

A review of Integrated Management of Childhood Illness (IMCI)

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Introduction

The Integrated Management of Childhood Illness (IMCI) strategy is the primary child-care approach of choice for South Africa.^{1,2} IMCI training was introduced into South Africa in 1996 by WHO and UNICEF. Since then 8695 health workers have been trained in IMCI – mainly primary health care nurse practitioners, but also primary care doctors and paediatricians. The basic 11-day course comprises classroom activities, assessing children both in an outpatient setting and paediatric ward.³ A compact 4-day course has been developed for doctors and is being taught in some medical schools. IMCI has been very well received by nurse practitioner and doctor alike in empowering them to make easy, evidence-based decisions in the management of sick children at first contact level. However many doctors continue to work with children without knowledge of IMCI.

Thus, the purpose of this review is two-fold:

- Firstly, many doctors working in hospitals receive referrals from clinic-based IMCI nurse practitioners. Doctors need to be informed what an IMCI classification means. For example,

children are commonly referred with a classification of “*Severe Pneumonia or Very Severe Disease*”. What does this mean? How should the doctor manage this child?

- Secondly, this review introduces some of the basic IMCI skills. An understanding of these skills could be helpful for doctors working with sick children in general practice, clinics, community health centres or in an outpatient setting. However, to become a skilled IMCI practitioner, it is essential for a doctor to attend an IMCI course.

The IMCI approach

IMCI focuses on illnesses that cause the majority of deaths in children under-6 years, many of which are preventable or readily treatable using simple interventions: These are pneumonia, diarrhoea, meningitis, malaria, malnutrition, anemia and HIV/AIDS. This is called a “child survival” approach. Other important aspects of child health are also addressed such as ear infections, the sick young infant (under 2 months), breast-feeding and feeding assessment.

Doctors attending a 4-day IMCI course work from two main

documents: Firstly, a short textbook called IMCI: A Handbook for Medical Practitioners.⁴ The second is a desk reference, used by all nurses and doctors practicing IMCI, called the Chart Booklet.⁵ These were developed by WHO and adapted to the South African setting. The Chart Booklet contains all the information needed to conduct a comprehensive primary child-care consultation and is available on the website. The key information in the Chart Booklet has been summarized into Table I of this review. Table I is designed as an easy reference on the wall of the consultation room. The rest of this review revolves around the information in Table I.

As can be seen in Table I, the IMCI practitioner asks pertinent questions, examines the child and will then assess these signs. Depending on the signs present, one or often more classifications are made. Classification is similar to a diagnosis but is context-specific: For example, in a primary care setting, a classification of *Suspected Meningitis* is made in a feverish child with neck stiffness. Only when this child is referred to hospital where a lumbar puncture can be performed and the cerebro-spinal fluid

examined under the microscope can a *diagnosis* be made. The classifications are graded into levels of seriousness and are colour-coded. A severe classification, coloured red, requires urgent treatment and referral to hospital. The less serious classification, coloured yellow, requires some treatment at home such as amoxycillin for *Pneumonia*. The least severe classification, coloured green, requires supportive treatment at home.

Assessing children between 2 months and 5 years

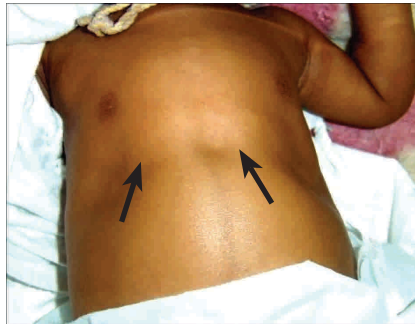
The IMCI practitioner performs the consultation in a systematic manner, checking the important systems in the same order as in Table I. Start by checking for the 4 *General Danger Signs* (GDS). These are: A child who is unable to drink or breastfeed; a child who vomits everything taken by mouth; convulsions in this illness; a child who is lethargic or even unconscious. If one or more of these signs are present, the child is likely to be seriously ill and require hospital care.

The practitioner then asks for all 4 of the main symptoms, even if the caregiver does not mention them. These are: cough or difficult breathing, diarrhoea, fever and ear problem. The relevant symptoms and signs are listed in the left hand column of Table I.

