

# CHILD HEALTH SURVEILLANCE : ENLARGING THE ROLE OF THE FAMILY DOCTOR

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## ABSTRACT

*The family doctor looks after the family as a unit of care. This includes not only curative care but also disease prevention and health promotion. One of the areas is child health. He is in an ideal position to participate in child health surveillance as a member of the primary health care team. The tasks involved in child health surveillance include growth monitoring, monitoring of developmental progress, prevention of disease by immunisation, health education, nutrition education, developmental guidance and injury prevention. To meet the expanding role of the family doctor in child health surveillance, he needs adequate training and continuing education.*

*Keywords: growth monitoring, child development, immunisation, health education.*

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## INTRODUCTION

The family doctor looks after the family as a unit of care. This includes not only curative care but also disease prevention and health promotion. One of the age groups under his care is the paediatric patient. He is in a vantage position to participate in child health surveillance as a member of the primary health care team<sup>(1)</sup>. This paper describes the concept of child health surveillance and the enlargement of the family doctor's role in this aspect of holistic care.

## CHILD HEALTH SURVEILLANCE

Child health surveillance may be defined as periodic assessment of the physical, social and emotional health and development of all children. Surveillance, in the sense of "watchful observation", is a term now frequently applied to the preventive health care of children, especially in the years before school entry<sup>(2)</sup>. The tasks consist of measuring and recording physical growth; monitoring developmental progress, intervening when necessary, preventing disease by immunisation and necessary health education so that the parents will be motivated to comply. The concept of surveillance is one that involves the whole population<sup>(3)</sup>.

In child health surveillance, the relationship between the doctor and the parents should not be one of only professional supervision but rather a partnership where parents play a role and make use of services and expertise in the most appropriate way<sup>(1)</sup>.

## Measurement and recording of physical growth

All children should have height and weight measurements taken periodically. In infants, instead of height, length measurement and occipitofrontal head circumference measurements are taken.

### Weight

Weight is the most widely used clinical measurement of growth. Babies should be weighed nude unless they are wearing splints. Weighing scales should be checked and calibrated daily. Weight

measurements should be dated and plotted on growth centile charts. There are weight for age charts and also weight for height charts.

Common causes of poor weight gain include the following:

- Chronic diseases eg congenital heart diseases, renal problems.
- Malabsorption disorders eg coeliac disease
- Endocrine and metabolic conditions.
- Underfeeding
- Psychosocial or emotional deprivation.

Some babies lose weight when they have acute illness but this should be a transient process and they should regain the lost weight in a few days.

Babies who are quite big at birth in weight as well as length and whose weights and lengths cross centile lines gradually downwards especially in the 2nd and 3rd year of life are in fact normal<sup>(4)</sup>. They are likely to be following a genetically programmed growth trajectory<sup>(2)</sup>. Of course rapid downward crossing of the centiles, marked weight loss or prolonged failure to gain weight suggest the presence of pathology. These children should be referred to the hospital paediatrician for detailed assessment, investigations and management.

### Length/Height

Infants and children under 2 years should be measured lying down, using a stadiometer, to record the length of the child. From about 2 years old, measurement of the height can be done. Children's height measurements can be done against an accurately positioned wall measuring chart. The child must be measured with bare feet together, with the back of the heels against the wall. The head must face forward and the chin tilted so that the eye is at the same level with the ears.

The measurement of length/height is an important clinical assessment of skeletal growth. The causes of short and tall stature are given in Tables I and II.

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**Table I – Causes of short stature**

1. Familial
2. Small for gestational age babies
3. Chronic diseases eg. congenital heart disease renal conditions Coeliac disease
4. Endocrine disorders – growth hormone deficiency – congenital hypothyroidism
5. Congenital syndromes – Down's syndrome – Turner's syndrome
6. Social deprivation

**Table II – Causes of tall stature**

1. Familial
2. Congenital syndromes – Marfan's syndrome – Klinefelter's syndrome – Cerebral gigantism (Soto syndrome)
3. Endocrine disorders – Precocious puberty (early stages) – Thyrotoxicosis – Pituitary (eosinophilic adenoma)

*Occipito-frontal circumference measurements (Head Circumference)*

This is done with a paper or plastic tape at the maximum circumference around the supra orbital ridges and glabella (anteriorly), and that part of the occiput that gives the maximal circumference (posteriorly)<sup>(4)</sup>. The measurements are plotted on centile charts. Routine head measurement in infants is designed to detect those disorders characterised by a small head and those by a large head.

