Identification and management of children with cancer and low-risk febrile neutropenia (RCH use ONLY)

1. Background

In children with cancer and fever and neutropenia (FN) an infection or serious medical complication is documented in less than half of all episodes. The risk of infection or complication may be assessed using the 'Swiss Paediatric Oncology Group (SPOG) risk index that has been validated at the Royal Children's Hospital, Melbourne. Children with low-risk FN may be managed safely at home with oral or intravenous antibiotics. This has been shown to improve quality of life and reduce healthcare expenditures.

2. Risk stratification

The following criteria below need to be fulfilled to be suitable for assessment with the SPOG risk index.

Table 1: SPOG risk index

Criteria	Eligible	Not eligible
Neutropenia ANC of < 1.0 X 10^9/L	☐ Yes	☐ No
Fever of ≥ 38.0ºC	☐ Yes	☐ No
Cancer or haematological malignancy	☐ Yes	☐ No
All criteria needs to be fulfilled to continue with SPOG index		

2.1 SPOG clinical decision rule

All children admitted to hospital with fever (≥ 38.0ºC) and neutropenia (ANC < 1.0 x 10^9 cells/L) should be risk stratified using the SPOG clinical decision rule (CDR) (Table 2). The risk score must be documented in the electronic medical record. This includes patients who may already be admitted and who develop FN while an inpatient and who are not already on any antimicrobials (excluding prophylactic antimicrobials). The SPOG score is based on the FBE blood results at the time of the initial onset of fever.

The SPOG rule is applied after an overnight period of observation. Total score <u>less than 9</u> indicates the patient is at <u>low risk of adverse event</u> (AE). An AE is defined as a serious medical complication (death, complication requiring ICU and potentially life-threatening complication as judged by the treating physician) as a result of infection, microbiologically defined infection (positive bacterial or fungal culture from a normally sterile site and detection of a viral antigen by PCR) or radiologically confirmed pneumonia.

Table 2: SPOG Clinical Decision Rule

SPOG Variables	SCORE
Preceding chemotherapy more intensive than ALL maintenance	4
Haemoglobin ≥ 90 g/L	5
Total white cell count < 0.3 x10^9/L	3
Platelet <50 x10^9/L	3

3. Eligibility for early transfer to Hospital-In-The-Home (HITH)

Patients with FN and identified as low risk using the SPOG rule (i.e. score <9) may be suitable for transfer to HITH within 24 hours of admission (Table 3). The patient will require outpatient monitoring and antibiotics (Table 4), via HITH, until resolution of fever and evidence of marrow recovery (see 5.2).

Table 3: Eligibility criteria for early transfer to HITH (must be YES to all to proceed to HITH):

Criteria	Eligible	Not eligible
Disease status. Leukaemia/lymphoma in remission (as per last BMA) or solid tumour stable/responding (as per treating oncologist)	☐ Yes	☐ No
Disease group. Not any of: ALL induction, infant ALL, AML, post HSCT, congenital immunodeficiency, aplastic anaemia	☐ Yes	☐ No
Expected duration of neutropenia < 7 days	☐ Yes	☐ No
No confirmed focus of infection requiring inpatient care*	☐ Yes	☐ No
No medical complication requiring inpatient care**	☐ Yes	☐ No
No active infection with multi-drug resistant bacteria (ie, MRSA, VRE, MDRGN)	☐ Yes	☐ No
Availability of a 24 hour caregiver	☐ Yes	☐ No
Good education of patient and carer on reportable symptoms	☐ Yes	☐ No
Availability of a telephone (with credit)	☐ Yes	☐ No
Availability of 24 hour phone advice/emergency department review from treating hospital	☐ Yes	☐ No
Within 1-hour of an emergency department or treating hospital	☐ Yes	☐ No
Treating team preference	☐ Yes	☐ No
No previous history of non-compliance with medical care	☐ Yes	☐ No

*including, *but not limited to*, CVAD site infection, cellulitis, perianal cellulitis or pain, pneumonia, colitis;

**including, *but not limited to*, pain requiring intravenous analgesia, poor oral intake or excessive loss requiring intravenous hydration; respiratory distress or oxygen requirement; pulmonary infiltrates on CXR;

Table 4. Intravenous antibiotic options for HITH

No beta-lactam allergy Piperacillin-tazobactam 400mg/kg/day (maximum16,000mg of piperacillin every 24 hours) intravenous continuous infusion. ***Pharmacy must be notified by 10am the morning of discharge to make up infusion the same day***
Non-life threatening beta-lactam allergy (rash): Ceftazidime 150mg/kg/day (maximum 6,000mg every 24 hours) intravenous continuous infusion. ***Life-threatening beta-lactam allergy (anaphylaxis):*** Manage as inpatient

5. HITH schedule, key responsibilities and patient point of contact

Once patient is assessed as low risk (as per SPOG rule) and has met all criteria for early transfer, they are referred to HITH. Transfer to HITH is recommended after a minimum of overnight observation in hospital. See Table 5 for HITH schedule.

5.1 HITH schedule and key responsibilities

The following is a recommended schedule for HITH visits and interventions.