Cough is one of the most common presenting complaints among sick children. The practitioner needs to be able to efficiently identify which children do not just have coryza, but may have pneumonia. When making a classification, always start with the severe, red row: Then very sick children will not be missed – IMCI is like a safety net catching the very sick children. A child with cough or difficult breathing together with a GDS, chest indrawing or stridor would be assigned to the severe, red classification, called *Severe Pneumonia or Very Severe Disease*. Chest indrawing is an inward movement of the lower chest wall when

the calm child breathes in (Figure 1).

Figure 1: Chest Indrawing



If the child has none of these signs, but has fast breathing, then the classification is *Pneumonia*. The cut-off rates for breathing rate decrease with age and are written in Table I for the older child and the sick young infant. The breathing should be counted for a full minute in a calm child. The breathing rate has been shown to be much more reliable in diagnosing pneumonia than listening with a stethoscope.⁶ A child with none of the severe signs and a normal breathing rate is classified as *Cough or Cold*. Using these simple signs, it is easy to decide which child needs referral to hospital, an oral antibiotic or supportive care at home. Treatment is listed in the right hand column. Full dosages for all medicines used can be found in the Chart Booklet. The presence of a wheeze is also considered together with cough.

Diarrhoea is also a common childhood illness. The first step is to decide on the degree of dehydration: 4 signs are assessed: general condition (restless/ irritable or lethargic/ unconscious), sunken eyes, skin pinch (slow or very slow if the skin returns to normal only after 2 seconds) and response to a cup of Oral Rehydration Solution (ORS) (drinking eagerly or unable to drink). As can be seen in Table I, at least 2 signs need to be present to classify the child as either *Diarrhoea with Severe Dehydration* or *Diarrhoea with Some Dehydration*. Plan C is used to treat *Severe*

