified following laboratory confirmation

AGRICULTURAL OR STOCK REMEDY POISONING

Disease epidemiology	Who must notify	Clinical case definition (Suspected case)	Probable case definition	Confirmed case definition
<p>A pesticide (e.g. an agricultural or stock remedy) is any chemical substance, or mixture of substances, intended to kill, repel, or control forms of plant or animal life considered to be pests, or to regulate plant growth. Pesticides include herbicides, insecticides, fungicides, rodenticides, repellents. Pesticides are potentially toxic to humans and the environment, and can have both acute and chronic health effects, depending on the quantity and ways in which a person is exposed. Some pesticides can remain in soil and water for years.</p> <p>The toxicity of a pesticide depends on its function, formulation and the route of exposure (i.e. ingestion, inhalation, or direct contact through the skin or eyes).</p> <p>Pesticide poisoning can be classified as occupational, if exposure occurs while at work, or non-occupational, which includes exposure at home as well as</p>	<p>The health care provider making the clinical diagnosis for a suspected, probable or confirmed case. Clinicians should not wait for laboratory confirmation before notifying.</p>	<p>Must satisfy ONE criterion in EACH category listed below:</p> <ol style="list-style-type: none"> Pesticide exposure <ol style="list-style-type: none"> Report of acute pesticide exposure, from a patient or witness Health effects <ol style="list-style-type: none"> Health care provider documenting ≥ 2 new post-exposure symptoms Cause-effect relationship <p>The health effects must:</p> <ol style="list-style-type: none"> not be associated with any other likely explanation <p>AND</p> <ol style="list-style-type: none"> occur within a reasonable time period after exposure 	<p>Must satisfy ONE criterion in EACH category listed below:</p> <ol style="list-style-type: none"> Pesticide exposure <ol style="list-style-type: none"> If criterion as for a Suspected case, must have Health effects criterion as for Confirmed case Health effects <ol style="list-style-type: none"> If criterion as for a Suspected case, must have Pesticide exposure criterion as for Confirmed case Cause-effect relationship <p>The health effects must:</p> 	<p>Must satisfy ONE criterion in EACH category listed below:</p> <ol style="list-style-type: none"> Pesticide exposure <ol style="list-style-type: none"> Observation of residue/odour by health care provider Clinical response to treatment or antidote (e.g. atropine) OR clinical description by a health care provider of ≥ 2 post-exposure health effects (at least 1 of which is a sign) characteristic for the pesticide Laboratory test demonstrating physiologic response to pesticide (e.g. prolonged clotting or pseudocholinesterase level below normal laboratory range) Health effects <ol style="list-style-type: none"> Health care provider documenting ≥ 2 characteristic signs Health care provider documenting ≥ 3 new post-exposure characteristic symptoms

Heavy metals

LEAD:

- Lead concentration
Blood \geq 5ug/dL

MERCURY:

- Mercury concentrations
Urine \geq 10ug/L
Blood \geq 10ug/L

CATEGORY 2 NMC



Must be reported through a written or electronic notification within 7 days of clinical or laboratory diagnosis, but preferably as soon as possible following diagnosis.

Agricultural or stock remedy poisoning

Bilharzia (schistosomiasis)

Brucellosis

Congenital syphilis

Haemophilus influenzae type B

Hepatitis A

Hepatitis B

Hepatitis C

Hepatitis E

Lead poisoning

Legionellosis

Leprosy

Maternal death (pregnancy, childbirth, puerperium)

Mercury poisoning

Soil transmitted helminths (*Ascaris Lumbricoides*,

Trichuris trichiuria, *Ancylostoma duodenale*, *Necator americanus*)

