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***Childhood Immunisation:  
The Legal Dimensions***

*by*

*Marie Swain*

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***ABSTRACT***

Childhood immunisation against vaccine preventable diseases is seen by the majority of the Australian community as beneficial. The question remains as to how the State obtains optimum immunisation levels. In determining the mechanisms to achieve this end, the interests of the children, the parents and the community must be considered, and it is not always possible to reconcile these interests. To date the Australian approach has been similar to that adopted in many overseas jurisdictions, namely enacting legislation requiring documentary proof of immunisation on school entry. While such action is somewhat of a compromise between the extreme competing views on the matter, it nonetheless raises issues of a child's right to education and a right to be treated in a non-discriminatory fashion. Non-legislative responses are now being examined as a way of encouraging parents to immunise their children.

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## INTRODUCTION

Immunising children against preventable diseases has had a history of acceptance by the majority of parents in New South Wales as a necessary health measure, both from an individual and a community point of view. In recent times, however, public health officials have expressed concern that the rate of immunisation has been gradually declining, resulting in a situation where children, especially those too young to be immunised, are put at risk. Stark evidence as to the reality of this concern was provided by the recent deaths of three infants from whooping cough in a three month period.<sup>1</sup> An Australian Bureau of Statistics (ABS) study in 1995 revealed that Australia-wide the childhood immunisation uptake rate was 53%, ranking it third last among Western countries, and below many third world nations (China and Vietnam achieve an immunisation rate of more than 95%.)<sup>2</sup> That children can still die from vaccine preventable diseases in a country such as Australia is considered unacceptable by State and Federal governments alike. This point was made by the Federal Minister for Health, Dr M Wooldridge, at the launch of the national advertising campaign for the Immunise Australia Program on 28 July 1997.<sup>3</sup> How to achieve a higher level of immunisation, and by what mechanisms, remains the challenge facing governments. In 1993, a National Childhood Immunisation Program was established by all State and Federal Health Ministers, with an aim of achieving immunisation target levels above 95% by the year 2000. At such levels, the occurrence of vaccine preventable diseases is minimised and their spread prevented.<sup>4</sup> Those opposed to immunisation, however, argue that there are negative aspects associated with immunisation and that these aspects should be addressed in material made available to individual parents to enable them to make a properly informed decision.

The aim of this paper is to examine the legal issues involved in the area of childhood immunisation.<sup>5</sup> Certain issues, such as the competition between public and private 'rights', are of a general nature. Others, such as excluding non-immunised children from schools or child-care centres during outbreaks of infectious diseases, reflect specific

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<sup>1</sup> *Public Health Bulletin*, NSW Department of Health, 8(1-2), 1997, p7.

<sup>2</sup> 'Children to die without their jabs: Wooldridge', *The Australian*, 9 January 1997.

<sup>3</sup> 'To immunise or not ? These pictures may help you decide', *Sydney Morning Herald*, 29 July 1997.

<sup>4</sup> 'Immunisation in New South Wales', *Performance Audit Report*, New South Wales Audit Office, June 1997, p2.

<sup>5</sup> Although the terms 'vaccination' and 'immunisation' are often used interchangeably, their meanings are not exactly equivalent. Vaccination originally referred to the inoculation of vaccinia virus to render individuals immune to smallpox. These days the term 'vaccination' means the administration (usually by injection) of a vaccine or toxoid, whether or not the injection is successful in making the recipient immune. On the other hand, the term 'immunisation' denotes the process of inducing or providing immunity by the administration of an immunobiological product. Nevertheless, the everyday usage of the terms has been retained in this Paper. These definitions are taken from *The Australian Immunisation Handbook*, 6th edition, National Health and Medical Research Council, 1997, p3.

legislative responses. While the emphasis is on the situation as it exists in New South Wales, comparisons with other relevant Australian and overseas jurisdictions are made. In the first section the background to childhood immunisation is presented, with arguments for and against outlined in section two. The many and varied legal issues associated with childhood immunisation are discussed in section three. Concluding remarks are contained in section four.

