

HGSA POLICY STATEMENT 2004

HGSA-RACP Newborn Screening Joint Subcommittee

NEWBORN BLOOD-SPOT SCREENING

Newborn blood-spot screening is a public health activity aimed at the early identification of infants who are affected by certain congenital disorders. Timely intervention in these disorders significantly reduces morbidity, mortality and associated disabilities. Newborn screening is an accepted part of neonatal health care in all developed countries and has been established in Australasia since the late 1960's.

All Australasian screening programs are voluntary and fully publicly funded. Newborn screening services for Australia are coordinated from the five centralised screening laboratories (Western Australia; South Australia; Victoria; New South Wales and Queensland). There is a single laboratory service for New Zealand. Recommended screening policy for the programs is developed by a joint subcommittee of the Human Genetics Society of Australasia and the Division of Paediatrics of the Royal Australasian College of Physicians. The disorders to be included and other program policies are decided within each jurisdiction.

1 General recommendations

Newborn screening is recommended provided that:

- 1.1 There is benefit for the baby from early diagnosis (benefit to the family may also benefit the baby);
- 1.2 The benefit is reasonably balanced against financial and other costs;
- 1.3 There is a reliable test suitable for newborn screening;
- 1.4 There is a satisfactory system in operation to deal with diagnostic testing, counselling, treatment and follow-up of patients identified by the test.

2 Organisation of programs

- 2.1 The screening program comprises the sum of the operations necessary to ensure that all babies are offered testing, all necessary follow-up is done, all cases found are adequately treated and there are appropriate quality management and program evaluation processes in place.
- 2.2 The current policy of public funding for newborn screening programs should be retained. They should be organised and controlled within the public health sector. It is recommended that the organisers of the screening program take advice about the general operation of the screening program from multidisciplinary expert sources.
- 2.3 The organisers of the screening program should facilitate development and implementation of nationally recognised newborn screening standards, policies and guidelines.

- 2.4 Screening programs should provide a seamless system of care that coordinates and involves community- and hospital-based providers, tertiary-care centres and paediatric subspecialty clinics.
- 2.5 Health professionals and the public should be kept well informed about screening programs. Specifically, written information and the opportunity for discussion must be provided for parents before testing, and health professionals should be provided with comprehensive guidelines describing all aspects of the screening program including correct sample collection procedure.
- 2.6 Health care authorities have a responsibility to ensure that tests are available to all babies born in their region.
- 2.7 For each baby born, an individual or individuals must be identified as responsible for providing information about the test, offering the test, obtaining appropriate consent, collecting the sample and completing any requested follow-up.
- 2.8 A system should be in place to ensure the community- and hospital-based providers know which samples have been received by the screening laboratory. Special care must be taken to ensure that a sample is collected from each baby or refusal of testing is documented and notified to the screening laboratory. An acceptable way of achieving this is for the empty screening test card (with demographic information but no blood sample) to be returned to the laboratory with the documented refusal.
- 2.9 Regular assessments of screening program performance should be undertaken and must include test sensitivity, specificity, positive predictive value, timeliness of reporting, and outcome of diagnosed patients. Outcome assessment should include short and long-term evaluation and may be based on a surrogate measurement in disorders that are well understood.

3 Laboratory services

- 3.1 Screening tests should be carried out in large centralised laboratories, so that costs can be kept low, expertise rapidly gained and kept, and for low prevalence disorders, sufficient data are available for assay performance assessment and program audit.
- 3.2 Laboratories should have appropriate accreditation. External assessors should review programs to ensure that suitable tests, quality assurance, cut-off points, follow-up procedures and screening audit processes are in operation.
- 3.3 The HGSA should ensure that quality control programs are available Australasia-wide for each test employed on a routine service basis.
- 3.4 The screening laboratory director is responsible for ensuring the correct performance and interpretation of the test, ensuring that the baby's doctor, treating midwife or parents are informed of any abnormal result and of the appropriate action to be taken. The director should ensure that responsibility for further action is formally handed over to an appropriate healthcare professional.

4 Legal and ethical considerations

- 4.1 Participation in a newborn screening program should not be mandatory. Parents should be informed of the availability of testing. If after discussion the parents refuse to have their newborn tested, they should sign a statement that they are fully informed about the test and the consequences of not testing.
- 4.2 The screening program should have appropriate policies and procedures to ensure that the privacy and confidentiality of the patient and family are carefully protected.
- 4.3 If a newborn screening test is investigational or being developed and the benefits and risks are yet to be demonstrated, separate consent and/or more detailed information may be required and this should be discussed with appropriate ethics and advisory committees.
- 4.4 A separate HGSA policy covers the storage and use of newborn screening sample cards. All programs should develop their own detailed policy following the suggestions in the HGSA policy and include:
 - i. Following completion of newborn screening testing, cards should be stored securely for such period of time as is determined by the screening program taking into account legal requirements and local pathology service guidelines for samples.
 - ii. Further use of the stored samples for purposes other than screening program audit requires either written permission from the individual, the parents or guardian, or a legally binding directive, or appropriate ethics committee approval for research studies .
 - iii. The written information provided for parents should include information about the storage and potential uses of residual samples.

