Evaluating Medical Research
Why Bother?

Perspective on Metrics-based Research Evaluation
Brisbane - 16 May 2011
Steven Wooding - Research Leader - RAND Europe
RAND Europe

- Independent not-for-profit public policy research institute
  
  "help improve policy and decision making through research and analysis"
  
- Part of the RAND Corporation

- Strongly held values of quality and objectivity

- Openly disseminate our work
## RAND Europe research agenda

### Policy-focused programmes

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### Ideas incubator

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### Method-focused groups

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<td>Evaluation and performance audit group</td>
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RAND
Acknowledgements slide
• Thoroughly pointless
• Trivial
• Tiresome
• Tick boxing
• Tedious
• Totally ridiculous
Why evaluate?

Advocacy

Allocation

Analysis

Accountability
Medical Research: What’s it worth?
Estimating the economic benefits from medical research in the UK

Health Economics Research Group (HERG)
Brunel University
Office of Health Economics (OHE)
RAND Europe

For the Medical Research Council,
the Wellcome Trust and the
Academy of Medical Sciences
November 2008
To arrive at a number for the return on investment, we made three key estimates:

- How much was spent on research?
- How much health gain?
- How much spillover?
- How long does it take?
From 1975-1992, £2 billion in public and charitable funding went to UK cardiovascular research.
Estimating the monetised health gains from specific interventions for CVD diseases

- Identify research based interventions that contributed most to cardiovascular health
- Estimate Quality Adjusted Life Year (QALY) gains per intervention
- Estimate number of users
- Adjusted for compliance and polytreatment
- Multiply up to get total QALYs gained - 3.7 million
- Multiply by value of QALY - £25,000 - £92 billion
- Subtract costs of delivering care - £75 billion

RAND
To arrive at a number for the return on investment, we made three key estimates:

- How much was spent on research?
- How much health gain?
- How much spillover?
- How long does it take?
How was it used?

39%
What impact did it have?

• Cited in parliamentary debates

• News media

“few studies that have made a genuine attempt to objectively assess the economic returns of research” – Nature
Unanswered questions

- Is that really the time lag?
- What about other diseases?
- Is the spillover estimate right?
- How does domestic research affect other countries?
Why evaluate?

- Advocacy
- Allocation
- Accountability
- Analysis
# A tale of two systems

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**RQF pilot**

**Excellence**

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- Accountability
- Allocation
- Analysis
- Advocacy
NIHR Awards Assessment Tool
Knowledge Production

Research Targeting and Capacity Building

Informing Policy and Product Development

Health and Health Sector Benefits

Broader Economic Benefits
Breaking impact into atoms

- Knowledge production
- Research targeting and capacity building
- Informing policy and product development
- Health and health sector benefit
- Broader economic benefit
Breaking impact into atoms

- Knowledge production
- Research targeting and capacity building
- Informing policy and product development
- Health and health sector benefit
- Broader economic benefit
Breaking impact into atoms

- Research targeting and capacity building
  - Further funding
  - Interactions with academia
  - Interactions with industry
  - Research training
  - Research careers
  - Research tools
Breaking impact into atoms

- Research targeting and capacity building
  - Further funding
- Interactions with academia
- Interactions with industry
- Research training
- Research careers
- Research tools
Breaking impact into atoms

- Research targeting and capacity building
- Interactions with academia
  - Have you had initial discussions about collaboration of informal knowledge exchange?
  - Did these discussions lead to co-applications for funding?
  - Were these successful?
  - And/or, did these discussions lead to co-publications?
  - And/or, did the discussions lead to Material Transfer Agreements (MTAs)?
  - And/or, did these discussions lead to sharing of reagents without MTAs?
Breaking impact into atoms

- Research targeting and capacity building
- Interactions with academia
  - Have you had initial discussions about collaboration of informal knowledge exchange?
  - Did these discussions lead to co-applications for funding?
  - Were these successful?
  - And/or, did these discussions lead to co-publications?
  - And/or, did the discussions lead to Material Transfer Agreements (MTAs)?
  - And/or, did these discussions lead to sharing of reagents without MTAs?

Yes
Yes
Yes
No
No
**Health Policy**

Was your research cited by a clinical guideline or other health policy document or in a systematic review?
- [ ] Yes
- [ ] No
- [ ] Not known

Citation in clinical guidelines?
- [ ] Yes
- [ ] No
- [ ] Not known

At what level?
- **Local/Regional**
  - [ ] Yes
  - [ ] No
  - [ ] Not known

- **National**
  - [ ] Yes
  - [ ] No
  - [ ] Not known

- **European/International**
  - [ ] Yes
  - [ ] No
  - [ ] Not known

Note: 2005 NICE guideline, stroke prevention
How long it takes

![Bar chart showing the time taken to complete the questionnaire.](chart.png)
How the data is being used

- Providing a map of IP generating activities for follow up
- Looking at time lags to allow comparison with other funders
- Providing input to selection panels
Why evaluate?