Table I: Summary of IMCI Case Management

Summary of IMCI Case Management

1	CHECK FOR GENERAL DANGER SIGNS: ASK	<ul style="list-style-type: none"> Is the child able to drink or breastfeed? Does the child vomit everything? 	<ul style="list-style-type: none"> Convulsions in this illness? Is the child lethargic or unconscious? 	
CHILD 2 MONTHS TO 5 YEARS: ASSESS CLASSIFY TREATMENT				
2	<p>DOES THE CHILD HAVE COUGH OR DIFFICULT BREATHING?</p> <ul style="list-style-type: none"> For how long? Count the breaths in one minute Look for chest indrawing Look and listen for stridor or wheeze <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Age Fast breathing</p> <p>2 - 12 mths = 50 or > breaths/min</p> <p>1 - 5 yrs = 40 or > breaths/min</p> </div>	<ul style="list-style-type: none"> Any General Danger Sign OR Chest Indrawing OR Stridor in a calm child 	<p>SEVERE PNEUMONA OR VERY SEVERE DISEASE</p>	<ul style="list-style-type: none"> Give ceftriaxone IMI (80mg/kg) and if child < 6 mths also give cotrimoxazole Give O₂ and check blood sugar If stridor, nebulize with adrenalin Keep child warm and refer URGENTLY to hospital
		<ul style="list-style-type: none"> Fast breathing 	<p>PNEUMONIA</p>	<ul style="list-style-type: none"> Give amoxicillin for 5 days Consider symptomatic HIV Follow up in 2 days
		<ul style="list-style-type: none"> No signs of pneumonia or very severe disease 	<p>COUGH OR COLD</p>	<ul style="list-style-type: none"> Soothe the throat and relieve the cough If coughing for more than 21 days consider TB or asthma Follow-up 5 days if not better
3	<p>DOES THE CHILD HAVE DIARRHOEA?</p> <ul style="list-style-type: none"> For how long? If >14 days, has child lost weight? Is there blood in the stool? What Rx is the mother giving? Look at child's general condition Look for sunken eyes. Offer the child fluids. Pinch the skin of the abdomen <p>CLASSIFY FOR DEHYDRATION (All children with diarrhoea)</p>	<p>Two of the following signs:</p> <ul style="list-style-type: none"> Lethargic or unconscious Sunken eyes Not able to drink or drinking poorly Skin pinch goes back very slowly (>2 secs) 	<p>DIARRHOEA WITH SEVERE DEHYDRATION</p>	<ul style="list-style-type: none"> Start Fluids for Plan C Refer URGENTLY to hospital Give frequent sips of ORS on the way, continue breastfeeding Keep the child warm
		<p>Two of the following signs:</p> <ul style="list-style-type: none"> Restless or irritable Sunken eyes Child drinks eagerly and is thirsty Skin pinch goes back slowly 	<p>DIARRHOEA WITH SOME DEHYDRATION</p>	<ul style="list-style-type: none"> Give fluids: Plan B Continue breastfeeding or feeding Follow up in 2 days if not improving
		<ul style="list-style-type: none"> Not enough signs to classify as severe or some dehydration 	<p>NO VISIBLE DEHYDRATION</p>	<ul style="list-style-type: none"> Give fluid and food to Rx diarrhoea at home: Plan A Follow up in 5 days if not improving
	<p>CLASSIFY FOR PERSISTENT DIARRHOEA (If diarrhoea for 14 or more days)</p>	<ul style="list-style-type: none"> Child has signs of dehydration Child has history of weight loss 	<p>SEVERE PERSISTENT DIARRHOEA</p>	<ul style="list-style-type: none"> Rx for dehydration if present Refer URGENTLY to hospital Give Vit A unless given in last month Give frequent sips of ORS on the way
		<ul style="list-style-type: none"> No dehydration No history of weight loss 	<p>PERSISTENT DIARRHOEA</p>	<ul style="list-style-type: none"> Counsel the mother about feeding Give Vit A unless given in last month Consider symptomatic HIV infection Follow up in 5 days
	<p>CLASSIFY FOR DYSENTERY (If diarrhoea with blood)</p>	<ul style="list-style-type: none"> Child has signs of dehydration Child less than 12 months of age 	<p>SEVERE DYSENTERY</p>	<ul style="list-style-type: none"> Rx for dehydration if present Refer URGENTLY to hospital Give frequent sips of ORS on the way
		<ul style="list-style-type: none"> Blood in stool 	<p>DYSENTERY</p>	<ul style="list-style-type: none"> Nalidixic acid for 5 days Follow up in 2 days
4	<p>DOES THE CHILD HAVE A FEVER?</p> <ul style="list-style-type: none"> For how long? Examine for stiff neck Examine for bulging fontanelle Look for other causes of fever <p>IF EXPOSED TO MALARIA, ALSO CLASSIFY FOR MALARIA</p> <ul style="list-style-type: none"> Do a rapid malaria test if available 	<ul style="list-style-type: none"> Any General Danger Sign OR Stiff neck OR Bulging fontanelle 	<p>SUSPECTED MENINGITIS</p>	<ul style="list-style-type: none"> Give ceftriaxone IMI (80mg/kg) Check blood sugar Rx the fever Refer URGENTLY to hospital
		<ul style="list-style-type: none"> No General Danger Signs and.. No stiff neck or bulging fontanelle 	<p>FEVER, OTHER CAUSE</p>	<ul style="list-style-type: none"> Rx the cause of the fever Rx the fever Follow up in 2 days if fever persists
		<ul style="list-style-type: none"> Any General Danger Sign OR Stiff neck OR Bulging fontanelle (Malaria rapid test or positive or negative or not done) 	<p>SUSPECTED SEVERE MALARIA</p>	<ul style="list-style-type: none"> If child > 12 months, give first dose of co-artemether Give ceftriaxone IMI Refer URGENTLY to hospital If child <12 months refer URGENTLY to hospital for malaria Rx
		<ul style="list-style-type: none"> Rapid malaria test positive 	<p>MALARIA</p>	<ul style="list-style-type: none"> If child >12 months, give co-artemether at clinic and then for 3 days at home Rx fever Follow up in 2 days if the fever persists
		<ul style="list-style-type: none"> Rapid malaria test not done 	<p>POSSIBLE MALARIA</p>	<ul style="list-style-type: none"> Refer for malaria testing Rx fever
		<ul style="list-style-type: none"> Rapid malaria test negative 	<p>FEVER, OTHER CAUSE</p>	<ul style="list-style-type: none"> Rx the fever and the cause Follow up in 2 days if fever persists

