IS THIS CHILD SERIOUSLY ILL?

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INTRODUCTION

Large numbers of children present acutely every day with one or more symptoms such as fever, cough, rash, vomiting, "not herself" and others. A system is described to sort the many who are not seriously ill from the few who are. In this article a seriously ill child is one whose homeostatic mechanisms are being compromised and who has the potential to proceed from shock to cardiac arrest and death. This is a generic system applicable to all illnesses. It works when the diagnosis is not known and provides the earliest identification of children being compromised by illnesses such as meningococcal septicaemia.

Airway
- Patency
- Noise eg stridor

Breathing (Remove clothing)
- Effort of breathing
  - Respiratory rate
  - Recession: subcostal, intercostal and sternal
  - Use of accessory muscles
  - Noise eg grunt, wheeze
  - Trachael tug/Flaring of nostrils
- Auscultation

Circulation
- Heart rate
- Pulse volume
- Capillary refill time
- Skin temperature and colour

Disability
- Conscious level (AVPU)

Table 1 Summary: Is this child seriously ill? – in 60 seconds

BACKGROUND

When faced with an acutely ill child it is helpful to answer two questions:

1. Signs and Symptoms → Are they seriously ill? → No → Home
   → Yes → 1. ? Review in 1 hr, 2hrs
   2. Call for help, eg refer to paediatrics
2. Signs and Symptoms → What is the diagnosis → Definitive treatment

This system uses knowledge and skills which nurses and doctors already possess. Its usefulness is the framework it provides: for example, clarifying the above two questions to answer with every child. This article focuses on question 1.

Figure 1 represents how a range of different pathologies produces increasing effects on physiology. As time proceeds from left to right physiology is increasingly affected. Initially physiological parameters remain in the normal range. If the illness does not self-limit or there is no intervention the parameters exceed the normal range. This is called shock. Children have an extraordinary ability to compensate for assaults on their system and increase their work of breathing and cardiac output. They are also very effective at diverting perfusion from non-essential organs such as skin and fingers to essential organs such as brain, heart and other organs in the core. This first stage is compensated shock. Once the child is unable to continue to compensate, their systems rapidly fail; their blood pressure falls, perfusion of vital organs fails and they quickly advance to cardiac arrest. The skill is to find the child as early as possible at the upper limits of physiology or at the earlier stages of compensated shock, represented by the vertical yellow zone in Figure 1. Treatment at this point is easy and the outcome good.

ASSESSMENT

The assessment takes 60 seconds. It is summarised in Table 1. It follows the ABCD format of resuscitation. Objective features that can be accurately counted, for example respiratory rate, heart rate and capillary refill time, are very valuable because variation between observers is small, and they respond rapidly with changing severity of compromise. Change for better or worse is easily monitored.

AIRWAY

It takes five seconds to listen and observe the child for airway problems, including if the child can maintain the airway and if the child adopts a specific position to optimise airflow.

BREATHING

Clothing must be removed. The respiratory rate takes 30 seconds to count. During this time look and listen for other signs of increased work of breathing: subcostal recession, intercostal recession, sternal recession, use of accessory muscles, grunt, wheeze, tracheal tug and flaring of the nostrils. The recessions and other observations should be scored as nil, 1+, 2+ or 3+.

Age (years)	Respiratory rate (breaths per minute)
<1	30-40
1-2	25-35
2-5	25-30
5-12	20-25
>12	15-20

Table 2. Normal respiratory rate by age at rest

CIRCULATION

The pulse takes 15 seconds to count, the capillary refill time 7-10 seconds. Capillary refill time is an elegant powerful clinical sign – we must all make it a routine observation (its adoption by all staff in paediatrics in the past five years has

