

## THEORY AND METHODS

## A population perspective to evidence based medicine: "evidence for population health"

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We explore the notion that the public health community could learn lessons from the success of evidence based medicine (EBM) and develop a public health counterpart called "Evidence for Population Health". While EBM focuses on individual patients, its public health counterpart would aim to improve the health of communities effectively and efficiently.

*J Epidemiol Community Health* 2002;**56**:45-47

between the individual and population approaches to the collection and use of evidence.

**While the population health sciences have contributed to the methodology for EBM, the academic public health community has neglected to develop a similar methodology to apply to public health**

The idea of clinical epidemiology to provide clinicians with research skills to let them tackle major population health issues has been lost with the narrowness of the confines of EBM to the clinical arena. There has been no comparable explosion of methodology in the public health arena. As improvements in public health are of major potential value, the academic public health community has a great need to develop a methodology of similar impact to that of EBM in the clinical arena to provide an evidence base for population as well as individual health problems. While there have been important advances in the population health sciences, these have not matched the developments and impact of EBM. There have been attempts to encourage "Evidence based public health".<sup>6,7</sup> The Cochrane Collaboration has started to address the "wider public health agenda", but has restricted itself to systematic reviews rather than developing new methods.<sup>8</sup> Health policies are sometimes made with the use of evidence, although political imperatives often overwhelm the decision making process<sup>9</sup> and evidence may be neglected even in important public health policy reports.<sup>10</sup> The need is particularly evident in assessing the impact of public health interventions, where randomised controlled trials are often difficult to introduce.<sup>11</sup> Macintyre and Petticrew have urged us not to be frightened to extend evidence to realms of public policy,<sup>12</sup> Neuberger has encouraged us to build the evidence base for health improvement<sup>13</sup> and the Health Development Agency has evidence as one of its central themes.<sup>14</sup> There have been some recent attempts to develop measures of disease risk that extend those used in EBM to a population perspective<sup>15,16</sup> These include such measures as the population impact number, which may enable policy makers to more explicitly compare the population impact of different interventions for different diseases, and represent the type of methodological extensions to EBM that can contribute to population health.<sup>16</sup>

## SOME HISTORY

Evidence based medicine (EBM) is an extremely valuable concept and has transformed the clinical practice of medicine by providing acceptability for the use of the scientific method (particularly the methods of the population sciences) in clinical decision making.<sup>1</sup> EBM has evolved from the discipline of clinical epidemiology. This discipline aims to bridge the gap between clinical practice and public health by the use of population health sciences to inform clinical practice.<sup>2</sup> Others have a broader concept of clinical epidemiology that includes a population focus<sup>3</sup> and urge clinicians to use population health sciences to collect research evidence that would help improve the health of the population.<sup>4</sup>

**Broadening EBM beyond clinical policy decision making has the potential to produce a larger impact on the health of the population**

Clinical decision making is important and appropriate decisions will lead to reduction in symptoms for patients, improved quality of life as well as improvements in life expectancy. However, clinical decisions have a relatively small impact on health outcomes in comparison with changes in the social environment.<sup>5</sup> Larger impacts on life expectancy will be made by improvements in public health, although in many cases these can also entail clinical decision making such as the use of primary and secondary preventive measures from a clinical base. Extending the perspective of the clinician to the population by helping the clinician to think about population health would add to the benefits of EBM at a population level, through an emphasis on studying aetiology, health needs, practices and outcomes across the health spectrum and by taking action on prevention.

The population health sciences have contributed the major methods for EBM, and should now set about providing a population perspective to EBM to attempt to increase the impact of this type of thinking and to recognise the differences

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Accepted for publication 21 June 2001

**Abbreviations:** EBM, evidence based medicine; NHS, national health service; RCT, randomised controlled trial; NNT, number needed to treat.

### Clinical and public health approaches to evidence for practice

To take account of the differences between the individual and population approaches to evidence, it may be useful to explore the relevance of the methods, which have been valuable for the practice of EBM, to public health. EBM methods can be thought of as either “statistical” or “implementation”.

The major methodological developments that have been important to EBM include:

#### “Statistical”

- 1 Refinements of the randomised controlled trial (RCT)
- 2 Large scale trials of simple interventions
- 3 Meta-analysis and systematic reviews
- 4 Cost effectiveness analysis
- 5 Number needed to treat (NNT)
- 6 Evaluation of diagnostic tests for use in individuals

#### “Implementation”

- 1 Improved access to evidence (both electronic and paper based)
- 2 The development of clinical guidelines
- 3 Clinical audit
- 4 Framing of measures of risk
- 5 The development of guidelines for the application of the results of RCTs to “real life”
- 6 Training courses in critical appraisal for clinicians

A set of complementary methods to provide a population focus, might look like this.

#### “Statistical”

- 1 The development and use of appropriate study designs and methods to assess interventions without the RCT
- 2 Use of routinely collected data for research.
- 3 Extensions of the NNT concepts to the population (building on work already started<sup>16</sup>)
- 4 Decision analysis for populations rather than individuals
- 5 Quality of life measures for populations
- 6 The use of multilevel modelling to appropriately analyse clustered data at individual and population levels.

