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ACE-Obesity project: Modelling cost-effectiveness & population impacts in obesity prevention

Speaker: A/Professor Rob Carter
Community Based Obesity Prevention ICO Satellite, Geelong 2006
Plan of Talk

1. Brief history of ACE research program
2. Locate ACE approach in context of international literature
3. Overview ACE approach to priority setting
4. Present findings from the ACE: Obesity study
1) Brief History: Assessing Cost-Effectiveness (ACE) studies

- Pilot study: ACE-Cancer (Australian government, 2000-2001)
  - evaluated 7 cancer control interventions
- ACE: Heart Disease (NHMRC, 2000-2003)
  - 20 + interventions for prevention of CHD
- ACE: Mental Health (Aust/Vic govt 2001-04)
  - 20 + interventions for depression, schizophrenia, anxiety and ADHD
1) Brief History: Assessing Cost-Effectiveness (ACE) studies

- **ACE: Obesity** (Vic govt 2004-2006)
  - 12+ interventions; focus on prevention and childhood interventions
- **ACE: Prevention** (NHMRC 2005-2009)
  - 150 interventions for both Indigenous and non-Indigenous populations
- ACE funded by government & competitive grants, covering range of diseases & decision contexts
2) International literature

• Next, I’d like to locate ‘ACE’ within international literature on priority setting
• There have been important attempts to develop theoretical base for priority setting
  – within the economics discipline
  – but also from other disciplines
    • Philosophy (“fair innings” approaches);
    • Behavioural Science (consensus-based approaches);
    • Epidemiology (needs-based approaches)
2) Literature on priority setting

• Key issues to emerge from the literature
  – ‘explicit’ verses ‘implicit’ approaches
  – how explicitness in priority setting should be achieved
  – ‘technical school’ verses ‘due process’
• appeal of a combined approach has driven the development of ACE
3) Tried to achieve this with ACE

1. Clear process for selection of interventions
2. Standardised evaluation methods to minimize methodological confounding
3. Evaluation conducted as integral part of priority setting exercise (not collation from literature)
4. Evidence-based approach with extensive uncertainty & sensitivity testing
5. Information assembled by multi-disciplinary research team, working to stakeholders
6. Careful thought given to concept of “benefit” and its measurement
3) Defining “benefit” to reflect policy aims

Typical policy objectives in Australia are:

1. Size of the problem (i.e. where can the biggest difference be made?)
2. Efficacy/effectiveness of the intervention (i.e. quality and nature of the available evidence?)
3. Capacity to reduce inequity in health status?
4. Efficiency of the intervention?
5. Cost of the intervention (i.e. ‘affordability’)
6. Acceptance by stakeholders, particularly the general community
7. Likelihood of successful implementation (i.e. ‘feasibility’ issues)
3) From policy to measurement of “benefit”

• Two-stage approach adopted in ACE
  – first, a measure of health gain in relation to resources consumed ($ cost per DALY)
  – second, explicitly provide for judgement based on broader considerations (‘2nd stage filters’) not easily reflected in CEA “decision rules”

• Objectives of efficacy/effectiveness and efficiency can be picked in the “Cost per DALY” ratio (1st stage measure)
3) From policy to measurement of ‘benefit’

- 2nd stage filters designed to pick up the other policy objectives
  - strength of the ‘evidence’ base;
  - size & importance of the problem addressed;
  - acceptability & feasibility of implementation;
  - equity (who receives the health gain?)
  - Other? (cultural integrity; empowerment; healthy community, etc)
3) Rationale for 2\textsuperscript{nd} Stage Filters

- Purpose of 2\textsuperscript{nd} stage filters is to incorporate:
  - broader dimensions of benefit (i.e. of “value” in the “value-for-money” notion underlying economics)
  - objectives & underlying principles of government policy
  - impact on stakeholders (“due process”)
  - sensible interpretation of “cost per DALY” findings
  - initial consideration of implementation & change management

- And to do so in an explicit & accountable way
3) Recap: Why ACE as priority setting approach?

