

Paracetamol Overdose in Children (under 18 years)

Toxicity from paracetamol exposure is dependent on many variables including the amount of paracetamol ingested, the type of exposure (i.e. staggered, single ingestion over less than one hour or supratherapeutic dosing) and the time since exposure. Patients with clinical features of hepatic injury such as jaundice or hepatic tenderness should be treated urgently with acetylcysteine. Acetylcysteine is most effective if given **within 8 hours** of paracetamol ingestion.

Symptoms/signs in paracetamol overdose

- Extremely common: nausea, vomiting and abdominal pain
- Very rarely: coma and severe metabolic acidosis in patients who have ingested extremely large paracetamol doses
- Later features in severe cases (12-36 hours): abdominal pain.
- After 2-3 days: features of hepatic necrosis with right subcostal pain and tenderness, nausea, vomiting, jaundice, acute kidney injury and hepatic encephalopathy.
- Abnormal LFTs, metabolic acidosis, hypoglycaemia, elevated creatinine.

All information for management/dosing/investigations can be found on [Toxbase](#).

Children under the age of 6 years:

- All neonates (under 28 days) must be discussed with the National Poisons Information Service (NPIS)
- If the child has **ingested <150mg/kg** it is unlikely that serious toxicity will occur and, in the **absence of symptoms**, they **do not need investigation**, unless there is uncertainty about the dose ingested or the circumstance of ingestion.

Children aged 6 years and over:

- If the patient has **ingested <75mg/kg**, it is unlikely serious toxicity will occur and, in the **absence of symptoms**, they **do not need investigation**, unless there is uncertainty about the dose ingested or the circumstance of ingestion.

Always consider:

- The background to the overdose
- Where intentional overdose has taken place, medical management should take place in parallel with mental health assessment using the mental health triage matrix tool and referral should be made to the CAMHS team.
- Safeguarding should be considered in all cases – **a health visitor form must be completed**.
- If there are any doubts about the management of a complex or unusual clinical presentation, advice for each individual case should be sought from www.toxbase.org and the NPIS (0344 892 0111).
- If the patient is being admitted for the treatment, then please ensure all acetylcysteine is prescribed to reduce potential delays in infusions.

Glucose 5% is the preferred diluent; sodium chloride 0.9% can be used if glucose 5% is not suitable – see Toxbase and Medusa for administration information.

Use the [21-hour acetylcysteine regime](#) in all children.

Acute Overdose

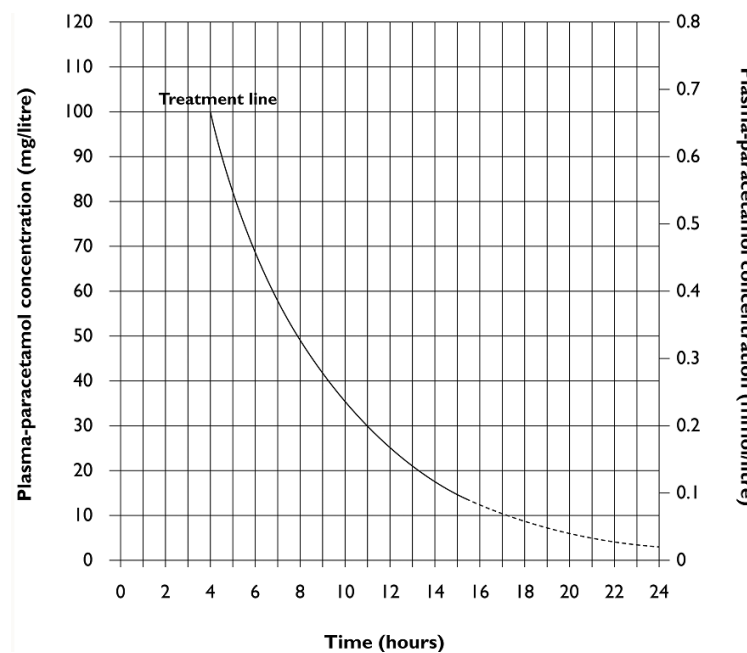
Acute overdose = ingestion of a potentially toxic dose of paracetamol in ≤ 1 hour.

Consider **activated charcoal** if the child presents **within 1 hour of ingesting paracetamol $>150\text{mg/kg}$** .

In all children presenting after ingesting **$>75\text{mg/kg}$** (or $>150\text{mg/kg}$ if <6 years old), **blood tests** should be taken at **4 hours post-ingestion** (or immediately if ingestion over 4 hours earlier). Blood tests should include: U&Es, creatinine, bicarbonate, LFTs, INR and FBC and plasma-paracetamol concentration.

The plasma-paracetamol concentration should be plotting of the paracetamol treatment graph.

- In obese children $>110\text{kg}$, use a body-weight of **110kg** (rather than actual body-weight) when calculating the total potentially toxic paracetamol dose ingested.