If the baby's head circumference curve deviates from the 97th or the 3rd percentile and does not correspond with other measurements like length and weight or if the child shows signs and symptoms of hydrocephalus, the child should be referred to a paediatrician for further investigation and management.

*The use of centile charts*

Percentile charts compiled from the child's local population should be used. Percentile charts are based on two kinds of data collected from normal children: cross sectional data, that is measuring and weighing large numbers of children from different age groups at one time; or longitudinal data following a number of children as they grow with regular weighing and measuring<sup>(4)</sup>. The percentile lines show the chances of a normal child falling above or below that line – for example if the child is 97th percentile for height there are only 3 in 100 children taller than him and 97 in 100 shorter than him.

Children whose weight, height and occipitofrontal head circumferences are above the 97th percentile or below the 3rd percentile need additional evaluation.

Growth monitoring requires:

1. an understanding of normal growth and its variations.
2. the ability to make accurate measurements of height, weight and head circumference.
3. the ability to plot the result correctly on the percentile chart and
4. the ability to decide if further action is necessary.

**Monitoring of developmental progress**

Monitoring of developmental progress of children is important because it can detect developmental delays thereby allowing the best chances for early intervention and therapy.

Monitoring of developmental progress of children requires:

1. a thorough understanding of child development, both normal and abnormal.
2. the ability to take a good history including the developmental history.
3. the observation of the child at play and his behaviour.
4. the recognition of atypical patterns of development.
5. the use of developmental tests for detailed assessment of the child when necessary.

The current trend and thinking is that developmental screening should be part of the health surveillance programme. Rigid routine developmental screening of all preschool age children using developmental screening tests may not be necessary. Opportunities to evaluate development should be available when the child is seen for any other reason. Developmental screening tests should not be used in isolation but as an aid in assessment together with the developmental history, clinical examination and observation of the child. The need for a detailed developmental examination of each is a matter of professional judgement but health professionals should respect parental observations and worries.

*Developmental Screening Tests*

There are many developmental screening tests available<sup>(5)</sup>. The Denver Developmental Screening Test (DDST)<sup>(6)</sup> and the Woodside Test<sup>(7)</sup> are two popular tests. In Singapore, the DDST had been standardised<sup>(8)</sup> and used in all polyclinics as part of the child health surveillance programme. Both the DDST and Woodside test use simple, standardised test items and clearly defined pass/fail rules for referral.

*Screening for hearing impairment*

Screening for hearing loss may be undertaken by a number of methods.

*Screening at birth*

Screening for newborns can be done before the infants are discharged from hospital. Some screening tests that are done for newborns are:

1. An automated behavioural method, using the auditory response cradle (ARC).
2. Brain-stem evoked response audiometry (BSERA) which involves recording and computer analysis of EEG signals evoked in response to a series of clicks.
3. Measurement of cochlear emissions.

The above tests are very expensive and not all hospitals would have them in the routine screening programme but where facilities are available they are used for selective screening for high risk neonates.

*Distraction test*

This is a behavioural test carried out during the first year of life involving a technique known as the distraction test. This test is best performed when the child is about seven to nine months old. This test requires two persons, and it depends on the infant's ability to turn and localise a sound source. This test can be done in a primary care setting but has limitations as cases with mild or moderate hearing loss may be missed. To be successful the

test requires careful and regularly repeated retraining of the operators and monitoring of their own hearing. Also necessary are quiet, unhurried conditions and a good deal of patience<sup>(2)</sup>.

*Hearing tests – two years to five years*

Between the ages of two years and five years, children's hearing can be tested by methods involving cooperation. Speech discrimination tests require the child to respond by pointing to a series of objects when the examiner says them in a very quiet voice. An example of these tests is the McCormick Toy Discrimination Test. Most children can perform this test successfully by three to three and a half years old. When the child is about five years old the standard pure-tone audiometry can be done.

