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Public health ethics

Public health ethics: informing better public health practice

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Abstract: Public health ethics has emerged and grown as an independent discipline over the last decade. It involves using ethical theory and empirical analyses to determine and justify the right thing to do in public health. In this paper, we distinguish public health ethics from clinical ethics, research ethics, public health law and politics. We then discuss issues in public health ethics including: how to weigh up the benefits, harms and costs of intervening; how to ensure that public health interventions produce fair outcomes; the potential for public health to undermine or promote the rights of citizens; and the significance of being transparent and inclusive in public health interventions. We conclude that the explicit and systematic consideration of ethical issues will, and should, become central to every public health worker's daily practice.

Welcome to this special issue of the *NSW Public Health Bulletin* focused on public health ethics. With it, we hope to open a local conversation about the importance and

usefulness of ethics in public health practice. Ethics is traditionally a branch of philosophy, although it is increasingly an interdisciplinary field. Ethics is concerned with moral questions and with discerning the right thing to do.¹ Ethics is normative, that is, it asserts how things should be, it makes evaluative statements and judges some courses of action to be better than others. However, ethics rarely provides easy or absolute answers to the questions it poses. Instead, ethics is more concerned with providing explicit reasons why, and on what basis, one action is better than another.

Public health and ethics

All public health practitioners make decisions that have ethical implications, knowingly or otherwise. If we allocate more funding to services for disadvantaged communities, design a program to achieve the greatest population reach, or shut down a take-away shop because of a high incidence of food poisoning, we are making choices that have ethical consequences, and we are probably acting because we think it is 'the right thing to do' or 'just common sense.' Each of these actions can be linked to a well established set of moral ideas: respectively, the importance of distributive justice or fairness, a commitment to achieving the greatest good for the greatest number, and the belief that we have a right to limit someone's freedom if he or she is doing harm to others. These ideas are deeply embedded in our social and professional culture but are rarely made explicit.

This issue of the *Bulletin* demonstrates the benefit of an alternative: explicitly focusing on and reasoning about ethical issues in public health. Such a focus requires understanding of ethical concepts and theories, and knowingly making ethical judgments. A strength of ethics is that it contains a diverse and sometimes contradictory set of ideas about what is right. Although this can feel troublesome to those of us trained in scientific traditions, the diversity and

complexity of ethics are its strength. It unsettles our common-sense interpretations, upsets our tendency to pursue an automatic course of action, and forces us to clarify our own reasons for acting and give good reasons to others. Without access to ethical ideas, we may justify our actions by reference to gut feeling, organisational policy, evidence or economic and procedural efficiency. The right thing to do then becomes the thing that feels right, is directed by a higher authority, is proven, costs the least money and/or reaches the most people. These reasons are an impoverished base for decision making, and we suspect that they often do not sit well with many experienced public health practitioners. What we hope to show in this issue is that public health practice can be better conceptualised and justified if we apply a greater knowledge of public health ethics.

What is ethics?

Ethics is a broad and diverse field. It can be divided into meta-ethics, normative ethics and practical ethics.¹ Meta-ethics deals with foundational ethical questions: the meaning of concepts such as virtue, justice, good and right. Normative ethics provides principles, rules, guidelines and frameworks for evaluating the morality of actions. Practical ethics, or applied ethics, concerns ethical questions in particular contexts. From the mid-20th century many sub-branches of practical or applied ethics emerged, such as: research ethics, bioethics and most recently public health ethics. When people think of ethics in a health context, they often think first of research ethics: applications made to Human Research Ethics Committees.² Bioethics, focused on medicine and biotechnology, was born in the 1960s and rapidly expanded concurrent with advances in biotechnology.³ Although philosophers have written about doctor-patient relationships for centuries, clinical ethics is now generally seen as a branch of bioethics. Public health ethics did not get started in earnest until the 21st century.⁴⁻⁶ The last decade has been highly productive, generating specific journals,⁷ many books⁸⁻¹⁶ and technical reports.¹⁷

Public health ethics, research ethics, clinical ethics, politics and the law

Public health ethics is distinct from both research ethics and clinical ethics. Research ethics concerns the protection of research participants and the conduct of researchers: how researchers should, for example, ensure that participants consent to participate in clinical trials, allow participants to withdraw from studies without penalty and minimise potential harms to participants. Clinical ethics concerns the protection of patients and the conduct of individual clinicians: how clinicians should, for example, show respect for patients, offer and provide beneficial treatments and protect confidentiality and privacy. Clinical ethics often intersects with public health ethics – when clinicians, for example, administer vaccinations to individuals, they are

participating in a public health intervention. However, broadly speaking, public health and public health ethics are characterised by their ‘publicness.’ Dawson and Verweij have suggested that the ‘public’ in public health has two meanings that are important for ethical deliberation: first, ‘public’ in that the aim of public health is to protect or promote health at a collective, community or population level; second, ‘public’ in that public health involves collective, generally state, action.¹⁰

This public focus entails distinctive and challenging ethical issues. Public health ethics requires thinking at a collective level, not just an individual level, and this inevitably requires trade-offs, including between the wellbeing of communities and the wellbeing of individuals. In clinical encounters, health professionals are ethically obliged to advocate in the best interests of an individual patient. In research, the researcher is required at all times to consider the interests of individual participants, regardless of the consequences for the study. In public health, in contrast, we are almost always forced to weigh up benefits and harms across problems and populations, creating winners and losers, commitments and missed opportunities. In general, in dealing with individuals, we value respect for the autonomy of others, that is, recognition of the moral importance of allowing other individuals to govern their own lives, to be and to do in accordance with their own goals. However, much more than in clinical medicine or research, public health necessarily involves encouraging people to do things for their own good, or to reduce their risk of future harm: that is, public health involves being paternalistic. The proper limits of this paternalism are a commonly discussed problem in public health ethics.^{5,18,19}

This highlights that, because public health measures are often undertaken by the state, both decision making in public health and ethical reasoning about public health are inevitably political. Political philosophy, closely related to moral philosophy, is an important intellectual resource for public health ethics. Public health, like other areas of state activity, is subject to the budgetary processes of governments, and the community to which public health responds is partly shaped by political forces. Ethical reasoning about public health thus must occur in a political context. However ethics does not accept these political processes uncritically: sometimes politically acceptable actions are immoral, and sometimes politics is used as a trump to avoid ethical debate.

One final distinction we need to make is that between public health ethics and public health law. Public health practitioners are accustomed to working within the framework of public health law; indeed acting in accordance with the law may sometimes be conflated with the idea of acting ethically.^{1,14} The law and ethics, however, are distinct. The law is final, compulsory, precise and specific.

Ethics, in contrast, is open to disagreement, flexible and dynamic. However – perhaps counter-intuitively – ethics is the higher authority. We can make a judgment that a law, including a public health law, is immoral. Laws that are immoral may sometimes be considered illegitimate by the population that they govern. Consider, for example, the state of emergency laws frequently introduced by dictators to justify torture and severe limitations on citizens' freedoms. These are technically legal in that state at that time, but are also immoral. Thus, although public health practice is framed by a complex web of legislation and regulation, public health law will rarely help us in determining whether public health actions are ethical. Public health actions that are morally justified are more likely to be perceived as legitimate, whether or not they are supported by laws.

Issues in public health ethics

While public health ethics covers an enormous range of issues, some central concerns underpin debates about the ethics of public health interventions or policies. They include:

- the way problems are prioritised or de-prioritised in public health practice
- weighing up the benefits, harms and costs of intervening
- ensuring that public health interventions produce fair outcomes
- undermining or promoting the rights of citizens
- being transparent and inclusive in public health interventions.^{3,17,20–26}

Setting priorities and measuring benefits, harms and costs

Because public health always involves prioritisation and compromise, many public health ethicists have sought to determine what problems public health should address, and how public health practitioners should evaluate the benefits and harms of such interventions. Some writers have suggested that it is more ethical to focus on fundamental causes of ill health such as environmental or market structures, rather than on more proximal causes such as individual behaviours.^{3,21} One possible method to choose actions to address these problems is to evaluate the net benefits and harms of each possible action. This task is the primary concern of utilitarians. Utilitarianism is a form of consequentialism – it evaluates the morality of actions according to their consequences. Utilitarianism defines the right action as the action that achieves the greatest good for the greatest number of people, where good can be defined variously as pleasure, happiness, preference satisfaction or more generically, benefit.^{3,17,19,20,22,23,25} Much of public health is implicitly built on utilitarian ideas, so public health evaluations often seek to determine the average net benefit of an intervention. For utilitarians, some harms might occur to some people, but this can be justified if an average benefit can be demonstrated.

Focusing on fairness

An alternative to utilitarianism is a range of distributive justice approaches. These resonate with a commonly expressed concern in public health for achieving equity. Distributive justice theorists suggest that interventions are more ethical if they are more fair. In contrast with utilitarianism, distributive justice approaches are less interested in the average net benefit and burden of a problem or intervention: instead what matters is who benefits and who is burdened, particularly whether vulnerable groups are made worse off and health inequalities increased.^{3,4,15,17,19–21,23,25,27} For these theorists, the collective is generally considered more important than the individual. Thus interventions that generate collective benefit and could not be achieved by individuals alone – for example, the development of a community garden, the regulation of a dangerous industry or the provision of common transport infrastructure – are considered more valuable than individualistic interventions such as one-on-one healthy lifestyle counselling.^{3,19,20,23,25}

Considering rights

The human rights approach can also be useful in thinking about public health problems.^{5,23} Two kinds of rights are generally recognised: negative rights (to non-interference), and positive rights (to receive or possess certain goods). Positive rights include a right to health or even to health improvement, and a right to privacy and confidentiality.^{5,21,23,28} These positive rights were proposed later in the development of human rights. The older – and some still claim the only – human rights are negative rights, that is, rights to non-interference. The English philosopher, John Stuart Mill, famously argued that an individual's freedoms should be infringed only to prevent harm to others. This principle is frequently invoked in arguments about individual liberty and the proper role of the state.^{5,19,22,28} With this Millian Harm Principle in mind, interventions intended to prevent people from harming others become more ethically justifiable, while those intended to prevent them from harming themselves become less ethically justifiable.^{3,21} Consider legislation making it illegal to sell contaminated food, versus legislation making it illegal to consume contaminated food. We support the first and not the second in part because the first conforms to the Harm Principle.

