

# KAISER PERMANENTE SEPSIS RISK CALCULATOR

Based on <https://neonatalesepsiscalculator.kaiserpermanente.org>

***This Guideline should be used in conjunction with:  
Infection in the first 72 hours of life guideline and NICE NG195 Neonatal infection:  
antibiotics for prevention and treatment updated April 2021***

## INTRODUCTION

The Kaiser Permanente Sepsis Risk Calculator (KP-SRC) is an online calculator used to determine which well babies meeting the NICE criteria for treatment for possible early onset neonatal infection should receive antibiotics

### Inclusion criteria

- Babies who meet the criteria for antibiotic treatment as defined by NICE (See **Infection in the first 72 hours of life** guideline) and:
  - $\geq 34$  weeks' gestation **and**
  - aged  $\leq 12$  hr **and**
  - clinically well

### Exclusions

- Follow **Infection in the first 72 hours of life** guideline if:
  - antibiotics not recommended by NICE **or**
  - baby clinically unwell **or**
  - baby  $< 34$  weeks' gestation **or**
  - baby aged  $> 12$  hr **or**
  - confirmed Group B streptococcal (GBS) sepsis or neonatal death in a previous pregnancy and mother has not receive adequate intrapartum prophylaxis (see **Group B streptococcal colonisation of mother** guideline) **or**
  - co-twin meets criteria for antibiotics

***KPSRC is a risk calculator and has limitations in identifying all babies with sepsis. If any clinical concerns, even with a low calculation risk, discuss with neonatal tier 2 staff or consultant at earliest opportunity  
If baby clinically unwell, treat with antibiotics within 1 hr and follow Infection in the first 72 hours of life guideline***

## APPLICATION OF THE KP-SRC

***If KP-SRC not available follow Infection in the first 72 hours of life guideline***

### Identification of babies (see Flowchart: Application of KP-SRC for a baby who meets the criteria for antibiotics)

- If baby meets NICE criteria for antibiotics midwife/nursery nurse to alert neonatal team immediately
- Neonatal team to assess baby's eligibility for KPSRC and if eligible determine baby's status as well/equivocal/clinical illness using **Table 1**

Table 1

Clinical examination	Description
<b>Well appearing</b>	<ul style="list-style-type: none"> <li>• No persistent physiological abnormalities</li> </ul>
<b>Equivocal</b>	<p><b>Any one of the following persisting <math>\geq 4</math> hr after birth*</b></p> <ul style="list-style-type: none"> <li>• Tachycardia (HR <math>\geq 160</math> bpm)</li> <li>• Tachypnoea (RR <math>\geq 60</math>)</li> <li>• Temperature <math>&lt; 36.5^\circ\text{C}</math> or <math>\geq 38^\circ\text{C}</math></li> <li>• Respiratory distress (grunting, nasal flaring or chest recessions) not requiring supplemental oxygen</li> </ul> <p><b><math>\geq 2</math> of the following lasting <math>\geq 2</math> hr<sup>†</sup></b></p> <ul style="list-style-type: none"> <li>• Tachycardia (HR <math>\geq 160</math> bpm)</li> <li>• Tachypnoea (RR <math>\geq 60</math>)</li> <li>• Temperature <math>&lt; 36.5^\circ\text{C}</math> or <math>\geq 38^\circ\text{C}</math></li> <li>• Respiratory distress (grunting, nasal flaring or chest recessions) not requiring supplemental oxygen</li> </ul> <p>* Abnormalities can be intermittent  <sup>†</sup> If any observations abnormal for 2 consecutive hours – arrange middle grade review and consider commencing antibiotics</p>
<b>Clinical Illness</b>	<ul style="list-style-type: none"> <li>• Persistent need for CPAP/HFNC/mechanical ventilation (outside of the delivery room)</li> <li>• Haemodynamic instability requiring fluid bolus or inotropes</li> <li>• Neonatal encephalopathy/perinatal depression</li> <li>• seizure</li> <li>• Apgar score <math>&lt; 5</math> at 5 min</li> <li>• Need for supplemental oxygen <math>\geq 2</math> hr to maintain SpO<sub>2</sub> <math>&gt; 90\%</math></li> <li>• Any other symptoms of serious illness – clinician determined</li> <li>• Following should also be classified as clinical illness</li> <li>• equivocal state persisting <math>&gt; 2</math> hr</li> <li>• onset of symptoms at <math>&gt; 4</math> hr after an asymptomatic period</li> </ul>

### Application of sepsis risk score

- Access the sepsis risk calculator via maternity **BadgerNet** – early onset sepsis calculator or via web <https://neonatalesepsiscalculator.kaiserpermanente.org>
- Enter **2/1000** live births as incidence of early-onset sepsis (EOS)
- Calculate sepsis risk score to determine individual baby's risk for EOS and follow recommendations for management based on KP-SRC
- Note the following West Midlands modification of KP-SRC:
  - if KP-SRC recommends blood culture: treat baby with antibiotics until culture results available and follow **Infection in the first 72 hours of life** guideline
  - if KP-SRC recommends observations for 24 hr: observe baby for  $\geq 36$  hr
- SRC can be re-applied based on baby's clinical status at any time up to aged 12 hr
- **Variables input onto KP-SRC calculator to be cross-checked by both neonatal team and midwife (caring for mum and baby) to ensure no errors**
- Clearly document recommended plan regarding observations or antibiotics on **BadgerNet** (under baby's clinical note) or in baby's paper notes
  - ensure plan handed over to midwife
- If KP-SRC accessed via web:
  - print copy of EOS risk score calculated by KP-SRC
  - attach patient label to print out
  - medic (who calculated) and midwife (who cross-checked) to sign and date
  - file in baby's notes or scan/upload screenshot to the maternity EPR
- not required if KP-SRC accessed via **BadgerNet**. Further guidance given in **Table 2**

