Child Health Surveillance And Screening Programmes In Detecting Developmental Delay: The Malaysian Model

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Abstract

Aims: *This article describes the model of health surveillance and screening programmes and its application in the detection of childhood developmental disabilities.*
Content: *This review utilised data from various articles and websites confined to surveillance screening programmes for infant, toddler and pre-school children (0-6 years). The Wilson and Jungner's (1968) key concept of surveillance and screening was used as the benchmark.*
Conclusions: *Results show that the current model is congruent with other industrialised countries in the detection of global developmental disability but not the screening and detection of diseases.*

Key words: surveillance, screening & surveillance, developmental delayed, disability

1. Introduction

Developmental delay (DD) or childhood disabilities (CD) are common problems identified during the child health screening and surveillance in child health service. The risk groups are infants, toddlers and preschool children with the prevalence rate estimated at 5-16% globally (Bremberg, 2000,Hall & Elliman 2003,Simeonsson & Sharp, 1992). National Health and Medical Resarch Council (NHMRC) (2002), categorize DD children as those whose developmental growth and achieving skills are not according to the expected time frame as their peer group. The DD is commonly associated with mental or physical disabilities or both, resulting in substantial functional limitation on major life activities (Earl & Hay, 2006; Karoly et al., 2005). Disabilities have many effects on the social lives of those afflicted. These burdens of lifelong impairment include societal attitudes to the child and family, the effect of personal appearance and behavior, and participation of quality of life activities. Developmental delay cover a wide spectrum of disability including behavioural and global developmental delay, cerebral palsy, mental handicap, hearing, vision impairment, Autism, Attention Deficit Hyperactivity Disorder (ADHD) and other problems (Child Health Surveliance Programme Australia , 2005).

In relation to DD detection, it is a routine screening or observation in normal child health care using the Developmental Screening Tool (DST). Current detection rates of DD are lower than their actual prevalence (Pinto-Martin et al, 2005). The American Academy Paediatrics (AAP, 2006) highlighted that ineffective screening contribute to missed identification of DD problems. A standardized DST devise with good sensitivity and specificity in measuring the continuum process and complexity of a child's growth was recognised as a model in DD detection. A reliable DST serves as the guideline in preventing either over detection or under detection of DD problems (Glascoe, 1996, AAP, 2001). Sensitivity and specificity tools in detecting the DD for young children during the screening and surveillance process is of great importance to the health of the population which is at risk.

2. Early detection and its role

Early detection and intervention offers better long term outcome from rehabilitation, educational and vocational interventions (Rose, 1998, Hall & Elliman, 2003 ;Bamford, 1998).

Screening of these risks and early treatment or management of them effectively will reduce a huge individual and societal burden especially when it is clear that late treatment is ineffective and often very expensive. It helps to improve the quality of life of the affected children and their family. The following section details the concept of surveillance and screening.

3. Concept of surveillance and screening

The surveillance and screening programme is a common concept in public health care system. It is a monitoring and controlling programme that aims to separate the healthy people from the diseased ones or those who perceive that they are at risk by offering a test which is more likely to be help rather than harm (Taber's, 2006, and United Kingdom National Screening Committee, 2005). Clear distinctions have been drawn in application surveillance and screening in the detection of childhood disability within the context of this article. Surveillance is a flexible but continuous process of skilled monitoring and observation in recognizing children at the risk of DD during the child health screening. Developmental screening, on the other hand, is a procedure that utilises standardized DST to identify and refine risky children who may need more comprehensive evaluation and the implementation of an early intervention programme. This involves professional knowledge and skills in gathering relevant developmental history, accurate and informative observation and sharing parental concerns, other relevant professions opinions and concern. According to The National Health and Medical Research Council report (NHMRC, 2002):

> "Given the complex and interrelated nature of child health and development, there is a good case for a system of prevention and early detection that encompasses and goes beyond screening and surveillance for improvement child health outcome. For many early childhood risk factors it may not be possible to have simple screening test or well defined surveillance..."

The emphasis is on identification of preclinical conditions of disability as an integral part of routine child health care. Detection of disability is not as simple as it seems. It requires a comprehensive technique and meticulous observation by skilled personnel using the standard criteria.

4. Surveillance and screening model

Evidentially, many principles and guidelines were developed and have become the fundamental criteria for evaluating the effectiveness of the best practice. The guiding principles for instituting a screening programme were first produced by Wilson and Jungner (1968). It remains as a landmark contribution to the surveillance and screening literature for over a decade. Table 1 summarises the suggested criteria for a surveillance and screening programme. In reference to Table 1, the disease, test and diagnosis/treatment as the guiding criteria for suitability of surveillance and screening programmes (SSP). The model suggested that a disease must be reasonably important; of known origin, detectable and preventable. Secondly, the test is continuous, reliable, valid and cost effective, user-friendly and finally the importance of availability and acceptability of treatment once abnormality was detected.