## ***1 BACKGROUND***

The history of immunisation in Australia goes back to 1804 when packets of smallpox vaccine arrived in Sydney Town for use in infants. Mass immunisation programs were instituted during the 1940s to provide protection against diphtheria, tetanus and pertussis, with live viral vaccines being added to the schedule in the late 1960s. Those who had witnessed the effects of these vaccine preventable diseases were quick to embrace the notion of childhood immunisation. As a result, in the space of little over one generation the effect of this large scale immunisation has been the eradication of poliomyelitis and diphtheria, a significant fall in the incidence of tetanus, and congenital rubella infection is now rare. The addition of conjugated vaccines against haemophilus influenza type B (HiB) to the publicly funded infant vaccination program in 1993 has resulted in more than a 90% decline in the incidence of life threatening infections caused by this organism.<sup>6</sup>

Paradoxically, the success of the immunisation program explains to a certain extent the more casual attitude of the community towards vaccine preventable diseases today. Given the fact that many diseases have been eradicated or controlled and the fact that many of today's parents, not to mention health professionals, do not have direct experience of the devastating effects of these diseases, the real need to be immunised is less apparent. With the suppression of overt diseases and visible threat, the urgency for immunisation lessens, the degree to which parents will accept the risk of possible negative side effects diminishes and criticism of immunisation increases. These points are borne out by recent surveys which show that the reasons given by the majority of parents for failing to comply fully with the age-appropriate immunisation schedule for their children are: complacency, apathy, forgetfulness, ignorance, or unspecified concerns about the alleged risks. Only a small percentage of parents (2%) who did not immunise their children are actual conscientious objectors.<sup>7</sup>

As a means of addressing the growing failure to immunise, the introduction of legislation requiring documentary proof of childhood immunisation at entry to child care centres and school was recommended. Such legislation has been enacted in a number of Australian jurisdictions and is discussed in detail below. Provision is made in this legislation for exemption on medical or conscientious grounds.

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<sup>6</sup> Ferson MJ, 'Childhood Immunisation - so near yet so far', *Public Health Bulletin*, 7 (10), 1996, pp111-129, p111.

<sup>7</sup> 'Vaccination strategy to the point', *The Australian*, 27 February 1997.

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## 2 ARGUMENTS FOR AND AGAINST CHILDHOOD IMMUNISATION

It would appear from the literature that most parents and the bulk of the medical and scientific community support childhood immunisation. There are some, however, who do not share this view. The arguments most commonly put by those on both sides of the debate are as follows:

### *Arguments for :*

- these vaccine preventable diseases are serious.
- generally speaking, the risks of serious adverse reactions after infection with one of these diseases are far greater than the risks associated with the vaccine. (See *Appendix A*.) It is accepted, however, that in certain circumstances, such as where a child has leukaemia, immunisation is contra-indicated and health care professionals and parents should be aware of these circumstances. The call for legislation establishing a national scheme to compensate those who do suffer vaccine related injuries, similar to schemes available in the United States and the United Kingdom, has been made by many in the Australian medical and scientific community for a number of years. One of the arguments behind such a suggestion is that where the State requires, or even strongly encourages an individual to be immunised for the public good, it should ensure compensation for him or her for any resulting injury.<sup>8</sup> No such scheme has been established in Australia to date.
- the efficacy of immunisation is illustrated by examining what happens when vaccination rates fall. For example, prior to widespread vaccination in the 1950s there were approximately 100,000 notified cases of pertussis each year in England and Wales. This fell by 90% within ten years of vaccination being commenced, and in 1973 with a vaccine uptake of over 80% only 2,400 cases were notified. Then, because of public anxiety over alleged brain damage from reactions to pertussis vaccination, uptake dropped to about 30% in 1975. This was followed by epidemics in 1978 and 1982 with about 65,000 notifications in each of those years. Similar epidemics occurred in Sweden and Japan after pertussis vaccination rates fell.<sup>9</sup>
- although many of these vaccine preventable diseases have been controlled or eradicated to a large extent, there is nonetheless a need to be vigilant and to maintain a high level of immunised people to be confident the diseases will not re-emerge. As immunisation programs progress towards their maximum potential, a point is reached where the level of protection within the community is so high that the organism can no longer be propagated. This level is called

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<sup>8</sup> *National Childhood Vaccine Injury Act 1986 (US) and Vaccine Damage Payments Act 1970 (UK)* referred to in Carey M, *A Review of childhood immunisation in New South Wales*, Department of Health, 1991, p31.

<sup>9</sup> Carey M, *ibid*, p35.