Acetylcysteine treatment should be started in children:

- Whose plasma-paracetamol **concentration falls on or above the treatment line** or presenting **<8 hours of ingestion** of $>150\text{mg/kg}$ paracetamol if there will be a **delay of >8 hours** in obtaining the paracetamol concentration
 - [Children \$<6\$ years](#), [Children \$>6\$ years](#)
- Who present **8-24 hours after ingestion** of $>150\text{mg/kg}$ paracetamol, even if plasma-paracetamol concentration is not yet available
 - [Children \$<6\$ years](#), [Children \$>6\$ years](#)
- Who present **>24 hours after ingestion** of an overdose if they are clearly **jaundiced**, have **hepatic tenderness**, their **ALT is above the upper limit of normal**, or their **INR is >1.3** , or the **paracetamol concentration is still detectable**
 - [Children \$<6\$ years](#), [Children \$>6\$ years](#)
- Consider acetylcysteine in children presenting <24 hours of overdose if blood tests suggest acute liver injury, even if paracetamol concentration is below treatment line
- If the child is not at risk of liver toxicity (paracetamol level below treatment line/undetectable, INR and ALT are normal, and patient is asymptomatic), acetylcysteine is not indicated and can be discontinued if started

21-hour acetylcysteine regime in children <40kg (Toxbase)

Prepare the infusions as below, then give the **appropriate volume for the weight of the child**:

- **1st Infusion** – Prepare a 50mg/ml solution by diluting each 10ml ampoule of NAC with 30ml 5% glucose or 0.9% NaCl to give a total volume of 40ml.
- **2nd/3rd Infusion** – Prepare a 6.25mg/ml solution by diluting each 10ml ampoule of NAC with 310ml 5% glucose or 0.9% NaCl to give a total volume of 320ml.

	First infusion		Second infusion		Third infusion	
NAC dose	150 mg/kg		50 mg/kg		100 mg/kg	
Infusion	50 mg/ml for 1hour		6.25 mg/ml for 4 hours		6.25 mg/ml for 16 hours	
Patient weight (kg)	Total infusion volume (ml)	Infusion rate (ml/h)	Total infusion volume (ml)	Infusion rate (ml/h)	Total infusion volume (ml)	Infusion rate (ml/h)
1	3	3	8	2	16	1
2	6	6	16	4	32	2
3	9	9	24	6	48	3
4	12	12	32	8	64	4
5	15	15	40	10	80	5
6	18	18	48	12	96	6
7	21	21	56	14	112	7
8	24	24	64	16	128	8
9	27	27	72	18	144	9
10-14	38	38	100	25	208	13
15-19	53	53	140	35	288	18
20-24	68	68	180	45	368	23
25-29	83	83	220	55	448	28
30-34	98	98	260	65	528	33
35-39	113	113	300	75	608	38

21-hour acetylcysteine regime in children >40kg (Toxbase)

	First infusion		Second infusion		Third infusion	
NAC dose	150 mg/kg		50 mg/kg		100 mg/kg	
Infusion fluid	200ml 5% glucose or 0.9% NaCl		500ml 5% glucose or 0.9% NaCl		1000ml 5% glucose or 0.9% NaCl	
Duration of infusion	1 hour		4 hours		16 hours	
Patient weight (kg)	Ampoule volume (ml)	Infusion rate (ml/h)	Ampoule volume (ml)	Infusion rate (ml/h)	Ampoule volume (ml)	Infusion rate (ml/h)
40-49	34	234	12	128	23	64
50-59	42	242	14	129	28	64
60-69	49	249	17	129	33	65
70-79	57	257	19	130	38	65
80-89	64	264	22	131	43	65
90-99	72	272	24	131	48	66
100-109	79	279	27	132	53	66
>110	83	283	28	132	55	66

Therapeutic excess or staggered overdose

Children who have ingested **>150mg/kg** of paracetamol in any 24-hour period are at **risk of serious toxicity**. Doses consistently **<75mg/kg** in any 24-hour period are very **unlikely to be toxic**, however risk may be increased if this dose is repeatedly ingested >2 days.

Children with clinical features of **hepatic injury** (jaundice or hepatic tenderness) should be **treated urgently with acetylcysteine**. For other children, management is determined by the maximum dose of paracetamol ingested in any 24-hour period.

A **staggered overdose** involves ingestion of a potentially toxic dose of paracetamol **>1 hour**, with the possible intention of causing self-harm. All children who have ingested a staggered overdose should be **treated with acetylcysteine** without delay (see [Toxbase guideline on staggered overdose](#)).

Clinically significant hepatotoxicity is unlikely and the child is not considered to be at risk if:

- >4 hours since the last paracetamol ingestion
- No symptoms suggesting liver damage
- Paracetamol concentration is <10mg/L
- ALT is in the normal range
- INR is <1.3

Acetylcysteine can be discontinued in children not considered to be at risk of clinically significant liver damage.