	ASSESS	CLASSIFY	TREATMENT	
5	DOES THE CHILD HAVE AN EAR PROBLEM? <ul style="list-style-type: none"> • Ear pain? • Is there ear discharge? If yes for how long? 	<ul style="list-style-type: none"> • Tender swelling behind the ear 	MASTOIDITIS <ul style="list-style-type: none"> • Give ceftriaxone IMI and refer URGENTLY to hospital 	
		<ul style="list-style-type: none"> • Ear pain OR • Red tympanic membrane OR • Pus draining from the ear < 14 days • Pus draining from the ear > 14 days 	ACUTE EAR INFECTION CHRONIC EAR INFECTION	<ul style="list-style-type: none"> • Rx amoxicillin for 5 days • If ear discharge teach mother dry wicking and consider symptomatic HIV • Analgesia and follow up in 5 days if pain or discharge persists • Teach mother dry wicking • Consider symptomatic HIV • Follow up in 14 days
		<ul style="list-style-type: none"> • No ear pain and no pus draining 	NO EAR INFECTION	<ul style="list-style-type: none"> • No Rx

6	CHECK FOR MALNUTRITION AND ANAEMIA <ul style="list-style-type: none"> • Has the child lost weight? • Plot the weight on the RTHC • Look for visible severe wasting • Feel for oedema of both feet 	<ul style="list-style-type: none"> • Very low weight (<60% exp'd) OR • Visible severe wasting OR • Oedema of both feet 	SEVERE MALNUTRITION NOT GROWING WELL	<ul style="list-style-type: none"> • Vit A unless given in the last month • Refer URGENTLY to hospital • Check blood sugar and keep warm
		<ul style="list-style-type: none"> • Low weight OR • Poor weight gain OR • Mother reports weight loss 	NOT GROWING WELL	<ul style="list-style-type: none"> • Consider Vit A and mebendazole • Check and treat for oral thrush • Consider symptomatic HIV, TB contact • Assess feeding and counsel • Follow up in 14 days
		<ul style="list-style-type: none"> • Not low weight and.. • Good weight gain 	GROWING WELL	<ul style="list-style-type: none"> • Check feeding • Consider Vit A and mebendazole
		<ul style="list-style-type: none"> • Look for palmar pallor • Check hemoglobin level 	<ul style="list-style-type: none"> • Severe palmar pallor OR • Hb < 6 g/dl • Some palmar pallor OR • Hb < 10 g/dl • No pallor and Hb > 10 g/dl 	SEVERE ANAEMIA ANAEMIA NO ANAEMIA

7	ASSESS FOR SYMPTOMATIC HIV INFECTION: <ul style="list-style-type: none"> • 3 OR MORE POSITIVE FINDINGS OF THESE 8 SYMPTOMS AND SIGNS 	<ul style="list-style-type: none"> • Any pneumonia now • Ear discharge now or in the past? • Low weight for age • Poor weight gain or weight loss? • Persistent diarrhoea in last 3 mths? • Enlarged lymph nodes in 2 or more of the following 3 sites: Neck, axilla or groin • Oral thrush • Parotid gland enlargement 	SUSPECTED SYMPTOMATIC HIV <i>(3 or > positive findings)</i>	<ul style="list-style-type: none"> • Offer HIV testing for mother and child if status unknown • Start co-trimoxazole prophylaxis • Counsel the mother • Follow up for counselling about results
		<ul style="list-style-type: none"> • No additional findings 	SYMPTOMATIC HIV UNLIKELY <i>(< 3 positive findings)</i>	<ul style="list-style-type: none"> • Counsel mother about her health and precautions against HIV infection

