Public Health: The Science and Art . . .

Nick Payne,
School of Health and Related Research,
University of Sheffield,
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"The science and art of promoting and protecting health and well-being, preventing ill-health and prolonging life through the organised efforts of society."

Faculty of Public Health
Charles-Edward Winslow
Professor of Public Health, Yale

“The science and the art of preventing disease, prolonging life, and promoting . . . .”

Science 1920
"The Untilled Fields of Public Health"

THE UNTILLED FIELDS OF PUBLIC HEALTH

A short time ago two Yale undergraduates came to my laboratory to consult me in regard to the choice of a career. One of them was a son of a public health administrator of the highest eminence; and they particularly wanted to know something about the field of public health, what it included, what was the nature of the work involved, what were the qualifications required, and what the financial rewards and the more intangible emoluments to be expected by those who might enter upon this career. I told them what I could of the current tendencies which to me seem to make public health one of the most stimulating and attractive openings lying before the college student of the present
“Public health is the science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health.”
Charles-Erward Winslow:

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and the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health."

"
Past

Present

Future
THE PAST – for me
Planning, Commissioning, and Organisation of Health Care

Clinical Interventions

Public Health Interventions
Public Health in the planning and organisation of health care

• Where is the need for health care - and are we meeting it adequately and fairly?
• What works and how cost-effective is it?
• How good is the quality of care?
Use versus need for healthcare

• Many more people die early of heart disease - and indeed have symptoms of angina - in the deprived areas of Sheffield.

But . . .

• In the more deprived areas less than half as many people with angina symptoms got coronary artery surgery than in the more affluent areas.
Health Survey Data (SHAIPS) linked with Routine Healthcare Event Data

![Graph showing the relationship between Townsend deprivation score and coronary artery revascularisations per number with symptoms of angina. The correlation coefficient, $r = -0.67$, indicates a moderate negative correlation.]

**Fig 3** Coronary artery revascularisations per number with symptoms of angina compared with Townsend deprivation score
Use versus need for healthcare

• More people have disabling arthritis of hip or knee in deprived areas

But . . .

• In the most deprived areas fewer people with these conditions receive joint replacement surgery
What works and how cost-effective is it?

- Working Group on Acute Purchasing
- Regional Development and Evaluation Committees (DECs)
- National Institute for Health and Care Excellence (NICE)

Three key issues:
- Epidemiology of need
- Systematic evidence review and appraisal
- Health Economics and Modelling
Costs of 12 new interventions for a population of 500,000 (per annum)

Annual Expenditure (£000s - year 2000 prices)

- £0
- £1,000
- £2,000
- £3,000
- £4,000

With Prioritisation

Without Prioritisation
Costs of 13 new interventions for a population of 500,000 (per annum)

Annual Expenditure (£000s - year 2000 prices)

- £0
- £10,000
- £20,000
- £30,000
- £40,000

With Prioritisation

Without Prioritisation

Includes Statins
# How good is the quality of care?

- **Audit of Stroke and Hypertensive “Avoidable Deaths”** - CESHAD  
  *(in 123 patients)*

## TABLE II—Numbers of hypertensive patients with avoidable factors contributing to death identified by assessors

<table>
<thead>
<tr>
<th>Avoidable Factor</th>
<th>No of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Failure of the health service to:</strong></td>
<td></td>
</tr>
<tr>
<td>Detect hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Follow up and treat hypertension once diagnosed</td>
<td>25</td>
</tr>
<tr>
<td>Ensure that patients were recalled if they missed follow up appointments</td>
<td>3</td>
</tr>
<tr>
<td>Diagnose and treat complications of hypertension</td>
<td>3</td>
</tr>
<tr>
<td><strong>Failure of the patient to:</strong></td>
<td></td>
</tr>
<tr>
<td>Take drugs or agree to attend for follow up</td>
<td>3</td>
</tr>
<tr>
<td>Stop smoking</td>
<td>13</td>
</tr>
<tr>
<td>Lose weight</td>
<td>6</td>
</tr>
<tr>
<td>Reduce alcohol consumption</td>
<td>8</td>
</tr>
</tbody>
</table>
Planning, Commissioning, and Organisation of Health Care

Clinical Interventions

Public Health Interventions
THE PRESENT – for me

The evidence for the effectiveness of Public Health Interventions
Topics and Evidence

- Alcohol (6 reviews)
- Contraceptive Services for Young People (5 reviews)
- Preventing Pre-diabetes (3 reviews)
- Preventing Progression to Diabetes (5 reviews)
- Weight Management around Childbirth (2 reviews)
- Smoking in Pregnancy (1 review)
- Well-being of 0-4 Year Olds (2 review)
- Well-being of schoolchildren (1 review)
- Looked after children (4 reviews)

9 Topics - 29 Reviews - 94,556 papers
Results – overall:

Papers retrieved by usefulness / relevance

- Not relevant: 99.2%
- Used: 0.8%
Issues and problems in reviewing and synthesising public health evidence.

- There is always a big gap between the evidence that is available, and the evidence we need or would like;
- Comparing public health interventions is made harder by them having differing contexts or differing nature - “Apples and Oranges”;
- Insufficient suitably controlled trials;
- Study duration too short;
- Lack of health economic studies to inform the cost-effectiveness of the public health interventions.
How can we develop more effective public health interventions?

