Patient Label, or
Name: DoB: Hospital number: CHI:

Multi Disciplinary Care Pathway for

INGESTION OF A THERAPEUTIC EXCESS OF PARACETAMOL

(ingestions of excessive paracetamol with intent to treat pain or fever and without self-harm intent)

This care pathway includes the **ADULT** SNAP based regimen for acetylcysteine and is **ONLY** for use in **NHS LOTHIAN**

For advice contact the on-call toxicologist at the RIE (Monday – Friday 8.30 am - 6 pm) or the National Poisons information Service Tel 0344 892 0111 (out of hours)

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To be initiated once an INGESTION OF THERAPEUTIC EXCESS OF PARACETAMOL is suspected

(ingestions of excessive paracetamol with intent to treat pain or fever, without self-harm intent)

*KEY TO INITIALS OF **ALL** STAFF COMPLETING THIS CARE PATHWAY*				
Print name	Designation	Initials	Signature	Date
1				
2				
3				
4				
5				

PATIENT: This document is a supplement to your record of treatment for an admission with a suspected or confirmed ingestion of a therapeutic excess of paracetamol.

STAFF: Should be completed in addition to the Inpatient Record (nursing admission, medical clerking, Toxicology Questionnaire), NEWS observation chart, ED shock chart, Infusion charts and Prescription & Administration Record.

SUMMARY	**Initials & time**
Reason for the ingestion of a therapeutic excess of paracetamol…….....……	
Was the patient aware of the correct therapeutic dose of paracetamol? Yes ☐ No ☐	
If yes, why was an excess ingested?	
Therapeutic excess ingested from Date..... Time……...……	
Last dose ingested Date..... Time……...……	
List all drugs ingested (including brand names ie lemsip) and the quantity of each……...……	
…….....	
.....……...….	
Total paracetamol ingested……....g over .....hours/days	
CALCULATE:	
Total paracetamol ingested (in any 24-hour period)	
……..mg Patient's weight……..kg Amount ingested…….mg/kg	
Comments…….....	
.....……..	
Notes: **For obese patients weighing more than 110 kg**, the toxic dose in mg/kg should be calculated using 110 kg, rather than the patient's actual weight. **For pregnant patients** the toxic dose in mg/kg should be calculated using the patient's pre-pregnancy weight	
There is a dosage calculator on TOXBASE® for calculating mg/kg.	

Please tick boxes as appropriate and initial / time in conjunction with the Inpatient record

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Therapeutic excess (ingestions of a dose greater than the licensed daily dose AND more than or equal to 75 mg/kg/24 hours for the treatment pain or fever without self-harm intent

In dental patients tooth extraction should **not** be carried out prior to investigations and treatment (if necessary) due to the increased risk of bleeding