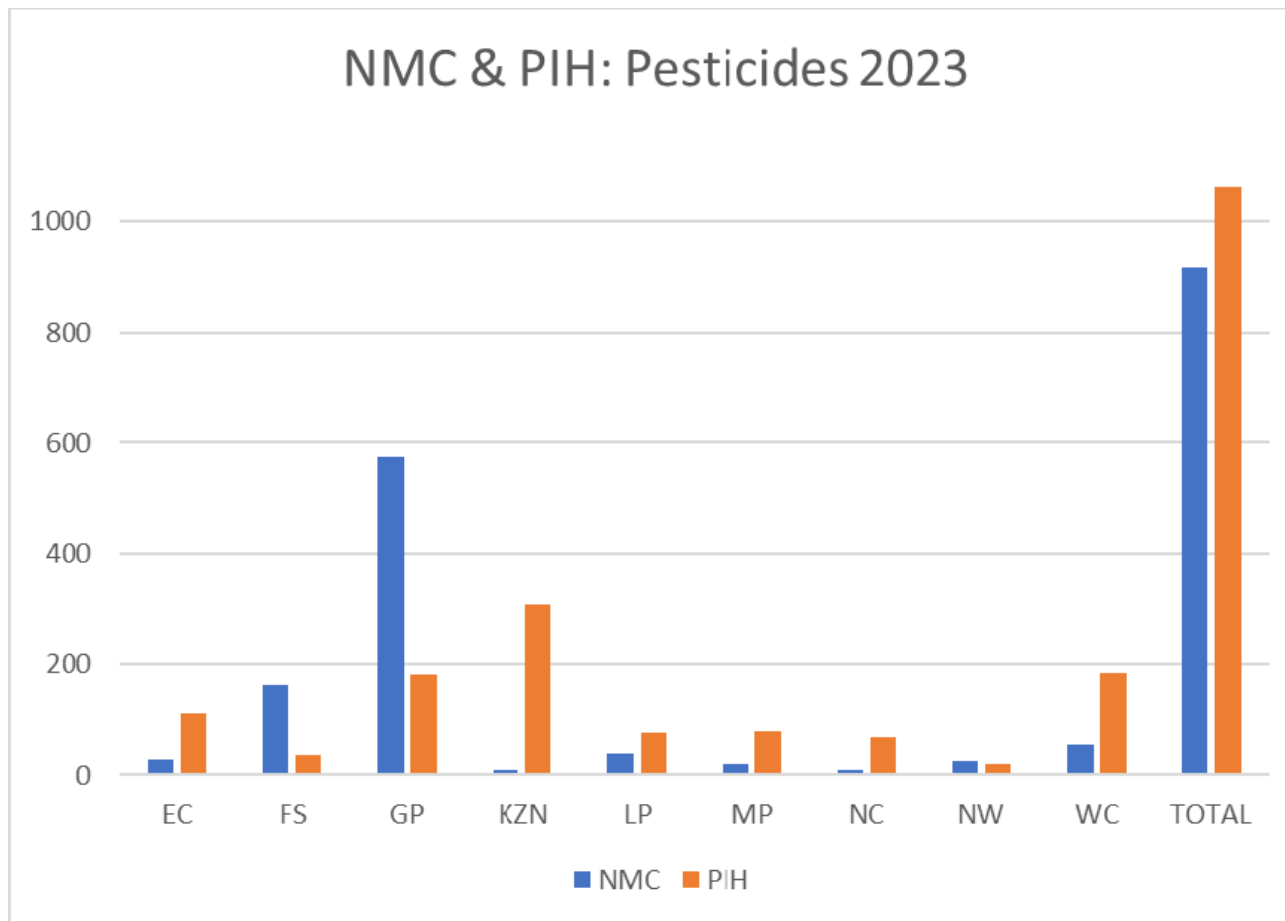
Tetanus

Tuberculosis: pulmonary

Tuberculosis: extra-pulmonary

Tuberculosis: multidrug-resistant (MDR-TB)