Diseases

In applying the suitability of this model in DD detection, many children are born with genetic, diseases and risk factors, for example congenital HIV syndrome that predisposes them to DD.

Test

However, to indentify DD is a challenging task in contrast to the screening of a disease using a specify test such as a blood test or medical resonance imaging.

Treatment

Early therapeutic intervention and treatment is known to prevent irreversible complications and deformities, thus improving the quality of life of the children and their families.

4. Surveillance and screening in the detection of developmental disability: A Malaysian Model

The Family Health Development Division (FHDD) is one of the divisions under Public Health Division. It main responsible is for planning, coordinating and monitoring the related health of women of childbearing age, child health and school health services through a comprehensive range of promotive, preventive, maintenance, curative and rehabilitative programmes in maternal and child health clinic (MCHC). It operates in 95 MCHC and 1,927 Community Clinics and 193 Mobile Clinics which are easily accessible to the population within a two tier health care system (Ministry of Health, Malaysia (MOH), 2006). Concerning child health services, the Integrated Management of Childhood Illness (IMCI) and the Development Programme Strategy are performed by trained medical doctors and community health nurses. This comprehensive strategy includes anthropometry monitoring and developmental screening of six (6) developmental domains that include gross motor, fine motor vision , hearing, speech and finally psychosocial development for children up to 6 year's old by interview, observation and a test.

Screening is carried out at three stages as outlined in Table 2. Children below 1 year old have a regular periodic screening at 6 weeks, 3, 6, 9 and 12 months in conjunction with their immunisation schedule. Toddlers from the age of 1-5 years are given 3 to 6 monthly appointments, in time for their 18 months and pre-school booster immunisation. The model for children aged 1 year and below is similar with the criteria guidelines of other industrialised countries as depicted in Table 2. However, a dissimilarity exists for school entry children because the school going age for Malaysia is 6- 7 years old. Nevertheless, children age 3-5 years old whom completed immunisation is given 6-12 monthly appointment for 'deworm' treatment. It is a measure to improve the compliance rate for health and DD screening during this critical growing age.

5. The deployment of developmental screening tools

Developmental screening tools (DST) are designed to monitor and identify children with potential DD. There are many DST to choose from and each has it strengths and limitations. The best instrument depends on the purpose of the surveillance and screening, has good psychometric properties including sensitivity, specificity, validity and reliability and has standardized criteria on a diverse population (Brothers, Glascoe, & Robertshaw, 2008).A national Child Health Home Based Record (CHHBR) contains examination and screening activities that a child undergoes within the screening programme. It comprises of health surveillance records and screening tests with a minimum of 20 items to be assessed at various ages. CHHBR has a weight graft plot for child's weight, Denver II chart growth and developmental boxes comprising 3-4 items of each developmental domain from gross motor, fine motor, hearing, vision, speech and psychosocial. These developmental screening checks are done by the community health nurses. The administration time for the entire assessment is 10 -50 minutes. As regards the effectiveness, the DST is said to be effective and good when sensitivity and specificity reach 70% to 80%, depending on the nature and complexity of measurement (NHMRC 2002). Table 3 outlines the DST incorporated in CHHBR and each has acceptable 43%- 99% sensitivity and specificity properties.

6. Evidence of quality and effectiveness of routine child health surveillance

Child health service is one of the maternal and child health programmes that are carried out in urban and rural community health clinics. The routine activities include growth and developmental assessment to monitor the well being of children and early detection for abnormalities. Since 1950s, the provision of these service focuses on morbidity and mortality prevention through health promotion and health maintenance. Children attendance at the health clinic was at an average of 85.9% in 2006. The infant and toddler mortality rates was 5.4 % and 0.2% per 1000 live births respectively. It showed a further reduction of the trend since 1980 to 2006. However, there is no available data on the morbidity trend among children (MOH, 2006). Despite the limitation of the tool and lack of evidence in quality, it has produced an outstanding outcome. Table 4 illustrates types of DD as quality evidence of sensitivity and specificity of screening and surveillance programmes in the early detection of DD. Many DD conditions listed in Table 4 which have a prevalence of 1/1000 were detected in 2006.

7. Does the surveillance and screening programme meet the criteria?

Detection of DD is of great importance to avoid irreversible complications due to disability. Does the procedure meet criteria for screening and surveillance? Effectiveness of early detection of DD must meet the surveillance and screening benchmarking. Table 5 demonstrates a summary of the characteristics and criteria of DD screening and surveillance programmes. In summary, the criteria set are possible to prevent a disease or condition in DD detection. Early detection prevents the clinical consequences of an established condition. Moreover, the sensitivity and specificity issue can be overcome by a further confirmatory test for true or false positive result. Finally, there is increasingly good evidence of the effectiveness of early intervention for conditions (Earl & Hay, 2006, Lindstorm & Bremberg, 1997). Therefore, a strong case can be made for the early identification of DD problems.

