Cascade Genetic Testing and Health Service Use in Families of Children with Cardiomyopathy: Implications for Health Technology Assessment

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BACKGROUND

- Paediatric cardiomyopathy (CMP) is a rare, genetically heterogeneous disease of the myocardium.
- Clinical practice guidelines recommend cascade clinical screening for all first-degree relatives of affected individuals and cascade genetic testing for relatives of patients with a positive genetic test for a CMP-associated mutation. This is routine at the Hospital for Sick Children (SickKids).
- Initiating a cascade has clinical consequences, and has health system and health policy implications.
- Health technology assessment (HTA) does not account for cascade effects and methodology for doing so is underdeveloped.

OBJECTIVES

The patterns and costs of cardiology and other health service referrals in the families of children with CMP are poorly understood. The objectives of this study were to:

1) Report the pattern of cascade genetic testing and clinical screening offered to relatives of children with CMP according to clinical practice guidelines.
2) Report the costs of offered cascade services.
3) Examine and assess the completeness of paediatric patients’ charts as a source for cascade health resource recommendations and use.

METHODS

A retrospective cohort study was conducted in the families of paediatric CMP patients at SickKids.

Table 1: Main characteristics of study

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<th>Study Sample</th>
<th>Time Horizon</th>
<th>Perspective</th>
<th>Data Collection</th>
<th>Costing</th>
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<tr>
<td>First-, second-, or third-degree relatives of children with CMP for whom genetic testing was conducted.</td>
<td>One year following disclosure of proband’s test results.</td>
<td>Public health care payer.</td>
<td>Retrospective review of probands’ electronic medical records.</td>
<td>Categories considered: genetic diagnostic tests (including post-test genetic counselling) and clinical screening procedures. No discounting was performed.</td>
<td>Determined patterns and costs of cascade health service use assuming full accordance with clinical practice guidelines.</td>
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- Cascade genetic testing: Familial mutation analysis offered to relatives of genotype-positive probands.
- Cascade clinical screening: All relatives offered an electrocardiogram, echocardiogram, and Holter monitor, depending on the type of CMP in the child.

SECONDARY ANALYSIS

- Data about cascade genetic testing in one or more relatives were available for 63% of probands.
- Data about cascade clinical screening in one or more relatives were available for 94% of probands.
- Available data revealed a number of divergences from clinical practice guidelines.

ONE-WAY SENSITIVITY ANALYSES

- Cost of cascade health services per family was most sensitive to changes in the unit price of familial mutation analysis.

RESULTS

- 53 probands with CMP were included.
- Family members included in analysis were: 53 mothers, 53 fathers, and 74 siblings.

PRIMARY ANALYSIS

- Pattern of Cascade Services Offered
  - # cascade genetic tests per family (mean ± SD): 1.23 ± 1.83
  - # cascade electrocardiograms per family: 3.40 ± 1.29
  - # cascade echocardiograms per family: 3.40 ± 1.29
  - # cascade 24-hour Holter monitors per family: 0.08 ± 0.55

- Cost of Cascade Services Offered
  - Total cost of all cascade health services per family (mean ± SD): $1,173.19 ± 746.92
  - Cost of cascade genetic testing per family: $418.64 ± 621.79
  - Cost of cascade clinical screening per family: $754.55 ± 293.23

CONCLUSIONS

- Cascade genetic testing and screening in families of children with CMP enables identification of at-risk relatives and initiation/cessation of surveillance protocols.
- Data contained in proband medical records about cascade services offered to relatives are incomplete. Future work should assess other data sources (e.g., administrative data and relatives’ medical records) for their suitability in research exploring cascade health service use.
- Cascade health service use in the first year following probands’ genetic testing cost approximately $1,200 per family. This highlights to policy and funding decision makers the need to incorporate cascade health services in HTA.
- More work is needed to understand cascade effects and to develop methodology for incorporating them in HTA.

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