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- herd immunity.<sup>10</sup>
  - immunisation, as a way of preventing disease, is of benefit to the individual and the community.
  - the unnecessary social costs of the consequences of failure to immunise: lost productivity due to parents' loss of work time; long term cost of learning impairment due to measles; and cost of care for birth defects caused by rubella. These costs are significant and of concern.
  - modern vaccines are extensively tested for safety and efficacy before being made available by suppliers. Yet unlike other pharmaceutical products, vaccines are primarily targeted to healthy people, especially children. Because healthy people are less willing to accept risk than people who need treatment for illness, and because society is unwilling to impose unnecessary risks on healthy infants and children, vaccine developers must be particularly sensitive to the risks of adverse effects. This principle would appear to be at the heart of the decision in *Best v Wellcome Foundation Pty Ltd.*<sup>11</sup> In this case, the parents of a child who had been brain damaged by pertussis vaccine manufactured by the Wellcome Foundation, recovered damages for negligence. The court held that:

the manufacturers of a vaccine have a duty to exercise all reasonable care to avoid exposing recipients to danger and harm from the use of their products. However, the fact that injuries were proximately caused by the manufacturer's products would not in itself establish liability in negligence on the part of a manufacturer provided that a high degree of care had been exercised in the production and testing of the vaccine.<sup>12</sup>

It emerged from the evidence, however, that the drug company had known that a particular batch of vaccine had failed its own testing procedures, yet it proceeded to distribute the vaccine world-wide, without re-testing or attempting any follow up studies.

- the fact that in New South Wales any serious adverse events following vaccination must be reported to the Department of Health and the Adverse Drug Reactions Advisory Committee means on-going monitoring of particular vaccines is possible, thus increasing the degree of surveillance.
- the claim that immunisation can lead to other problems and illnesses such as cot death and degenerative nerve disorders such as multiple sclerosis, are refuted by the medical and scientific community as 'speculative scapegoating' since there

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<sup>10</sup> Levy M, 'Will more muscle make the point?' in Hall R and Richter J (eds), *Immunisation: The old and the new*, Public Health Association of Australia, 1991, pp73-76.

<sup>11</sup> [1992] ILRM 609.

<sup>12</sup> *Ibid*, p610.

are a number of possibilities as to associations and causality.<sup>13</sup>

- there is no evidence that homeopathic immunisations protect against infectious diseases. The National Health and Medical Research Council (NHMRC) says that ‘homeopathic immunisation is useless ... it is not an alternative to the recommended childhood immunisation schedule ... and leaves children unprotected against serious, and potentially fatal, diseases ...’. It is also notable that the Council of the Faculty of Homeopathy, London, has issued a statement saying it ‘strongly supports the conventional immunisation program’ and that ‘immunisation be carried out in the normal way, using the conventional tested and approved vaccines, in the absence of medical contraindications.’<sup>14</sup>

In those States and Territories where evidence of immunisation is required for children starting school, children who have received homeopathic immunisation will be considered unimmunised and excluded from school in the event of a disease outbreak.<sup>15</sup>

***Arguments against :***

- it should be the right of the individual parents to make an informed choice as to whether their child is immunised or not.
- there is always a risk, however slight, of adverse effects from the vaccination.
- vaccines are not completely effective.
- the diseases themselves are not serious, and in many cases it is better to let the child contract the illness to build up natural immunities.
- the diseases have been controlled by improvements in living standards and high immunity comes with a healthy life style.
- the decline in epidemics of diseases such as pertussis is not due to immunisation or antibiotics, but to factors such as improved nutrition and hygiene.<sup>16</sup>
- given the generally high level of immunisation already achieved in the community it is no longer necessary to keep on vaccinating.

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<sup>13</sup> Thompson S, ‘Vaccination on the ABC - ‘Vaccination: protection at what price ?’, Supplement to the *Australian and New Zealand Journal of Public Health*, 21 (1), 1997, pp1-8, p5.

<sup>14</sup> *The Australian Immunisation Handbook*, op cit, p207.

<sup>15</sup> *Australian Health and Medical Law Reporter*, CCH, p47,011.

<sup>16</sup> Baden D, ‘Vaccination why not ? The myths, dangers and alternatives to infant vaccination’, *Australian Wellbeing Magazine*, Vol 54, pp96-100.

- some opponents claim that immunisation can lead to other problems and illnesses such as cot death and degenerative nerve disorders such as multiple sclerosis.
- ‘conspiracy’ by the medical and health authorities to hide the truth about vaccines.
- reliance of medical and health professions on information about vaccines provided by the pharmaceutical companies who stand to gain by use of their products.
- reluctance of doctors responsible for recommending or giving a vaccination to report adverse reactions thereby compromising the adverse events register and appropriate follow up.
- homeopathic and natural alternatives are available.
- disapproval on religious or moral grounds to the manner in which a vaccine has been developed. For example, rubella vaccine derived from the tissues of aborted fetuses provoked a number of English schools to boycott its administration to their pupils.<sup>17</sup>

It would appear that most governments have decided, on balance, that the arguments in favour of immunisation outweigh those against. The question then remains as to how they will ensure optimum levels of childhood immunisation are achieved.

