Purpose

This procedure provides clinical practice guidelines to guide clinicians involved in the emergency management of fever in infants and children. It aims to identify those at risk of serious bacterial or other significant illness who need timely treatment, whilst avoiding unnecessary investigations in the majority.

Scope

This procedure applies to all staff involved in the care and management of children who present with fever as their primary complaint. This guideline is not intended to be used for prolonged fever of greater than one week, when a broader differential diagnosis must be considered.

Management of fever in the neutropenic paediatric oncology patient is beyond the scope of this guideline and should be managed according to the specific oncology guideline. Sepsis must be considered in every paediatric patient with fever (link to sepsis guideline still being developed).

Procedure

Fever is one of the most common reasons for paediatric presentations to emergency services and provides diagnostic and management challenges to clinical staff. Infection remains the leading cause of death in children under the age of 5 years.

Fever definition and measurement

A practical definition of fever is temperature ≥38°C measured at home or in hospital.

In children under the age of 4 weeks body temperature should be measured with an electronic thermometer in the axilla. In children aged 4 weeks to 5 years body temperature should be measured by an electronic thermometer in the axilla, chemical dot thermometer in the axilla or infra-red tympanic thermometer. Forehead chemical
thermometers are unreliable and should not be used by healthcare professionals. A parent’s touch has been shown to have high sensitivity and low specificity for discovering a fever but parental concern should be considered valid and taken seriously.

**Pathophysiology of fever**

Fever is a physiological response most often caused by an infective process when exogenous pyrogens (e.g. bacterial toxins, antibody-antigen complexes) induce endogenous pyrogens (e.g. TNFα, IL-B1, IL-6 and interferons) resulting in an elevated body temperature. The thermoregulatory centre then raises and maintains the body temperature to the new set point. This may negatively stress some children with pre-existing cardiac, respiratory or neurological diseases, and gives most children a degree of malaise. However fever is thought to be a generally beneficial adaptive response that promotes the immune response and inhibits the invading pathogen, potentially reducing the duration of certain infections.

**Epidemiology of fever**

Febrile illnesses comprise approximately 20% of paediatric emergency presentations. Most (80%) have a readily identifiable source of the fever. Of the remaining 20%, most will have a self-limiting viral infection, however a small proportion will have a serious bacterial infection (SBI) or be febrile from conditions such as Kawasaki disease, vaccination reactions, arthritis or connective tissue disorders, malignancies, drug fever, or inflammatory bowel disease. Post vaccination fever usually begins within 24 hours of immunisation and lasts for 2-3 days. Teething does not cause fever > 38.5°C.

In a large Australian children’s hospital study, 7.5% of febrile children <5 years old had a SBI; 3.4% had a urinary tract infection (UTI); 3.4% pneumonia; 0.4% bacteraemia and 0.1% meningitis. Pyrexia of unknown origin (PUO) is any fever lasting 10 - 21 days without cause identified on history, examination and basic investigations.

**Serious bacterial infection (SBI)**

SBI includes UTI, pneumonia, meningitis, bacteraemia, osteomyelitis, septic arthritis, skin and soft tissue infection or bacterial enteritis; though only the first four are likely to present in an occult fashion with significant frequency. In infants less than three months of age, hypothermia or temperature instability can be signs of SBI or other serious illness.

**UTI**

This is a relatively common infection in febrile children <5 years. In the 1st year of life, 6.5% girls and 3.3% boys (1.2% of circumcised vs. 8% of uncircumcised males) will have a UTI. In the 2nd year, the rates become 8.1% girls and 1.9% boys and decrease thereafter. UTI is also the most common SBI causing fever without localising signs, at approximately 5%.

**Pneumonia**

About 3 - 4% all febrile children under 5 years and approximately 5% with fever without localising signs have a pneumonia, though most will be viral in origin. Increasing pneumococcal immunisation may continue to decrease the incidence of bacterial pneumonia due to the commonest bacterial agent, *Streptococcus pneumoniae*. 
**Bacteraemia**

The incidence of occult bacteraemia has fallen from over 10% to <0.5%\(^{12,18}\) of febrile children aged three months to three years. This is largely due to effective immunisation against *Haemophilus influenzae* type b (HIB) & *Streptococcus pneumoniae*. Rates are higher (approximately 2 - 10%) in non and pre-vaccinated children depending on age. Meningococcaemia occurs in only 0.02% of young febrile infants <2 - 3 months,\(^{19,20}\) but approximately 15% of these may not appear ill-looking.\(^{21}\) Other common pathogens, particularly in infants < 6 months, include Salmonella species (which may be associated with diarrhoea) and E. Coli (which may accompany UTI).\(^{16}\)

**Meningitis**

The incidence of meningitis is generally very low,\(^{13}\) but more common in younger infants, who may present with subtle signs and symptoms.

