Cost-Effectiveness of the ‘Molecular Autopsy’ in Sudden Unexplained Death in the Young

**Introduction**

- Sudden unexplained death (SUD) is a tragic and devastating event for a family, particularly when it occurs in a young person (< 35 years).
- In ~30% of young sudden cardiac death cases, no cause is found at post-mortem examination and the suspected cause is a primary arrhythmogenic disorder such as long QT syndrome (LQTS).
- The ‘molecular autopsy’ is genetic testing of a post-mortem DNA sample to identify an underlying genetic heart disease.
- A genetic diagnosis in the family can clarify the cause of death and the genetic status of at-risk asymptomatic family members.

**Aims**

- This study sought to determine the incremental cost-effectiveness of a family management strategy including the ‘molecular autopsy’, compared to clinical screening alone.

**Methods**

**Decision Model**

- A decision model was constructed to depict the two strategies:
  1. Family management including the ‘molecular autopsy’
  2. Conventional family management based on clinical screening alone

**Results**

- The addition of the ‘molecular autopsy’ to conventional management of SUD families was cost-saving (Table 2).
- One-way sensitivity analyses identified key variables and these were:
  - Cost of ‘molecular autopsy’, when 3 family members or less had predictive genetic testing the ‘molecular autopsy’ strategy became cost-effective rather than cost-saving.
  - The time period that variables were projected over was important, suggesting cost-effectiveness improves when family members are younger.

**Conclusions**

- The addition of the ‘molecular autopsy’ to conventional management of SUD families is cost-saving.
- There is significant economic and health benefit in predictive genetic testing of surviving family members.
- As newer genetic technologies are implemented, the ‘molecular autopsy’ will become even more cost-saving, with lower cost and higher mutation pick-up rates.

---

**Figure 1:** Decision model

<table>
<thead>
<tr>
<th>Gene mutation identified</th>
<th>Clinical screening alone (conventional practice)</th>
<th>Access to Molecular Autopsy</th>
<th>Molecular Autopsy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35</td>
<td>0.10</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1:** Key input variables

| Abbreviations: OHCA, out of hospital cardiac arrest; GPPN, genotype positive – phenotype negative patient; LQTS, long QT syndrome |

**Table 2:** Incremental cost-effectiveness ratio (ICER)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Incremental costs, $AUD / EUR</th>
<th>Incremental effects, LYG</th>
<th>ICER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to molecular autopsy</td>
<td>-5000 / -4400</td>
<td>-0.02</td>
<td>DOMINANT</td>
</tr>
</tbody>
</table>

---

Jodie Ingles,1,2 Christopher Semsarian1,2,3

1Agnes Ginges Centre for Molecular Cardiology, Centenary Institute, Sydney, Australia;
2Sydney Medical School, University of Sydney, Sydney, Australia;
3Department of Cardiology, Royal Prince Alfred Hospital, Sydney, Australia.