Evidence and context

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In October, Melbourne hosted the annual meeting of the Cochrane Collaboration. This international network of volunteers is unique in the history of health care. Founded in 1993 and named for the great British epidemiologist Archie Cochrane, the Collaboration invites volunteers to join one of 50 review groups that collate information about the effects of health care interventions in a specific area. The methods for assembling what we know are clearly defined, the results of more than 2,500 reviews are available online, reflecting the joint efforts of 12,000 people in nearly 100 countries.

While we cannot but be impressed by the weight of evidence produced, there are a few difficulties. The bulk of the reviews listed in the Cochrane Library provide evidence of the effects of clinical interventions and reflect the appropriateness of the term 'evidence-based medicine'. What about 'evidence-based public health'? There are reviews that address traditional public health concerns, such as the effects of population screening or smoking cessation but it would be fair to say that public health is under-represented in this polished and trusted program for synthesising evidence. The problem is not that we are less skilled in our research efforts. The areas in which public health operates are complex and multifactorial. Although it is certainly possible to design trials of community interventions that isolate cause and effect and exclude bias, and this has been done, these are difficult studies. In short, the problem is that public health is inescapably context-dependent and our evidence base has to reflect this difference.

In evidence-based medicine, it is recognised that contextual factors are important and that decisions cannot be based only on a comparison of the benefits, risks and costs of different courses of management. Values and preferences play a role in decision making and it is worth noting the argument that these values and preferences should be those of the patient rather than of the clinician.[1] The way in which patient values are to be elicited and incorporated into clinical decisions is far from clear and the underlying assumption seems to be that patients will make rational decisions, and communicate these, once the evidence is presented. The variety of ways in which patient preferences may be manifest is not presented as a proper focus of evidence-based research.

In public health we have long confronted the troublesome problem of values and preferences. Parents who do not wish to have their children immunised against diseases of childhood may pose a risk to other children. There is a history of fierce resistance to community-wide interventions like the fluoridation of the water supply, despite evidence of the reduction in caries. Some cultural practices challenge our ideas of the appropriate treatment of women or children. Such issues seem to be resolved most often through long and serious negotiation with community groups. Perhaps more important are those contextual issues that so seriously constrain patient choice that lives are put at risk. It is reported that poor women in Brazil elect to deliver by Caesarean section because this gives them access to better maternity care than in the public system where vaginal delivery predominates, thus contributing to the very high rate of this intervention.[2] Here, the individual patient should not be the focus of intervention but rather the health system that delivers inequitable care, reflecting the social inequities that we find not only in Brazil but also in Australia, New Zealand and most other countries. There is a lack of Cochrane-type evidence for such interventions.

The debate about the risk of a 'bird flu' pandemic illustrates these points. As a response to the 2004 tsunami, the Cochrane Collaboration is collecting a series of summaries of evidence that is relevant to natural disasters or health care emergencies. Summaries of the best evidence for the treatment of injuries or infectious diseases are certainly valuable but if the evidence is decontextualised, not generated in the actual setting of a disaster, then there is the risk that we may overlook the consummate skill that is needed to take a comprehensive view of a disaster and to focus on the most productive point at which to intervene with what may be very scarce resources. The most difficult issue, the long-term strategies for reducing the poverty that exacerbates risk, is all too easily overlooked in dealing with the immediate crisis.

For these other evidences we have to turn to studies that may not readily be incorporated into a review of the Cochrane Collaboration. The range of public health research problems that need to be addressed is wide, and the range of methods that are required to address these topics is equally wide. Our requirement in this Journal is that research studies should use the best possible methods, within the contextual constraints. As in all research studies, the limitations of a study should be acknowledged.

Fortunately, in Australia and New Zealand we have skilled public health researchers and practitioners who are able to generate excellent, contextually-situated evidence. Here it is also appropriate to mention that the quality of papers published in a journal depends very much on the good will of a further, and often unacknowledged set of volunteers, the reviewers. The list of reviewers published on pages 595-6 gives a good indication of the extent of this generous volunteer effort.