**Assessment**

A well-taken history and thorough clinical examination should aim to identify:

a. children who have a focus of infection that may then be investigated and treated , and
b. children for whom no infective focus may be found and who may require further investigations and/or empirical treatment according to their risk of SBI.

Factors that may assist in risk stratification include:

- child’s age
- immune status - incomplete immunisations, immune-compromise
- signs of toxicity
- current or recent use of antibiotics
- presence of concerning signs and symptoms (e.g. petechial rash)

**Age**

Several meta-analyses\(^{15,23,24}\) have shown that febrile young infants <3 months have a high risk of SBI (7-24%). This risk is greatest in the neonatal period and decreases progressively with increasing age. Young infants are more likely to present with non-specific features (they lack the hypothalamic and immune system maturity to localise the infection) and can deteriorate rapidly.\(^{25}\) In addition to the pathogens seen in older children, *Group B Streptococcus, E. Coli, Herpes Simplex virus, and Listeria monocytogenes* infections are more common in this period. Detecting other viral infections (e.g. RSV) lowers but does not remove the risk of SBI (7% vs. 12.5% for SBI (mainly UTI) in one large study.\(^{22}\) More recently a study\(^{26}\) found the incidence for SBI in infants one to three (1 - 3) months decreased significantly if they had bronchiolitis, however the UTI rate was still 4%. A systematic review\(^{27}\) supported the use of screening for UTI in bronchiolitic children aged one to three (1-3) months as this was the only SBI with significant incidence (3.3%).

It is important to remember that babies less than 3 months may not necessarily mount a fever in response to SBI, and that hypothermia or temperature instability can be signs of SBI.

Children aged three months to three years have a lower risk of SBI than the group under three months, and have their immunity boosted with vaccinations. Occult bacterial infection is most commonly UTI, pneumonia or bacteraemia. In this age group, the presence of a recognisable viral syndrome (including bronchiolitis) predicts a very low incidence of bacteraemia (0.2%).\(^{28}\)
Older children (>3 years) have mature immune systems, are better able to verbalise and localise symptoms and are at lower risk of SBI.

**Immunisations & Immune status**

The risk of occult bacteraemia (OB) and SBI has fallen in the last 20 years with the advent of several vaccines, in particular the *Haemophilus influenzae type b* (HIB) and pneumococcal (PC) immunisations. Recent studies suggest that OB rates have fallen to <0.5% in immunised children 3 - 36 months with fever without localising signs on history or examination. HIB has all but been eliminated as a cause of bacteraemia and serious invasive infection. Streptococcus pneumoniae remains responsible for the majority of current cases of OB, but is thought to cause invasive disease in less than 5% of these. In 2011, the 7 valent conjugate pneumococcal vaccine was replaced on the National Immunisation Program with a 13 valent vaccine, covering most of the remaining invasive serotypes. After two of the usual total three to four doses of these immunisations (usually achieved by four months of age in Australia), there is >95% protection. In addition the national program has increased herd immunity, which further reduces the risk to all children.

If a child has a congenital immune deficiency syndrome, sickle cell disease, HIV, asplenia, cancer, nephrotic syndrome, intracranial shunt, cochlear implant, immunosuppressive therapy or is indigenous then there is a greater risk for SBI, independent of vaccination status.

**Clinical appearance and toxicity**

Think SEPSIS in any patient presenting with signs or symptoms that indicate possible infection. (SEPSIS guideline)

Assessing paediatric patients to determine “toxicity” can be challenging, particularly if they are seen early in the course of their febrile illness. The younger the patient, the more difficult this can be, even for seasoned paediatric clinicians. A number of scoring and assessment systems have been devised in an attempt to provide a standardised approach. More recent studies have cast doubt on their utility, and recognise the difficulties in differentiating toxic and well-appearing infants. The younger the infant, the more important careful and repeated clinical examination is, with close attention to vital signs.