8. Conclusion

Collectively, surveillance and screening programmes are primary, secondary and tertiary approaches in preventing, controlling and monitoring a condition or disease in relation to childhood developmental disability. This programme follows the recommended guidelines of the screening programme for early identification of DD for children with risks. The advantages of early detection of DD are weighed against the possibility of long term irreversible disabilities and complications. By resorting to benchmarking, evidences have been produced which validate and confirm the reliable outcome of the surveillance screening of DD.

Table 1: A Model for Surveillance and Screening Programmes

Disease	Highly important and causing substantial mortality and/or morbidity Nature and condition is known. Detectable preclinical phase Treatable following abnormality detected Treatment at early stage and favourable affect the prognosis
Test	Non-invasive procedure Simple, cheap, safe, precise ,reliable and valid Accepted to the population Policy for future diagnostic investigation for positive test
Diagnosis/treatment	Successful depend upon the test and result of abnormality Acceptable procedure for further evaluation Effectiveness of the therapy

Source: Wilson and Jungner (1968)

Table 2. Current model of service and comparison with UK and Australia

	< 1 years of age	1-5 years of age	6-7 years of age (school entry)
MOH child visit recommended	6-8 weeks 3,6,9,12 months	3- 6 monthly visit for 1-2 years 6 – 12 monthly visit for 3-5 years	Health check at school entry and leaver
UK Health Check Guideline	Birth,1 week,6-8 weeks, 2,3,4,8-9 months	12-15 months, 3-4 years	School entry 4-5 at 4-5 years
Australian Heath Check	Birth,1 week,6-8 weeks, 2,3,4,8-9 months	18 months, 2 ½ -3½ years, 4-5 years	School entry at 5 years

Sources; MOH (2006) & American Academy of Pediatric Committe on children with Disability Policy Statement, 2006)

Table 3. Selected Surveillance and Screening Tools In Used

Screening Test	Description	Age range	Sensitivity (%)*	Specificity (%)*	Remarks
Denver-II developmental Screening Test	Screen expressive & receptive language, gross motor, fine motor & personal social skills	0-6 years	56-83%	43-80%	Widely used by community doctors and nurses
Modified Checklist for Autism in Toddlers (M-Chart)	Parent-complete questionnaire designed to identify children at risk of autism	16-48 months	85-87	93-99	Widely used by community doctors and nurses
Parents' Evaluation of Developmental Status(PEDS)	Parent-interview form designed to screen for developmental & behaviour problems	0-8 years	74-79	70-80	Used as surveillance tool
Child Development Inventory	Parent-completed questionnaire. Measures social, self help, motor language &general development skills	0-90 months	80-100	94-96	used in Community Based Rehabilitation Centres

Source: AAP (2006); The APP does not approve/endorse any specific tools for a screening purpose. This list is not exhaustive and other tests may be available. *Sensitivity= accuracy of the test for detection of DD. *Specificity = accuracy of the test detection of individual with DD: < 69 low, 70-89 moderate and > 90 high.

***Table* 4. Type of Disabled Detected in Screening at Child Health Clinics**

Disorder	No of cases detected
ADHA	86
Hearing impairment	58
Vision impairment	156
Physical disability	324
Cerebral palsy	419
Global development delay	596
Down syndrome	109
Autism	57
Mental retardation	139
Specific learning disability	114
Slow leaner	129
Others	348

Source: Ministry of Health Malaysia 2006

Table 5. A Summary of Screening and Surveillance of DD

Characteristics of screening test (Cochrane & Holland 1971)	Disease	DD	Disease	DD	Criteria of screening (Wilson & Jungner 1968)
Simple quick and easy to interpret	**Y**	**Y**	**Y**	**Y**	Important health problem
Acceptable to public	**Y**	**Y**	**Y**	**Y**	Accepted treatment
Accurate	**?**	**?**	**Y**	**Y**	Facilities for diagnosis and treatment
Repeatable	**Y**	**Y**	**Y**	**Y**	Latent or early symptomatic stage
Sensitive	**?**	**?**	**Y/N**	**Y/N**	Suitable test or examination
Specific	**?**	**?**	**Y**	**Y**	Natural history adequately understood
			Y	**Y**	Agreed policy on whom to treat
			Y	**Y**	The cost of case-finding balanced with expenditure on medical care as a whole
			Y	**Y**	Continuous case finding

Source: Adaptation from Cochrane & Holland 1971, and Wilson & Jungner 1968) *Y= yes, N=No

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