*Screening for vision defects*

*Assessment of visual acuity in infancy*

There is currently no satisfactory test of visual acuity for infants. The measurement of visual acuity in children under the age of three years is very difficult. There are some tests that provide an indication of visual function, as for example the Sheridan's graded balls test and the matching toy test.

*Visual acuity in preschool age children (3 years – 5 years)*

The visual acuity for distant vision can be assessed using single letters, eg the Stycar test, the Otago chart or the Sheridan Gardiner test. For children aged five years and older, the Snellen chart can be used. It is essential to occlude each eye in turn, otherwise the result indicates only the vision in the better eye. We need to make sure that the child knows the letters for the Snellen's test or is able to match the letters in the Sheridan Gardiner test or the Otago chart. If the child has visual acuity of 6/12 or worse the child should be referred.

*Squint*

Assessment of squint requires:

1. a careful inspection of the eyes,
2. the corneal reflection test,
3. the cover test,
4. examination of eye movements one eye at a time. This can be done by moving a small target of visual interest (not a light) through the horizontal, vertical and oblique planes.

Screening tests are only one part of child health surveillance which in turn is only one part of the many programmes for trying to maintain children's health<sup>(9)</sup>. If the screening tests are not carried out correctly and appropriate referrals are not made, then:

1. too many parents will be worried unnecessarily when their children are referred as being in a high-risk category, which may not be the case (false positives); and
2. some parents will be falsely reassured by a badly performed screening test which does not show that their children do have a problem, and should be referred (false negatives).

Developmental problems that can be identified from monitoring of developmental progress of children include: delay in motor development, delay in speech and language development, problems in personal and social development and developmental delay due to lack of stimulation. Some examples of motor development delays are poor head control, hypotonia, delay in sitting and walking. Autism should be suspected if a child is delayed in speech and language as well as in the personal and social parameters.

*Offering and arranging intervention when necessary*

The family doctor in monitoring growth and development of children is in an ideal position to detect growth and developmental problems so that they can be cured or alleviated by early therapy and intervention programmes.

Children with special needs, whether they are caused primarily by biological, environmental or social factors, need expert help. These children need specialist medical help as well as intervention programmes like early stimulation and special education programmes.

A better use of the existing resources, both in hospitals as well as in the community, could be made if the health professionals update their knowledge on these resources and also by closer collaboration with providers in the field of education, social services and voluntary organisations.

**Prevention of disease by immunisation**

Immunisation is a primary health care activity both at the family doctors' clinics or at government polyclinics. The family doctors need to have a thorough knowledge of the immunisation schedule, contraindications to immunisation, immunisation procedures, adverse reactions, dealing with children who have missed their immunisations at the recommended times as well as notification and reporting procedures.

The recommended childhood immunisation schedule of Singapore is shown in Table III. The age of immunisation and the intervals between the doses are both important. If a child had an immunisation later than the recommended age, the interval between the doses should be scheduled accordingly.

**Table III – Recommended Childhood Immunisation Schedule in Singapore**

Age	Vaccine
At birth	Bacillus Calmette – Guerin (BCG) Hepatitis B 1st dose
1 month	Hepatitis B 2nd dose
3 months	Diphtheria Pertussis Tetanus (DPT) and Polio 1st dose
4 months	DPT and Polio 2nd dose
5 months	DPT and Polio 3rd dose
6 months	Hepatitis B 3rd dose
OR 5 months after 2nd dose	
12 months & above	Measles, Mumps & Rubella (MMR)
18 months	DPT and Polio (1st booster)
OR 1 year after 3rd dose	
6 years	Diphtheria Tetanus (DT) and Polio (2nd booster) BCG (those with no previous vaccination)
12 years	DT and Polio (3rd booster) BCG (Mantoux negative) Rubella (both boys and girls)
16 years	BCG (Mantoux negative)

### *Contraindications to immunisation in childhood<sup>(9)</sup>*

There are three contraindications to immunisation in childhood.

#### *Current febrile illness*

Do not immunise a child if the child has an acute febrile illness. Advise the parent to come back for immunisation when the child is well in about 2 weeks time.