The National Institute for Health and Clinical Excellence (NICE) guidelines combine features of specific serious disease with general appearance into a traffic light system for identifying risk of serious illness.
<table>
<thead>
<tr>
<th></th>
<th>Green – low risk</th>
<th>Amber – intermediate risk</th>
<th>Red – high risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colour (of skin, lips or tongue)</strong></td>
<td>Normal colour</td>
<td>Pallor reported by parent/carer</td>
<td>Pale/mottled/ashen/blue</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>Responds normally to social cues</td>
<td>Not responding normally to social cues</td>
<td>No response to social cues</td>
</tr>
<tr>
<td></td>
<td>Content/smiles</td>
<td>No smile</td>
<td>Appears ill to a healthcare professional</td>
</tr>
<tr>
<td></td>
<td>Stays awake or awakens quickly</td>
<td>Wakes only with prolonged stimulation</td>
<td>Does not wake or if roused does not stay awake</td>
</tr>
<tr>
<td></td>
<td>Strong normal cry/not crying</td>
<td>Decreased activity</td>
<td>Weak, high pitched cry or continuous cry</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td>Nasal flaring</td>
<td>Tachypnoea: RR &gt; 50 bpm 6-12 mths</td>
<td>Grunting</td>
</tr>
<tr>
<td></td>
<td>Tachypnoea: RR &gt; 40 bpm &gt; 12 mths</td>
<td>RR &gt; 40 bpm &gt; 12 mths</td>
<td>Moderate or severe chest indrawing</td>
</tr>
<tr>
<td></td>
<td>Oxygen saturation &lt;95% in air</td>
<td>Crackles in the chest</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Circulation and hydration</strong></td>
<td>Normal skin and eyes Moore mucous membranes</td>
<td>Tachycardia: HR &gt; 160 bpm age &lt; 12 months</td>
<td>Reduced skin turgor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HR &gt; 150 bpm age 12-24 mths</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HR &gt; 140 bpm age 2-5 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capillary refill time &gt; 3 seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry mucous membranes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor feeding in infants</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced urine output</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>None of the amber or red symptoms or signs</td>
<td>Age 3-6 months, temperature &gt; 39C</td>
<td>Age &lt; 3 months, temperature &gt; 38C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fever for &gt; 5 days</td>
<td>Non blanching rash</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rigors</td>
<td>Bulging fontanelle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swelling of a limb or joint</td>
<td>Neck stiffness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non weight bearing limb/not using an extremity</td>
<td>Status epilepticus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Focal neurological signs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Focal seizures</td>
</tr>
</tbody>
</table>

*Table reproduced from NICE guideline: Feverish illness in children May 2013*

**Non-blanching rash and fever (Figure 1)**

SBI incidence (predominantly meningococcal disease) has been estimated to be 2 - 8% in children with fever and petechiae. If the child is unwell (i.e. abnormal vital signs, poorly perfused, or having altered mental state) or if the rash is purpuric (>2mm lesions) and not consistent with typical Henoch-Schonlein purpura (HSP), then the child should be managed presumptively for meningococcal disease with resuscitation as required and a 3rd generation cephalosporin whilst investigations are carried out. Well-appearing febrile children with petechiae caused by local pressure or only in the distribution of the superior vena cava (eg. following coughing/vomiting) may be discharged with early review. In all other cases blood tests should be performed (full blood count, C reactive protein (CRP), blood culture). If the FBC and CRP are within normal limits and the child remains well during a 4-hour period of observation, then discharge with early review is again appropriate, otherwise admission with or without antibiotics should be undertaken. It should also be remembered that many viral infections can cause petechiae.
Fever height, duration and response to antipyretics

The height of the temperature has been used in many management algorithms to risk stratify febrile children. Whilst there is evidence that higher temperatures are associated with increased risk of SBI\textsuperscript{40,41} the significance and degree of risk may be less clear in today's immunised population. In addition, viruses such as influenza routinely cause fevers >40°C, with SBI's being responsible for only a small proportion of high fevers encountered. SBI's such as sepsis and meningitis may present without significant fever. The height of fever per se should therefore not be used alone as the primary discriminating management decision variable, other than the group of infants less than 3 months in whom a temperature of greater than 38 degrees is classed as high risk.