5 Research

- 5.1 Screening programs should support research related to current and potential newborn screening, including laboratory and community aspects. Such research should be conducted in line with local ethics and advisory committee recommendations and particularly consider the benefits to families which can arise from non-anonymised studies and what permission might be required for such studies.
- 5.2 Pilot studies should be undertaken to demonstrate the safety, effectiveness, validity and clinical utility of tests for additional disorders and new testing technologies.

6 Recommendations for screening for specific disorders

- 6.1 When assessing whether a particular disorder should be added to the screening program of a region, the appropriate cost comparison is the cost of adding the disorder versus not adding it.
- 6.2 Screening is highly recommended for the following conditions because there is a demonstrated benefit from early diagnosis, the benefit is balanced against financial and other costs, there are suitable tests and follow-up services are available.
- Phenylketonuria (PKU).
 - Primary congenital hypothyroidism (CH).
 - Cystic fibrosis (CF).
- 6.3 Screening is recommended for the following conditions depending on local circumstances. There is a demonstrated benefit or likely benefit from early diagnosis, there are suitable tests and treatment, and follow-up services are available. The benefit may or may not be balanced against financial and other costs depending on the available technology, the frequency of the disorder in the region and other factors.
- Biotinidase deficiency
 - Congenital Adrenal Hyperplasia
 - Galactosaemias
 - Haemoglobinopathies
 - Disorders of amino acid, organic acid and fatty acid metabolism covered by tandem mass spectrometry. NB: A single test with two scans covers more than 30 disorders (see appendix). These should be considered as a package but individual disorders may be excluded based on the criteria above.
- 6.4 Screening is currently not recommended for the following conditions. Screening tests are not available or tests are available but proof of advantage from early diagnosis is absent or uncertain, or the test is unsuitable or does not detect those cases in which there might be an advantage.
- ADA deficiency
 - Duchenne muscular dystrophy
 - Familial hypercholesterolaemia II
 - G6PD deficiency
 - Haemochromatosis
 - Lysosomal storage disorders
 - Neuroblastoma
 - Toxoplasmosis

Appendix

Disorders detectable with tandem mass spectrometry include:

Amino acids

Argininaemia / arginase deficiency
Argininosuccinic aciduria (ASA lyase deficiency)
Citrullinaemia (argininosuccinate synthase deficiency, citrin deficiency)
Fumaryl acetoacetase deficiency (Tyrosinaemia Type I)
Homocystinuria (cystathionine beta-synthase deficiency)
Maple Syrup Urine Disease, classical and intermediate
Phenylketonuria, classical and intermediate
Pterin defects
Tyrosine aminotransferase deficiency (Tyrosinaemia type II)

Fatty acids oxidation disorders

Carnitine/acylcarnitine translocase deficiency
Carnitine transporter defect
CPT-1 (carnitine palmitoyl transferase deficiency type I)
CPT-2 (carnitine palmitoyl transferase deficiency type II)
LCHAD (3-hydroxy long chain acyl-CoA-dehydrogenase deficiency)
MCAD (medium chain acyl-CoA-dehydrogenase deficiency)
MADD (multiple acyl-CoA-dehydrogenase deficiency)
SCAD (short chain acyl-CoA-dehydrogenase deficiency)
SCHAD (short chain hydroxy acyl-CoA-dehydrogenase deficiency)
TFP (trifunctional protein deficiency)
VLCAD (very long chain acyl-CoA-dehydrogenase deficiency)

Organic acid disorders

Beta-ketothiolase deficiency; mitochondrial acetoacetyl-CoA thiolase deficiency)
Cobalamin C defect (homocystinuria with methylmalonic aciduria)
Glutaryl CoA dehydrogenase deficiency (glutaric acidemia type I)
Holocarboxylase synthetase deficiency
3-hydroxy-3-methylglutaryl-CoA lyase (HMGCoA lyase) deficiency
Isobutyryl-CoA dehydrogenase deficiency
Isovaleric acidemia
Methylmalonic acidurias –(mutase deficiency, CblA and CblB defects)
Propionic acidemia
3-methylcrotonyl-CoA carboxylase deficiency
2-methylbutyryl-CoA dehydrogenase deficiency
3-methylglutaconyl-CoA hydratase deficiency
Maternal vitamin B12 deficiency