### 3 *LEGAL ISSUES*

#### *General*

##### (i) Medical treatment of children

Starting from the principle that medical treatment without any consent will constitute trespass unless performed in circumstances of emergency, it is clear that the consent of the parents or guardians of a young child is necessary for immunisation to take place. Furthermore, under New South Wales law it is also an offence to carry out medical treatment on a child under sixteen without the consent of a parent or guardian, and such treatment may give rise to an action for assault or battery.<sup>18</sup> While individual parents

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<sup>17</sup> Bissett-Johnson A and Ferguson P, ‘Consent to medical treatment by older children in English and Scottish law’, *Journal of Contemporary Health Law & Policy*, Vol 12, 1992, p463, refer to a Roman Catholic school banning the administration of the rubella vaccine to its pupils and the action taken by Islamic leaders in Leicester in ordering Muslims to refuse the measles and rubella vaccinations because of their links with abortion.

<sup>18</sup> *Minors (Property and Contracts) Act 1970* - section 49(1). Exceptions to the need for consent exist if the medical practitioner considers it necessary as a matter of urgency to carry out the treatment to save the child’s life or to prevent serious damage to the child’s

may claim this ability to consent on the child's behalf as a 'parental right', it is more accurate to describe it as but one element of 'parental responsibility', which is not without bounds. This view was endorsed by the court in *Gillick v West Norfolk AHA*: 'parental rights to control a child do not exist for the benefit of the parent. They exist for the benefit of the child and they are justified only in so far as they enable the parent to perform his duties towards the child, and towards other children in the family.'<sup>19</sup>

In exercising this duty, a parent or guardian needs to make a decision as to whether the proposed treatment (or non-treatment as the case may be) is in the 'best interests' of the child. Where there is any doubt as to whether the decision taken is in the 'best interests' of the child, the courts will intervene through their *parens patriae* jurisdiction to protect the child. As expressed by Rutledge J in *Prince v Massachusetts*:

Parents may be free to become martyrs themselves, but it does not follow that they are free in identical circumstances to make martyrs of their children before they have reached the age of full and legal discretion when they can make their choices for themselves.<sup>20</sup>

In addition, there are some procedures, such as sterilisation, which do not come within the ordinary scope of parental power to consent to medical treatment and which require the approval of the Family Court or Guardianship Board.

The words of Rutledge J were referred to in a recent American case in which the parents, Dennis and Lori Nixon, members of a sect which believes that all disease comes from the Devil and that only God can cure illness, refused to call a doctor with the result that two of their thirteen children have died in the last six years.<sup>21</sup> The first incident occurred in 1991 when their eight year old son died of an ear infection treated only by prayer. The parents pleaded 'no-contest' to charges of involuntary manslaughter and endangering the welfare of a child and they were put on probation. They were found guilty of the same charges in April 1997 in relation to their sixteen year old daughter, who fell into a diabetic coma after four days of dehydration and nausea and subsequently died. No medical treatment was sought although according to expert testimony at the parents' trial, the girl would have had a 97% chance of full recovery if she had been brought into the hospital. The defence argued that as the girl was sixteen she was more than able to decide for herself whether she wanted to follow the sect's doctrine or seek medical help. The prosecution countered that a life or death situation called for parental intervention even for a mature minor. The jury, having been instructed by the judge that the case was one of law, not of religion, took less than two hours to find the Nixons guilty.

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health - *Child (Care and Protection) Act 1987* - section 20A.

<sup>19</sup> [1986] 1 AC 112 per Lord Fraser of Tullybelton, p170.

<sup>20</sup> (1944) 321 US 158 at 170. Cited in Kennedy & Grubb, *Medical Law: Text with materials*, 2nd edition, 1994, p270.

<sup>21</sup> 'Her Dying Prayers', *Time*, 12 May 1997, p48.