- Daily visits (Day 0 is day of transfer to HITH) until suitable for discharge (see 5.2)
- Interventions to be undertaken during home visit;
    - Administer intravenous antibiotic (if applicable)
    - Blood specimens taken - FBE (all) and U&E, LFTs (as required)
    - Home assessment chart reviewed / discussed (refer to home assessment chart), including temperature, oral intake / hydration, bowel patterns
- Patients' blood results monitored daily by the HITH AUM/CNC or FN CNC who will liaise with the Oncology medical treating team.
- Patient/family contacted by telephone by FN CNC at least once during the HITH admission for a phone review and discussion of results
- If absolute neutrophil count (ANC) remains $< 0.2 \times 10^9$/L on Day 4, patient must have medical review on Day 5 and decision made for readmission or ongoing HITH follow up.
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5.2 HITH discharge criteria

Patients can be discharged from HITH when all of the following are fulfilled:

- clinically well
- no documented infection requiring ongoing antibiotics
- afebrile for >24 hours
- evidence of marrow recovery (as judged by the treating clinician), including a post nadir ANC of at least $>0.2 \times 10^9$ cells/L and platelet recovery

Table 5: HITH Schedule

Day	Appointments / interventions	Responsibility
0 (day of transfer	Bloods reviewed prior to hospital discharge HITH appointments arranged Educational material / self-assessments (temperature monitoring) provided to patient Readmission letter provided to patient	HITH AUM/CNC *and* Treating team
1	Home visit for: -IV antibiotics -Observations and review home assessment chart -Blood tests HITH AUM to liaise/update treating team	HITH RN *and* AUM
	Review of blood results and action as required	HITH AUM *and* Treating team
2	Home visit for: -IV antibiotics -Observations and review home assessment chart -Blood tests HITH AUM to liaise/update treating team	HITH RN *and* AUM
	Review of blood results and action as required	HITH AUM *and* Treating team
3	Home visit for: -IV antibiotics -Observations and review home assessment chart -Blood tests HITH AUM to liaise/update treating team	HITH RN *and* AUM
	Review of blood results	HITH AUM *and* Treating team
	Telephone follow up Blood results discussed	FN CNC *or* Treating team
4	Home visit for: -IV antibiotics -Observations and review home assessment chart -Blood tests HITH AUM to liaise/update the treating medical team *NB. If ANC < 0.2 x 10^9 /L and still on program, patient must have medical review on Day 5 and decision made for readmission or ongoing HITH follow up.*	HITH RN *and* AUM
	Review of blood results	HITH AUM *and* Treating team
	Telephone follow up Blood results discussed	FN CNC *or* Treating team
5-7	If ANC remains < 0.2 X 10^9 cells/L patient to attend outpatient clinic for medical review and decision made for readmission or ongoing HITH follow up.	HITH AUM/CNC *and* Treating team

5.3 Patient point of contact

The hospital contact number for all patients admitted on the low-risk FN program is 9345 4770 available 24 hours per day. The call will be managed by the HITH AUM during business hours and by the CCC AUM after hours. Patient queries should be managed according to the Telephone Triage Tool (under development).

6. Patient resources

Patient resources should include:

- HITH appointments
- Pathology requests
- Educational material:
    - home observation and assessment chart with instructions for use
    - when to call the hospital and when to re-present to hospital
    - hospital contact numbers
    - letter for presentation to an emergency department including description of medical history, recent treatment received and current situation
- Ensure patient has a thermometer

7. Medical reviews and re-admission

A medical review and/or re-admission for in hospital care may be required for some patients on the low-risk FN program. All patients/families should receive education on symptoms and signs for review or readmission, prior to transfer to HITH.

Patients with the following criteria will require a medical review and/or readmission for inpatient care:

- Recurrent or persistent fever (> 48hrs from presentation) or new fever after being afebrile for 24 hours
- Feeling unwell / new signs and symptoms
- Significant decrease in oral intake (i.e. < 50% baseline) or significantly increased losses (vomiting or diarrhoea)
- Positive blood culture result (reported after patient hospital discharge) or other infection requiring inpatient care
- Pain: severe or persistent
- Inability to continue with oral antibiotics if applicable (i.e. allergy, vomiting, severe diarrhoea or patient refusal)
- Chills/rigors/shaking

Patients requiring review for readmission are required to present to the Emergency Department. The HITH AUM, CCC AUM (after hours) or Low-risk FN CNC is responsible for notifying the ED of the patient expect. The patient will be managed according to triage category. The Oncology team is responsible for reviewing the patient in ED. Patients on IV antibiotics with signs of sepsis should receive a stat dose of Amikacin +/- Vancomycin as per RCH 'Fever and suspected or confirmed neutropenia' guideline.

Patients requiring supportive therapies (e.g. blood products) may present to the Oncology Fast Track Clinic if there is capacity **and the child's condition is stable**

For all other presentations requiring a medical review, including Day 5 review, or ongoing fevers, the patient will need to present to the Emergency Department or Oncology Outpatient Clinics.