Comment

Wagih Shafik El Masri(y), Naveen Kumar
Keele University, The Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, Staffordshire SY10 7AG, UK
wagih.elmasri@rjah.nhs.uk

We declare that we have no conflicts of interest.


DOI:10.1016/S0140-6736(11)60102-5
Online Published March 15, 2011

Of all the dilemmas in acute paediatrics, that of distinguishing serious life-threatening illness in young children from self-limiting, acute viral infections is probably the problem that causes most anxieties for clinicians and parents. It is not possible, nor desirable, to admit and investigate every child with a high temperature, but of equal importance is prevention of progression of serious illness or infection. The restricted ability of young children to report how they feel, especially when distressed, means that this assessment is largely based on clinical examination. The front-line staff who make judgments about whether a child should be admitted or not are usually not paediatricians, adding further difficulty. Thus, although more than 25% of all patients seen in emergency departments in the UK are children, huge variation exists between National Health Service Trusts (4–24%) in the proportion of children admitted from these departments.1 To help address this problem, various guidelines, checklists, and algorithms have been developed, prompting the clinician to assess the presence of a constellation of symptoms and signs that can show whether the child is likely to be at high risk.2,3

Measurements of heart rate and respiratory rate are usually fundamental to the assessment of physiological status, and have the advantage of being easy to measure and generally raised during acute illnesses.4 Rapid breathing is recognised worldwide as an important red flag for serious infection in children,5 and is integral to the diagnosis of acute lower respiratory infection in resource-poor settings—its absence making such a diagnosis very unlikely.5

However, to add to the challenges, infancy and childhood are periods of enormous physiological and developmental changes, particularly in the early months and years. Although researchers have attempted to establish what constitutes normal heart and respiratory rates at different ages, these investigations have been in various populations, settings, and geographical locations, with use of different measurement techniques, during at least the past six decades. The result is that the

Lessons from normal heart and respiratory rates in children

Wagih Shafik El Masri(y), Naveen Kumar
Keele University, The Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, Staffordshire SY10 7AG, UK
wagih.elmasri@rjah.nhs.uk

We declare that we have no conflicts of interest.


DOI:10.1016/S0140-6736(11)60102-5
Online Published March 15, 2011

Of all the dilemmas in acute paediatrics, that of distinguishing serious life-threatening illness in young children from self-limiting, acute viral infections is probably the problem that causes most anxieties for clinicians and parents. It is not possible, nor desirable, to admit and investigate every child with a high temperature, but of equal importance is prevention of progression of serious illness or infection. The restricted ability of young children to report how they feel, especially when distressed, means that this assessment is largely based on clinical examination. The front-line staff who make judgments about whether a child should be admitted or not are usually not paediatricians, adding further difficulty. Thus, although more than 25% of all patients seen in emergency departments in the UK are children, huge variation exists between National Health Service Trusts (4–24%) in the proportion of children admitted from these departments.1 To help address this problem, various guidelines, checklists, and algorithms have been developed, prompting the clinician to assess the presence of a constellation of symptoms and signs that can show whether the child is likely to be at high risk.2,3

Measurements of heart rate and respiratory rate are usually fundamental to the assessment of physiological status, and have the advantage of being easy to measure and generally raised during acute illnesses.4 Rapid breathing is recognised worldwide as an important red flag for serious infection in children,5 and is integral to the diagnosis of acute lower respiratory infection in resource-poor settings—its absence making such a diagnosis very unlikely.5

However, to add to the challenges, infancy and childhood are periods of enormous physiological and developmental changes, particularly in the early months and years. Although researchers have attempted to establish what constitutes normal heart and respiratory rates at different ages, these investigations have been in various populations, settings, and geographical locations, with use of different measurement techniques, during at least the past six decades. The result is that the

Lessons from normal heart and respiratory rates in children

Wagih Shafik El Masri(y), Naveen Kumar
Keele University, The Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, Staffordshire SY10 7AG, UK
wagih.elmasri@rjah.nhs.uk

We declare that we have no conflicts of interest.

before general implementation of the findings. For height and weight varies over time compared with the charts are most useful for assessment of how a child’s comparison with a reference value, growth centile at particular ages and how these measurements change variations in measurements between healthy children paediatricians, centile charts are a familiar way to display measurements technique (manual vs clinical or laboratory), measurement technique (manual vs automated), developing versus developed country location, and when the study was published. However, other potentially important sources of heterogeneity, such as ethnic origin and sex, have not been explored. The omission of sex is surprising, in view of the consistent and well-recognised differences between normal heart rates of men and women.

Other important caveats should be thought about before general implementation of the findings. For paediatricians, centile charts are a familiar way to display variations in measurements between healthy children at particular ages and how these measurements change with age. However, rather than providing a one-off comparison with a reference value, growth centile charts are most useful for assessment of how a child’s height and weight varies over time compared with the centiles. Thus direct extrapolation from Fleming and co-workers’ centile charts for heart and respiratory rate to recommendations of cutoffs for intervention in particular clinical settings would be unwise. For example, a child whose heart rate usually falls on the 90th centile might be inappropriately categorised if they have a mild tachycardia in unfamiliar surroundings, whereas the same heart rate for another child could suggest an underlying problem, such as hypovolaemia.

A further caution relates to the appropriateness of directly imputing findings from studies of healthy children to the management of sick children. For example, heart rate might be raised by various factors, either in children without any illness (by distress or agitation) or without serious illness (by high temperature or pain), and the effects of these factors will probably differ between age ranges. Further detailed information about the varying effects of such stimuli on heart rate and respiratory rate are needed before reasonable limits of any danger zone can be proposed. Thus Fleming and co-workers’ centile charts should initiate important new studies to establish where the clinical boundaries should be set for different ages, to assist clinicians to distinguish between normal and abnormal heart and respiratory rates. These studies will lead to revised algorithms, risk scores, and guidelines, which will incorporate these limits. Such instruments will then need to be extensively validated in different settings and populations before they can be incorporated into clinical practice.

Rosalind L Smyth
Institute of Translational Medicine, University of Liverpool and Alder Hey Children’s Hospital, Liverpool L12 2AP, UK
rl.smyth@liv.ac.uk
I declare that I have no conflicts of interest.