References

1. Guyatt GH, Rennie D, *Users' Guides to the Medical Literature: A manual for evidence-based clinical practice*, US: AMA Press; 2001, p 571.
2. McCallum C. Explaining caesarean section in Salvador da Bahia, Brazil. *Sociology of Health & Illness.* 2005; 27(2):215-42.

In this issue

In this issue, the major theme is outbreaks. These papers did not all arrive at the Journal at the same time but as they were accepted over the past few months they set a context for the daily news discussions of possible major epidemics across the world. We are confident that the outbreak papers will not cast a dark shadow across Christmas, the New Year or the summer holidays, since many of them demonstrate effective public health responses to novel problems, new presentations or unusual pathways to a

familiar disease. (Beware: if you *are* easily upset you might want to move on to Susan Donath's account of standard errors for population estimates on p565, or the discussion by Virginia Dickson-Smith and colleagues on p576 of whether university ethics committees adequately protect public health researchers, with a response from Lynn Gillam.)

Back to 'Outbreaks!'. C.F. Graham and seven New Zealand colleagues describe cross-contamination of pre-cooked sausages with *Campylobacter,* and show the marked similarity in subtypes between the three cases in one family and an earlier unrelated set of three cases in the same city. The fact that authors outnumber cases in many of these reports is a reminder of the range of skills required. A very different 'ingestion' outbreak is reported by Rebecca O'Connell and colleagues who report a cluster of cases of thyrotoxicosis in Otago associated with consumption of a soy milk product contaminated with iodine. The New Zealand Food Safety Authority was alerted to the level of iodine in the product by the findings of the New Zealand Diet Survey, showing the value of routinely collected data in conjunction with detailed case investigation. Megan Young and 11 colleagues in Queensland draw attention to community-acquired pneumonia caused by *Legionella pneumophila.* Although the major source of such outbreaks in Australia is cooling towers, this paper reports the investigation and management of a single case which turned out to be caused by turning on the water heating system for only 30 minutes before a shower each day. Lara Wallis and Priscilla Robinson from Victoria describe another case of Legionnaires' disease – also unrelated to cooling towers – in which both sputum and a soil sample from a plant nursery where the affected person worked were positive for an unusual serotype of *Legionella pneumophila.*

Sabry Eissa and colleagues report on the difficulties of providing secondary prevention services for the sequelae of acute rheumatic fever in a large remote Aboriginal community in the Top End. Tanya Stewart and colleagues report on aspects of care for the same problem in Katherine, and draw attention to the need for making the diagnosis in the first episode. Their description of the problems around long-term penicillin prophylaxis makes clear what a major undertaking this is.

Garrett Prestage and colleagues provide an analysis of changes in the sexual behaviour of gay men over the past 13 years from four broadly based but non-random studies in Sydney, concluding that the complex changes, although difficult to interpret, do have implications for gay men's health. The same research group, led by Fengyi Jin, report baseline data on the prevalence and risk factors of hepatitis C in HIV-negative homosexual men. Their conclusion was that the findings were reassuring, but the study did not have the power to identify an odds ratio below 5.4.

Rebecca Guy and colleagues discuss the problems of estimating influenza vaccine effectiveness in a outbreak when antivirals were used as a control measure. Heather Gidding and colleagues model the impact of universal infant vaccination on the epidemiology of varicella zoster virus, predicting positive effects for at least the next 70 years. Rona Hiam and colleagues conclude that information alerts by ACT Health increased early notifications of pertussis in a 2003 outbreak. Abigail Wroe and John Clements' letter on feeling bad about immunising children fits into this discussion. Julie Hepworth and Madeleine Murtagh, use five case studies to raise questions about poor prevention and weak controls over occupational health and safety in the beauty therapy industry.

December is a good time to think about alcohol, and Jan Payne and colleagues report on Western Australian health professionals' knowledge, practice and opinions of alcohol consumption in pregnancy and fetal alcohol syndrome. Azar Kariminia and colleagues continue the Journal's reporting of prisoners' health over the past few years with an account of the accuracy of the National Death Index in identifying death and cause of death.

Thank you to all our reviewers, especially those who reviewed several papers this year, and those who re-reviewed revisions. We hope you enjoyed reading the other reviewers' comments, too.

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International challenges in health – can we succeed?