INFANT: 1 WEEK - 2 MONTHS

1	CHECK FOR POSSIBLE BACTERIAL INFECTION	One of the following signs: <ul style="list-style-type: none"> • Fast breathing (60 or > breaths/min. <i>(Repeat if fast)</i>) • Severe chest indrawing (deep and easy to see) • Nasal flaring or grunting • Convulsions • Bulging fontanelle • Umbilical redness extending to skin, and or draining pus • Fever (> 37.5°C) or low body temperature (<35.5°C) • Many or severe skin pustules (> 5 pustules) • Lethargic, unconscious or less than normal movements • Apnea attacks • Not taking feeds or taking feeds poorly • Jaundice worsening or still present after 2 weeks 	POSSIBLE SERIOUS BACTERIAL INFECTION	<ul style="list-style-type: none"> • Give IMI ceftriaxone (80mg/kg) • Give O2 • Give rectal diazepam if convulsing • Check and Rx low blood sugar • Refer URGENTLY to hospital • Continue breastfeeding • Keep the child warm
		<ul style="list-style-type: none"> • Red umbilicus • Skin pustules • Pus draining from the eye 	LOCAL BACTERIAL INFECTION	<ul style="list-style-type: none"> • Give erythromycin for 7 days • For eye infection give ceftriaxone IMI • Advise mother on care of the infection
		None of the above signs:	NO BACTERIAL INFECTION	<ul style="list-style-type: none"> • Relevant health counselling

2	CHECK FOR FEEDING PROBLEM OR LOW WEIGHT IN BREASTFED BABIES:	<ul style="list-style-type: none"> • Not able to feed • Infant not able to attach to breast • Not suckling at all 	NOT ABLE TO FEED	<ul style="list-style-type: none"> • Give IMI ceftriaxone (80mg/kg) • Check blood sugar and keep warm • Refer URGENTLY to hospital
		<ul style="list-style-type: none"> • Infant not well attached to breast • Infant not suckling effectively • Less than 8 breastfeeds in 24 hrs • Infant receiving other foods • Low weight for age or poor wt. gain • Oral thrush • Using a feeding bottle 	FEEDING PROBLEM OR NOT GROWING WELL	<ul style="list-style-type: none"> • Advise on breastfeeding esp. correct positioning and attachment • Breastfeed > 8x in 24 hrs and at night • Breastfeed more, reducing other foods • Follow up weight gain • Nystatin drops
		<ul style="list-style-type: none"> • Not low weight and feeding well 	NO FEEDING PROBLEM	<ul style="list-style-type: none"> • Relevant health counselling

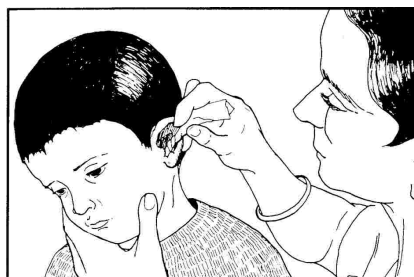
Dehydration: Until the child can be referred to hospital, Ringers Lactate 20ml/kg is given IV in the first 30 minutes and then 20ml/kg/hour IV for the next 5 hours. Plan B is used for *Some Dehydration*: ORS 20ml/kg/hour is given *per os* for 4 hours in the first contact health facility. The child is then reassessed and sent home if better. Plan A is used for the child with *No Visible Dehydration*: For the child under 2 years, give 50-100ml ORS after each loose stool; For the child older than 2 years, give 100-200ml after each loose stool. If diarrhoea is present for 14 days or more, assess for *Persistent Diarrhoea*. If there is diarrhoea with blood, then assess for *Dysentery*.

Fever is very common in childhood illness but can indicate serious illnesses especially if prolonged. Meningitis should always be excluded by feeling for a bulging fontanelle and testing for neck stiffness. If one or both signs or a General Danger Sign are present, the classification becomes *Suspected Meningitis*. Children with a febrile convulsion may present like this, and meningitis should be excluded. Urgent treatment should be instituted with IM ceftriaxone and the child referred to hospital for lumbar puncture.

In a malaria area such as northern KwaZulu-Natal, malaria should always be considered in a child with fever. Severe signs in the red row make the classification *Suspected Severe Malaria* and the child should be referred to hospital. Other classifications depend on the result of the malaria rapid test as can be seen in Table I.