Justifying public health processes

A final set of approaches – procedural justice approaches – focuses on the ethical importance of due process. In this approach, a more ethical intervention is one which is collaborative, transparent and accountable, accommodates diversity wherever possible, seeks a mandate for intervention and builds and maintains trust between the public health sector and the public it serves.^{20–22,25,26}

Thinking across ethical approaches

All of the approaches discussed above have strengths and weaknesses; they also reflect a commitment to different views of what society and a good human life should be. Utilitarianism is familiar to public health practitioners and is apparently simple: it requires only that we produce evidence of net benefit to justify an intervention. However the calculus at its heart is deceptively difficult. Who gets to decide what counts as a harm or a benefit? How can qualitatively different benefits and harms be defined, measured and compared, particularly where outcomes are uncertain and when harms and benefits may respectively accrue to different parties? Although it is possible to create measures that appear to allow such comparisons, they are often reductionist to the point of being meaningless.

The idea of distributive justice is equally familiar in public health, but often conflicts directly with utilitarianism. Achieving fairness is rarely consistent with achieving the greatest net average benefit, as it usually requires equals to be treated equally and unequals unequally, meaning that a larger share of resources may be allocated to a smaller number of disadvantaged people. Distributive justice also entails a collectivism (a privileging of the collective over the individual) that can be at odds with human rights and respect for individual autonomy.

There are difficulties in applying rights-based approaches also. If we decide that some people are being denied certain positive rights (e.g. a right to health improvement), to what extent can we justify interfering in their lives to ensure that they have that right respected, thus potentially intruding on their negative rights? How, for that matter, can we determine whether a person's right to health improvement exists, or is being respected? One way of attempting to solve this problem is to contrast opportunity and achievement. That is, it might be ethically preferable to ensure that everyone has an equal opportunity to be healthy, rather than requiring that everyone be equally healthy.

Procedural justice approaches are ethically important: in fact, some authors have argued that in a pluralist society we will never attain agreement on what should be done, so ensuring a fair process is the most ethical solution to public problems.¹⁶ While these arguments are persuasive, there is still a need for careful deliberation about the substance of public health, if only so that we can be sure that the fair process has considered and included all of the relevant issues.

Because each of these approaches has weaknesses as well as strengths, being able to think across them allows for a more balanced and reasoned approach to the ethical issues raised by public health. If a society is more procedurally just and does not routinely infringe people's negative rights, community trust may increase and the need for

coercion to achieve public health goals may decrease.^{5,20} Rather than consider only easily measurable outcomes, such as mortality rates or hospital admissions, utilitarian evaluations could include measures of justice or fairness.¹⁶ These are just two ways in which considering and incorporating lessons from public health ethics may help to ensure the legitimacy of public health.

A moment in the history of public health ethics

The articles in this collection illustrate the benefits of working across ethical approaches when considering public health problems. There are three articles and one case study in this issue. Ross Upshur uses the outbreak of severe acute respiratory syndrome (SARS) in Toronto to discuss ethical concerns around the use of evidence in public health decision making. What counts as evidence; that evidence is only one form of considered information; and that the values and mission of public health can be sufficient for action without evidence are discussed. He argues that the precautionary principle will sometimes need to be invoked in health protection contexts, such as communicable disease outbreaks. However, he questions thresholds for action based on evidence in other areas of practice such as health promotion, chronic disease or environmental health.

David Isaacs provides an ethical framework that includes principles such as trust, reciprocity and risk, among others, through which he examines and evaluates immunisation programs. Procedural justice is invoked when he advocates for no-fault compensation schemes where children suffer rare, serious complications from immunisation, and for the way improved community consultation can strengthen decisions about public health immunisation programs.

Craig Fry's article on ethical issues in obesity intervention picks up this theme, in part, taking a distributive justice lens to examine concerns about targeting individuals versus population level interventions, in particular given current equivocal evidence about the effectiveness of many interventions for reducing obesity. That affected groups are already stigmatised intensifies these concerns.

Stephen Conaty's case study describing forced detention of a man with tuberculosis highlights the ethical and other tensions inherent in these decisions. This case demonstrates how social, economic, geographic and other determinants invariably affect the appropriateness and effectiveness of public health interventions.

These articles illustrate the need for public health professionals to consider a spectrum of ethical approaches when examining their public health practice. A resource list has been developed for those interested in extending their reading in and around public health ethics and is included after this editorial.

This issue of the *Bulletin* comes at a critical juncture in public health ethics — a time when the field is gaining momentum, being defined and connecting with public health practitioners. We have already mentioned some of these developments: there are many others. In the USA in 2003, a model public health ethics curriculum was developed by leading ethics scholars and made freely available online.²⁴ In 2008, the World Health Organization released a special issue of its *Bulletin* on public health ethics.²⁹ The International Association of Bioethics has established an international public health ethics network.³⁰ The London School of Hygiene and Tropical Medicine has recently set up an International Programme for Ethics, Public Health and Human Rights, with associated visiting Fellowships and a seminar series.³¹ The US Centers for Disease Control and Prevention (CDC) has established a CDC Public Health Ethics Committee.³² Calls for a raised profile for public health ethics have been made in the local public health literature.³³ Public discussions relevant to health frequently invoke ethical concepts: for example, the *Northern Territory National Emergency Response Act 2007* (commonly known as the Northern Territory Intervention) has been critiqued for its potential to undermine the human rights of Indigenous Australians.^{34,35} Ethics is increasingly included in public health textbooks and curricula.

Conclusion

The articles in this issue illustrate the value for public health professionals of knowing and being able to deploy ethical approaches in deciding about, explaining and justifying their practice. We believe that the time has come for all those involved in public health to routinely and systematically include ethics in their deliberations. We hope that this *Bulletin* will help to achieve that goal.

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Public Health Ethics: some useful resources

Text books

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Web sites

National Health and Medical Research Council, Health Ethics, Australia. <http://www.nhmrc.gov.au/health-ethics>

Nuffield Council on Bioethics. <http://www.nuffieldbioethics.org/public-health>

Public Health Ethics [Specialist journal]. <http://phe.oxfordjournals.org/>

Further resources on specific public health ethics issues

Public health ethics and human rights

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Evidence and ethics in public health: the experience of SARS in Canada

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Abstract: Making decisions on the basis of evidence is a central tenet of all health-care disciplines, including public health. However, it is not entirely clear what it means to base decisions on evidence; debates on evidence-based approaches often lack a clear understanding of the nature of evidence and obscure the normative underpinnings of evidence. Public health decision making requires an acceptance of limitations such as the availability of funding for research to provide complete evidence for any given decision, the ethical constraints on the creation of certain types of evidence and the ongoing dilemma between the need to take action and the need to gather more information. Using the example of the SARS outbreak in Canada, the inter-relationships between evidence and ethics are explored. I outline a set of critical questions for the global public health community to discuss regarding the nature of the relationship between evidence-based public health practice and ethics.

*It is not the fault of Hill or Doll or Hammond that they cannot produce evidence in which a thousand children of teen age have been laid under a ban that they shall never smoke, and a thousand more chosen at random from the same age group have been under compulsion to smoke at least thirty cigarettes a day. If that type of experiment could be done, there would be no difficulty.*¹
RA Fisher, 1958

We live in an era where all decisions must be evidence based. This is as much the case for public health as it is for clinical care. However, much depends on how evidence is defined and what counts as a legitimate claim to being evidential. Sorting these issues out is not a straight forward

matter. In this paper, I raise some critical issues regarding the use of evidence in public health in the process of making choices and reaching conclusions, and the ethical constraints involved in this decision making. I use as an example the public health response to the SARS outbreak in Canada.

Historical introduction

Debates about evidence have existed in public health for a long time before the current era of evidence-based approaches to health services and care delivery. Indeed the quotation from Sir Ronald Fisher is directed against the early cohort studies by Bradford Hill and Doll in the 1950s showing an association between smoking and bronchogenic carcinoma in physicians. In his paper, *Cigarettes, Cancer and Statistics*, Fisher wrote:

*Before one interferes with the peace of mind and habits of others, it seems to me that the scientific evidence – the exact weight of the evidence free from emotion – should be rather carefully examined.*¹

In Fisher's theory of knowledge, there are three necessary requirements to be met before any claim can be made that an observation is evidential:

1. There must be randomisation
2. There must be replication
3. There must be an appropriate control group.

The type of observational study Bradford Hill and Doll conducted failed one of the tests and therefore failed to meet Fisher's standard required of scientific evidence. Most public health practitioners are aware of Bradford Hill's response, which was distilled into a set of considerations required for drawing causal inferences.² The issue remains unresolved, though few among us would take Fisher seriously and propose a randomised controlled trial of smoking in adolescents.

Properties of evidence

We may think that we have gotten past this impasse in the 21st century. A quick review of the literature will persuade us that evidence-based approaches are ascendant and admit to no opposition. However, it is not entirely clear what it means to be evidence based, in a context where the key term, evidence, is seldom defined. I have argued elsewhere that evidence, in the form of published studies in the peer reviewed literature (or, by extension, a report from a public health organisation), has certain intrinsic properties, among them being its provisional and defeasible nature,

meaning, that all evidence is capable of being overturned or modified in light of new findings.³ Thus evidence can be understood, particularly in public health decision making, from a more pragmatic perspective. Evidence is only one form of considered information that forms the knowledge base required for decision making. Indeed, evidence, as currently understood, does not exhaust the range of knowledge relevant to decision making. Given this definition of evidence, basing decisions on evidence is to rest such decisions on a shifting foundation.⁴

Computational constraints make it almost certain that we will more often than not be in possession of imperfect and limited evidence for any given decision. This means that a degree of uncertainty will pervade almost all decisions. As well, because of historical traditions, certain health disciplines have not been committed to the production of certain types of evidence. Funding priorities make some public health interventions less likely to have an accumulated body of evidence of a particular type (think here of restaurant inspection and randomised control trials). There are thus features of evidence that are seldom acknowledged or systematically addressed. Simply put, if evidence is to be available to inform decisions across the varied contexts of health care delivery, then efforts must be made to assure that research questions and research resources are devoted to them all. Finally, as the Fisher quotation illustrates, there are ethical constraints on the creation of certain types of evidence.