#### *Anaphylactic reaction to previous dose*

An Anaphylactic reaction to previous dose of vaccine is an absolute contraindication to further doses of that vaccine. Anyone administering vaccines should be able to recognise anaphylaxis. These reactions may be delayed by a few minutes so it is advisable that children stay in the clinic about or 20 to 30 minutes after immunisation.

#### *Immunosuppression*

Children with poor immune responses such as those with leukaemia or other cancers and children who are receiving chemotherapy should not receive live vaccines (the live vaccines are: BCG vaccine, measles vaccine, poliomyelitis vaccine, rubella and measles-mumps-rubella vaccine).

Children receiving high doses of corticosteroids or those on prolonged courses of oral steroids should not be immunised with live vaccines until three months after completion of treatment. Local administration of steroids including inhaled steroids and a short course of systemic steroids is not a contraindication to vaccination.

#### *Immunisation procedure*

##### *History taking and clinical examination*

A history must be taken for suitability for immunisation. Before each immunisation the health of the child should be assessed.

##### *Informed consent*

Parents should be informed about the benefits and risks of immunisation. Either a written consent or a verbal consent should be obtained before each immunisation.

##### *Giving the immunisation*

At the actual giving of immunisation, check expiry dates of the vaccines and storage conditions. Check also the dose and name of the vaccine against the child's clinic card. The skin should be clean and dry before giving the immunisation.

##### *Route of administration*

The routes of administration for different vaccines and their dosages should be noted eg BCG is given as an intradermal injection and the dosage depends on the brand of BCG vaccine used. Sabin vaccine is given orally and the dosage is 3 drops of vaccine.

#### *Cold Chain and good storekeeping*

##### *Maintaining the Cold Chain*

Special attention should be paid to the "Cold Chain" concept. This attempts to ensure that all vaccines are maintained at the correct temperature at all stages of transport and storage from the manufacturer to the point of vaccination. All vaccines except for oral polio should be stored in the main compartment of the refrigerator at a temperature between +2°C and +8°C. Oral polio vaccines should be stored in the freezer compartment at a temperature of below -4°C. The person in charge of the immunisation programme must check that the daily temperature in the refrigerator is between +2°C and +8°C. Food or drinks must not be stored in the same refrigerator.

#### *Good storekeeping*

When new stocks of vaccines are received, they should be put behind the old vaccines in the refrigerator so that the old vaccines can be used first. This is the "first in, first out" principle of storekeeping and is an important rule for good vaccine storage.

#### *Interval between doses*

The interval between doses is according to the recommended immunisation schedule. Should the child present at a later age than the recommended age, the interval between doses should be spaced accordingly.

#### *Interrupted immunisations*

Interrupted immunisations need not be restarted. The remaining dose or doses should be given as if the prolonged interval had not occurred.

#### *Unimmunised children*

Children not immunised in the first year of life may be started on a course of primary immunisation any time before the age of 7 years. The schedule should be modified for these children so that they are properly protected against as many of the communicable diseases as possible. They can be given Measles, Mumps, Rubella (MMR), Triple vaccine (DPT) and oral poliomyelitis vaccine simultaneously at different sites and routes. The subsequent doses should be given according to the intervals recommended. If the child has not been immunised against diphtheria, pertussis, tetanus and poliomyelitis and is now over 7 years old, only diphtheria, tetanus (DT) and poliomyelitis immunisation should be given.

#### *Simultaneous administration of vaccines*

Simultaneous administration of two inactivated vaccines can be given but they should be at different sites. An inactivated vaccine and a live viral attenuated vaccine may also be administered simultaneously. For example, Diphtheria, Pertussis and Tetanus (DPT), Oral Polio Vaccine, (OPV) and Measles, Mumps, Rubella (MMR) can be given simultaneously at separate sites without interfering with each other<sup>(10,11)</sup>.

#### *Recording*

It is very important that all immunisations are recorded and dated both on clinic records and in the child's health booklet.

#### *Notification*

Notification of immunisation is also very important. In Singapore, notification is to the Central Immunisation Registry, (CIR), Ministry of Health, Singapore. There are forms for notification and the CIR must be notified after each dose.

#### *Adverse reactions*

Adverse reactions are rare but the doctor must be aware of the possibility and be equipped with drugs and equipment at the clinic to deal with these reactions.