- **Relevance:**
  - enables focus on relevant options for change
  - recognises broader policy issues

- **Rigour:**
  - applies key concepts of economic analysis
  - avoids methodological confounding
  - evidence-based approach with extensive sensitivity/uncertainty testing
  - evaluation conducted as part of priority setting process

- **Due process:**
  - involves stakeholders
4) ACE: Obesity ~ Background

- Growing profile of obesity as a key issue of public health significance
- Governments are committing funds to obesity decisions with insufficient evidence available to guide them
- ACE Project funded by Vic Department of Human Services (Jan 2004 – Dec 2006)
- To inform policy-making at a national and state level
Aim of the ACE-Obesity project

“To assess from a societal perspective the most cost-effective options for preventing unhealthy weight gain in Australia, particularly amongst children and adolescents.”
## Economic protocol in ACE: Obesity

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Societal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparator</td>
<td>“current practice” / no intervention</td>
</tr>
<tr>
<td>Target population</td>
<td>Australian population 2001</td>
</tr>
<tr>
<td>Time horizon</td>
<td>Intervention time period</td>
</tr>
<tr>
<td></td>
<td>reflects its real-life application</td>
</tr>
<tr>
<td></td>
<td>Costs &amp; benefits tracked for 100 yrs or till death</td>
</tr>
<tr>
<td>Discounting</td>
<td>3%</td>
</tr>
<tr>
<td>Study design</td>
<td>CEA – “cost per BMI unit saved”</td>
</tr>
<tr>
<td></td>
<td>CUA – “cost per DALY saved”</td>
</tr>
<tr>
<td>2nd Stage filters</td>
<td>Equity, strength of evidence, feasibility,</td>
</tr>
<tr>
<td></td>
<td>acceptability to stakeholders, sustainability,</td>
</tr>
<tr>
<td></td>
<td>positive &amp; negative side-effects</td>
</tr>
</tbody>
</table>
## Economic protocol in ACE: Obesity

<table>
<thead>
<tr>
<th>Costs</th>
<th>Range of sources, expressed as real costs in 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost-offsets</td>
<td>Matched to health gain modelling methodology</td>
</tr>
<tr>
<td></td>
<td>Incorporated AIHW costs of illness estimates - IHD, ischaemic stroke, hypertensive heart disease, type 2 diabetes, osteoarthritis, cancers (endometrial, colon, kidney and post-menopausal breast cancer)</td>
</tr>
</tbody>
</table>

### Uncertainty analysis
Calculated 95% uncertainty interventions around ICERs
Monte Carlo simulations using @RISK software

### Expert Working Group
Active role in selecting interventions, defining filter criteria, and critically examining models

### Research team
Epidemiologists and health economists - conducted C/E analyses using the best available evidence
Intervention selection criteria

- Relevance to current policy decision-making
- Availability of evidence for efficacy/effectiveness
- Potential impact on addressing obesity problem
- Ability to clearly specify intervention pathway
- Inclusion of a mix of interventions and settings
- Considerations of program logic
# Interventions selected for analysis

by ‘Healthy Weight 2008’ Settings

<table>
<thead>
<tr>
<th>Child Care and Schools</th>
<th>1. Active After School Communities program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Multi-faceted School-based program (- PE)</td>
</tr>
<tr>
<td></td>
<td>3. Multi-faceted School-based program (+ PE)</td>
</tr>
<tr>
<td></td>
<td>4. Multi-faceted School-based program targeted at overweight and obese children</td>
</tr>
<tr>
<td></td>
<td>5. Education program to reduce fizzy drink consumption</td>
</tr>
<tr>
<td></td>
<td>6. Education program to reduce TV viewing</td>
</tr>
<tr>
<td>Neighbourhood and Community Organisations</td>
<td>7. TravelSMART Schools</td>
</tr>
<tr>
<td></td>
<td>8. Walking School Bus</td>
</tr>
</tbody>
</table>
## Interventions selected for analysis