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The outbreaks described in this issue of the Journal have one thing in common: all provide opportunities to identify areas for improvement of health systems. Similarly, many outbreaks occur across international borders, theoretically providing opportunities to deal more effectively with the health problems of our world and our time. There have been some notable successes in the international control of infectious diseases, including smallpox and SARS. For some other diseases, however, we have failed. There are more than 40 million people living with HIV, all infected since we discovered the cause of, and means to prevent (at least theoretically), this disease. The majority of these infected people are not receiving the treatment that is proven to improve the quality and length of life of the individual patient as well as decreasing their infectiousness to others.

The current concern about the epidemic of avian influenza and the associated risk of human pandemic influenza has highlighted the need for a global approach; no-one doubts that in the globalised world in which we live a virus could spread throughout the world with frightening rapidity. The current concerns also highlight the need for co-ordination across countries and sectors, and the recognition of the importance of what are traditionally considered non-health aspects of improving health and controlling disease.

Collectively, we understand a great deal about what predicts disease, whether the disease is caused by an infection or not. Poverty is a major predictor. Poverty decreases educational opportunity which, in turn, decreases the chance of employment. Without employment, poverty is exacerbated. Poor and uneducated people are less able to access public health, primary care or most forms of private health care. Even if they can access health care, an illness may lead to increased demand for money to pay for diagnosis or treatment. Of course, once ill, individuals are less likely to gain or maintain employment. Poor people live in overcrowded circumstances, often without safe and sufficient supplies of food and water, and without adequate sanitation, because they have no choice. Such situations facilitate the spread of infectious diseases and accompany the development of non-infectious disease.

Another significant predictor of health is the autonomy of women. Autonomy interacts with education; those societies that support female education are more likely to support female autonomy and vice versa. An educated mother will make better choices about feeding, protecting and teaching her children. She can make a decision about when a child needs to attend a health centre. An educated and autonomous mother is much more likely to have surviving children.

Access to a minimum but sufficient standard of health care is also critically important in predicting survival and health.

The majority of these underlying causes of disease are identical, whether the disease is infectious or non-infectious. Some of the challenges around the world include infectious diseases such as AIDS, polio, tuberculosis and measles; and non-infectious diseases such as smoking-related illness, stroke, renal disease and diabetes. There are many others.

What are the characteristics that facilitate the control of diseases and outbreaks in an international context? We already understand a considerable amount about the epidemiology, demography, risk factors, culture, education levels, and the various factors that describe diseases and their associated predictors. So, why do some disease control efforts fare better than others?

Various bodies and groups have suggested ways in which humans can improve health. One of the best known and still relevant 20 years on is the Ottawa Charter for Health Promotion promulgated in 1986 that suggested five key strategies to improve health:

- build healthy public policy;
- create supportive environments;
- strengthen community action;
- develop personal skills; and
- reorient health services.

Despite the Ottawa Charter and a range of other strategies, many problems remain with moving from strategies to health outcomes. For instance, despite global attempts to improve child health, some of which have been successful, the World Health Report (2005) states that just 42 countries accounted for 90% of deaths in children less than five years old. When these data were examined in more detail it became apparent that the children were deprived of apparently easy solutions. For instance, 33% of children received no vitamin A, 50% had no access to safe water or sanitation, 60% with pneumonia received no antibiotics and 70% with malaria received no treatment. These advantages were available to others in their community. In other words, the treatment or preventive action was known, it was available and given to others in the same community or country, yet some children did not receive it. This example highlights the gap between information and action to improve health, and the importance of examining the context in which health systems fail to deliver optimal health.

This information-action gap is found at virtually all points of the health care system. For many diseases we know the cause, we know the risk factors, we know (theoretically) how to prevent most cases and often we know the treatments that make a difference to individual outcomes. With current knowledge we could theoretically prevent or treat the majority of diseases that cause premature illness or death. Even for diseases such as AIDS, we know the viral causes, the transmission causes such as unsafe sex, unsafe needle sharing practices and unsafe blood supplies. We know how to prolong quantity and quality of life with appropriate medication and we know how to stop unborn infants from being infected by their HIV-infected mothers. Even for children – usually considered both the most precious and the most vulnerable in

society – and despite treatment efficacy, less than 10% are receiving treatment.