The duration of the fever\textsuperscript{42} and response to antipyretics\textsuperscript{7} have failed to show any ability to differentiate severe from mild illness or bacterial from viral infection.

Investigations

Most tests used to investigate febrile children have only moderately good sensitivities and specificities. Investigations may be used to help make a diagnosis, determine antibiotic use and duration, or risk stratify certain patients when no focus of infection is found on history and examination. In the case of a PUO, more extensive investigations may be warranted, but will not be discussed further here.

A recent study\textsuperscript{67} validates a step by step approach to infants between 21 and 90 days, aiming to determine a low risk group of infants who could safely be managed as outpatients without lumbar puncture nor empiric antibiotic treatment. This approach sequentially evaluated the general appearance of the infant, results of urinalysis, and the results of blood investigations including CRP and/or absolute neutrophil count. This approach was found to be accurate and reliable in identifying patients who were low risk of invasive bacterial infection, and is reflected in our flowchart for management of fever in infants in this age group.
Urinalysis, microscopy and culture\textsuperscript{43-46} (link to UTI guideline still being developed)

UTI is the most prevalent SBI in febrile young children and testing for one should be performed in symptomatic children or in febrile children <3 years.

Dipstick urinalysis or urine microscopy may be used to screen urine samples for UTI. A diagnosis of UTI is likely (positive likelihood ratios of >20) when:

- both the leucocyte esterase and nitrite tests are positive in children $\geq$ 2 years or
- bacteria are seen on a Gram stain.

A presumptive diagnosis of a UTI can then be made and empirical antibiotics commenced while the sample is being cultured and tested for sensitivities.

UTI may be confidently ruled out (negative likelihood ratio of 0.19) when both leucocyte esterase and nitrite are negative on dipstick testing in patients over two (2) years of age. If not, a sample for microscopy and culture should be obtained.

The method of urine collection is also important and different methods vary by potential delays, invasiveness, and contamination rates.

\textit{Supra-pubic bladder aspiration (SPA)} has the lowest contamination rate, but is invasive and has a success rate of 23 - 90\% depending on the operator and use of ultrasound to determine location and the presence of at least 20ml of urine. It should be only generally considered in infants <6 months or if there is phimosis or labial adhesion, and where possible should be guided by ultrasound.

\textit{Urethral catheterisation} has a sensitivity of 95\% and specificity of 99\% compared to SPA. It is also invasive but success rates may be higher than with SPA. It should be used first line in children >6 months who are not toilet-trained or if SPA fails.

\textit{Clean catch specimen} may be used for children who are unable to void on request, are not toxic, and in whom a delay in obtaining the sample is not detrimental. The child’s perineum should be washed prior to collection and the inside of the clean/sterile container used for collection should not be contaminated by touching the collector’s or the child’s skin. (Link to information sheet on collection of clean catch specimen once developed)

\textit{Midstream urine} is recommended once the child is toilet trained.

\textit{Bag specimen}s although uncomfortable for the child (especially on removal) are often more acceptable to parents and staff because they are less invasive. Unfortunately, up to 85 - 90\% samples are contaminated and thus can never be used for a culture. The high contamination rates plus potential delays in obtaining samples mean that bag samples should generally be discouraged.

(Refer to UTI guideline – to be hyperlinked once developed)

Chest X-ray (CXR)

There is limited value in performing a CXR in a febrile child without cough. The likelihood of detecting pneumonia is increased with longer duration of cough and fever or the presence of leucocytosis.\textsuperscript{17} Most pneumonia in infants and young children is viral in origin and a CXR cannot reliably distinguish viral from bacterial pneumonia. Even when the CXR suggests a bacterial aetiology, a virus is more often isolated than a bacterial pathogen.\textsuperscript{47}

A CXR is recommended in febrile children with:\textsuperscript{48}

- increased work of breathing (chest recession, tracheal tug, use of accessory muscles)
- cough, tachypnoea and low oxygen saturation ($\leq$ 93\% in room air)
- a temperature >39°C and WBC >20 x 10\textsuperscript{9} (as a screen for occult pneumonia).\textsuperscript{49,50}
Blood Culture

Although blood cultures are the gold standard for diagnosing a bacteraemia, there are limitations with this investigation. Now that the incidence of occult bacteraemia is very low, the contamination rate is often higher than the true positive rate. Negative blood culture may also have a poor NPV due in part to inadequate sampling (minimum blood sample required usually ≥1 ml but confirm with local laboratory). Young infants have higher rates of bacteraemia, and may become bacteraemic with other invasive SBI’s, and it is recommended to collect a blood culture in this group.