Evidence and ethics

In public health, there is an inherent tension between the credibility and security of evidence relative to any public health action or program that may be contemplated, and the need to take concerted action to promote health and prevent illness. Where large swathes of uncertainty exist, such uncertainty in a public health context cannot easily be resolved by soliciting preferences for care as is the case in clinical medicine. This difficulty is most starkly experienced in matters regarding health protection. An example is the severe acute respiratory syndrome (SARS) outbreak in 2003.⁵

A newly discovered pathogen spread quickly around the world, playing particular havoc in the province of Ontario, Canada. We now know that SARS was caused by a coronavirus and that it exerted most of its effect on highly exposed patients in hospital settings. The community impact was modest. Yet in the early months of 2003, the exact nature of the virus was unknown. The possibility that the virus could spread in the community with potentially high morbidity and mortality was real and significant harm to the community could not be ruled out. Lacking any other form of effective intervention, public health authorities in Ontario imposed strict infection control measures including the use of quarantine for those potentially exposed to

the virus. This decision was not based on anything resembling what counts for evidence in current evidence-based frameworks. The decision was a justifiable use of public health powers to contain the threat of a potentially serious epidemic. As subsequent analysis has shown, quarantine was indeed effective in helping to blunt the spread of the virus.⁶ Does this, though, establish an evidence base for quarantine?

The SARS experience exposed serious deficiencies in the capacity of modern health-care systems to respond to novel pathogens. In the aftermath of the SARS epidemic in Canada, several commissions of enquiry were held to learn lessons and propose reforms to the way in which public health is structured and funded in Canada. One of the most influential enquiries was chaired by Justice Archie Campbell and made a series of recommendations, including the following:

That the precautionary principle, which states that action to reduce risk need not await scientific certainty, be expressly adopted as a guiding principle throughout Ontario's health, public health and worker safety systems by way of policy statement, by explicit reference in all relevant operational standards and directions, and by way of inclusion, through preamble, statement of principle, or otherwise, in the Occupational Health and Safety Act, the Health Protection and Promotion Act, and all relevant health statutes and regulations.

That in any future infectious disease crisis, the precautionary principle guide the development, implementation and monitoring of procedures, guidelines, processes and systems for the early detection and treatment of possible cases.⁷

Justice Campbell considered that this was the most important message to be derived from the SARS epidemic in Canada. He noted that failure to heed this principle was at the core of a previous public health failing regarding the protection of the blood supply. Subsequently, the precautionary principle was introduced into the regulations of Ontario public health law.

Law and ethics are by no means one and the same thing and ethics do not reduce to the law. It is also the case that the precautionary principle admits to several, somewhat contrasting formulations. However, an important lesson was drawn by the Campbell Commission in the case of the Ontario SARS outbreak. Public health practitioners and agencies tasked with the mission of protecting and promoting health will always be mediating between the need to take action and the need to gather more information. Action which is evidence based, while desirable, may not be achievable in all circumstances. In such cases, having a clear normative mandate is required. Campbell recognised that this particular normative mandate is held only by public health in modern democracies.

Several scholars articulating ethical frameworks for public health action have stressed the importance of having information on the effectiveness of the proposed intervention as a necessary condition before acting.^{8,9} Such a requirement may be overly constraining, particularly in cases of rapidly evolving threats to community health. Others have argued that when public health officials take action in a precautionary manner to secure public health goods that in some way curtails established civil liberties there is a reciprocal obligation on the part of the public health authorities to support those affected, and if necessary provide compensation.¹⁰ This condition of reciprocity recognises that there may be circumstances when public health authorities will act when such action was not required.

Several questions for sustained discussion in global public health emerge from the above experience. Is precaution appropriate to all public health interventions or only to communicable diseases outbreaks or disasters? The emerging patterns of obesity in the developed world prompt the question of whether some intervention based on precaution is required. Do thresholds for action based on evidence vary between communicable diseases, chronic diseases, health promotion and environmental health? How does a commitment to practising evidence-based public health align with calls for public health to address social justice and issues of health inequity? If, as some argue, the moral basis of public health is rooted in social justice, then it would follow that a very different vision of evidence would need to be articulated, one less focused on systematic reviews and randomised controlled trials.¹¹ Michael Marmot has recently written on how standards of evidence may need to be redefined and expanded if action on the determinants of health is not to be plagued by inaction.¹²

Austin Bradford Hill acknowledged the moral epistemology of public health. In the concluding section of his famous paper on causation he noted the following:

*On fair evidence we might take action on what appears to be an occupational hazard, e.g. we might change from a probably carcinogenic oil to a non-carcinogenic oil in a limited environment and without too much injustice if we are wrong. But we should need very strong evidence before we made people burn a fuel in their homes that they do not like or stop smoking the cigarettes and eating the fats and sugar that they do like. In asking for very strong evidence I would, however, repeat emphatically that this does not imply crossing every 't', and swords with every critic, before we act.*²

As we move forward to embrace more evidence-based approaches, we would be wise to have a sustained discussion on precisely what constitutes fair and strong evidence, and when claims to evidence are in alignment with or in

opposition to the values and mission of public health. Such a discussion is likely a constitutive element of public health practice.

Conclusion

Evidence in health care is provisional and capable of being overturned, modified, refuted or superseded by better evidence. It is finite in its application and utility. There is a very important sense in which evidence exists to become obsolete. In some ways the vision, mission and values of public health, when clearly articulated, provide a sufficient guide to action, even in the absence of evidence. This simply means that both will be contested and the need for reasoned public discussion on the nature of both evidence and the goals and values of public health will not soon be discarded.

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An ethical framework for public health immunisation programs

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Abstract: This paper presents seven ethical principles associated with the implementation of immunisation programs. For a public health immunisation program to be ethically justifiable, its principles and operation should be based on sound ethical values: the program should benefit the individual and the community; targeted diseases should be sufficiently severe and frequent to justify the risks and expense of the program, and vulnerable groups within the population should be targeted. The principles also deal with the obligation to monitor for adverse events and for disease incidence to ensure safety and effectiveness. When immunisations are voluntary, vaccine recipients or their parents or carers should be given sufficient information to make autonomous, informed decisions and incentives to participate in public health immunisation programs should not be coercive. Public health immunisation programs depend on mutual trust, which may be threatened by circumstances such as excessive media publicity about adverse events associated with vaccines.

Immunisation is one of the most successful of all public health interventions, responsible for the eradication of smallpox, the near eradication of poliomyelitis and huge reductions in the incidence of many other lethal infectious diseases including diphtheria, measles, *Haemophilus influenzae* type b (Hib), meningococcal, pneumococcal and rotavirus infections, saving many millions of lives annually.^{1,2} Funded immunisation programs reduce inequity, because the socio-economically disadvantaged are at greater risk from many infections.² If immunisation levels fall, diseases may return, exemplified by the major

diphtheria outbreak in Russia in the 1990s with over 140 000 cases and over 4000 deaths.³ Immunisation also prevents some infection-related cancers, notably liver cancer through hepatitis B virus vaccine⁴ and cervical cancer through human papillomavirus (HPV) vaccine.⁵

Immunisation programs cause ethical challenges, because they often involve mass immunisation of individuals to benefit not only the individual, but also the population, and because the individuals are often children who are too young to make their own choices. The risks and benefits for an individual vary depending on factors such as age, disease incidence and immunisation levels, raising concerns of autonomy, liberty and justice that may conflict. For example, parents may want to exercise their autonomy not to immunise their school-aged child, but other parents may argue that this decision puts their child at unjustifiable risk. On the whole, however, the majority of the world population supports immunisation programs.

New vaccines bring new ethical challenges. The high cost of vaccine development is often reflected in high prices, making it difficult to demonstrate cost effectiveness. The new zoster vaccine, which has been assessed as cost effective by the Australian Pharmaceutical Benefits Advisory Committee, will benefit elderly people, but at a very high fiscal cost, borne by the community. Vaccines which target sexually transmitted diseases, for example, HPV vaccine, raise unique ethical challenges. The diseases might be prevented by alterations in behaviour (condoms, fidelity or abstinence) but the HPV vaccine is usually administered before sexual debut, at an age when the child may or may not be competent to give individual consent. In the USA, the introduction of HPV vaccine was associated with a moral backlash from conservatives who argued, obscurely, that it would increase promiscuity. The success of immunisation programs depends on public trust, which can be damaged if surveillance mechanisms are not in place to monitor vaccine-adverse events and to deal with safety concerns promptly.

For a public health immunisation program to be ethically justifiable, its principles and operation should be based on sound ethical values. Verweij and Dawson outlined seven ethical principles for collective immunisation programs.⁶ This paper develops this concept further, to outline the ethical basis for seven over-arching principles in the light of the emergence of new and future vaccines.

Ethical principles for public health immunisation programs

Seven ethical principles that can be applied to considering an immunisation program are:

1. *Benefits.* The program should benefit the individual and the community significantly. The burden of disease should be sufficient, in terms of severity and frequency, to justify the risks and expense of the program.
2. *Risks.* Program providers should monitor assiduously for adverse events to ensure the program is as safe as possible.
3. *Effectiveness.* Program providers should monitor that the program is effective and should halt or alter the program if it is or it becomes ineffective.
4. *Equity and justice.* The program should be cost effective in comparison with competing health-care interventions. Vulnerable, disadvantaged groups within the population should be targeted for special vaccines if possible.
5. *Autonomy.* Vaccine recipients and the parents or carers of children or adults not competent to make their own decision should be given sufficient information to make autonomous, informed decisions about the risks and benefits of immunisations. Any incentives to participate and any disincentives for failure to participate in public health immunisation programs should not be so excessive that they are effectively coercive.
6. *Reciprocity.* People who suffer rare, serious complications of public health immunisation programs should receive adequate medical care and there is a strong ethical argument that governments should have no-fault compensation schemes.
7. *Trust.* Public health immunisation programs depend on mutual trust, which may be threatened by circumstances. Measures to improve public consultation regarding decisions about public health immunisation programs will improve their ethical status.

Benefits

It is generally accepted that an immunisation program should benefit the individual and the community. Many but not all immunisation programs confer herd immunity, meaning that immunisation of a proportion of the population against an infectious disease protects other members of the population, both unimmunised and immunised, by reducing disease transmission. This herd immunity is unique to immunisation programs, although it could be argued that smoking prevention programs and programs to reduce drink driving also protect others and confer a form of herd immunity.