#### *Human Immunodeficiency Virus (HIV) positive infants and children and Immunisation*

All infants and children should be immunised with the recommended childhood vaccines according to standard schedules. In developing countries, the high risk of infection with measles, poliomyelitis and other communicable diseases in infants and children who have not been immunised, outweighs the risks from the administration of live vaccines, even in those who are infected with HIV. The only exception is in infants with

clinical symptoms of HIV infection who should not be given BCG vaccine<sup>(12)</sup>.

### Health education

Health education is defined as "any activity which promotes health-related learning, ie some relatively permanent change in an individual's capabilities or dispositions". Health education should result in permanent behaviour change with regard to health behaviour. Areas or topics where health education may be beneficial in the context of child health surveillance are as follows:-

1. Nutrition education -- Infant feeding and advice on feeding practices
2. Education on the value of immunisation
3. Developmental guidance and
4. Injury prevention

Of these, injury prevention requires elaboration. There is a scope for health professionals to be involved in health education in injury prevention. The scope of the subject is given in Table IV. Along with advice about injury prevention, parents should be taught what to do when an injury occurs. Topics that should be covered include first aid treatment of burns and scalds, suspected poisoning, control of bleeding and simple resuscitation<sup>(13)</sup>.

**Table IV – Health education in injury prevention**

<ol style="list-style-type: none"><li>1. Advice on home safety<ul style="list-style-type: none"><li>– drawing attention to potentially dangerous areas within the home (kitchen, bathroom, stairs, windows).</li><li>– drugs and hazardous chemicals (to be kept in a place where children cannot reach or in a locked cupboard).</li><li>– advising about safe furniture and electrical equipment.</li><li>– advising about child safety devices.</li></ul></li><li>2. Advice on safety of toys and how to choose safe toys for their children.</li><li>3. Advice on safety at playground and parks.</li><li>4. Advice on safety during transport in cars.</li><li>5. Advice on road safety.</li></ol>
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### Training to meet the expanding role of the family doctor in Child Health Surveillance

To meet the expanding role of the family doctor in child health surveillance, the practitioner needs adequate training and continuing education. The following will require attention:-

1. *Acquisition and updating of the knowledge base in child health surveillance*  
This could be acquired through reading and keeping up with new information on immunisation, growth and development, nutrition and injury prevention.
2. *Building up clinical skills*  
An assessment of a child's development will require a good history taking, clinical examination, observation of the child at play and his behaviour, listening to parental worries and anxieties, carrying out a developmental screening and assessment and interpretation of findings. The practice provides opportunities to observe what is normal and normal variations of growth and development in a child. It is only when you know the normal variations in children, that you will be able to identify the abnormal. Primary health care professionals must have a thorough knowledge of child development, both normal and abnormal, to form a basis to exercise clinical judgement. They must have a thorough

knowledge of the natural history of conditions detected so that they know which conditions are self-curing, not requiring further investigations or treatment<sup>(14)</sup>.

3. *Interaction and feedback with colleagues.*  
Discussion with doctors and paramedical staff in the health care team provides opportunities for learning at the "teachable moment". Feedback should be sought for cases referred and the outcome followed up.
4. *Short courses and workshops*  
There is a place for short courses and workshops that not only increase knowledge but also clinical health education and counselling skills. There is plenty of scope for the College, Paediatric Departments and the Division of Family Medicine to collaborate on running such courses.

### The need for continuing education

It is vital not only to make available a thorough initial training but also provide continuing education in child health surveillance and child development as in any branch of professional practice. All personnel carrying out child health surveillance must have proper training and must continue to receive training in the subject.

### CONCLUSION

The participation in child health surveillance programmes by family doctors is advocated because there are several advantages. Repeated contact with family doctors can result in a relationship with greater potential for support and the promotion of positive health. The family doctors' involvement in the preventive care of children can result in improved immunisation coverage rates, reduction in childhood injuries and good nutrition and eating habits. Child health surveillance provides the family doctor with a systematic way of monitoring the physical and developmental growth of children. It allows for early detection and timely intervention of abnormalities detected. The family doctor is in a good position to offer guidance relating to child development, behavioural problems and appropriate use of services. He needs a working knowledge and practical skills for this enlarged role.

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