Babies Under 3 Months Old Who Are Sick

Author: Dr Anne Jacquari (ASH paediatrician)

Topic Reviewer: Dr Ian Dumbrell (Port Keats)

Clinical assessment of young babies is difficult and often causes anxiety in health professionals. There may be non-recognition of ‘warning signs’, and history is obviously observer dependent. Patterns of behaviour are still emerging in the young infant and it may be difficult for a parent to decide if non-specific symptoms, such as irritability or fussy feeding, are outside the realm of normal.

Illness in this age group is often due to infection but congenital abnormalities of heart, gut, kidneys, and inborn errors of metabolism may also manifest in this period, with presenting signs and symptoms very similar to those of sepsis. Conversely, the septic child may present without fever or be hypothermic. Although empiric management must be aimed at common, treatable conditions, such as bacterial infection, it is important to consider other diagnoses.

Assessment of the young sick baby

It has been formally recognised for many decades that the manifestation of serious illness — including bacterial infection — in young babies is non-specific, and that clinical assessment alone even by experienced clinicians may not have high sensitivity or specificity.[1,2] Several baby illness checklists and infant observation scales have been developed over the years to try to provide a framework of markers of serious illness in febrile and afebrile infants, with relative weighting of the most relevant findings via a scoring system.[1,3,4]

The Yale Observation Scale (Appendix 1) is dependent on observer grading of the quality of cry, reaction to parent stimulation, state variation (see description in the Yale observation scale in appendix 1), colour, hydration and response to social overtures. However, validation of this approach in very young babies has not always been successful. One such study using the Yale Observation Scale in febrile babies aged 29–56 days found that — of the infants who had positive bacterial cultures of blood, urine, stool or spinal fluid — 67% had observation scores indicative of a well-appearing child.[2] The Young Infant Observation Scale includes items from both history and examination, such as feeding, respiratory status, CNS/arousal, GI/fluid status and skin (colour, perfusion, rash) (Appendix 2).[4] The most useful items from this checklist in distinguishing an infective outcome are listed as being affect, respiratory status and peripheral perfusion.

Clinical assessment of young babies should include a thorough history and full examination, including objective measures of temperature, heart and respiratory rates and oximetry where possible. However, literature and experience suggest one can only be partially reassured when a young febrile baby appears well clinically, as bacterial infection may still be present.[2]

The threshold for further observation and investigation must therefore be low in the <3 month age group.

Infection in the young infant

In the first few months of life, infection may be congenital or acquired in the neonatal or post-neonatal period. This has implications for the CARPA region where there are high rates of STI and maternal infection, and where antenatal information may not always be available. Late onset Group B streptococcal disease and neonatal herpes infection may both occur several days to several weeks after birth.[5] Studies in the Top End looking at postnatal colonisation with pneumococcus in particular show a marked left shift (younger) in the curve for Aboriginal babies, with presumed increased susceptibility to developing early bacterial infection.[6,7] Babies in this age group are also incompletely immunized, as the first dose of HIB, pneumococcal vaccine and DTPa are given at the age of two months.

The young infant has poor immune system ability to localise infections, and finding one focus does not preclude infection in other sites e.g. coexistence of pneumonia or urinary tract infection with meningitis.[8]

Although a baby with bacterial infection may initially appear well, progression of disease may be very rapid, hence the low threshold for early empiric antibiotic treatment in situations where full investigation must be postponed. Choice of antibiotic should take into account both gram-positive and gram-negative organisms, and should be given parenterally.[5,9] A third generation cephalosporin — such as cefotaxime or ceftrixone — will usually cover the most likely bacterial organisms in the CARPA region setting in the first instance (local data, microbiology, Alice Springs Hospital). Late onset neonatal infection with Listeria monocytogenes, though rarely found in Alice Springs over the last several years, can cause meningitis. Hence benzylpenicillin or ampicillin is added as a second agent in the <3 month age group.