Some immunisations benefit the individual but provide no herd immunity because infection is not passed from person to person, e.g. tetanus and rabies. Therefore, how is it ethically justifiable to include tetanus immunisation in a community program? The American Academy of Pediatrics has argued that immunisation against infection not

only benefits the individual, but can also benefit the public by preventing the societal costs of medical care.⁷

Because public immunisation programs involve large populations, they carry inherent risks and burdens, and so should target diseases that cause high morbidity and mortality (e.g. diphtheria, tetanus, poliomyelitis, measles) or that are so contagious that, although usually mild, the absolute numbers of severe cases is significant (e.g. chickenpox).

The benefits achieved by immunisation should be better than those obtained by alternative options, either personal or community based. For example, smokers are at increased risk of pneumococcal pneumonia. A decision to fund pneumococcal vaccine for smokers might be considered a poor public health response if a program to reduce smoking was likely to be more cost effective.

Risks

Most vaccines are given to a large population of mainly healthy individuals, so large numbers of individuals may be affected by rare adverse events. As such, there is an obligation for health authorities to ensure surveillance of adverse events and a timely response to any emerging adverse events, particularly with new vaccines. Licensure studies may involve thousands of individuals but still not have the power to detect very rare but very serious adverse events, such as intussusception following rotavirus vaccine in young children, emphasising the importance of post-licensure surveillance for adverse events. The relative contribution that industry and government should make to funding surveillance is debatable and possibly negotiable, but there is an ethical onus on health authorities to ensure the safety of vaccines and indeed of the whole program, including the way vaccines are administered.

At a population level, the benefits of immunisation should outweigh the risks. As immunisation levels rise, however, the disease becomes rare and the risk to any individual child at any given point in time from the vaccine may be greater than the risk of contracting the disease. For example, measles vaccine carries a one in a million risk of causing encephalitis, compared with a risk of about one in a thousand from wild-type measles.¹ If there is no circulating measles, the risk from the vaccine may exceed the risk that the child will contract measles and develop a complication. However, the individual's risk can change, e.g. if a measles outbreak occurs or if the child travels to an endemic country.

If all parents decided not to immunise their children, epidemics would recur. If just one or two elect not to immunise, they can be seen as 'free riders' on the rest of the population, although an elective decision to free ride is a less common reason for failure to immunise than family chaos or a genuine belief that vaccines are ineffective.⁸

Most parents elect to immunise their children to the benefit of the whole community.

Effectiveness

Newer vaccines are often licensed on the basis of immunogenicity data, as opposed to trial-based efficacy data or community-based effectiveness data. Vaccine effectiveness in public health programs may be greater than expected, as happened with the *Haemophilus influenzae* type b vaccine program, because of unanticipated herd immunity, or may be compromised by phenomena such as the emergence of serotype replacement, as followed the introduction of pneumococcal conjugate vaccines.⁹

As continuing an ineffective immunisation program would be unethical, ongoing disease surveillance is essential, and ineffective programs should be changed or halted. This requirement places an obligation on health authorities to maintain surveillance, although it may be within the purview of the health authority to make vaccine funding, in whole or part, contingent on the vaccine company's funding the surveillance. In Australia, vaccine companies are allowed to increase the price of a vaccine if they can show their funded vaccine is more cost effective than anticipated.

Equity and justice

The cost of a public health immunisation program is an opportunity cost. The money might be better spent on another public health program such as reducing smoking or screening for bowel cancer. The principle of just distribution of limited resources places a reasonable ethical obligation on public health authorities to ensure that any community immunisation program is likely to be as cost effective as other competing health interventions. Since 2006, Australia has considered vaccines offered through the Pharmaceutical Benefits Scheme largely, but not exclusively, on cost-effectiveness criteria.¹⁰ The Pharmaceutical Benefits Advisory Committee considers the estimated cost per quality-adjusted life year (QALY) of drugs and vaccines. For national immunisation programs, the Pharmaceutical Benefits Advisory Committee takes advice from the Government's expert immunisation advisory committee, the Australian Technical Advisory Group on Immunisation (ATAGI) on issues such as vaccine efficacy, predicted herd immunity and program feasibility. The Pharmaceutical Benefits Advisory Committee process keeps vaccine prices down, helping to fulfil the Government's obligation to spend health resources wisely.

The principle of equity makes it desirable to target vulnerable, disadvantaged sectors of the population with a higher disease incidence with selective immunisation programs. For example, the decision to routinely provide hepatitis A immunisation to Aboriginal and Torres Strait Islander children was made before the Pharmaceutical Benefits

Advisory Committee involvement in vaccines, on the basis of the greater disease burden in this group than in non-Aboriginal and Torres Strait Islander children and on equity grounds. Nowadays the same decision would still be possible, but it would need to be shown that hepatitis A vaccine was cost effective for Aboriginal and Torres Strait Islander children but not for non-Aboriginal and Torres Strait Islander children. In 2006, the Pharmaceutical Benefits Advisory Committee did recommend rotavirus vaccine for all Australian children, even though Aboriginal and Torres Strait Islander children had a far higher burden of serious disease, because rotavirus vaccine was deemed cost effective for all children.

Autonomy

Respect for autonomy is one of the most important ethical principles. It is accepted in most Western countries that individuals can make autonomous decisions about their health care and about their children's health care which reflect their needs, wishes and values.⁸ Compulsory immunisation infringes that autonomy, and there is a strong argument that immunisation should be voluntary as long as voluntary immunisation levels remain acceptably high.¹¹ Currently in Australia, because immunisation levels are high without compulsion, a voluntary immunisation policy is safe and effective. Australia legally compels the wearing of seat belts but not immunisation even though seat belts occasionally damage their wearers, particularly children.¹² It could be argued, on the communitarian grounds that individual immunisation often protects others, that there is a stronger case for compelling immunisation than for compulsory wearing of seat-belts. However, the invasive nature of immunisation, in terms of the physical act of introducing foreign substances into the body and the potential severity and frequency of adverse events compared with the rarity of adverse events from seat-belts, arguably justify the Australian approach. In contrast, compulsory immunisation laws in different states in the USA have been upheld on several occasions by the courts as a reasonable exercise of the power of the state, even in the absence of an epidemic.⁷

Would compulsory community immunisation ever be ethically justified? Special circumstances, such as the emergence of a devastating, new vaccine-preventable disease, might justify introducing a special compulsory immunisation program if the disease were sufficiently severe and the vaccine safe and effective. In this situation, however, it is likely that voluntary immunisation would increase and might make compulsion unnecessary. It is also possible that immunisation levels might fall, e.g. because of a failure of trust, and that the altered risk-benefit ratio might alter the ethical justification for compulsion.

In Australia, where immunisation is voluntary, high levels of population coverage have been achieved and maintained

primarily by delivering free vaccines through the National Immunisation Program and through financial incentives to providers and to parents. The ethical validity of financial incentives would be compromised if the inducements constituted a major part of child welfare payments, and refusing immunisation would disadvantage financially challenged families. Currently, families which register as conscientious objectors still receive benefits.

Similarly, draconian and punitive disincentives for parents who do not immunise their children are coercive and infringe parental autonomy. In some states of the USA, children are not allowed to start school without being immunised. In Australia, unimmunised children can attend school but are excluded during disease outbreaks. This approach is more ethically justifiable because it protects all children: the unimmunised child from catching infection and other children from catching infection from the unimmunised child.

There are circumstances where the ethical justification for a targeted compulsory immunisation program is stronger than for a whole-of-population program. It has been argued that immunisation of health-care workers is justified if there is a high risk of their transmitting an infection to their vulnerable patients, e.g. influenza, although this infringement of the health-care worker's autonomy is only justified if immunisation cannot be achieved voluntarily.^{13,14}

Is it ever ethically justifiable to over-ride parental autonomy with regard to an individual child's immunisations? If the risk from disease is high and imminent, e.g. the refusal of rabies vaccine by the parents of a child bitten by a rabid animal constitutes a child protection issue: the best interests of the child over-ride parental autonomy, and compulsion is justified.¹¹ A more controversial situation involves the parents of babies born to mothers with chronic hepatitis B infection who refuse vaccine and/or immunoglobulin for their newborn babies.^{15,16} The baby's risk of contracting chronic hepatitis B infection varies depending on whether or not the mother is hepatitis B *e* antigen positive or negative and whether the parents refuse vaccine or immunoglobulin or both (in one case, Jehovah's Witness parents refused immunoglobulin as a blood product).^{16,17} Sound ethics requires sound facts: it is important to know the estimated risk to the baby of contracting hepatitis B in different situations, as a basis for considering the best interests of the child during possible child-care proceedings.¹⁷

Reciprocity

Parents who immunise their children as part of a public health program are protecting not only their own child but also the entire community. When the disease incidence is low and immunisation levels are high, the risk to a child of having a serious vaccine-related adverse event may be higher than the risk of developing a complication of the disease. Parents who continue to immunise their children

under these circumstances are exhibiting communitarian altruism which strengthens community values.

Currently in Australia, if a child suffers an extremely rare but serious complication of immunisation, such as measles vaccine encephalitis, the family only receive normal health care. While recognising that public medicine covers some of the costs of care incurred from rare vaccine-associated injury, for many injuries there are emotional costs and considerable unfunded financial costs. There is a strong ethical argument based on reciprocity and justice that Australia should follow the lead of the 19 other countries which have implemented no-fault compensation schemes for vaccine injuries.¹⁸ An analogy can be drawn with people who contracted an infection by receiving blood or blood products contaminated with human immunodeficiency virus (HIV) before the blood supply was secured,¹⁹ although a stronger analogy would be if an unpaid volunteer contracted HIV or hepatitis C from donating blood, since both voluntary blood donors and vaccine recipients are exhibiting altruism.

A society that depends on communitarian values to protect its population against infectious diseases has a moral obligation to compensate people who suffer unintended harms as a result of altruistically immunising themselves or their children commensurate with those communitarian values.

Trust

The availability of different vaccines for the same disease may raise ethical problems which challenge conventional cost-effectiveness considerations of the value of vaccines and introduce other values such as public trust. Live attenuated oral polio vaccines (OPV) are cheaper than killed injected inactivated polio vaccines (IPV). Both are highly effective in eradicating polio in national immunisation programs. OPV is preferred in developing countries, largely because of cost. However, one in every 2.4 million doses of OPV causes vaccine-associated paralytic poliomyelitis, indistinguishable clinically from wild-type polio,²⁰ whereas IPV never causes vaccine-associated paralytic poliomyelitis. Australia's decision to change to IPV antedated the Pharmaceutical Benefits Advisory Committee involvement in vaccine decisions.¹⁰

In the USA, about eight cases of vaccine-associated paralytic poliomyelitis occurred annually from OPV and the change from OPV to IPV was made to avoid such cases occurring and to maintain public trust in the national immunisation program.²⁰ In Australia, it was initially estimated to cost over \$100 million to prevent one case of vaccine-associated paralytic poliomyelitis, an opportunity cost the government could hardly ignore.²⁰ However, IPV-containing combination vaccines became available (consequently, an extra injection was not needed), the price of IPV in the combination vaccines fell and the price of OPV rose.