Full Blood Count

A systematic review found that WCC has no value in ruling out SBI in vaccinated children and is less valuable than CRP for ruling in SBI. This is supported by a recent prospective cohort study which found that total white cell count and absolute neutrophil count were not sufficiently accurate to be used as triage tests for febrile children with possible SBI. Meningococcal, salmonella & staphylococcal bacteraemias often do not elevate the WCC. When used, the threshold that has most often been used to indicate increased bacteraemia risk is WCC>15 x 10⁹/L, which has only moderate sensitivity and specificity. One large study including the post-PC vaccine era reported 74.0% sensitivity, 54.5% specificity, 1.5% positive predictive value and a 99.5% negative predictive value. Some investigators also include WCC<5 x 10⁹/L, absolute neutrophils count (ANC)>10 x 10⁹/L or <1 x 10⁹/L, or the presence of bands as risk factors.

C-reactive protein (CRP)

CRP is an acute phase reactant and concentrations start to rise at four to six (4 - 6) hours after onset of inflammation and peak around 36 - 50 hours. CRP is better than the FBC for detecting SBI, especially if used after 12 hours of fever. A recent systematic review suggested that different cut-off values could be used to identify high risk and low risk children, however many of the papers included in this review predated pneumococcal immunisation, and the findings must be interpreted with this in mind. This review found that a CRP of >80 mg/L was associated with a 72% risk of SBI, and a CRP of <20 mg/L was associated with a 5% risk of SBI. This review discussed the difficulty of nominating a lower level of CRP below which treatment was not necessary, balancing the need to minimise the number of children with SBI who would be missed, and the desire to avoid over treating children with antibiotics. Another recent paper stated that a CRP of > 20 mg/L suggested intermediate risk for invasive bacterial infection in infants between 22 and 90 days. The current NICE guideline supports the use of CRP in evaluation of febrile children, but does not nominate specific values to guide treatment. This guideline does not nominate a cut off CRP value and recognises that decisions should always be made in conjunction with clinical assessment and where available, review by experienced paediatric clinicians. There may be a role for serial CRP measurements to guide management.

Serum electrolytes, glucose and venous blood gas

These should be considered as guided by the clinical assessment. Lactate can be used as a marker of possible early sepsis – link to sepsis guideline once developed
Lumbar Puncture (LP)

There is limited evidence regarding which children should have an LP performed as part of the septic workup, especially as the incidence of bacterial meningitis has decreased dramatically since the introduction of the HIB and PC vaccines. Although there is good evidence for several useful clinical features which influence the likelihood of meningitis in a child, no one clinical feature is diagnostic and in the very young infant meningitis often presents with non-specific features like poor feeding, lethargy or irritability. The height of the fever and WCC are unhelpful as they do not reflect the risk of bacterial meningitis. In general, as long as the child is well enough to tolerate the procedure and there are no contraindications the procedure, an LP should be considered in children with signs or symptoms of meningitis, or in the young febrile infant with non-specific features such as vomiting, lethargy / drowsiness, irritability or poor feeding. [Refer to acute management of meningitis in children clinical procedure – to be hyperlinked once developed]

Other tests

*Procalcitonin* (a prohormone rises with physiological stress) has restricted availability currently, but has shown utility in differentiating bacterial from viral illness. It has been reported to have better specificity and possibly sensitivity than CRP for bacterial meningitis or sepsis especially in first six to eight (6 - 8) hours of fever. At present this test is not widely available and is not part of the investigations performed in the emergency department setting.

*Viral diagnostic studies* – limited usefulness in ruling out SBI as noted above.

*Stool microscopy and culture* – may be indicated in very young infant or if mucoid, bloody or prolonged diarrhoea.