Table 2

Calculator input	Value to be entered	Notes
Incidence of early-onset sepsis	2/1000 live births	Based on local incidence
Gestational age (GA)	GA in weeks and days	Weeks range: 34–43 Days range: 0–6
Highest maternal intrapartum temperature (°C)	Units °Celsius  Use highest intrapartum maternal temperature including up to 1 hr following delivery	Use whole number or number with single decimal place e.g.: 37, 37.1, 37.0 <b>NOTE: If postpartum temperature within 1 hr of birth is <math>\geq 0.5^{\circ}\text{C}</math> above intrapartum temperature, midwives to document and inform neonatal team</b>
ROM (hours)	Use entire duration of rupture of membranes to delivery, not just pre-labour duration	Round value to single decimal place, e.g. enter ROM 4 hr 30 min as 4.5 hr, 4 hr 55 min as 5.0 hr
GBS	Enter maternal GBS screening result in current pregnancy if available. If not known enter 'unknown'	
Type of Intrapartum Antibiotics  and  Interval from first dose to birth	<ul style="list-style-type: none"> <li>• <b>'GBS-specific antibiotics'</b> are defined <b>ONLY</b> as benzylpenicillin G. ampicillin is an acceptable alternative. Penicillin-allergic women with no history of anaphylaxis, angioedema, respiratory distress, or urticaria after administration of penicillin or a cephalosporin should receive cefuroxime</li> <li>• should apply only to mothers who are GBS positive or GBS unknown</li> <li>• If erythromycin, clindamycin or vancomycin <b>ALONE</b> are given for GBS prophylaxis, choose the option <b>'No antibiotics or any antibiotics given &lt;2 hr prior to delivery'</b></li> <li>• <b>'Broad-spectrum antibiotics (BSAB)'</b> defined as <math>\geq 2</math> antibiotics given in combination when concern for the mother developing chorioamnionitis</li> <li>• <b>'Timing'</b> of administration of <b>'GBS-specific antibiotics'</b> or <b>'BSAB administration'</b> = interval between first dose of benzylpenicillin G or second antibiotic in the combination to the time of birth</li> <li>• e.g.: cefuroxime at 2:00 pm, metronidazole at 3:30 pm, birth at 4:30 pm, so 2<sup>nd</sup> antibiotic given 1 hr before delivery. Choose <b>'No antibiotics or any antibiotics given &lt;2 hours prior to delivery'</b></li> <li>• If mother given <b>BOTH</b> GBS-specific antibiotics and BSAB – of the 4 possible options, select the category with the longest duration of treatment</li> <li>• e.g.: benzylpenicillin G at 8:00 pm and 12:00 pm for GBS positive, then develops fever to <math>38.3^{\circ}\text{C}</math> at 2:00 pm so cefuroxime given at 3:00 pm. Benzylpenicillin G given at 4:00 pm, birth at 4:30 pm. GBS-specific antibiotics were given <math>&gt;4</math> hr before delivery, but BSAB were given only 1.5 hr before delivery. Choose <b>'GBS specific antibiotics given <math>&gt;2</math> hours prior to birth'</b></li> </ul>	

## OBSERVATIONS:

All babies on whom KP-SRC has been applied should have regular observations as shown in table below

**Table 3**

<b>Clinical status</b>	<b>Observation schedule</b>
Well appearing	<ul style="list-style-type: none"><li>• Routine observations at aged 1 hr and aged 2 hr, <b>then</b></li><li>• 2-hrly until aged 12 hr, <b>then</b></li><li>• 4-hrly until aged 36 hr (despite KP-SRC recommending only 24 hr in some)</li></ul>
Equivocal	<ul style="list-style-type: none"><li>• Hourly until all observations in normal range for 2 consecutive measurements. Then follow guidance for well appearing baby</li><li>• If any 2 consecutive measurements abnormal or equivocal request middle grade assessment and review need for antibiotics</li></ul>
Unwell	<ul style="list-style-type: none"><li>• Admit to NICU and observation as directed by clinician</li></ul>

## SUBSEQUENT MANAGEMENT

- If baby appears unwell at any time or in equivocal state for >2 hr, treat baby with antibiotics following **Infection in first 72 hours of life** guideline
- Give parents **Screening for infection in newborn babies – information for parents** leaflet

## DISCHARGE

- All babies on KP-SRC observation pathway to be observed for ≥36 hr in hospital and re-examined by neonatal team before discharge to confirm well-being

## APPLICATION OF KP-SRC FOR A BABY WHO MEETS THE CRITERIA FOR ANTIBIOTICS