At this time, Australia elected to switch from OPV to IPV to prevent any cases of vaccine-associated paralytic poliomyelitis and to maintain public trust in the immunisation program.²¹ The Pharmaceutical Benefits Advisory Committee did not have to compare OPV with IPV, so it is not known whether IPV would have been found to be more or less cost effective than OPV. If it were not, Australia would have been unable to change to IPV under current regulations, which raises the question of whether consideration of public trust should be incorporated into Pharmaceutical Benefits Advisory Committee decision making.

The benefits and harms of public health immunisation are borne by the whole community. There is a strong ethical case for better public consultation about immunisation programs, to include community values into decision-making. Lay members on advisory committees may struggle to represent community views. There is increasing interest in direct community involvement through avenues such as telephone surveys,²² public meetings, citizens' juries and consensus conferences.⁸

Such consultation can yield important and unexpected information. A telephone survey about HPV vaccination found that 83% of the public sampled thought HPV vaccination should be given to boys as well as girls, information that is arguably germane to any decision about funding the vaccine for boys in a public health program.²²

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Ethical issues in obesity interventions for populations

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Abstract: Beyond the usual technical and evidentiary considerations, there are ethical questions that we must consider in the justification of our obesity interventions in the name of expected population health gains. These relate to the types of health identities that are permitted in society, the possible unintended consequences of preferring certain health identities over others, and the manner in which public health policies and interventions are justified. The prevalence of overweight and obesity in Australia highlights some of the areas of uncertainty and identifies some important ethical questions that arise as a result of this uncertainty. I propose that the Australian obesity prevention strategy could be evaluated using the Nuffield Council on Bioethics stewardship model of public health to assess whether any current approaches exceed recommended intervention constraints or limits. My aim is to prompt further debate on this topic.

A recurrent challenge for public health professionals is making research, policy and practice decisions in an environment where there is often tension between what can be done and what should be done in the name of health. In public health, this dilemma is typically defined as a question of how to apply our health-improving technical capabilities in line with best science, evidence and economics (efficiencies, resource rationing, waste prevention).

In essence, what is at issue is how to justify intervening in the lives of some individuals or groups in the pursuit of better health outcomes for the whole population.¹ There are important technical and evidentiary considerations here such as defining the health problem, identifying available tools and resources and deciding what works

best in preventing or alleviating the health impact. However, our health policy and intervention decisions are not wholly determined by science, evidence, technical expertise and knowledge. In many areas of population health, our policy and intervention decisions (and indeed the community attitudes and responses to these decisions) are also informed by a range of value positions about the ‘types’ of healthy citizens we wish to see in our societies.

These ideas about health types or identities fall somewhere along the theoretical continuum of positions described by individualist or collectivist frameworks – the libertarian, liberal, utilitarian and communitarian ‘isms’. How we define health identity and where we are situated on this individualist-collectivist continuum comes down to what we believe about the nature of individual agency and responsibility (e.g. human rationality and the capacity to make ‘good’ choices around the consumptions and behaviours associated with health or otherwise), and the acceptability of different categories of individual actions according to their impacts and costs (individual and societal).

In lay terms, we can think of these health types or identities in two ways. Firstly, there are permissible or *accepted health identities* such as being rational and responsible, disciplined and in control, and aspiring to be healthy or healthier e.g. health seeking behaviour in pursuit of being fitter, thinner, smarter, stronger or faster. In the health sphere it is also acceptable to be vulnerable and in need of professional help. Secondly, there are the disapproved or *contested health identities* or states including being unhealthy, over-consumptive (of alcohol, drugs, food), non-adherent or out of control in the treatment context and engaging in health risks.^{1,2}

These groupings of accepted and contested health identities are readily observable in the specialty public health fields concerned with drugs, alcohol, tobacco, food, gambling, sex, and other dangerous consumption activities with defined health risks.³ The value positions underpinning these health fields are, however, not always made explicit in either the public, academic or government debates on these issues.

The questions of whether, and how, different health identities are defined as accepted or contested are ethically relevant because they become the basis for the ways in which we perceive, understand and respond to what people do and experience in pursuit of good health (or otherwise).

Population health policies and programs are crucial for the promotion of good health and prevention of avoidable health risks and harms across the individual, group and environment level. However, the inherent inequities that exist in the population level distributions and determinants of health, and the heterogeneity of understandings and practices of health require that we examine the values and ethical questions that exist in this area.

Health promotion strategies which emphasise the 'moral management of the self' (i.e. the responsibility to make healthy or accepted choices), can lead to punitive consequences for those who make unhealthy or contested choices.⁴ This paper examines concerns about targeting individuals versus population level interventions, given the lack of compelling evidence about the effectiveness of many interventions for reducing obesity.

The problem of overweight and obesity

The prevalence of overweight (a body mass index (BMI) above 25 kg/m²) and obese (BMI above 30 kg/m²) Australian adults and children has increased significantly over the last 2 to 3 decades.^{5,6} In 2009 the National Preventive Health Taskforce Obesity Working Group highlighted the significant mortality, morbidity and financial impact on the population of high body mass in this country.⁷

Overweight and obesity is now regarded as *one of the greatest public health challenges confronting Australia and many other industrialised countries*,⁷ with the *escalating epidemic of adult obesity estimated at more than 1 billion worldwide*.⁸ A compelling case exists for intervening in overweight and obesity to the extent that doing so will deliver improved individual and public health, informed health choices and reduced societal costs.⁹

However, obesity is a complex public health problem that is controversial and challenging in a number of ways. First, there is debate about the utility of attributing purported causative factors for obesity, and the question of whether it is a disease in itself or a risk factor for other chronic diseases.¹⁰

Second, there is uncertainty about the best intervention approaches, whether these are focused at the population level (e.g. policy and regulation/taxation/financial disincentives; food labelling/nutritional information; advertising restrictions; social marketing/mass media/education and prevention; physical activity infrastructure and urban environment; workforce), or the level of the individual (e.g. commercial dieting; tailored fitness programs; surgery/gastric banding; nutrigenomics/personalised approaches to obesity prevention).¹¹

Despite the existence of a wide range of population and individual-focused interventions, the available evidence regarding effectiveness in preventing obesity is equivocal.¹²

Thomas and colleagues concluded recently that *at present there is only limited evidence to support [individual and population level] interventions that lead to long-term sustained change in health and behaviour regarding obesity*.¹³

The complexity of the problem of overweight and obesity requires multifaceted solutions. In the context of an increasingly rationed health dollar, and uncertain evidence about the long-term impact of obesity interventions, important ethical considerations arise around access to preventive programs and treatments¹⁴ and the justification for intervening in the lives of certain individuals in the population.

Ethical considerations

Overweight and obesity measurement and monitoring are new frontiers of public health surveillance, with significant policy efforts directed at frameworks for monitoring both individuals and population target groups.^{7,15} The policy documents make clear the roles and responsibilities involved:

All Australians share responsibility for individual and population health, and the success of the health system.

It is the role of government to enable and support individuals, families and communities to take responsibility for health ('making healthy choices easier for everyone, everywhere and every day').⁷

In the case of obesity, there is therefore an expectation that governments and individuals should seek to minimise behaviours and choices that reduce good health and increase cost burdens on the health system.

Peckham and Hann have acknowledged that focusing on the responsibilities of overweight and obese individuals might be ethically justified if it did not add to the harm.¹⁶ But they also argue that a focus is needed on the *moral questions surrounding a public health policy that rests on equivocal evidence, sustains the stigma against overweight and obese persons, and has a part to play in the causation of untold human misery*.¹⁶

One such ethical question is the extent to which we consider in public health what the impact is of preferencing certain accepted health types or identities over contested health types. A common view about high profile health problems (e.g. mental illness, drug dependence, obesity) is that the primary affliction of those people experiencing such conditions is a type of disrupted agency in relation to their consumption or other health-related choices which affect their ability to lead the lives they value.

In the case of obesity, Peckham and Hann have observed that *fatness is becoming increasingly stigmatised as 'scientific' health information is incorporated into a*

*pre-existing set of cultural beliefs that fat people are either gluttonous or slothful (or both), and that their lack of self-control and moral fibre is costing millions of pounds each year in medical treatment and lost earnings.*¹⁶

The assumptions we make about the types of lives that afflicted groups value (or should do) guide the professional and policy choices about prevention, early intervention and treatment. In the case where such prevention target groups express a periodical preference for taking health risks (e.g. in the case of obesity – eating junk food or exercising less), these choices can unintentionally lead to further repression because these already vulnerable and marginalised groups are seen to be engaged in disapproved behaviours (or contested health choices) for which they need professional assistance in avoiding.

Another ethical issue then in this intervention area is the question of what obese individuals themselves perceive to be the overweight and obesity problem, and their attitudes about acceptable intervention responses.¹³ A recent qualitative interview study by Thomas and colleagues has provided empirical findings in this area. The Thomas study showed that obese adults support interventions that are non-commercial, non-stigmatising and designed to improve lifestyles (e.g. regulation, physical activity programs and public health initiatives), rather than promoting weight loss (e.g. diets and surgery).¹³

Others have taken the idea of consumer involvement and engagement further in relation to obesity policy, by arguing for its direct application in the evaluation of obesity interventions – *the evaluation of interventions should involve a strong ethical dimension...consideration of the opinions of the people affected, who are subjected to interventions in ways that necessarily go beyond individual consent...interventions might also be assessed by how much they empower people-and especially those persons...who are otherwise often disempowered.*¹⁷

Further still, in a recent ethical evaluation of 60 interventions and policies targeting overweight or obesity, ten Have and colleagues identified a number of potential ethical problems including:⁹

- uncertain or unfavourable intervention effects on physical health
- negative psychosocial consequences (e.g. uncertainty, fears and concerns, stigmatisation, discrimination; enhanced inequalities)
- disregard for the social and cultural value of eating
- privacy concerns
- disregard for the complexity of responsibilities regarding overweight
- interventions infringe upon personal freedom regarding lifestyle choices and raising children, private enterprise, policy choices by schools and other organisations.