• Systematic reviews of the effectiveness of public health interventions:

• Clear public health issue, but not only was there an absence of:
  – Published effectiveness studies, but also often an absence of:
  – Well developed interventions.
Public Health Interventions

**Definition** = A set of actions with a coherent objective to bring about change or produce identifiable outcomes . . . intended to promote or protect health or prevent ill health in communities or populations.

*Rychetnik et al. 2002*
Methods

• Literature search
  – “Development of Public Health Interventions”

• Comparison with introduction of new drugs
  – Contrasting steps in the process
Literature 1 - Development

• Importance of identification of innovative public health interventions.

• Plausible mechanisms and causal pathways for effectiveness need to be understood – for example basing on behavioural science principles.

• Key steps in development of interventions have been identified - . . . .
Literature 2 – Key Steps

*Five key steps in development are:*

- **Select** possible interventions;
- **Test** – safety, feasibility, acceptability;
- **Formulate** to make available and consider alternative programme designs;
- Assess the **efficacy**;
- Assess the **effectiveness**.

*de Zoysa et al. 1998*
Details of the interventions need to be reported more fully – with clearer criteria.

Information about the **context** is needed.

Assess **fidelity** to the intended intervention.

A **register** of interventions - with fuller descriptions.
Literature 4 - Evaluation

• Less than 1% of UK public health research is on the outcome of interventions.
• Evaluability assessment – full scale evaluation should not be too early.
• Feasibility and observational studies should be done first.
• Beware reviews that lump together interventions that are not really alike.
Comparison with New Drugs - 1

Drugs

Understand the disease or health issue.

- Basic biological processes often well researched and understood.

Public Health Interventions

Describe the problem.

- Epidemiology may be well researched, but underlying model of causation may be poorly understood.
Comparison with New Drugs - 2

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Public Health Interventions</th>
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<tbody>
<tr>
<td><em>Discovery/synthesis and purification.</em></td>
<td><em>Select or formulate possible public health interventions.</em></td>
</tr>
<tr>
<td>• Was often fortuitous or arose from screening large numbers of possible products.</td>
<td>• Sometimes based on basic principles – but frequently just based on ideas and political beliefs.</td>
</tr>
<tr>
<td>• Increasingly now is by tailored design and synthesis of new compounds.</td>
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</table>
Comparison with New Drugs - 3

**Drugs**

*Full detailed description of the product including Patenting.*

- Almost universal

**Public Health Interventions**

*Detailed description of the final intervention and Patenting.*

- Neither are usually provided and carried out in public health.

**Licensing**

- Mandatory

**Licensing**

- Not needed
Comparison with New Drugs - 4

Drugs

*Phase 1 testing – test in 20-100 volunteers for safety*

*Phase 2 testing – tests in around 100-500 patients the short-term efficacy and intermediate outcomes and side-effects, dosage and treatment schedules.*

- Mandatory before further progress to licensing.

Public Health Interventions

*Test interventions (for unwanted effects, e.g. increasing health inequalities).*

- Rarely carried out in public health.

*Trials to assess the efficacy of public health interventions.*

- Sometimes carried out but often the optimum “dose” and schedule for the intervention is not evaluated.
Conclusion - Improving the process of Development and Introduction of Public Health Interventions

Ideas Include:

• Improve how we Select, Test, Formulate, Evaluate, Review, and Champion public health interventions;
• Better description and “Registration” or “Licensing”;
• The establishment of an equivalent “pharmaceutical company sponsor” for public health interventions.
THE FUTURE – for me

School for Public Health Research
SPHR

• Shifting the Gravity of Spending

• Ageing Well Programme – Inequitable Access to Interventions
Shifting the Gravity of Spending – what’s this about?

Much of Public Health has now been moved to Local Authorities who now need to make tough choices about spending and prioritisation (in public health).

This, “Shifting the Gravity of Spending”, study recognises that this priority-setting is now taking place within a quite different organisational, cultural and political setting from the NHS.

It aims to assist a range of players within Local Authorities by bringing together specialist decision-making support from health economics. It recognises that there are many influences and multiple criteria for decision making – not, for example, just cost-effectiveness.

So the project is seeking to:
• Find out which priority-setting tools local authorities find useful for public health investment;
• Assess facilitators and barriers to this decision-making;
• Provide recommendations about appropriate support for determining priorities in public health within Local Authorities.
Inequalities in access to, and uptake of, health interventions in older people.

It’s going to look at four different interventions delivered across different settings (probably at Public Health; Primary Care, Secondary Care, and Tertiary Care levels) which have significant potential to benefit older people.

Inequitable patterns of availability, uptake and use of interventions will be identified using quantitative results - and qualitative methods will be used to explore why such patterns arise.

There’ll be a focus on whether barriers to interventions can be modified, and if potential ways to deal with what are increasingly called “Intervention Generated Inequalities” in older populations can be developed.
Where does Public Health Belong?

- National Government
- Local Government
- Health care providers
- Universities
- Health care planning & commissioning
Acknowledgments and Thanks

thank you so much