Excluding serious illness in feverish children in primary care: Restricted rule-out method for diagnosis

Matthew J. Thompson
Anthony Harnden
Chris Del Mar

Bond University, chris_del_mar@bond.edu.au

Follow this and additional works at: http://epublications.bond.edu.au/hsm_pubs
Part of the Clinical Epidemiology Commons

Recommended Citation

Two children presenting to general practice with fever show how general practitioners use restricted rule-out, one of the strategies to make a diagnosis set out by Heneghan and colleagues (p 1003)

Case scenarios

Consider two common scenarios in primary care.

Child 1: A mother calls the out of hours service in the early evening about her 3 year old son. He was seen earlier in the week with cough and runny nose, and the general practitioner (GP) diagnosed an upper respiratory tract infection. He has been getting more miserable and irritable, is lying on the sofa reluctant to move, looks “washed out,” and has a fever. His mother is worried: “Could it be meningitis, doctor?”

Child 2: A 2 year old girl is brought to your morning surgery with a history of a fever that started during the night. You have already seen several children this morning with a non-specific but seemingly mild viral illness.

DIAGNOSIS IN GENERAL PRACTICE

Excluding serious illness in febrile children in primary care: restricted rule-out method for diagnosis

Matthew J Thompson,1 Anthony Harnden,1 Chris Del Mar2

Two children presenting to general practice with fever show how general practitioners use restricted rule-out, one of the strategies to make a diagnosis set out by Heneghan and colleagues (p 1003)

Case scenarios

Consider two common scenarios in primary care.

Child 1: A mother calls the out of hours service in the early evening about her 3 year old son. He was seen earlier in the week with cough and runny nose, and the general practitioner (GP) diagnosed an upper respiratory tract infection. He has been getting more miserable and irritable, is lying on the sofa reluctant to move, looks “washed out,” and has a fever. His mother is worried: “Could it be meningitis, doctor?”

Child 2: A 2 year old girl is brought to your morning surgery with a history of a fever that started during the night. You have already seen several children this morning with a non-specific but seemingly mild viral illness.

The diagnostic dilemma

The list of possible diagnoses for febrile children seen in primary care is long. Identifying children who may have a serious illness can be difficult and is at the heart of decisions to prescribe, investigate, and refer to hospital. Serious infections (including pneumonia, meningitis, septicemia, appendicitis) account for less than 1% of children presenting to primary care,1 2 yet they are leading causes of morbidity and mortality in children. One of the key challenges for primary care practitioners is trying to balance the risk of missing a serious disease against unnecessary investigation or referral. The diagnostic process hinges on the need to rule out (exclude) serious illnesses.

The diagnostic approach: the restricted rule-out

Many doctors come to use some variant of the restricted rule-out method, which recognises that we cannot rule out all of the alternative diagnoses for each presenting complaint, but that there is a short list of serious ones that we absolutely must rule out. The method involves constructing a limited list of serious diagnoses to be ruled out, in addition to constructing a conventional
Box 1: Early “red flags” for meningococcal disease

**Lethargy**—most patients with meningococcal disease will be drowsy or unusually lethargic

**Confusion**—nearly half of older children and adults will be acutely confused

**Headache**—less than half of children overall will have headache, but this symptom is more common in older children and adults.

**Photophobia**—can be a specific concern from the parent about this illness, but in the early stages of the disease, the rash may be absent or may be a “red flag” symptoms (such as a rash or laboured breathing) could suggest serious infection. The speed of onset of illness can be helpful: meningococcal disease, for example, progresses rapidly—nearly 90% of children with it are admitted to hospital 24-48 hours after onset of symptoms. The long history of illness of Child 1 makes meningococcal disease less likely (although pneumonia often presents over several days, and other forms of bacterial meningitis can develop over a couple of days). The short illness in Child 2 is of concern, or it could simply indicate an “overly concerned” parent.

**Localising features**

Depending on findings during the first two stages, primary care practitioners will check for localising features of both serious and minor infections. In the early stages most patients with meningococcal disease have non-specific symptoms: fever, nausea, vomiting, decreased appetite, being miserable or lethargic. It is difficult to exclude or confirm the presence of serious infection on the basis of these early clinical features. In general, rule-in features are missing for most diseases and typically we focus on rule-out features—for example the absence of tachypnoea in children presenting with respiratory symptoms largely excluds a diagnosis of pneumonia. When no features in the history and overall assessment give concern, the search for an inflamed eardrum or chickenpox rash may be all that is needed. Child 2 presents with features in the history and initial assessment that could cause concern, and needs a more detailed assessment before serious illness can be ruled out.

Early markers of possible meningococcal disease

What can the primary care practitioner do at this stage to rule out serious infection? One aspect to consider is the speed with which the illness is evolving. As we mentioned previously, meningococcal disease progresses very rapidly, whereas typical upper respiratory tract infections can linger for 1-2 weeks. In addition it is worth looking for the early “red flag” features of meningococcal disease such as leg pain, confusion, cold extremities (box 1). These are clinical features that primary care practitioners might consider as uncommon in self limiting infections, so may have some value at discriminating them from meningococcal disease.

**Classic features**

The classic “red flag” features of meningococcal disease such as neck stiffness, photophobia, and haemorrhagic rash are more common later in the clinical
The restricted rule-out approach to diagnosis recognises that it is difficult for clinicians to rule out all alternative diagnoses for each presenting complaint. For any clinical presentation, a short list of rare serious diagnoses usually must be ruled out, out all alternative diagnoses for each presenting complaint. The restricted rule-out approach to diagnosis recognises that it is difficult for clinicians to rule out all serious infections. Exploring the parents’ components of safety netting. The effect of age

Infants (under 1 year old) with meningococcal disease are more likely to present with non-specific features, such as cold hands and feet, an abnormal skin colour, or breathing difficulty rather than signs of meningal irritation. Preschool children (1-4 years old) also have non-specific features of infection, but nearly one third will have leg pain or neck stiffness, half will have cold hands and feet, and just under half will be confused. The presentation in older children and teenagers tends to be more similar to that of adults, who usually have a combination of headache, neck stiffness, or an altered mental state. Safety netting

The restricted rule-out process depends on being aware of the relative frequency and time course of clinical features in serious disease. They are less common in younger children and infants, at least in the prehospital course of illness. When they are present, they are helpful to rule in possible meningococcal disease—but even then, they are not highly specific in isolation: for example, only a small proportion of children presenting with petechial rash will have septicaemia. When these features are absent it is difficult to be sure whether meningococcal disease is absent, or the symptom simply has not developed yet in the course of the evolving infection. Box 2 outlines some of the pitfalls of trying to use these features to rule out meningococcal disease.

The most likely diagnosis is a persisting upper respiratory disease. Exploring the parents’ concerns and safety netting, with explanation of the clinical course of upper respiratory tract infections and what to watch for at home, are all that is needed. Child 2 has a high temperature and seems withdrawn and much less alert than usual. She does not have a rash, difficulty breathing, or any obvious focus of infection on examination. Dip stick urine testing is negative and probably excludes urinary infection, but the GP is unable to rule out serious infection, which in this child would include meningococcal disease. The child is referred urgently to the paediatric team for assessment, and she is admitted to hospital for further investigation.