#### “Implementation”

- 1 Encouragement of data collection across the health sector
- 2 Simple methods of accessing data in order to calculate population measures of risk
- 3 Methods to easily access results of public health interventions
- 4 Ways to present risk data to policy makers and the public in a manner that is easy to understand
- 5 Education of policy makers to use evidence
- 6 Population services audit

### The collection and use of data is central to EBM and should become the guiding force in describing how all aspects of health can be counted and improved

The EBM movement has concentrated on large scale RCTs and meta-analyses of RCTs. Although the properly conducted RCT is the study design that provides the most valid measure of the effect of an intervention at an individual level, observational study designs may in some circumstances be more appropriate to population health<sup>11</sup> and numerous opportunities to learn lessons about the effectiveness of public health interventions are being lost because of failure to devise and perform appropriate evaluations. Major advances in public health followed

the collection of data on causes of death in the 19th century.<sup>17</sup> The public health response to the AIDS epidemic worldwide has followed relatively simple data collection that demonstrated the size of the problem.

The UK National Health Service (NHS) has identified the need for data to plan and evaluate health services—“Information for Health: an information strategy for the modern NHS”,<sup>18</sup> although Aspinall has argued that the information database needed to implement UK government policies to reduce inequalities in public health is lacking.<sup>19</sup> There are a number of current initiatives to improve collection of and access to health data, such as the Public Health Observatories.<sup>20</sup>

A major impact could result if more areas of health practice were to incorporate data collection as a routine. The collection of data on patients and populations as groups is fundamental and a prelude to more sophisticated analyses and studies. The use of well designed standardised forms to collect data on patient outcomes in physician practices and hospitals will serve to reduce bias and provide more valid outcome measures for observational studies in the community.

Data collection can be applied at the clinical, preventive, service fund provider, public health and consumer settings. Health professionals should be stimulated to collect data across categories—in particular those in clinical settings should develop a population perspective to their data collection. The academic public health community should develop methods that will allow the adequate collection, analysis and interpretation of data, as a central theme for “Evidence for population health”.

### Epidemiological principles should be used to improve the quality of routine data collection. The value of routine data can be increased if data are collected both at the population and individual levels

Routine data, essential for service planning, are often variable in quality, completeness and availability even in excellent settings<sup>21</sup> and policy makers may not act on evidence that is not clearly communicated. This clearly limits the potential usefulness of the data as well as their perceived value. This is an opportunity for epidemiologists and others with appropriate knowledge to contribute to improved data quality and use. Epidemiological principles should be used to design instruments for routine data collection. The use of standardised simple data collection instruments can contribute greatly to improvement in both the quality and completeness of routine data. Even those who state that the RCT is the best available tool, admit that routine data may also be used to complement the results of RCTs.<sup>22</sup>

At the population level, appropriate data collection can add significantly to the insights to be gained from ecological studies. This study design has been discouraged in the medical literature<sup>23</sup> largely because of the inappropriate application of group level effects to individual patients (ecological bias).<sup>24</sup> However, when inferences are made at the appropriate level, this study design has much to add to population health. In order to maximise the impact of this study design, appropriate data need to be collected at both the individual and population levels. In doing ecological studies, if more information is collected on individuals, that information can be used to obtain more meaningful estimates of group level effects. This can be done if appropriate statistical methods are used. Thus, multi-level modelling<sup>25</sup> may be used to adjust group level estimates for individual level effects while taking the clustering at group level into account.

### The new information technology revolution gives many opportunities for data collection and use

The advent of the electronic medical record, electronic databases of health service inputs and outcomes will

### Key points

- Evidence based medicine (EBM) has made a major contribution to clinical practice, but lacks a population perspective.
- “Evidence for population health” is a term that could be used to provide a public health counterpart to EBM and provide a stimulus for the public health academic community to develop and apply appropriate methodologies that are of special relevance to public health. The “statistical” and “implementation” methods that have proved so valuable in EBM each have a population counterpart.
- The collection and interpretation of good quality data on health needs, practices and outcomes across the health spectrum, and building the capacity for this across the health professions, is an essential component of this initiative.
- The identification of the collection and use of evidence could be a way of focusing academic contributions to public health and provide a clear agenda whose achievement would require the academic and service public health communities to work together.

transform our ability to collect and use data. As the new information technology is being applied to the health field an emphasis on the collection and use of data is timely.

### The data must be used, not just collected

The famous Jewish scholar Rabbi Akiva argued before the sages of Lydda that both study and action are important as “studying leads to doing”.<sup>26</sup> There are many examples in the health field where data are collected and never used. This is usually a function of either a lack of precision as to the reason for the data to be collected in the first place, poor data quality or to difficulties or delays in accessing the data. If data collection and analysis become part of routine practice, health professionals and policy makers need to become skilled in the critical appraisal, interpretation and application of reports based on these data. There are obvious implications for undergraduate and postgraduate education in this. There are also implications for the provision of resources for clinical and preventive services, which should always include the collection and analysis of data about the services in order that they may be improved.

### Academic and service public health

The identification of the collection and use of evidence could be a way of focusing the academic contributions to public health and provide a clear agenda whose achievement would require the academic and service public health communities to work together.

### In conclusion

A population perspective to EBM could be an important way for the population sciences to contribute to improving the health of the community. New methodologies should be developed to take account of the differences between the collection and application of evidence at the clinical and population levels. There is an essential need for appropriate, simple and accurate data collection to be incorporated into routine clinical and preventive practice in all health related disciplines. This should be underpinned by the provision of the resources

and skills to collect, analyse, interpret and act on the data. The role of policy makers is paramount to facilitate the transfer of evidence provided by these data to practice. The identification of the collection and use of evidence could be a way of focusing the academic contributions to public health and provide a clear agenda whose achievement would require the academic and service public health communities to work together.

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