<table>
<thead>
<tr>
<th>Category</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media and Marketing</td>
<td>9. Reduction of TV advertising of high fat and/or high sugar foods and drinks to children (up to 14 yrs)</td>
</tr>
<tr>
<td></td>
<td>10. Family-based GP program for overweight and mildly obese children</td>
</tr>
<tr>
<td></td>
<td>11. Family-based targeted program for obese children</td>
</tr>
<tr>
<td></td>
<td>12. Orlistat therapy for obese adolescents</td>
</tr>
<tr>
<td>Primary Care</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13. Gastric banding for morbidly obese adolescents</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
</tr>
</tbody>
</table>
Incremental cost-effectiveness of interventions (net $ per DALY saved)

- Walking School Bus
- TravelSMART
- Active After School
- Orlistat in adolescents
- GP intervention
- Multi-faceted school-based - PE
- Gastric banding
- TV viewing
- Multi-faceted school-based + PE
- Fizzy drinks
- Family-based targeted
- Targeted multi-faceted school-based
- TV advertising

<table>
<thead>
<tr>
<th>Cost-effective</th>
<th>Not cost-effective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$0.25M</td>
</tr>
<tr>
<td></td>
<td>$0.76M</td>
</tr>
</tbody>
</table>

Group of six “dominant” interventions
<table>
<thead>
<tr>
<th>Study</th>
<th>BMI per person</th>
<th>Target pop’n</th>
<th>DALYs</th>
<th>Gross Cost</th>
<th>Net Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV advertising</td>
<td>0.17</td>
<td>2.4 M</td>
<td>37000</td>
<td>$0.13M</td>
<td>-$300M</td>
</tr>
<tr>
<td>Family-based targeted program</td>
<td>1.7</td>
<td>5,800</td>
<td>2,700</td>
<td>$11M</td>
<td>-$4.1M</td>
</tr>
<tr>
<td>Targeted multi-faceted school-based</td>
<td>0.52</td>
<td>4,300</td>
<td>370</td>
<td>$0.56M</td>
<td>-$0.08</td>
</tr>
<tr>
<td>Fizzy drinks</td>
<td>0.13</td>
<td>119,000</td>
<td>1,060</td>
<td>$3.3M</td>
<td>-$5.2M</td>
</tr>
<tr>
<td>TV viewing</td>
<td>0.45</td>
<td>227,000</td>
<td>6,700</td>
<td>$54.6M</td>
<td>-$2.1M</td>
</tr>
<tr>
<td>Multi-faceted school-based +PE</td>
<td>1.1</td>
<td>115,000</td>
<td>8,000</td>
<td>$40.4M</td>
<td>-$28.7M</td>
</tr>
<tr>
<td>Gastric banding</td>
<td>13.9</td>
<td>4,100</td>
<td>12300</td>
<td>$130M</td>
<td>$55.0M</td>
</tr>
<tr>
<td>GP intervention</td>
<td>0.25</td>
<td>9,700</td>
<td>511</td>
<td>$6.3M</td>
<td>$3.0M</td>
</tr>
<tr>
<td>Orlistat in adolescents</td>
<td>0.86</td>
<td>3,300</td>
<td>450</td>
<td>$6.4M</td>
<td>$4.0M</td>
</tr>
<tr>
<td>Multi-faceted school-based -PE</td>
<td>0.31</td>
<td>115,000</td>
<td>1,600</td>
<td>$24.3M</td>
<td>$11.2M</td>
</tr>
<tr>
<td>Active After-School</td>
<td>0.07</td>
<td>99,000</td>
<td>449</td>
<td>$40.3M</td>
<td>$36.6M</td>
</tr>
<tr>
<td>TravelSMART</td>
<td>0.07</td>
<td>268,000</td>
<td>50</td>
<td>$13.1M</td>
<td>$12.5M</td>
</tr>
<tr>
<td>Walking School Bus</td>
<td>0.03</td>
<td>16,000</td>
<td>30</td>
<td>$22.8M</td>
<td>$22.6M</td>
</tr>
</tbody>
</table>
Assessing Cost Effectiveness

Total DALY benefit versus strength of the evidence

- **Ideal Spot**
  - Strong evidence of effectiveness
  - Total DALY Benefit: 40,000

- **Limited Evidence**
  - Multi-faceted school-based + PE
  - Orlistat

- **Weak Evidence**
  - Targeted multi-faceted school
  - TV advertising

- **No Evidence**
  - Fizzy drinks
  - TV viewing
  - LAGB
  - Targeted family-based
  - Multi-faceted school-based–PE
  - GP intervention
  - Active After-School
  - TravelSMART
  - Walking School Bus
CEA Results + 2nd stage filters