Management

The recommended emergency management of febrile children is summarised on the Flowcharts (Appendix 1 and Appendix 2) and comprises:

**Supportive**

The child should have excess layers of clothing removed. Over-enthusiastic physical cooling can be counterproductive by stimulating shivering and other heat-retaining reflexes. Oral fluids if tolerated should be encouraged to maintain hydration.

**Antipyretics**

Antipyretics may be prescribed for an awake child to provide relief from discomfort caused by the fever or the underlying cause of the fever. Parents should be advised that fever is one of the body’s immune system responses to infection and that antipyretics do not treat or shorten the illness, will not prevent febrile convulsions, and if the dosing is excessive can cause adverse events. Aspirin should be avoided in children as the uncommon possibility of Reye’s syndrome increases with varicella or influenza-like illnesses.

Appropriate choices for symptomatic relief one of:

- **Paracetamol** 15mg/kg up to four hourly with a maximum of four doses per day, or
- **Ibuprofen** 10mg/kg up to six hourly with a maximum of four doses per day (avoid in children <6 months, if significantly dehydrated or history of hypersensitivity.)
There is some evidence that ibuprofen reduces fever and discomfort more quickly than paracetamol. The popular dual therapy dosing regimes advocated by some reduce the time with fever, however there is no significant difference in resolution of discomfort versus monotherapy. Safety concerns have been raised over recommending two drugs with different dosing regimes for little gain, and parents should be specifically advised against this.

Risk Stratification

The risk of SBI may be stratified by age, the presence of a focus for infection, and toxicity. See the Flowcharts in Appendix 1 and Appendix 2 for details.

Antibiotics

Antibiotics may be indicated depending upon the perceived risk of SBI or the specific infection found. Antibiotics are usually administered via the intravenous route initially for admitted patients. For choices and doses see CHQ Paediatric Antiobocard: Empirical Antibiotic Guidelines. See flowcharts Appendix 1 - Emergency Management of Fever in Children (< 4 months) and Appendix 2 - Emergency Management of Fever in Children (≥4 months).

Disposition

As indicated by the Flowchart. All children who appear unwell should be reviewed early by a senior medical officer. Febrile children fit for discharge should be discussed with a senior doctor and arrangements made for a follow up visit at his / her local General Practitioner to check progress and outstanding test results. See flowchart Appendix 3 - Admission / discharge criteria for children presenting with fever. When a decision is made to transfer a child to a Level 6 facility, referral must be made through RSQ. Activation of the QLD emergency medical system coordination centre (QCC)

Further information on the preparation of a infant prior to transport can be obtained through RSQ Clinical Guidelines paediatric section (page 31-35).

Supporting documents

Procedures, Guidelines and Protocols

- Emergency management of children presenting with fever – less than 4 months
- Emergency management of children presenting with fever – greater / equal to than 4 months
- Admission / discharge criteria for children presenting with fever
- Fever in children fact sheet
- CHQ Paediatric Antiobocard: Empirical Antibiotic Guidelines

Consultation

Key stakeholders who reviewed this version:

- Dr Fiona Thomson, Paediatric Emergency Physician, LCCH
- Dr Sarah Martin, Paediatric Emergency Physician, LCCH
- Dr Julia Clarke, Infection Management and Prevention Director, LCCH
Children’s Health Queensland would like to acknowledge the contribution made by the Greater Brisbane Metropolitan Area Clinical Procedures Working Group who developed the original guideline.