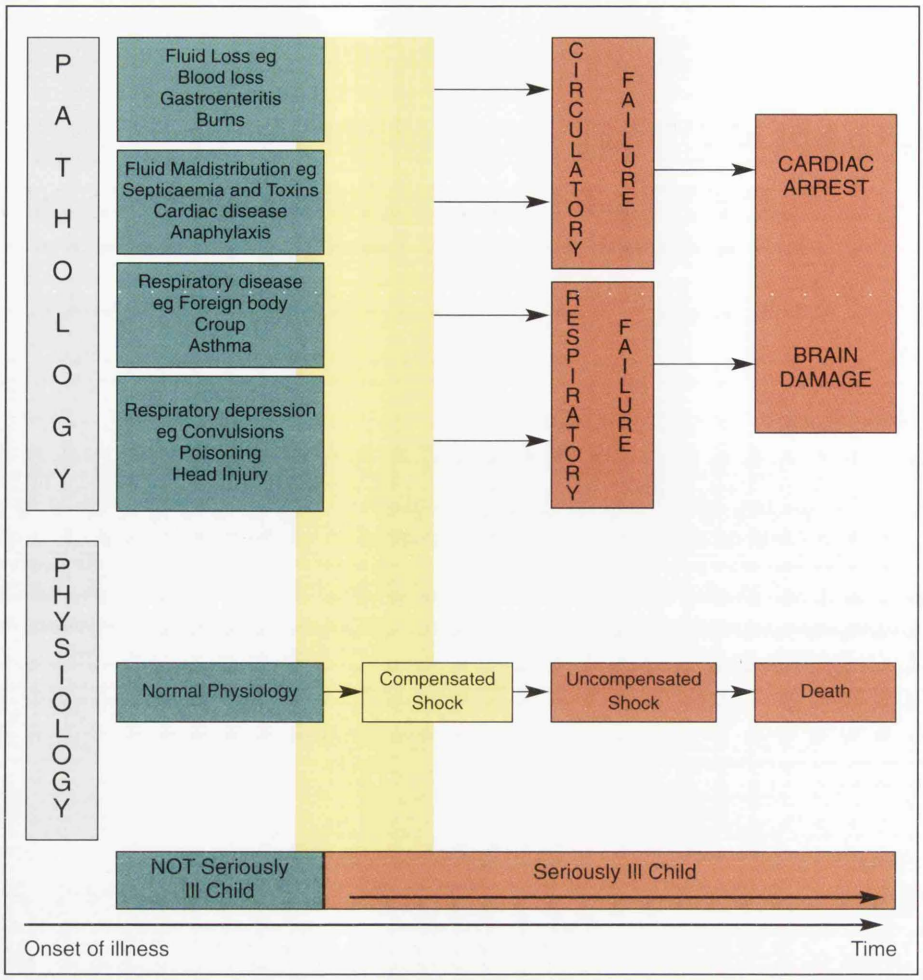

Figure 1 The seriously ill child: pathology and physiology

had a marked improvement on the early identification of ill children). While counting the rate, look and feel the peripheries. Normal perfusion of fingers, hands, and arms (warm, pink and capillary refill ≤ 2 seconds) means there is normal perfusion of brain and other core organs. Compromised perfusion of peripheries (cool, pale or blue, and capillary refill >2 seconds) implies the child is in shock until proved otherwise (eg cold from playing with snowballs).

Age (years)	Heart rate (beats per minute)
<1	110-160
1-2	100-150
2-5	95-140
5-12	80-120
>12	60-100

Table 3. Normal heart rate by age

1. Hold a finger or toe above the level of the child's heart throughout.
2. Gently squeeze finger or toe for 5 seconds.
3. Release squeeze and count how many seconds for colour and circulation to return to the squeezed area. This is the Capillary Refill Time.

Table 4. Capillary refill time

DISABILITY

Assess the level of consciousness. At this initial stage use AVPU instead of the Glasgow Coma Scale.

CLINICAL RECORDS

The clearest method to record and communicate this clinical approach and examination findings is to use the ABCD of resuscitation as the first entry of 'On Examination'. For example:

A	ALERT
V	responds to VOICE
P	responds to PAIN
U	UNRESPONSIVE

Table 5. Rapid assessment of consciousness using AVPU

1 year old
A ✔
B 25/min, no increased work
C 145/min. Can refill 2 seconds, warm pink finger
D **A**VPU

Table 6. On examination

CLINICAL JUDGEMENT

Clinical judgement is required whether this system or any other approach is used when caring for a sick child. This systematic approach guides thought processes as well as information-gathering to support clinical judgement. In the children's department, sick children are identified increasingly early in the amber zone of Figure 1 using this method. We continue to improve our clinical judgement and recommend the method.

FURTHER READING

Advanced Paediatric Life Support – The Practical Approach. 2001. Third Edition. Ed. Mackway-Jones K. *et al*. BMJ Publishing