

Cost Benefit Analysis of 15 Candidate Conditions for Inclusion on the Newborn Screening Panel

Introduction/Purpose

Fifteen inborn errors of metabolism have been determined to meet four of the Board of Health's five criteria for inclusion on Washington's newborn screening panel:

- Prevention potential and medical rationale
- Availability of treatment
- Public health rationale, and
- Availability of suitable and reliable testing to screen and diagnose affected infants.

This document addresses the fifth criteria, cost-benefit or cost-effectiveness of screening.

Should the Board of Health determine to amend Chapter 246-650 Washington Administrative Code (WAC) to include any of the fifteen conditions, this document will also serve to meet the statutory requirement to assess the likely costs and benefits of any significant changes to administrative law.

Methods¹

This analysis is intended to answer the question: are the probable benefits of screening greater than the probable costs?

For each condition a 'medical model' was developed to estimate the significant expected outcomes for a screened and an unscreened population. The models were based on the frequency of each condition and adverse outcomes with, and without, screening. The frequencies of the conditions and outcomes were based on the medical literature where available, and expert opinion where information was sparse or lacking. The changes in expected outcomes between the screened and unscreened populations were then used to estimate medical benefits of screening. The value of these benefits was estimated from the health economics literature.

For each condition, the significant costs of screening the population in the medical models were estimated. Significant costs considered were: the cost of the screening test, the cost to follow-up abnormal screening results to assure appropriate diagnostic testing and evaluation, the cost of diagnostic testing and evaluation for those infants who would be found to not have the disorder (false-positive screening results), and the cost of treatment for those infants who would be expected to die in the unscreened population. The cost of diagnosis was not included for infants

¹ Detailed analysis available on request. Contact mike.glass@doh.wa.gov

who would be found to be affected by a disorder (true positive screening results) under the assumption that these infants would incur comparable costs with or without screening. Similarly, the cost of treatment was assumed to be comparable for infants detected through screening and those in the unscreened population who would not die from their condition prior to diagnosis.

Findings

The estimated costs and benefits of screening a population of one million infants and the ratio of benefits to costs are shown in the table below. The potential benefits and costs vary between disorders due to differences in frequency of each disorder in the population as well as differences in clinical manifestations and treatments.

Disorder	Benefits	Costs	B/C ratio
VLCADD	\$18,654,308	\$326,174	57.19
IVA	16,317,304	324,327	50.31
CIT	3,085,322	79,845	38.64
HMG	8,287,783	228,012	36.35
TFP	2,683,651	83,016	32.33
MMA	12,960,199	476,007	27.23
(2 forms)			
ASA	1,427,747	58,703	24.32
GA I	5,135,433	244,405	21.01
PROP	1,287,913	102,542	12.56
LCHADD	681,082	62,953	10.82
CUD	883,810	122,707	7.20
TYR I	4,399,560	1,106,081	3.98
BKT	401,767	105,304	3.82
MCD	233,447	145,726	1.60
total	\$76,439,325	\$3,465,803	22.0

Avoided mortality was found to be the most significant benefit for all but one of the conditions and dominated other potential benefits such as preventing mental delay, developmental disability, liver and heart disease, and others, as well as the estimated costs of screening. The only exception, multiple carboxylase deficiency (MCD), causes seizures but does not result in mortality in an unscreened population. However, a conservative estimate of the value of avoiding the associated seizures still exceeds the estimated costs of screening.

Conclusion

The estimated costs of screening² are considerably less than the anticipated benefits for each of the sixteen conditions evaluated. The highest ratio of benefits to costs is predicted for very long chain acyl Co-A dehydrogenase deficiency (VLCADD) with an estimated \$57 of benefit for each dollar in cost. At the other extreme is multiple carboxylase deficiency (MCD) with an estimate \$1.60 of benefits for each dollar in cost. As a group, it is estimated that screening a population of 1,000,000 newborns would cost \$3.5 million while returning \$76 million in benefits for a ratio of \$22 of benefit for each dollar of cost. Based on these analyses, both the Board of Health criteria and the statutory requirements that the anticipated benefits justify the anticipated costs are met for each of the conditions.

² The costs of implementing screening tests will not require an increase in the Department of Health screening fee. Increased births, fixed costs, and efficiencies due to automation will provide sufficient revenue to cover the additional screening tests.