Microarray as a first genetic test in global developmental delay: a cost-effectiveness analysis
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study evaluated the cost-effectiveness of array-based comparative genomic hybridisation (aCGH) as a first genetic test for chromosome anomalies, indicative of non-syndrome, global developmental delay. The authors concluded that as a first test, aCGH was cost-effective. There were a few significant limitations to the study methods and it was unclear how the cost-effectiveness ratios were calculated; the validity of the authors' conclusions is unclear.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the cost-effectiveness of comparative genomic hybridisation, using a DNA microarray, as the first genetic test for chromosome anomalies that indicated a non-syndrome, global developmental delay.

Interventions
Array-based comparative genomic hybridisation (aCGH) was compared with standard karyotyping. Other diagnostic tests were conducted, based on the results of the first genetic test. The other tests included genetic testing for the child's family.

Location/setting
Canada/secondary care.

Methods
Analytical approach:
The cost-effectiveness analysis was based on a clinical study conducted between 2006 and 2009. The time horizon was the time taken to reach a diagnosis. No study perspective was stated.

Effectiveness data:
This retrospective cohort study analysed data on all children diagnosed with a global developmental delay, by an experienced paediatric neurologist, at one hospital, between 2006 and 2009. A total of 114 children received all their requested investigations and were included; 32 children had both a karyotype and an aCGH test. The measure of effectiveness was children identified to have a delay. The additional number of children identified by aCGH was calculated based on those who had both tests.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of benefit was the number of additional diagnoses with aCGH as the first test.

Cost data:
The costs of the two alternative tests, fluorescence in situ hybridisation (FISH), and individual clinical assessments were included. All other costs were assumed to be the same for both tests. The resource use was obtained by chart review. Two costs were estimated for aCGH; one was based on the fees of a private laboratory (Signature Genomics) and the other was based on local experience (in-house laboratory). The costs were reported in 2010 Canadian dollars (CAD). Prices in US $ were assumed to be the same as CAD prices.
Analysis of uncertainty:
Confidence intervals were reported for the difference in cost between the two diagnostic approaches. The results were presented for two scenarios, using the different cost estimates for aCGH.

Results
The aCGH test identified an extra eight children with a delay. The authors stated that 47% of all diagnoses could have been made without genetic testing.

Using the Signature Genomics cost, aCGH resulted in an increased cost per child of CAD 421 (98% CI 238 to 604), or an increased cost of CAD 12,874 per additional diagnosis. Using the local cost, aCGH resulted in a reduction per child of CAD 106 (98% CI -17 to 195), or an increased cost of CAD 1,379 per additional diagnosis.

Authors' conclusions
The authors concluded that aCGH was cost-effective as a first genetic test for the diagnostic evaluation of children with suspected global developmental delay.

CRD commentary
Interventions:
The interventions were adequately described. The usual practice seems to have been included, which was good for local decision-makers.

Effectiveness/benefits:
The effectiveness data were from a retrospective cohort study. All children had a final diagnosis of global developmental delay by the end of the study, based on their performance on standard developmental tests. The analysis was limited to the diagnostic performance of the tests, so any treatment utility or disutility related to true and false positives was not analysed. It was not clear what downstream benefits might occur from the different testing pathways.

Costs:
No perspective was stated, but a hospital perspective appears to have been taken. The resource use categories and their sources were reported, but it was not clear where the unit costs were from. The total costs from each source were not clearly reported. The analysis was limited to the diagnostic performance of the tests, so any treatment costs for true and false positives were excluded. The authors stated that the costs of additional diagnostic tests that could be avoided with aCGH first were not included, but it was unclear to what extent these would increase the costs for karyotyping; a sensitivity analysis defining and including these costs would have been useful. The authors indicated that the turnaround time for aCGH (10 days) was much quicker than for karyotyping (three months), which could prevent parental anxiety and eliminate additional testing.

Analysis and results:
There was no evaluation of uncertainty around the cost-effectiveness estimate, but 98% confidence intervals were reported for the cost differences per child in the cohort. The authors reported a saving of CAD 106 for aCGH for all children in the cohort, but an incremental cost of CAD 1,379 per additional diagnosis. It was not clear which patients were included in these figures, and if these statements were consistent with each other. The authors discussed most of the limitations stated above, and reported useful comparisons with the results from other studies.

Concluding remarks:
There were a few significant limitations to the study methods and it was unclear how the cost-effectiveness ratios were calculated; the validity of the authors' conclusions is unclear.

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Bibliographic details