Viral infections, though less specifically treatable than bacterial infections, may also be life-threatening in young babies. Often, morbidity is secondary to respiratory infection, but overwhelming viraemia may also occur. Even if a viral aetiology is suspected, empiric antibiotics should be given to a sick infant in a setting where access to laboratory and radiology services is not immediately available. Other management is supportive with particular attention to respiratory management if these symptoms predominate.

Whether viral or bacterial, gastrointestinal infections may be rapidly dehydrating in infants and should always be taken seriously, especially if both vomiting and diarrhoea are present. Compensatory mechanisms, such as colonic reabsorption of fluid, are poor in the first several months of life.[10] Electrolyte and acid-base disturbance are common in Aboriginal babies with moderate gastroenteritis, and hypokalaemia in particular may be life-threatening. The blood glucose level should also be checked in the small baby who has been unable to feed because of vomiting or poor responsiveness. GI upset may be a manifestation of sepsis or viraemia rather than a specific GI focus of infection. Gram-negative sepsis may exist concurrently with gastroenteritis, and if a baby is very sick, empiric antibiotic cover is indicated.

Non-infective causes of serious illness in young infants

Although less common, other causes of illness should be considered in this age group as congenital conditions may manifest in the first several weeks of life. Cardiac failure may be difficult to differentiate clinically from respiratory disease or sepsis. Relatively minor infection may have devastating sequelae in children with certain inherited inborn errors of metabolism. Gut obstruction at any level may present with vomiting, bilious or otherwise, without diarrhoea, and an incarcerated inguinal hernia needs urgent surgical attention. Undiagnosed renal abnormalities often present with urinary tract infection, but may have associated electrolyte abnormalities. Envenomation, e.g. from red-back spider bite, may present with a constellation of signs that is difficult to interpret, and history may not be forthcoming unless a witness was present.

Although initial management will almost always include cover for sepsis, other urgent treatment — especially in surgical cases — may be lifesaving, so thorough assessment is important.

References

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APPENDIX 1

Yale observation scale

Observation variable	Normal (1)	Moderate impairment	Severe impairment
Quality of cry	Strong, normal tone or content, not crying	Whimpering or sobbing	Weak or moaning or high- pitched
Reaction to parent stimulation	Cries briefly then stops or content, not crying	Cries on and off	Continual cry or hardly responds
State variation	If awake, stays awake or if asleep and stimulated wakes up quickly	Eyes close briefly when awake or awakes with prolonged stimulation	Fails to sleep or cannot be aroused
Colour	Pink	Pale extremities or acrocyanosis	Pale or cyanotic or mottled or ashen
Hydration	Skin normal, eyes normal and mucous membranes moist	Skin, eyes normal and mouth slightly dry	Skin doughy or tented and dry mucus membranes or sunken eyes
Response (talk, smile) to social overtures	Smiles or becomes alert	Brief smile or becomes alert briefly	No smile, anxious, dull, expressionless or cannot be alerted

Total score ranges from 6 to 30

APPENDIX 2

Young infant observation scale

Observation variables

1. Level of activity:

   Spontaneously active, vigorous (1)
   Diminished spontaneous activity (3)
   No spontaneous activity, or active only with painful stimulation

2. Level of alertness:

   Fully awake, or asleep but awakens quickly, alerts fully (1)
   Lethargic, arouses with difficulty, alerts briefly (3)
   Won’t alert or arouse (5)

3. Respiratory status, effort:

   No impairment, vigorous (1)
   Mild – moderate respiratory compromise (tachypnoea, retractions or grunting) (3)
   Respiratory distress with inadequate effort (apnoea, respiratory failure) (5)

4. Muscle tone:

   Strong (1)
   Diminished (3)
   Weak, limp (5)

5. Peripheral perfusion:

   Pink, warm extremeties (1)
   Mottled, cool extremeties (3)
   Pale, shock (5)

6. Affect:

   Smiles and/or not irritable (1)
   Irritable, consolable (3)
   Irritable, won’t console (5)

7. Feeding pattern (offer infant a feed):

   Strong suck, eager to feed (1)
   Feeds briefly, weak suck (3)