STAGE 1 - IMMEDIATE ASSESSMENT AND MANAGEMENT

	Initial & time
Assessment of hepatic injury Clinical features of hepatic injury (jaundice or hepatic tenderness)? Yes ☐ No ☐ **If yes,** • **START ACETYLCYSTEINE IMMEDIATELY** (Refer to SNAP based dosage table on Page 5) ☐ • Obtain blood samples for paracetamol concentration, U&Es, TCO_2, LFTs, INR, FBC ☐	
If no, • ASSESS FOR RISK OF LIVER DAMAGE Paracetamol ingested in any 24-hour period.....mg/kg (see calculation on page 2) **If maximum dose is more than 75 mg/kg in any 24-hour period** ☐ • Obtain blood samples for paracetamol concentration, U&Es, TCO_2, LFTs, INR, FBC, **at least 4 hours** after the last ingestion ☐ **If maximum dose is more than licensed 24-hour dose for the patient (e.g. 4g in an adult) but less than 75 mg/kg/24 hours over the preceding 2 days or more** ☐ Risk of toxicity is extremely small but consider blood tests for paracetamol concentration, U&Es, TCO_2, LFTs, INR, FBC **at least 4 hours** after the last ingestion especially if: • **there is doubt about the doses ingested, OR** ☐ • **other factors are present that may increase the risk of hepatoxicity, such as:** o long term treatment with carbamazepine, phenobarbital, phenytoin, rifampacin, St John's Wort or other drugs that induce liver enzymes ☐ o regular consumption of alcohol in excess of recommended amounts ☐ o likely glutathione depletion e.g. eating disorders, cystic fibrosis, HIV, starvation, cachexia ☐ **If maximum dose is consistently less than the licensed 24-hour dose for the patient (e.g. 4g in an adult) AND consistently less than 75 mg/kg over the preceding 24-hour period** ☐ • **Blood tests are not needed**, and the patient can be discharged (also see "Subsequent Management & Discharge Advice" at end of this document)	
On receipt of blood results assess risk of hepatotoxicity (document on page 4) ☐ • Clinically significant hepatotoxicity is unlikely if **at least 4 hour or more** after the last ingestion: - Paracetamol concentration less than 10 mg/L, **AND** - ALT is within normal range (50 U/L or less), **AND** - INR is 1.3 or less, **AND** - The patient has no clinical features suggesting liver damage • If these criteria are met then acetylcysteine if not required ☐ • If these criteria are met and acetylcysteine has been started it can be discontinued ☐ • **If these criteria are not met start acetylcysteine** (refer to SNAP dosage regimen on page 5) ☐	
Assessment of renal function • If acetycysteine is not required and the creatinine is normal the patient can be discharged ☐ Provide the patient with a 'Patient Information Sheet' (available on TOXBASE) • If acetylcysteine is not required and the creatinine is abnormal the patient should remain in hospital for monitoring of renal function and if required, treated conventionally ☐	
The underlying clinical reason for chronic excess dosage should always be considered	

Medical staff of grade FY2 or above <u>must</u> review blood results prior to discontinuing therapy Results reviewed by ……Date……..Time……. Acetylcysteine discontinued Yes ☐ No ☐	Initial & time
If acetylcysteine is not indicated or discontinued and further blood sampling is not required, go to Stage 4 'Subsequent Management & Discharge' [page 8]	

If you complete an entry on this page, initial as you complete each aspect of care then complete the 'KEY TO INITIALS' table on page 1 sign/print/designation.

Assessment blood results Date/Time of sample	**Repeat blood results (if required)** Date/Time of sample
Urea	Urea
Sodium	Sodium
Potassium	Potassium
TCO_2	TCO_2
Creatinine	**Creatinine**
eGFR	eGFR
Bilirubin	Bilirubin
ALT	**ALT**
Alk Phos	Alk Phos
Hb	Hb
MCV	MCV
WCC	WCC
Platelets	Platelets
INR	**INR**
Plasma paracetamol concentration……..……...	**Plasma paracetamol concentration……..……..……**
Other	Other
Initials date / time	Initials date / time

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STAGE 2 – INITIATION OF TREATMENT WITH ACETYLCYSTEINE

FOR OBESE PATIENTS WEIGHING more than 110 kg
Calculate acetylcysteine dose using 110 kg rather than the patient's actual weight

FOR PREGNANT PATIENTS
Calculate acetylcysteine dose using the patient's actual pregnant weight

THIS SNAP BASED DOSAGE TABLE IS ONLY FOR USE IN NHS LOTHIAN

Adult acetylcysteine prescription

(each ampoule = 200 mg/mL acetylcysteine)

Regimen	First Infusion		Second Infusion	
Infusion fluid	200 mL 5% glucose[1] or sodium chloride 0.9%		1000 mL 5% glucose[1] or sodium chloride 0.9%	
Duration of infusion	2 hours		10 hours	
Drug dose	100 mg/kg acetylcysteine		200 mg/kg acetylcysteine	
Patient Weight[2]	Ampoule volume[3]	Infusion Rate	Ampoule volume[3]	Infusion Rate
kg	mL	mL/h	mL	mL/h
30-39	18	109	35	104
40-49	23	112	45	105
50-59	28	114	55	106
60-69	33	117	65	107
70-79	38	119	75	108
80-89	43	122	85	109
90-99	48	124	95	110
100-109	53	127	105	111
≥110	55	128	110	111

[1] Check capillary blood glucose at least once in all patients, and 4-hourly in patients with diabetes

[2] Dose calculations are based on the weight in the middle of each band

[3] Ampoule volume has been rounded up to the nearest whole number.