Analysis

Accountability

Allocation

Advocacy
Breadth and depth
**Project Retrosight**

- 29 Case studies of research grants awarded in the early 1990s
- Across UK, Canada and Australia countries
- Analysed to look at the nature of impact and factors that correlate with impact
- International Consortium
**Why cardiovascular research?**

- **Important disease area**
- ‘Lab rat of Science of Science’
- **Availability of funding**

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<th></th>
<th>Australian</th>
<th>Canada</th>
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<tr>
<td>Mortality</td>
<td>38%</td>
<td>30%</td>
<td>35%</td>
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<tr>
<td>Morbidity</td>
<td>18%</td>
<td>5%</td>
<td>13%</td>
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<tr>
<td>Total Annual Costs to National Economy</td>
<td>$10.5 billion</td>
<td>$15.0 billion</td>
<td>$53.3 billion</td>
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<tr>
<td>Annual Research Spending</td>
<td>$120.9 million</td>
<td>$66.6 million</td>
<td>$191.5 million</td>
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All figures in US dollars.
Basic Research → Academic Impacts
Clinical Research → Wider Impacts
How do we go about it?

Select case studies

Build case studies

Rate case studies

Theme case studies

Identify factors associated with Impact
How did we select case studies?

List of 1347 grants

Survey

Clinical High impact
Basic

Random

Clinical High impact
Basic

How did we select case studies?
How did we build the case studies?

- Read papers
- Did bibliometrics
- Read archives
- Interviewed PIs
How do we structure the case studies?
Stock or reservoir of knowledge

Stage 0: Topic/issue identification
Interface A: Project specification and selection
Stage 1: Inputs to research
Stage 2: Research process
Stage 3: Primary outputs from research
Interface B: Dissemination
Stage 4: Secondary outputs: policy making; product development
Stage 5: Adoption: by practitioners and public
Stage 6: Final outcomes

Direct feedback paths
Direct impact from processes and primary outputs to adoption

The political, professional and industrial environment and wider society
**Variety of impacts**

### Story

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### List of impacts

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### Payback Scores

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### Collaboration

- Yes

### Strategy

- No

### -ve Results

- No

### Clinical Motivations

- Yes
There Is Substantial Diversity Across the Five Payback Categories
Knowledge production impacts

- Project looking at genetic determinants of increased growth of vascular smooth muscle in spontaneously hypertensive rats
- Produced 16 articles that were cited 849 times
Health impacts

- Project analyzing the automated defibrillators in Scotland’s ambulances
- Widely cited in policies and made an important contribution to the increased survival rate following out-of-hospital cardiac arrest
Economic impact

- Project that developed animal models of myocardial dysfunction
- Led to commercial transgenic facility
- Now a multimillion-dollar business that exports 80% of its services
How did we rate the case studies?

• International panel of 9 experts
• 0-9 scale
• Rated each case study, on each payback category
Spread of impacts

**Story**

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Economic impacts come from a minority of the case studies

**Recommendation:** Research funding agencies should understand and acknowledge distributional effects in any discussion or assessment of research impact, especially when it could influence the allocation of research funds.
Impacts of different types of research

Story

Collaboration: Yes
Strategy: No
-ve Results: No
Clinical Motivations: Yes

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Academic impact is not correlated with wider impacts

**Recommendation:** Research funding agencies wishing to maximize wider impacts should use broader selection criteria than just maximizing knowledge production
Basic biomedical has greater academic impact; clinical has greater wider impact

**Recommendation:** Funding bodies could prioritise basic biomedical or clinical research based on type of research they wish to achieve and timescale over which they wish to achieve it.

Mean Rating
(0=no impact; 1=least impact; 9=most impact)
We identified a number of factors that could explain impact.
Factors associated with impact

**Story**

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**Impact Scores**

Academic

| 12 |

Wider

| 4  |
Collaboration is associated with high impact

- Research collaboration is associated with high academic and wider impact
- International collaboration is associated with high academic impact
Motivation and location are associated with impact for basic research

- Basic biomedical research with clear clinical motivation is associated with high academic and wider impacts.
- Co-location of basic biomedical research in a clinical setting is associated with high wider impact.
Strategic thinking is associated with impact for clinical research

- Strategic thinking by clinical researchers is associated with high wider impact
Engaging with those outside the academic research system is associated with impact

- Engagement with practitioners and patients is associated with high academic and wider impacts
- Basic biomedical research collaboration with industry is associated with high academic and wider impacts
We identified two factors associated with low impact

- Initial rejection of a subsequently accepted basic biomedical research grant may be associated with low academic and wider impacts
We identified two factors associated with low impact

- Initial rejection of a subsequently accepted basic biomedical research grant may be associated with low academic and wider impacts
- Negative or null findings are associated with low academic and wider impacts