The authors concluded that an *ethical framework to support decision makers in balancing potential ethical problems against the need to do something would be helpful.*⁹

The Nuffield Council on Bioethics stewardship model

One potentially useful framework that has been developed is the Nuffield Council on Bioethics stewardship model of public health, which seeks to clarify ethical boundaries for public health interventions. It recommends that public health programs: not attempt to coerce adults to lead healthy lives; minimise introduction of interventions without consent; and minimise interventions that are unduly intrusive and in conflict with personal values.^{18,19} The stewardship model also incorporates an intervention ladder, ranging from ‘no intervention’ to ‘eliminating choice’ altogether, as follows:¹⁹

- *Eliminate choice* – e.g. compulsory isolation of patients with infectious diseases
- *Restrict choice* – e.g. removing unhealthy ingredients from foods, or unhealthy foods from shops or restaurants
- *Guide choice through disincentives* – e.g. through taxes on cigarettes, or by discouraging the use of cars in inner cities through charging schemes or limitations of parking spaces
- *Guide choices through incentives* – e.g. offering tax breaks for the purchase of bicycles that are used as a means of travelling to work
- *Guide choices through changing the default policy* – e.g. in a restaurant, instead of providing chips as a standard side dish (with healthier options available), menus could be changed to provide a more healthy option as standard (with chips as an available option)
- *Enable choice* – e.g. by offering participation in a National Health Service (NHS) stop smoking program, building cycle lanes or providing free fruit in schools.
- *Provide information* – e.g. campaigns to encourage people to walk more or eat five portions of fruit and vegetables per day
- *Do nothing or simply monitor the current situation.*

The stewardship model of public health emphasises the state’s responsibility to address the needs of both individuals and the population, but is careful to articulate what the practical limits of this responsibility might be and how such limits might be identified.¹⁸

In light of the currently uncertain evidence about the long-term impact of overweight and obesity interventions, and identifiable ethical questions in this area, it would be useful to conduct an analysis of the current obesity prevention strategy in this country according to the stewardship model. This analysis would identify where Australia’s obesity interventions sit on the intervention ladder (from ‘no intervention’ to ‘eliminating choice’ altogether) and what their associated impact is on health choices.

The analysis could provide information about whether any of the approaches exceed acceptable intervention constraints or limits, and if they do, what action should be taken and who should be involved in that action.

Conclusions

The available evidence clearly demonstrates that obesity is a significant public health issue in Australia and globally, and as such requires a comprehensive prevention response. The evidence is currently less clear about the long-term impact of both individual and population level interventions on reducing obesity and associated health outcomes, and there are indications that some interventions may have unintended consequences for individuals assessed as overweight and obese.

In seeking to justify our interventions in the lives of individuals in the name of expected population health gains, there are ethical questions that we must consider beyond the usual technical and evidentiary considerations. These ethical issues relate to the types of health identities that are permitted in society, the possible unintended consequences of preferencing certain health identities over others, and the manner in which public health policies and interventions are justified.

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Detention to prevent transmission of tuberculosis: a proportionate public health response?

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Case study

Trevor (not his real name) was a homeless man in his late 40s habituated to heroin and alcohol who presented to a hospital in Sydney with cough and shortness of breath in June 2009. A chest X-ray showed upper lobe changes and computed tomography (CT) scanning revealed a cavity in his left lung apex; his sputum smear was positive for acid fast bacilli (a marker of infectiousness). It was presumed and later proven that he had tuberculosis (drug sensitive) and he was started on standard four-drug therapy. These medications need to be taken for at least 6 months to ensure cure. With regular meals and effective therapy, including daily methadone for opiate dependence, his health improved fairly quickly and he discharged himself 3 weeks after admission (without a plan for further treatment in place).

He was found 2 weeks later and agreed to attend for a further chest X-ray and to have directly observed treatment (standard in tuberculosis) in the community, but he was not regularly available to receive his thrice-weekly tablets. By chance he was brought in by ambulance to the Emergency Department after collapsing in the street. During this admission, he was served with a public health detention order (*NSW Public Health Act 1991*, ss. 21–36) as his behaviour was likely to endanger the health of the public. This duly authorised order required him to remain in the city hospital and be detained using any security measures that were necessary.

Despite the order he left hospital temporarily but returned. A security guard was then placed on his hospital room door. At the expiry of the order (valid for a month), discharge plans, including a housing arrangement with a family member, fell into disarray. He left hospital and was difficult to find. This became an established pattern. Over the ensuing months, he was placed on two further public health orders. The last was extended for 4 months by the Administrative Appeals Tribunal after an application made by the NSW Department of Health. Trevor, the subject of the order, refused representation. These detention orders

were only partially effective. Trevor managed to escape his city hospital detention four times and was returned by police each time when he could be found. By June 2010 at the end of the extension to the detention order granted by the court, treatment was stopped and he was allowed to leave. He had received less than the recommended length of treatment because of frequent interruptions.

Trevor was a reluctant inpatient: restless, suspicious and prickly, and at times verbally aggressive. At other times he was charming, appeared settled and prepared to stay. But staying in hospital was on his own terms, with a fairly casually articulated threat that he could leave whenever he wanted. Getting regular meals and saving money are advantages of a stay in hospital. He was not cognitively impaired and was frequently quick witted. It was difficult to gauge at what level he understood and believed that he had tuberculosis and needed regular therapy for a long time to keep him well and to prevent the infection being transmitted to others. He didn't refuse treatment when he was available to take it and he tolerated the treatment well. He was used to authority and suspicious of it, and thus may have discounted the advice he was given.

General hospitals (as distinct from psychiatric and dementia units that are designed to be locked) are poorly equipped places to detain patients, especially someone who is relatively fit and determined to leave. Wards are generally open places and staff are not trained to deal with involuntary patients. Issues arise of whether a room can be safely locked, whether patients should be allowed out of the locked room for exercise and whether security guards have the right to physically restrain patients. In this case, the burden on staff was high, largely because of constant demands and uncertainty with how to manage a difficult and reluctant patient. A light touch and frequent cigarette breaks accompanied by a security guard seemed to be the formula that worked best. The cost of detention was high including the bed and 24-hour security guard as well as the time of public health professionals, doctors, nurses, lawyers, police and others.

The story has a surprising postscript. Having stopped therapy prematurely in June 2010, Trevor relapsed some months later and presented in a poor state around Christmas 2010. He had been very sick. He described an experience of feeling close to death and then pulling away rather

than letting go. This experience seemed to shift his priority to getting better and finishing treatment. He responded positively to support and completed treatment as a voluntary inpatient in July 2011.

Discussion

The public health arguments to detain Trevor are: he is either infectious now or his risk of relapse and of becoming infectious are high; he is homeless and cannot be prevented from having regular contact with other people including homeless people (as he could be if he was cared for at home); homeless people who have drug or alcohol problems are at higher risk of acquiring the infection and developing active tuberculosis; attempts at treatment in the community and as a voluntary inpatient have failed. He also risked spreading infection into his own community – a community with high contact rates because of large extended family groups. The conclusion reached in this situation was that the only sure way of treating Trevor and preventing transmission of tuberculosis to others was to confine him in hospital until treatment was completed.

The ethical tension is between denial of liberty of an individual and the public health benefits of preventing tuberculosis infection in others. Under section 23 (1) of the Act, the test that must be met is that an individual by his or her behaviour is 'endangering or likely to endanger the health of the public'. These legal provisions appear in the legislation in all states and territories¹ although they are seldom used. When tuberculosis re-emerged in New York in the early 1990s similar provisions were used systematically² although not without criticism.³ If the risks to the health of others are small, then detaining someone against his or her will is unlikely to be justified. The facts of each

situation are important. However, in this case the risks to a large number of homeless injecting drug users and possibly family and community members seemed real. Clusters of tuberculosis in homeless people and injecting drug users are well described⁴ and in some contexts this has prompted special efforts to find early active cases in these groups.⁵

Despite sound arguments, it should be noted that the benefits of detention were probably overestimated because, on this occasion, we were unable to do it well, it did not result in cure and there was a further period of infectiousness after Trevor had been detained on several orders, discharged and then relapsed. In addition, there are considerable costs associated with detention.

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Tuberculosis

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Tuberculosis infection occurs in all countries of the world, and is caused by organisms of the *Mycobacterium tuberculosis* complex.¹ In recent decades the development of multidrug-resistant tuberculosis and the presence of human immunodeficiency virus (HIV) have combined to increase the global threat to public health posed by tuberculosis. In 2010 there were 8.8 million new cases of tuberculosis worldwide, with more than 50% from South East Asia and the Western Pacific Region.² In 2009, the estimated global incidence of tuberculosis was 128 cases per 100 000 population;² in Australia the notification rate was 6.2 per 100 000,³ and in NSW there were 508 notified cases with an incident rate of 7.2 per 100 000 (data not yet published).

Transmission occurs from individuals with active pulmonary tuberculosis by the airborne route.² Household contacts and other close contacts are exposed when tuberculosis bacilli are expelled into the air by coughing, sneezing or talking. Most people develop an inactive form of disease (latent tuberculosis), which is asymptomatic and not infectious. Those who have latent tuberculosis have a 10% lifetime risk of progressing to active infection, with half (5%) occurring within 1–2 years after initial infection.^{1,2} The likelihood of developing active disease is increased in the presence of impaired immunity from HIV, malnutrition, drug and alcohol use, other immune suppressive conditions, or treatments for cancer, diabetes and kidney disease.

The minimum period of treatment for tuberculosis is 6 months, and will typically use a starting regimen of four drugs (isoniazid, rifampicin, pyrazinamide and ethambutol). Compliance with treatment in most patients is facilitated by directly observed therapy short course (DOTS), which is recommended by the World Health Organization. Multidrug-resistant tuberculosis (MDR-TB), is resistant to at least isoniazid and rifampicin; extensively resistant tuberculosis is additionally resistant to other second-line drugs, complicating the medical and public health management of people with the infection.⁴ In NSW all cases of multidrug-resistant tuberculosis are referred to the NSW Health MDR TB Expert Panel.

The early detection and treatment of people with tuberculosis and assessment of close contacts at risk of infection

are important for reducing further transmission. Cases and their contacts that have been exposed to active tuberculosis receive education, testing and support through the network of 29 Chest Clinics in NSW. It is through these clinics that DOTS is managed.