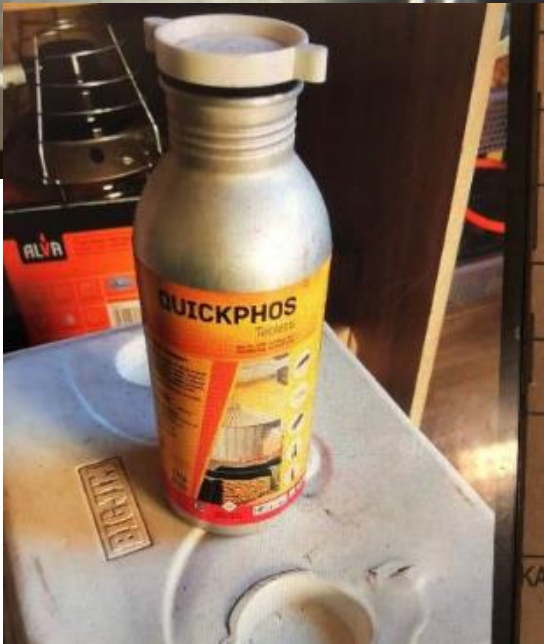
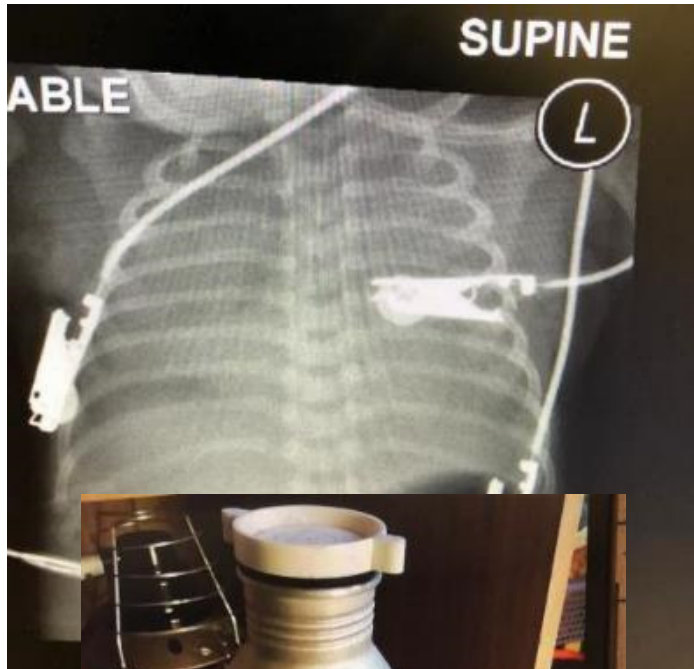
NMC (NICD) vs PIH: 2023



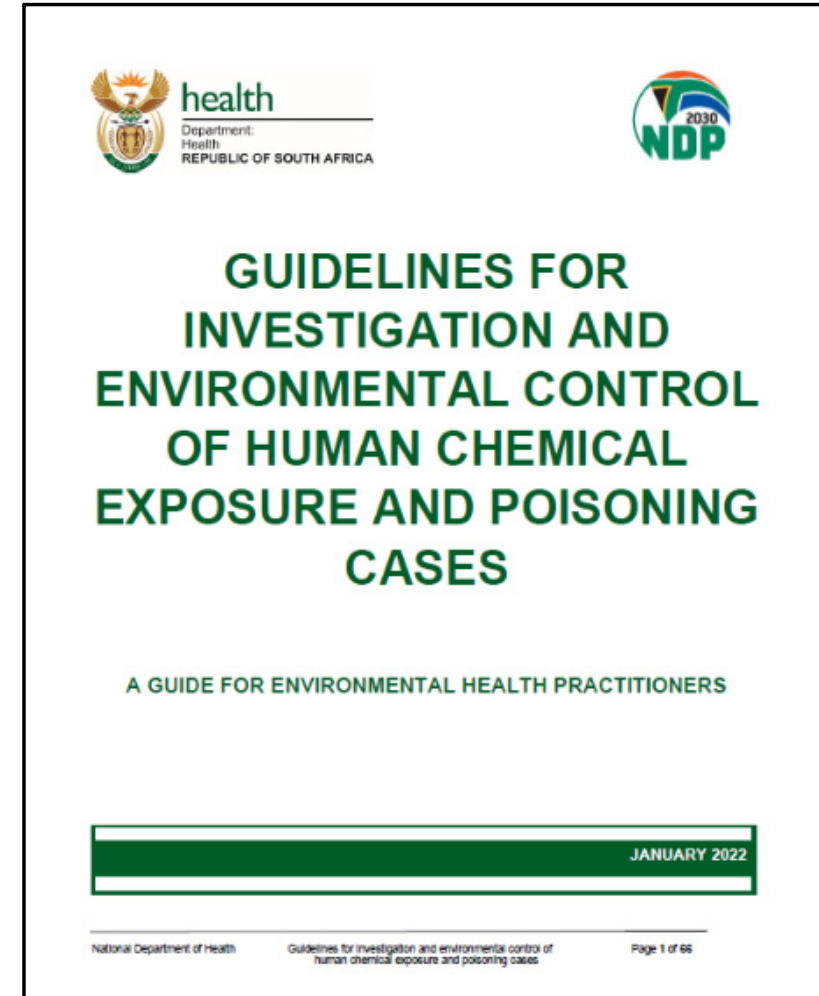
	NMC		PIH	
	2022	2023	2022	2023
Pesticides	720	917	1007	1063
Lead	2	5	2	1
Mercury	2	0	2	2