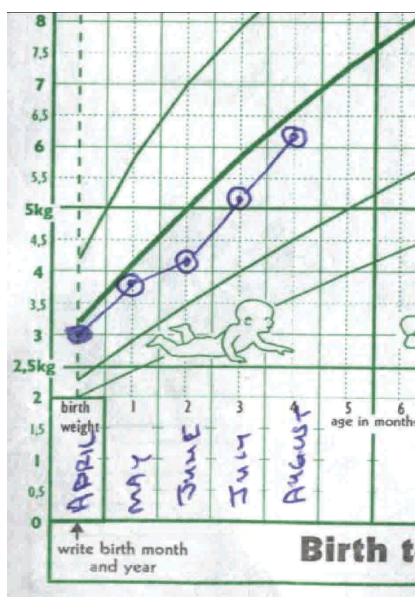
Ear infections, although not life threatening, may cause deafness and learning problems. With a chronic ear infection, dry wicking with thick paper towel is an effective means of drying the discharge. (Figure 2) Follow up is very important to ensure healing and proper function of the ear.

Figure 2: Ear wicking



Malnutrition and anemia should be checked in all children. The proper use of the Road to Health Chart (RTHC) is essential. The first step is to write the birth month in the first column of the RTHC. The weight for the current month is then plotted on the dotted line for that month (Figure 3).

Figure 3: RTHC



Signs of visible severe wasting (marasmus) are loss of muscle and subcutaneous tissue. The child's arms and legs are thin with ribs and spine prominent. The buttocks become flatter and the skin hangs in folds, giving the appearance of "baggy pants". Oedema of the dorsa of the feet may indicate kwashiorkor. If wasting, oedema or very low weight-for-age are present, the classification is *Severe Malnutrition*. The classification *Not Growing Well* indicates a more minor nutritional problem. Pallor of the palm

is a reliable indicator of anaemia. Compare the child's palm to that of the mother's. Just a trace of pinkness around the outside of the palm indicates *Anaemia*. However if the palm is completely pale, classify as *Severe Anaemia* and check the hemoglobin level.

HIV infection has become very common. As seen in Table I, Eight signs have been identified as best determining the presence of HIV infection⁷. The presence of 3 or more of these signs makes the classification *Suspected Symptomatic HIV* and the child should be formally tested. PCP prophylaxis with cotrimoxazole should be considered especially before the age of 1 year.

Assessing infants between 1 week and 2 months

Sick infants presenting in this age group should all be carefully checked for *Possible Serious* or *Local Bacterial Infection*: Because sick young infants die quicker than older children, the IMCI approach for this age group is rigorous: The breathing rate of all infants should be counted – the cut-off rate being 60 breaths per minute. Look for severe chest indrawing: Mild indrawing is normal in a young infant because the chest wall is soft. Fever or low body temperature are significant at this age are indicators of a serious illness as is the non-specific sign of not taking feeds. As can be seen from Table I, any 1 of the signs present from the red row makes the classification to be *Possible Serious Bacterial Infection*. These infants should be treated and referred urgently to hospital. An infant classified as *Local Bacterial Infection* is treated appropriately at home.

Feeding Assessment

The IMCI practitioner assesses feeding problems in all children under-2 years or who are low weight-for-age. More complete information on assessing

the older child's feeding can be found in the Chart Booklet. In the young infant, a feeding or low weight problem should be checked as per Table I. The severe classification is *Not Able to Feed*. However many more infants are classified as *Feeding Problem* or *Not Growing Well*. Infants should be breastfed at least 8 times in 24 hours. Attachment refers to how well the infant suckles on the breast – all breastfeeding mothers should be checked and counselled for attachment.

Figure 3: Breastfeeding



The 4 signs of good attachment are: Infant's mouth wide open; chin touching the breast; lower lip turned outward; more areola visible above than below the infant's mouth while feeding. Oral thrush or the concurrent use of a feeding bottle also indicates *Feeding Problem*.

In summary

The IMCI approach ensures that a comprehensive and accurate assessment is made of a sick child using simple yet reliable clinical signs at the first contact level. Also doctors, especially those working in the public sector need to understand the IMCI approach that is used in primary health care throughout South Africa: They will be better able to receive referrals and send the child back for care and follow up into the primary health care system. All doctors who manage sick children should consider updating their skills to include IMCI. The National Child and Youth Health Directorate

(012-3120199) can supply information on doctor courses being conducted throughout the country. ✎

Acknowledgements

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UNIVERSITY OF LIMPOPO (MEDUNSA CAMPUS)



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