Definition of terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAP</td>
<td>American Academy of Pediatrics</td>
</tr>
<tr>
<td>ANC</td>
<td>Absolute neutrophil count</td>
</tr>
<tr>
<td>BSL</td>
<td>Blood sugar level</td>
</tr>
<tr>
<td>Children</td>
<td>0-14 years of age</td>
</tr>
<tr>
<td>CHQ</td>
<td>Children’s Health Queensland</td>
</tr>
<tr>
<td>CRP</td>
<td>C-reactive protein</td>
</tr>
<tr>
<td>CXR</td>
<td>Chest x-ray</td>
</tr>
<tr>
<td>E.Coli</td>
<td>Escherichia coli</td>
</tr>
<tr>
<td>FBC</td>
<td>Full blood count</td>
</tr>
<tr>
<td>HIB</td>
<td>Haemophilus influenzae type B</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
</tr>
<tr>
<td>HSP</td>
<td>Henoch-schonlein purpura</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>LP</td>
<td>Lumbar puncture</td>
</tr>
<tr>
<td>MCS</td>
<td>Microscopy, culture and sensitivity pathology test</td>
</tr>
<tr>
<td>NICE</td>
<td>National Institute for Health and Clinical Excellence</td>
</tr>
<tr>
<td>NPV</td>
<td>Negative predictive value</td>
</tr>
<tr>
<td>OB</td>
<td>Occult bacteraemia</td>
</tr>
<tr>
<td>PC</td>
<td>Pneumococcal</td>
</tr>
<tr>
<td>PUO</td>
<td>Pyrexia of unknown origin</td>
</tr>
<tr>
<td>RSQ</td>
<td>Retrieval Services Queensland</td>
</tr>
<tr>
<td>SBI</td>
<td>Serious bacterial infection</td>
</tr>
<tr>
<td>SPA</td>
<td>Supra-pubic bladder aspiration</td>
</tr>
<tr>
<td>SVC</td>
<td>Superior vena cava</td>
</tr>
<tr>
<td>UTI</td>
<td>Urinary tract infection</td>
</tr>
<tr>
<td>UEC</td>
<td>Urea, electrolytes and creatinine</td>
</tr>
<tr>
<td>WCC</td>
<td>White cell count</td>
</tr>
<tr>
<td>YOS</td>
<td>Yale observation score</td>
</tr>
</tbody>
</table>

References


CHQ-GDL-00707 – Febrile Illness

### Audit/evaluation strategy

<table>
<thead>
<tr>
<th>Level of risk</th>
<th>High</th>
</tr>
</thead>
</table>
| **Strategy**  | 1. Staff survey to evaluate awareness of procedure and emergency management practices  
2. Observe practice  
3. Review documentation, i.e. chart audit, to evaluate compliance with procedure |
| **Audit/Review tool(s)** | Nil |
| **Audit/Review date** | Annual snapshot review (August) |
| **Review responsibility** | Individual Greater Brisbane Metropolitan hospitals, i.e. Ipswich, Logan, Redland, MCH, RCH, TPCH, Redcliffe, Caboolture |
| **Key elements / Indicators / Outcomes** | KPI 1 — greater than 80% staff awareness of procedure  
KPI 2 — greater than 80% compliance with procedure |

### Procedure revision and approval history

<table>
<thead>
<tr>
<th>Version No.</th>
<th>Modified by</th>
<th>Amendments authorised by</th>
<th>Approved by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Director, Paediatric Emergency Medicine</td>
<td>Greater Brisbane metropolitan area Children’s Health Queensland</td>
<td>Chief Executive, Children’s Health Queensland</td>
</tr>
<tr>
<td>2.0</td>
<td>Director, Paediatric Emergency Medicine</td>
<td>Divisional Director, Critical Care Services</td>
<td>Director Hospital</td>
</tr>
</tbody>
</table>

**Keywords**
- Children; fever; febrile; temperature; emergency management; admission, discharge criteria, 00707

**Accreditation references**
- NSQHS Standards 3, 4
- EQuIP National Standard 12

### Appendices

- [Appendix 1: Emergency Management of Children with Fever (<4 months)](#)
- [Appendix 2: Emergency Management of children with Fever (>4 months)](#)
- [Appendix 3: Admission / Discharge Criteria for Children with Fever](#)
Appendix 1: Emergency Management of Children with Fever (< 3 months)

Emergency Management of children with FEVER (< 3 MONTHS)

Child presents to emergency services with a fever > 38°C

Assess Severity
Consider pre-hospital management given
- Treat discomfort with antipyretic
- Remove excess layers of clothing
- Early senior review

Toxic features
- Marked Lethargy/decrease in activity
- Altered mental status
- Inconsolable irritability
- Tachypnoea, increase work of breathing, grunting, weak cry
- Cyanosis
- Poor perfusion (mottled skin, pallor, mottled)
- Marked/persistent tachycardia > 180
- Moderate to severe dehydration
- Infant feeding <50% normal
- < 4 wet nappies in 24 hours
- Seizures
- Petechial or purpuric rash
- Do not underestimate parental concern