Extended treatment – continue acetylcysteine at the dose and infusion rate used in the 2nd treatment bag

Patient's weight …….. kg	
Prescription and Administration record completed ☐	
Date/time treatment commenced	Initial

REACTION to acetylcysteine				**COMPLICATIONS of paracetamol ingestion**			
None	☐	Wheeze	☐	Abnormal liver function	☐	Encephalopathy	☐
Flushing	☐	Hypotension	☐	Acute kidney injury	☐	Haemorrhage	☐
Vomiting	☐	Other	☐	Hypoglycaemia	☐	Other	☐
Rash/Itch	☐	Specify……		Acidosis	☐	Specify…….……	
Date and time of reaction		Initial		Date and time of complication		Initial	

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STAGE 3 – END OF TREATMENT WITH ACETYLCYSTEINE

- **End bag 2 blood samples**
  U&Es, TCO_2, LFTs, FBC, INR & **PARACETAMOL CONCENTRATION**

• **End of bag 2 blood results -** documented in table below	☐	Initial & time

Blood results

	Admission Bloods	**End of bag 2 bloods**	**End of extended bag 1 bloods**	**End of extended bag 2 bloods**	**End of extended bag 3 bloods**
Notes	* Copy from page 4	Obtain blood samples at the end of bag 2	Obtain blood samples at the end of extended bag 1	Obtain blood samples at the end of extended bag 2	Obtain blood samples at the end of extended bag 3
		Date/time taken Initial	Date/time taken Initial	Date/time taken Initial	Date/time taken Initial
Urea					
Sodium					
Potassium	*				
TCO_2					
Creatinine	*				
eGFR					
Bilirubin					
ALT	*				
Alk. Phos					
Hb					
WCC					
Platelets					
INR	*				
Paracetamol	*				
Reviewed by Decision		Initial Continue / stop	Initial Continue / stop	Initial Continue / stop	Initial Continue / stop

END OF BAG 2 bloods review:

- **Criteria for DISCONTINUING acetylcysteine after Bag 2 are:**
  ALT is less than 50 U/L **AND**
  ALT is less than double the admission measurement (even within normal range) **AND**
  PARACETAMOL concentration is less than 10 mg/L
- **If criteria are NOT met continue with extended acetylcysteine**

***Patients with isolated INR rise of less than 0.5**

For patients who have an isolated INR rise of less than 0.5, stop acetylcysteine and recheck INR and ALT after 4-6 hours.

- **Criteria for DISCONTINUING acetylcysteine at this point are:**
  INR is unchanged or falling **AND**
  ALT is less than 50 U/L
- **If criteria not met – restart acetylcysteine at the dose and infusion rate of the last treatment bag.**

If creatinine is abnormal or is 10% greater than at presentation, further acetylcysteine is not required but renal function should be monitored as an inpatient. Re-check 12 hours later.