• **Excellent buys (cost-saving)**
  - TV advertising
    - acceptability to C’w Govt
  - Family-based targeted program for obese children
    - acceptability, feasibility
  - Targeted multi-faceted school-based program
    - acceptability, sustainability
  - Fizzy drinks
    - acceptability (Dept Education), feasibility
  - TV viewing
    - acceptability (Dept Education), feasibility, evidence
  - Multi-faceted school-based + PE
    - acceptability (Dept Education), feasibility
**Assessing Cost Effectiveness Studies**

**CEA Results + 2nd stage filters**

- **Good buys (<$50,000 per DALY)**
  - Gastric banding
    - equity, acceptability
  - GP intervention for overweight and mildly obese children
    - evidence
  - Orlistat in adolescents
    - equity, acceptability
  - Multi-faceted school-based - PE
    - acceptability (Dept Education), feasibility
CEA Results + 2^{nd} stage filters

- **Weak buys under current assumptions (>\$50,000 per DALY)**
  - Active After School Communities
    - evidence, sustainability
  - TravelSMART
    - feasibility, sustainability
  - Walking School Bus
    - evidence, feasibility, sustainability
## Walking School Bus – Sensitivity testing

### Scenarios to improve C/E

<table>
<thead>
<tr>
<th>Base case</th>
<th>Net cost per DALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce costs</td>
<td></td>
</tr>
<tr>
<td>Attribute 50% costs to other objectives</td>
<td>$0.76M ($0.23M; $3.32M)</td>
</tr>
<tr>
<td>Annuitise fixed costs</td>
<td>$0.37M ($0.1M: $1.5M)</td>
</tr>
<tr>
<td>Improve capacity utilisation/participation</td>
<td>$0.36M ($0.11M; $1.5M)</td>
</tr>
<tr>
<td>↑ no. children per WSB from 7 to 10</td>
<td>$0.26M ($82,000; $1M)</td>
</tr>
<tr>
<td>↑ no. WSB per school from 1.6 to 3</td>
<td>$0.16M ($57,000; $0.59M)</td>
</tr>
<tr>
<td>↑ no. schools per Council from 4 to 6</td>
<td>$0.12M ($45,000; $0.4M)</td>
</tr>
<tr>
<td>↑ % non-Vict. Councils from 50% to 65%</td>
<td>$0.118M ($43,000; $0.4M)</td>
</tr>
<tr>
<td>Increase participants receiving benefit</td>
<td>$86,000 ($35,000; $0.29M)</td>
</tr>
<tr>
<td>↑ % new to active transport from 50 to 65%</td>
<td>$20,000 ($4,400; $83,000)</td>
</tr>
</tbody>
</table>

### More optimistic scenario (cumulative)
Concluding Comments

- There are cost-effective obesity prevention interventions.
- Some interventions have potential to save money in the longer term – mostly public health interventions.
- Restricting TV advertising to children of high fat and/or high sugar drinks is the most cost-effective intervention.
- Multi-faceted school-based programs save money if include increased active PE component. Targeted programs also save money but less acceptable.
Concluding Comments

- Education to reduce consumption of fizzy drinks likely to be cost-saving.

- Physical activity interventions were not good buys in their current form. Need to ↑ amount of PA, ↑ recruitment and ↓ costs to become cost-effective.

- Application of 2nd stage filter criteria highlight issues that require attention if an intervention is to be implemented.

- Results assume 100% maintenance of BMI benefit into adulthood. If reduced to 50%, ICERs would ~ double.
Concluding Comments

- Evidence for some interventions is still weak.
- Quality of public health evaluations needs to be improved if they are to contribute to evidence-based decision-making.
- Not all obesity prevention interventions could be evaluated within ACE-Obesity.
- Is our armoury of current interventions sufficient to reverse the trend towards increasing BMI?
- More evidence needed for other types of interventions (taxes and subsidies on food) and in other settings (maternal and infant health services).