Public Health Orders and tuberculosis

A Public Health Order is a rarely used legal instrument in NSW which is designed to protect the public from an individual whose medical condition and behaviour may place others at risk. It can only be made after other strategies to establish and maintain adherence to care or treatment are exhausted. Under the NSW *Public Health Act 1991* a person must have a specified condition (avian influenza, severe acute respiratory syndrome (SARS), tuberculosis, typhoid or AIDS/HIV) and he or she must be behaving in a way that is endangering or likely to endanger the health of the public. The Public Health Order is made by the Chief Health Officer or medical practitioner authorised by the Director General, and is valid for a period up to 28 days. The Order may require the person to whom it applies to undergo one or more of the following:

- refrain from a specified conduct
- undergo specified treatment
- undergo counselling by a specified person or by one or more persons belonging to a specified class of persons
- submit to the supervision of a specified person or one or more persons belonging to a specified class of persons
- be detained while undergoing treatment.

In NSW in the period 2000–2010 there have been 10 such orders for people with tuberculosis infection.

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Communicable Diseases Report, NSW, March and April 2012

Communicable Diseases Branch **NSW Department of Health**

For updated information, including data and facts on specific diseases, visit www.health.nsw.gov.au and click on **Public Health** and then **Infectious Diseases**. The communicable diseases site is available at: <http://www.health.nsw.gov.au/publichealth/infectious/index.asp>.

Figure 1 and Tables 1 and 2 show notifications of communicable diseases received in March and April 2012 in New South Wales (NSW).

Enteric infections

Outbreaks of suspected foodborne disease

Ten outbreaks of gastrointestinal disease, thought to be due to the consumption of microbiologically contaminated food and which affected a total of 103 people, were reported in March and April 2012. This is higher than the number of outbreaks reported for the same period last year. These outbreaks were linked to restaurants ($n=6$), take-away shops ($n=2$) and commercial caterers ($n=2$). Of the 10 outbreaks; six were identified through complaints to the NSW Food Authority, three were reported directly to a public health unit, and one was detected through monitoring laboratory notifications of *Salmonella* clustered in time and space. Stool samples were tested in six of these outbreaks: *Salmonella* Typhimurium was found to be the cause in all of these.

There was insufficient data to draw conclusions about the likely cause for four outbreaks. In one of these outbreaks the cases had consumed a Bombe-Alaska from a Chinese restaurant. This dessert is covered with meringue made with raw egg and is known to be a high-risk food for salmonellosis because the meringue undergoes little or no cooking; any pathogens present in the egg therefore may cause illness. In three other outbreaks illness occurred in those who had consumed sandwich rolls and other items from Vietnamese bakeries or a crepe and kebab shop. Cross-contamination from raw ingredients is thought to

be the cause of these outbreaks. Another outbreak occurred in people who ate bacon and egg burgers at a restaurant and the exact point of contamination of this well-cooked food could not be determined. In the final outbreak, illness was statistically significantly associated with eating a lamb salad however no pathogen, mechanism for contamination or bacterial growth or toxin could be identified.

Outbreaks of gastroenteritis in institutional settings

In March and April 2012, 108 outbreaks of gastroenteritis in institutions were reported, affecting 1805 people. This is 59% higher than for the same period last year (68 outbreaks). Thirty-seven outbreaks occurred in aged-care facilities, 61 in child-care centres, seven in hospitals, two in residential care units and one in a military facility. All of these outbreaks appear to have been caused by person-to-person spread of a viral illness. In 54 (50%) outbreaks one or more stool specimens were collected. Norovirus was detected in the specimens from 23 (43%) of these outbreaks. Rotavirus was detected in two (4%) outbreaks. In 16 (30%) outbreaks no pathogens were detected in stool specimens. Results for 13 outbreaks are outstanding.

Viral gastroenteritis increases in winter months. Public health units encourage institutions to submit stool specimens from case-patients for testing during an outbreak to help determine the cause of the outbreak (for further information see: *Guidelines for the public health management of gastroenteritis outbreaks due to norovirus or suspected viral agents in Australia* available at: <http://www.health.gov.au/internet/publications/publishing.nsf/Content/cdadna-norovirus.htm-1>).

Respiratory infections

Influenza

Influenza activity in NSW, as measured by the number of people who presented with influenza-like illness to 59 of the state's largest emergency departments, was low during March and April 2012. In addition, laboratory surveillance identified only low numbers of influenza-positive specimens, although these were more than is usual for this time of year.

In March, there were:

- 106 presentations to emergency departments (rate 0.5 per 1000 presentations)
- 49 cases of laboratory-confirmed influenza including:
 - 33 (67%) influenza A
 - 16 (33%) influenza B.

In April, there were:

- 110 presentations to emergency departments (rate 0.7 per 1000 presentations)
- 56 cases of laboratory-confirmed influenza including:
 - 45 (80%) influenza A
 - 11 (20%) influenza B.

For a more detailed report on respiratory activity in NSW see: http://www.health.nsw.gov.au/PublicHealth/Infectious/influenza_reports.asp.

Legionnaires' disease

There were 19 cases of Legionnaires' disease reported in March and April 2012. Of these, 15 cases were due to *Legionella pneumophila* and two cases were due to *Legionella longbeachae*. Despite careful interviews with case-patients for common exposures and a review of the potential sources of infection (including cooling towers), no common environmental sources were identified for these cases.

Legionella bacteria can cause severe pneumonia if aerosolised water or dust that contains the bacteria is inhaled by susceptible people. Some air-conditioning cooling towers have been identified as the source of Legionnaires' disease outbreaks in the past as they can become contaminated by *Legionella* bacteria which are then aerosolised. There are requirements for building owners to register their cooling towers with local councils and to maintain cooling towers to minimise the growth of *Legionella* bacteria in the cooling tower water. For further information see: http://www.health.nsw.gov.au/factsheets/environmental/legion_control.html.

Vaccine-preventable diseases

Meningococcal disease

Eleven cases of meningococcal disease were notified in NSW in March and April 2012 (three in March and eight in April); the age of the case-patients ranged from four months to 48 years and included five case-patients aged under 5 years. Eight cases were due to serogroup B (for which there is no vaccine), two cases were unable to be typed and one had missing information. There were no deaths notified in this period.

The number of cases is unchanged from the same period in 2011. Of the 11 cases notified in 2011, six were due to serogroup B, one to serogroup W135, one to serogroup Y and for the remaining cases the serogroup was unknown. The ages of those affected ranged from 1 to 80 years, with four cases notified in children aged under 5 years.

It is recommended that a single dose of vaccine for meningococcal disease be given to all children at the age of 12 months as well as to those individuals at high risk of disease.¹

Measles

Three cases of measles were notified in NSW in March and April 2012. A 25 year-old man who acquired measles in Thailand infected his 9 month-old nephew and a soccer team contact after his return to Australia.

These are the first measles cases notified in 2012, following notifications in every month in 2011. The number of cases has decreased from the same period in 2011, when there were 36 cases.

It is recommended that young adults travelling overseas should be up-to-date with their vaccinations, including that for measles.

Sexually transmissible infections

Gonorrhoea

There has been an increase in the number of cases of gonorrhoea notified in NSW, with 970 reported in the first quarter of 2012 compared to 608 in the same period in 2011. The increase in gonorrhoea notifications has been noted across most local health districts and in both men and women. The highest risk group continues to be men aged 25–44 years (who account for nearly 50% of all notifications).

Part of the increase in the reporting of gonorrhoea may be due to more testing and better laboratory diagnoses. Campaigns have aimed to increase testing rates for sexually transmissible infections in those at highest risk. A number of laboratories have also recently introduced new testing strategies which may be resulting in more cases of gonorrhoea being identified.

Gonorrhoea is a type of bacteria that can infect the urethra (the tube that carries urine from the bladder to outside), throat and anus in both men and women and the cervix (neck of the womb) in women. It can be effectively treated by a single dose of antibiotics. Using a condom for vaginal or anal sex can significantly reduce the risk of catching gonorrhoea and other sexually transmissible infections.

References

1. National Health and Medical Research Council. The Australian Immunisation Handbook. 9th ed. Canberra: Australian Government Department of Health and Ageing; 2008.

Figure 1. Reports of selected communicable diseases, NSW, January 2004 to April 2012, by month of onset.

Preliminary data: case counts in recent months may increase because of reporting delays.
 Laboratory-confirmed cases only, except for measles, meningococcal disease and pertussis.

BFV = Barmah Forest virus infections, RRV = Ross River virus infections,
 lab conf = laboratory confirmed,

Men Gp C and Gp B = meningococcal disease due to serogroup C and serogroup B infection,
 other/unk = other or unknown serogroups.

NB: Multiple series in graphs are stacked, except gastroenteritis outbreaks.

NB: Outbreaks are more likely to be reported by nursing homes and hospitals than by other institutions.