A. Toxic
Investigations
- Urine MCS
- FBC
- CRP
- Blood culture
- +/- CXR
- +/- LP

B. CXR indications
- Increased work of breathing
- Cough
- Tachypnoea
- SaO₂ ≤ 93% in room air
- T > 39°C & WCC > 20 x 10⁹

C LP indications
- age < 2 months
- vomiting
- lethargy/drowsiness
- cerebral irritability
- poor feeding
- caution if marked drowsiness

CONTRAINDICATIONS to LP
- Focal neurological signs
- Reduced level of consciousness
- Haemodynamic instability
- Respiratory compromise

D. High risk criteria
- ANC < 1 or > 10 x 10⁹/L
- Bands > 1.5 x 10⁹/L
- CSF > 7 WBC
- Urine microscopy: >10 WBC or bacteria
- CXR: Infiltrate, collapse
- Consider prematurity
- Immune deficiency or significant underlying chronic disease

Any high risk features? Y

Antibiotics as per CHQ Antiobocard

Meets discharge criteria?

Disposition

N

Discharge

Y

Admit to children's inpatient service

CHQ-GDL-00707 – Febrile Illness
Appendix 2: Emergency Management of Children with Fever (≥ 3 months)

Emergency Management of children with FEVER (≥ 3 MONTHS)

Child presents to emergency services with a fever > 38°C

Assess Severity
Consider pre-hospital management given
- Treat discomfort with antipyretic
- Remove excess layers of clothing
Close attention to vital signs/CEWT

No Toxic features *

Focus of infection evident? (including bronchiolitis)

≥ 2 doses of immunisations (Hib + PCV)?

Investigations
- Urine for urinalysis +/- MCS if fever for > 48 hours

Antibiotics if results suggest UTI

Any features suggesting SBI? *

Meets discharge criteria?

Discharge

B. CXR indications
- Increased work of breathing
- Cough
- Tachypnoea
- SaO₂ ≤ 93% in room air
- T > 39°C & WCC > 20 x 10⁹/L

C. LP indications
- Vomiting/lethargy/drowsiness
- Cerebral irritability/poor feeding
- CONTRAINDICATIONS to LP
- Focal neurological signs
- Reduced level of consciousness
- Haemodynamic instability
- Respiratory compromise

D. Features suggestive of SBI
- WCC > 15 x 10⁹/L if not fully immunised
- ANC < 1 or > 10 x 10⁹/L
- Bands > 1.5 x 10⁹/L
- CSF > 7 WBC
- Urine micro: >10 WBC or bacteria
- CXR: Infiltrate, collapse
- Immunodeficiency/chronic disease

Emergency Management as per SEPSIS guideline to be linked

A. Toxic
- Marked Lethargy/decrease in activity
- Altered mental status
- Inconsolable irritability
- Tachypnoea, work of breathing, grunt, weak cry
- Poor perfusion (mottled skin, pallor)
- Marked/persistent tachycardia
- Moderate to severe dehydration
- Seizures
- Petechial or purpuric rash (see text)
- Do not underestimate parental concern

Discuss with senior doctor and consider antibiotics

Discuss with senior doctor re disposition – admission vs early clinical review
### Criteria for admission to children’s inpatient service

Criteria for admission to the children’s inpatient service for an infant with febrile illness includes:
- age less than 2 months
- any toxic features
- need for intravenous antibiotics
- significant high risk criteria for SBI
- inability to maintain adequate oral intake to maintain hydration
- unplanned return within 24 hours of initial assessment
- social factors such as long distance to hospital and family/carers not able to cope with symptom management.

---

### Criteria for discharge from the emergency service

Criteria for discharging an infant with febrile illness from the emergency service includes:
- age greater than 2 months
- no toxic features
- no indication for intravenous antibiotics
- no high risk criteria for SBI
- able to maintain adequate oral intake to maintain hydration
- parent information sheet given and discussed
- recommend review by GP within 24 hours

When discharging an infant with a febrile illness, their social circumstances should be considered and appropriately addressed after the initial assessment and observation period:
- time of day
- parents/carers comprehension and compliance
- access to transport should return be required
- distance to local hospital