NMC = 55 pesticide
deaths
CFR 5,6%

Case studies



Full Blood Count:			
White Cell Count	1.19 L	$\times 10^9/L$	
Red Cell Count	5.48 H	$\times 10^{12}/L$	
Haemoglobin	15.0	g/dL	
Haematocrit	0.460	L/L	
MCV	84.0	fL	
MCH	27.4	pg	
MCHC	32.6 L	g/dL	
Red Cell Distribution Width	13.8	%	
Platelet Count	136 L	$\times 10^9/L$	
MPV	8.5	fL	
Differential Count:			
\$ White Cell Count	1.17 L $\times 10^9/L$		
\$ Neutrophils	25.60 L %	0.30 L %	
\$ Lymphocytes	61.50 H %	0.72 L %	
\$ Monocytes	12.00 H %	0.14 L %	
\$ Eosinophils	0.00 %	0.00 L %	
\$ Basophils	0.90 %	0.01 L %	
\$ Immature Cells	1.70 %	0.02 L %	
White Cell morphology comment:			
Neutropenia			
Lymphopenia			



Aluminium phosphide

Mercury and lead poisoning

CHELATION						7-11 October	
	25-Aug	12-Sep	29-Sep	03-Oct	04-Oct	11-Oct	18-Oct
Hg - urine (ug/L)	260,65	76,15			3,57	2276,31	27,63
Hg - Corrected (ug/g creat)	512,04	197,99				1749,82	62,63
Hg - blood (ug/L)	40,97	12,21		2,81	4,96		5,29
Pb - urine (ug/L)					0,67		
Pb - blood (ug/dL)			6,72				



Used with permission

Key messages

- Symptomatic and supportive treatment is the mainstay of care
- Resources
 - Poisons Information Helpline 0861 555 777
 - AfriTox www.afritox.co.za
 - NDoH STG & EML
- Pesticide poisonings result in severe morbidity and even mortality
- Notifiable poisoning conditions: pesticides, lead and mercury

CHAPTER 19 POISONING		
POISONS INFORMATION CENTRES		
Poisons Information Helpline (national service)		
Red Cross War Memorial Children's Hospital Poisons Information Centre Email: poisonsinformation@uct.ac.za http://www.paediatrics.uct.ac.za/poisons-information-centre	24/7	0861 555 777
Tygerberg Poisons Information Centre Email: toxiconomy@sun.ac.za www.sun.ac.za/poisoncentre		
University of the Free State Poison Control and Medicine Information Centre	24/7	082 491 0160
Telephone numbers tested April 2022		
Access poisons information at: https://www.afritox.co.za/ The Afritox database is available free of charge to public hospitals in South Africa. If the above centres cannot be contacted, enquire at the nearest trauma and emergency unit.		
ENVENOMATION		
Envenomation is an instance of poisoning by venom resulting from a bite or sting from an animal such as a snake, spider, scorpion, insect, or marine life.		
South African Vaccine Producers (SAVP):	Office hours: (011) 396 6062/6063/6078	



AfriTox



Thank you!



cindy.stephen@uct.ac.za

www.afritox.co.za

Poisons Information Helpline: 0861-555-777