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• **End of bag 2 blood results reviewed by medical staff (of grade FY2 and above)** • **Decision to discontinue or continue acetylcysteine documented in the table above and on page 7**	☐ ☐	Initial & time

STAGE 3 – END OF TREATMENT WITH ACETYLCYSTEINE

If criteria for discontinuing acetylcysteine at end of Bag 2 are met: • **Discontinue** acetylcysteine. Time infusion discontinued.....	☐ ☐	Initial
Decision • If further treatment or blood sampling is not required go to Stage 4 'Subsequent Management & Discharge'(page 8) • If monitoring of renal function is required obtain blood samples 12 hours later followed by a medical review • **If extended acetylcysteine is indicated follow advice below**	☐ ☐ ☐	Initial & time

If criteria for discontinuing acetylcysteine at the end of Bag 2 are NOT met: • **Continue** extended acetylcysteine treatment at the dose and infusion rate of bag 2 (page 5) • Obtain blood samples for U&Es, TCO_2, LFTs, FBC & INR at the end of extended bag 1 • Extended bag 1 bloods due at …..……..... obtained at ….....….	☐ ☐ ☐ ☐	Initial & time

End of Extended bag 1 bloods review:

- **Criteria for DISCONTINUING acetylcysteine after extended bag 1 are:**

  INR is 1.3 or less and has not risen by 0.5 or more from admission measurement* **AND**

  ALT is less than two times the upper limit of normal (less than 100 U/L) **AND**

  ALT is less than double the admission measurement

- **If the criteria for discontinuing are NOT met continue with further extended acetylcysteine**

If creatinine is abnormal or is 10% greater than at presentation, further acetylcysteine is not required but renal function should be monitored as an inpatient. Re-check 12 hours later.

***Patients with isolated INR rise of less than 0.5**

For patients who have an isolated INR rise of less than 0.5, stop acetylcysteine and recheck INR and ALT after 4-6 hours.

- **Criteria for DISCONTINUING acetylcysteine at this point are:**

  INR is unchanged or falling **AND**

  ALT is less than two times the upper limit of normal (less than 100 U/L)

Otherwise commence 2nd extended bag of acetylcysteine

• **End of extended bag 1 blood results reviewed by medical staff (of grade FY2 and above)** • **Decision to discontinue or continue acetylcysteine documented in the table on page 6 and in the decision box below**	☐ ☐	Initial & time
Decision • If further treatment or blood sampling is not required go to Stage 4 'Subsequent Management & Discharge'(page 8) • If renal function monitoring is required obtain samples 12 hours later followed by medical review • **If further extended acetylcysteine is indicated follow advice below**	☐ ☐ ☐	Initial & time

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If further extended treatment is required:

		Initial & time
• Continue acetylcysteine at the dose and infusion rate used in the 2nd treatment bag (Page 5)	☐	
• Ward level capillary blood glucose monitoring (BMs) at least four times daily	☐	
• Recheck U&Es, LFTs, FBC and INR every 9 hours to assess the course of liver injury (1 hour before the end of each extended bag). Document results on page 6	☐	

Discontinue further extended treatment when:

- INR 1.3 or less; OR falling towards normal on two consecutive blood tests, and less than 3.
- There is no clinical advantage to treating ALT rises after this normalisation in INR (indicating restoration of hepatic synthetic function)

			Initial & time
Extended treatment with acetylcysteine was required If YES, number of extended bags required ……	Yes ☐	No ☐	

Once treatment with acetylcysteine is discontinued and further blood tests are not required go to Stage 4 'Subsequent Management & Discharge' (page 8)

STAGE 4 – SUBSEQUENT MANAGEMENT & DISCHARGE

		Initial/time
Target Treatment with acetylcysteine tolerated • Patient eating and drinking. • Seen by Psychiatry team member Comment……	N/A ☐ Yes ☐ No ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐	
Discharge • Treatment complete • Criteria for discharge met Comment…… • Discharge advice given, **including paracetamol patient discharge sheet** (available on TOXBASE®) • NOK informed Comment…… Left department Date…….. Time……..	N/A ☐ Yes ☐ No ☐ Yes ☐ No ☐ ☐ Yes ☐ No ☐	
Follow-up • Has follow-up been arranged? Comment……	N/A ☐ Yes ☐ No ☐	

Notes	Medical follow-up arrangements are not normally required if blood results are within acceptable range