# Flowchart: Hypercalcaemia in Paediatric Oncology

<table>
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<th>Version:</th>
<th>1</th>
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<tr>
<td>Approval Committee:</td>
<td>Wessex PIER Regional Guideline Governance Group</td>
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<td>Date of Approval:</td>
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<tr>
<td>Ratification Group (eg Clinical network):</td>
<td>Wessex Paediatric Oncology Network</td>
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<tr>
<td>Date of Ratification</td>
<td>2/5/18</td>
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<tr>
<td>Signature of ratifying Group Chair</td>
<td>Juliet Gray</td>
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</table>
| Author’s and job titles | Claire Fosbrook: Paediatric Oncology Pharmacist  
Editor: Dr Amy Mitchell  
Paediatric Oncology Consultant, |
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| Relevant national or international Guidance eg NICE, SIGN, BTS, BSPED |  |
| Consultation document completed: see Appendix A |  |
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| Does this document replace or revise an existing document? If so please identify here which document/s | Paediatric Oncology Supportive Care Guidelines S Bevin Version 1, |
1.1 Introduction

1.2 Scope
This guideline applies to all paediatric oncology patients in the Wessex region. It does not apply to neonates on neonatal units.

1.3 Purpose
Children receiving treatment at the Southampton Paediatric Oncology Principal Treatment Centre (PTC) have open access to the designated Paediatric Oncology Ward at either the PTC or their Paediatric Oncology Shared Care Unit (POSCU) Hospital. Their parents/carers will be in possession of contact details for these wards and have been instructed to contact them for any medical problems that arise while they are receiving treatment. These Guidelines are intended for the use of the medical teams at the PTC or POSCU. If one of the Paediatric Oncology patients presents to a medical service outside of the PTC or POSCU, please contact the medical teams at the PTC or POSCU for advice.

2 Implementation
Network updated at Network meeting of changes in guideline.

3 Process for Monitoring Effectiveness
Reduced variation in practice has been shown to improve outcomes. Please detail how the impact of this guideline will be measured to demonstrate it’s effectiveness and identify areas for further development. Where possible this should include patient reported outcomes.

4 References: London supportive care guidelines

5 Appendices
Appendix A Paediatric Regional Guideline Consultation Documentation:
Appendix A

Paediatric Regional Guideline Consultation Documentation
Paediatric Oncology Consultants (UHS):

The Wessex paediatric oncology network have agreed that new guidelines being developed by the Wessex paediatric oncology supportive care guidelines working party can be ratified as follows:

All documents are edited by Dr Amy Mitchell and all are approved by at least 1 other Paediatric Oncology Consultant. Any controversial issues are brought before the MDT and final sign off is by the Network Lead Dr Juliet Gray.

On this basis the region accept the use of these guidelines for the management of their shared care paediatric oncology patients.

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<tr>
<th>Name of person consulted* (print)</th>
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<tr>
<td>Dr Juliet Gray</td>
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<td>Dr Gary Nicolin</td>
<td>Dr Gary Nicolin</td>
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<td>Dr Amy Mitchell</td>
<td>Dr Amy Mitchell</td>
<td>4/5/18</td>
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* this person agrees they have read the guidelines, consulted with relevant colleagues and members of MDT, managers and patients, young people & their families as appropriate. Any queries raised during consultation and review process should be documented with responses and any changes made to guideline.

$ this can be electronic for ease
HYPERCALCAEMIA SUSPECTED
This occurs relatively rarely in children with cancer. A normal total calcium level may represent hypercalcaemia if the patient has a low serum albumin. If the result is not consistent with the clinical scenario then repeat.

NORMAL LEVEL
Observe and repeat Ca level if indicated

Corrected calcium = measured Ca + {0.01 x (38-serum albumin)} mmol/l
Blood gas: Ionised calcium normal range 1.15-1.29 mmol/L

IF CONFIRMED, DEFINE SEVERITY
MILD/MODERATE (<3) OR SEVERE (>3 mmol/l)
Identify aetiology and check for symptoms and signs. Urgency of correction depends on how low calcium is and on presence of symptoms/signs
Measure: PO4, PTH, Urea & electrolytes, Albumin
Check for ECG changes: Shortened QTc

Symptoms and signs of hypercalcaemia
Polyuria and thirst • Anorexia, nausea and constipation • Mood disturbance, cognitive dysfunction, confusion and coma • Renal impairment • Shortened QT interval and dysrhythmias • Nephrolithiasis, nephrocalcinosis • Pancreatitis • Peptic ulceration • Hypertension, cardiomyopathy • Muscle weakness

IS THIS A CLINICAL EMERGENCY?
NO: Mild to moderate and asymptomatic <3 mmol/l
Normally well tolerated with good hydration

- Advise about maintaining good hydration, provided there are no contraindications (such as severe renal impairment or heart failure).
- Reassure that a low calcium diet is not necessary, as intestinal absorption of calcium is usually reduced.
- Check child’s medications and ensure not taking supplements which could exacerbate it

YES: Severe and/or Symptomatic > 3 mmol/l
Initiate IV therapy and seek specialist advice

- Hyperhydrate with 3l/m²/day 0.9% saline
- Monitor for fluid overload if renal impairment
- Loop diuretics rarely used and only if fluid overload develops; not effective for reducing serum calcium
- May need to consider dialysis if severe renal failure
- Once hydrated, consider use of bisphosphonates
- Consider short term use of corticosteroids in lymphoma
- Seek advice from Paediatric Endocrinology team who may consider calcimemetics, calcitonin or emergency parathyroidectomy

CONSIDER THE LIKELY CAUSE OF HIGH CALCIUM
90% is due to primary hyperparathyroidism or malignancy
Other causes include:
- Thiazide diuretics
- Rhabdomyolysis
- Tertiary hyperparathyroidism
- Thyrotoxicosis
- Hypervitaminosis D
- Lithium
- Immobilisation
- Non-malignant granulomatous disease
- Adrenal insufficiency
- Milk-alkali syndrome
- Hypervitaminosis A
- Theophylline toxicity
- Familial hypocalciuric hypercalcaemia
- Phaeochromocytoma