There is currently an outbreak of polio in Australia's immediate neighbour, Indonesia. Again, this is a disease that can be easily prevented via a vaccine, yet we appear unable to ensure vaccine programs are implemented faster than the disease spreads. This is another example where the science provides a near-perfect solution yet somehow we have not been able to implement the science in all societies, highlighting the importance of considering the socio-economic and politico-cultural context of health.

Similar information-action gaps can be found in many disease areas such as meningitis, smoking-related disease, stroke, diabetes, cervical cancer and liver cancer, to name just some. This is not to imply that there are answers for all cases, but rather that we have the potential to prevent or mitigate the majority of cases of many diseases.

What have we learned from the successful international approaches to disease control, including disease control in outbreak situations, and how has the information-action gap been closed? Vietnam was the first country to report the disease which was later discovered to have originated in China and later came to be known as SARS, as well as the first country to declare SARS contained. How did Vietnam control SARS? Factors such as the importance of leadership, speed of response, good and formalised intersectoral collaboration, transparency with the public and the international community, communication skills, a good public health infrastructure, logistical support and appropriate technical skills all had important roles. As well, however, the global collaboration of people was extraordinary. The Global Outbreak and Alert Response Network, a network which is attached to, and provides surge capacity for, the World Health Organization (WHO) swung into action, providing workforce where needed. WHO established networks to assist the sharing of laboratory, epidemiological and clinical information, with their work being facilitated by the use of modern information technology. All of these were essential components of the successful response and it is now difficult to imagine a successful response without all the elements.

Smallpox and its eradication provide more clues about what works in an international context. There was extraordinary and visionary leadership, which provided strength of argument, a plan of action and ensured involvement of relevant groups. Those involved also ensured flexibility in program delivery which could be adapted for local conditions. Recent massive global efforts to rid the world of polio have highlighted the importance of combined approaches to any one problem. For instance there is a need for multiple funders, multiple supporters, multiple strategies and multiple interim outcomes. Multiple funders and supporters encourage all players to remain involved and provide ongoing resources should one fail to maintain support. The ability to obtain diversity in support presumably also reflects a broader engagement with the problem. Multiple strategies and interim outcomes help ensure success. A simple example is HIV. A strategy to control sexually transmitted HIV will not control HIV infection spread by intravenous drug use. An interim outcome needs to be practical. For instance, although a falling prevalence is the aim of an HIV prevention program, initial efforts may uncover previously unknown cases, thereby providing an *increase* in prevalence due to better measurement, highlighting the need for appropriate interim indicators. This can be a particular problem for diseases with long incubation periods.

Successfully working with governments is essential to international (or national) control of disease. This means considering the objectives of government and how the objectives overlap with health objectives, ensuring that the language used is appropriate for governments and recognising the importance of economic arguments, as well as recognising the competing interests that may jeopardise disease control efforts.

Relationships with individuals are essential in ensuring success and their importance is regularly under-estimated. Trust can only happen between persons known to one another. This takes time, energy and commitment. When this is considered across departments, government and countries, the investment is vast, but without the investment, cross-jurisdictional co-operation is almost impossible. And without cross-jurisdictional co-operation, international disease control cannot exist.

In summary, there is a great deal to learn from outbreaks, whether in an international, national or local context. Outbreaks should always be considered in the context of what they represent about inadequately functioning systems. Outbreaks provide a unique opportunity to examine society and health systems. Despite the considerable disease burdens throughout both developing and developed countries, there are many actions that can be taken immediately to improve health, control disease and prevent outbreaks. The challenge lies in how best to tackle the challenges, taking into account a broad view of health. Fortunately, we have precedents for successful action.

Whether it is controlling outbreaks or controlling disease in general, science is necessary but not sufficient to solve our global problems. There is a need to recognise that our changing and globalising world has many factors which have a direct impact on health outcomes, while not necessarily being within the scientific domain. While science may be necessary (but not sufficient) for dealing with international challenges in health, people of good will, applying solutions already available, working with other people, countries, non-government organisations and governments are, and will remain, essential.

References

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