NSW Population	
Male	50%
<5 y	7%
5-24 y	27%
25-64 y	53%
65+ y	13%
Rural	46%

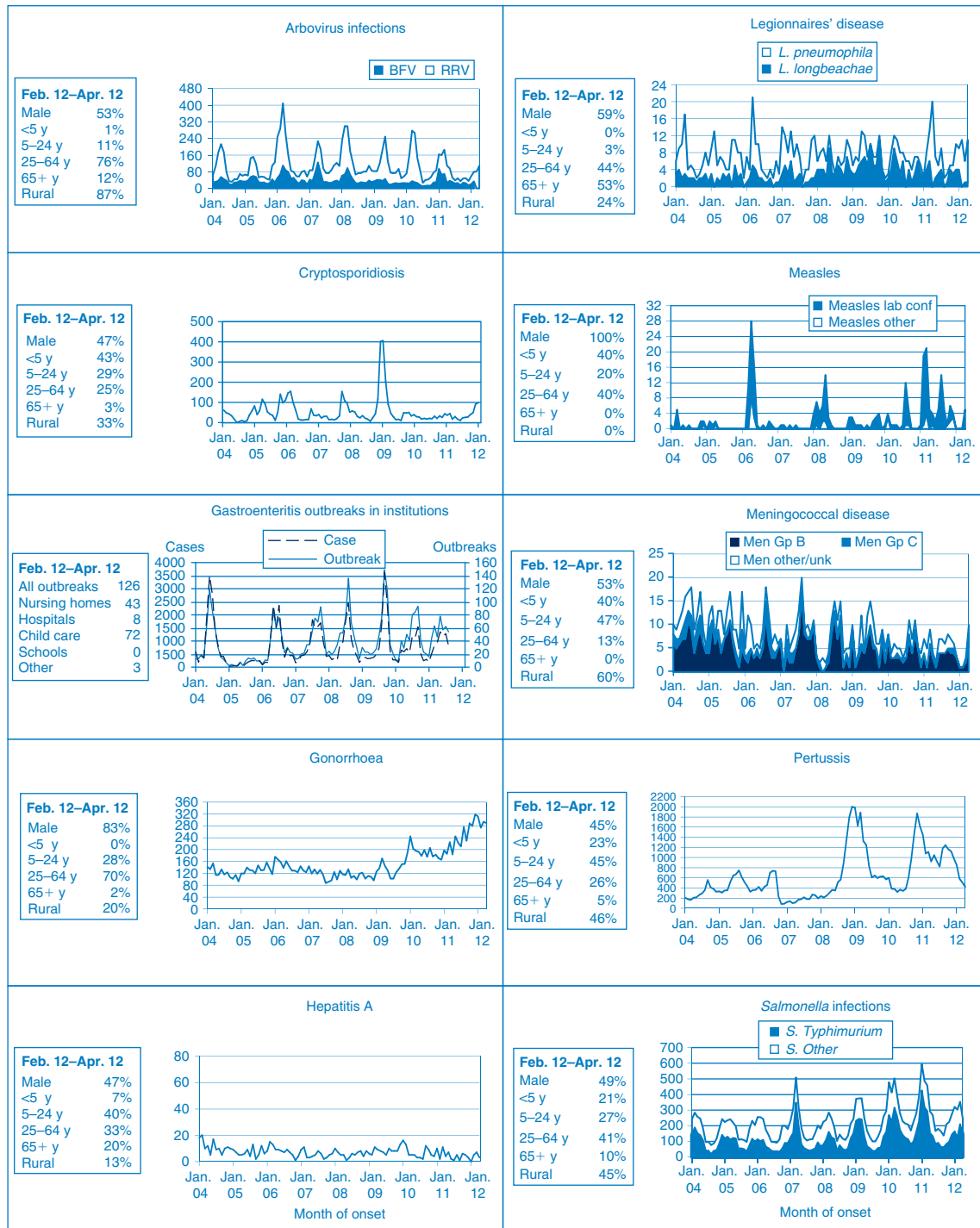


Table 1. Notifications of scheduled medical conditions received in March 2012 by Local Health District, NSW

Condition	Local Health District										Total							
	Murrumbidgee	Southern NSW	Western NSW	Far West	Hunter New England	Northern NSW	Mid North Coast	Central Coast	Northern Sydney	South Eastern Sydney		Illawarra Shoalhaven	Sydney	South Western Sydney	Western Sydney	Nepean Blue Mountains	Justice Health	For March ^b
Bloodborne and sexually transmitted																		
Chancroid ^a	63	41	73	17	301	103	63	95	160	311	117	209	161	152	79	14	1959	5759
Chlamydia (genital) ^a	-	-	4	3	28	7	2	3	13	96	11	64	36	31	14	3	315	1007
Gonorrhoea ^a	-	-	-	-	1	-	-	-	-	1	-	1	1	1	-	-	3	7
Hepatitis B – acute viral ^a	1	-	2	1	5	-	4	3	31	30	4	43	42	43	-	-	209	618
Hepatitis B – other ^a	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	3	12
Hepatitis C – acute viral ^a	8	7	15	9	22	16	11	28	17	36	16	26	41	26	12	24	316	856
Hepatitis C – other ^a	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	2
Hepatitis D – unspecified ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5
Lymphogranuloma venereum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Syphilis	1	1	-	1	2	1	-	2	3	15	3	10	8	6	1	-	54	166
Vectorborne																		
Barmah Forest virus ^a	3	2	4	1	4	19	7	-	-	-	2	-	-	-	-	-	42	95
Ross River virus ^a	5	2	9	9	29	12	6	1	1	-	2	2	-	1	2	-	79	177
Arboviral infection (other) ^a	1	1	-	-	3	-	2	1	6	-	1	3	3	2	1	-	24	89
Malaria ^a	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	2	13
Zoonoses																		
Anthrax ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leptospirosis ^a	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	5
Lyssavirus ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis ^a	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5
Q fever ^a	1	3	-	-	2	2	-	-	-	-	1	-	-	-	-	-	9	31
Respiratory and other																		
Blood lead level ^a	8	2	4	11	1	1	-	2	1	1	1	-	4	4	8	-	48	105
Influenza ^a	4	1	7	-	-	2	2	4	17	20	2	5	18	21	4	-	107	240
Invasive pneumococcal infection ^a	1	1	2	-	1	-	-	-	6	3	1	1	3	2	2	-	22	62
<i>Legionella longbeachae</i> infection ^a	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	-	2	8
<i>Legionella pneumophila</i> infection ^a	-	-	-	-	-	-	-	-	1	-	-	1	1	1	1	-	5	26
Legionnaires' disease (other) ^a	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	2
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meningococcal infection (invasive) ^a	-	1	-	-	-	-	1	-	-	-	-	-	1	1	-	-	4	8
Tuberculosis	-	1	-	-	3	-	-	-	3	2	-	-	-	2	-	-	11	54
Vaccine-preventable																		
Adverse event after immunisation	5	-	3	1	-	-	-	-	3	-	2	2	1	1	-	-	18	38
<i>H. influenzae b</i> infection (invasive) ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mumps ^a	-	-	-	-	1	-	-	-	-	-	-	2	1	1	2	-	7	22
Pertussis	12	21	28	5	68	57	12	22	46	38	48	32	43	80	52	564	2164	
Rubella ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enteric																		
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis ^a	-	-	2	-	14	4	1	2	18	15	2	5	-	11	6	-	80	182
Giardiasis ^a	4	4	4	3	31	2	4	9	53	47	17	21	16	24	12	251	639	
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	1	-	-	-	2	1	3	-	7	11	2
Hepatitis A ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Hepatitis E ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Listeriosis ^a	-	-	-	-	1	-	-	-	-	-	-	-	2	-	-	3	3	11
Rotavirus ^a	3	3	3	1	12	5	44	2	14	12	16	4	3	8	7	74	195	
Salmoneellosis ^a	13	7	12	-	56	14	4	19	37	39	16	30	29	39	8	363	1035	
Shigellosis ^a	-	-	-	-	-	1	1	1	3	4	1	1	1	1	1	13	47	
Typhoid ^a	-	-	-	-	-	1	-	-	2	-	-	3	2	1	-	9	15	
Verotoxin producing <i>E. coli</i> ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Miscellaneous																		
Creutzfeldt-Jakob disease	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1
Meningococcal conjunctivitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

^aLaboratory-confirmed cases only. ^bIncludes cases with unknown postcode. N.B. Data are current and accurate as at the preparation date. The number of cases reported is, however, subject to change, as cases may be entered at a later date or retracted upon further investigation. Data is reported as of public health unit office.

Table 2. Notifications of scheduled medical conditions received in April 2012 by Local Health District, NSW

Condition	Murrumbidgee										Local Health District										Total	
	Southern NSW	Western NSW	Far West	Hunter New England	Northern NSW	Mid North Coast	Central Coast	Northern Sydney	South Eastern Sydney	Illawarra Shoalhaven	Sydney	South Western Sydney	Western Sydney	Nepean Blue Mountains	Justice Health	For April ^b	Year to date ^b					
Bloodborne and sexually transmitted																						
Chancroid ^a	40	30	56	4	209	73	28	84	109	295	83	161	123	160	58	21	1535					
Chlamydia (genital) ^a	7	1	1	18	7	7	4	4	28	87	10	55	31	22	8	1	281					
Gonorrhoea ^a	2	5	1	6	2	2	6	6	12	29	4	25	32	33	3	3	163					
Hepatitis B – acute viral ^a	11	6	1	1	12	9	28	21	28	28	19	27	36	19	12	28	297					
Hepatitis C – acute viral ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1153					
Hepatitis D – unspecified ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3					
Lymphogranuloma venereum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6					
Syphilis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	186					
Vectorborne																						
Barmah Forest virus ^a	4	2	2	1	17	4	4	7	2	1	1	1	1	1	1	1	30					
Ross River virus ^a	16	2	16	5	16	20	4	7	2	2	1	2	1	1	1	92	269					
Arboviral infection (other) ^a	1	1	1	1	1	1	1	1	5	1	1	5	5	1	1	15	104					
Malaria ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17					
Zoonoses																						
Anthrax ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12					
Brucellosis ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Leptospirosis ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Lyssavirus ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Psittacosis ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Q fever ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	43					
Respiratory and other																						
Blood lead level ^b	6	2	2	5	1	1	1	1	1	2	2	10	24	26	4	13	118					
Influenza ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	361					
Invasive pneumococcal infection ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	97					
Legionella longbeachae infection ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10					
Legionella pneumophila infection ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32					
Legionnaires' disease (other) ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4					
Leptosy	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16					
Meningococcal infection (invasive) ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	62					
Tuberculosis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8					
Vaccine-preventable																						
Adverse event after immunisation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	51					
H. influenzae b infection (invasive) ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3					
Measles	12	14	18	1	53	13	8	7	38	30	35	10	26	62	53	379	2543					
Mumps ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7					
Pertussis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29					
Rubella ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5					
Tetanus	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Enteric																						
Botulism	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Cholera ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Cryptosporidiosis ^a	5	2	3	1	9	4	5	7	9	18	3	10	4	18	2	115	297					
Giardiasis ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	834					
Haemolytic uraemic syndrome	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2					
Hepatitis A ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12					
Hepatitis E ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3					
Listeriosis ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14					
Rotavirus ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32					
Salmonellosis ^a	7	11	7	2	23	15	12	9	34	42	11	18	29	13	9	227	1277					
Shigellosis ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	53					
Typhoid ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19					
Verotoxin producing E. coli ^a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7					
Miscellaneous																						
Creutzfeldt-Jakob disease	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Meningococcal conjunctivitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					

^aLaboratory-confirmed cases only. ^bIncludes cases with unknown postcode. NB: Data are current and accurate as at the preparation date. The number of cases reported is, however, subject to change, as cases may be entered at a later date or retracted upon further investigation. Data is reported as of public health unit office.

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