While the principle of ‘best interests of the child’ must prevail against the interests of the parents where practices are doing manifest harm to children as defined by each State’s law and procedure, the question remains, however, as to how the ‘best interests’ of the child are determined and the latitude given to parents and guardians in determining what is in their particular child’s ‘best interests’. It would appear from the case law that ultimately it is the court’s view of what is in the particular child’s ‘best interests’ which will prevail.<sup>22</sup> This is especially so in cases where the issue is less clear. Kennedy and Grubb do not sympathise with this approach stating that: ‘in our view the court should stay its hand, both because the parents are prima facie entitled to form a judgment within the permissible limits, and because the court has no real basis for claiming to be a better parent.’<sup>23</sup>

Immunisation is a good example of these less clear cases. While refusal of life-saving treatment such as a blood transfusion by a parent or guardian may easily be described as not in the child’s best interests, refusing to have a child immunised against a possible risk of catching a vaccine preventable disease is not so easily categorised. Since Australia does not have compulsory immunisation, it is unlikely that refusal to immunise would itself come before the courts. However, challenges on the basis that the school exclusion policy of non-immunised children during outbreaks of infectious diseases is discriminatory have been brought. This was the issue in the *Beattie* case discussed in detail below. It should also be noted that under the *Child (Care and Protection) Act* (NSW) it is an offence for a person to neglect to provide medical aid to a child in his or her care, unless there is a reasonable excuse for not doing so.<sup>24</sup> Whether this section would have any application in relation to immunisation would be up to the courts to decide.

In addition, attention may need to be paid to provisions contained in various conventions relating to children to which Australia is a signatory.<sup>25</sup> Two pertinent examples are: the Convention on the Rights of the Child, ratified by Australia in December 1990, which contains issues relevant to child health in many of its Articles, in particular Article 24:

State parties recognise the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health. State parties shall strive to ensure that no child is deprived of his or her right of access to such health care services

Australia is also signatory to the World Declaration on the Survival, Protection and Development of Children, which includes a series of measurable goals for the year 2000. One of the key areas for specific action is as follows:

Preventable childhood diseases, such as measles, polio, tetanus, tuberculosis ,

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<sup>22</sup> *Secretary, Department of Health and Community Services v JWB & SMB* (1992) 175 CLR 218 (Marion’s case).

<sup>23</sup> Kennedy and Grubb, op cit, p273.

<sup>24</sup> Section 26.

<sup>25</sup> Murphy E, ‘Key initiatives in child health’, *Public Health Bulletin*, 3(4), 1992, pp37-38.

whooping cough and diphtheria, against which there are effective vaccines, and diarrhoeal diseases, pneumonia and other acute respiratory infections that can be prevented or effectively treated through relatively low cost remedies, are currently responsible for the great majority of the world's 14 million deaths of children under 5 years and disability of millions more every year. Effective action can and must be taken to combat these diseases by strengthening primary health care and basic health services in all countries.

(ii) Children's rights versus parents' rights<sup>26</sup>

The tension inherent in the childhood immunisation debate is reflected in the following comment by the former Member for the South Coast, the Hon J Hatton MP, who said:

The issue of compulsion is interesting. I am not in favour of compulsory immunisation, yet I question that judgement. We have to look at the rights of the child. To what extent does a parent have a right to subject the child to a risk which is preventable? However, at the same time, we say through our education legislation, 'Thou shalt educate thy child'. When put in that context, it is an interesting debate as to where the parents' rights should start and finish and when the State should intervene.<sup>27</sup>

The notion of children's rights is a relatively recent phenomenon. Reasons advanced for why this is so include the following: childhood is generally not perceived as a state requiring the protection of rights; children are not readily identifiable as a 'disadvantaged group', and children do not have oppressors in the way other vulnerable groups have. There are also definitional problems in the area of 'children's rights'. To speak of children's rights presupposes a clear understanding of what it is to be a child, whilst the notion of 'children's rights' challenges some assumptions traditionally understood to underlie rights. It has traditionally been accepted that independence and autonomy are central to the notion of rights. This of course poses particular problems when it comes to children, whose capacity to be independent rights holders is limited by their stage of development. On one view, the notion of children as possessors of rights is rejected on the basis that children are incapable of assuming responsibility and obligations as their part of the social contract.<sup>28</sup> On the other hand, there are those that argue that simply because children cannot claim their rights for themselves this is no reason for denying them rights. Some regard parents as playing a pivotal role in ensuring that the rights of their child are recognised and fulfilled.<sup>29</sup> Others view children's impotence as a reason for setting up institutions (government authorities and courts) that can monitor those who have children in their charge and intervene to enforce

<sup>26</sup> Information in this section is taken from Manning F, 'Children's Rights', *Briefing Paper NSW*, Parliamentary Research Service, 17/96.

<sup>27</sup> Debate on the amendments to the *Public Health Act 1991*, *New South Wales Parliamentary Debates*, Legislative Assembly, 26 November 1992, p10089.

<sup>28</sup> Edgar P, 'Do children have rights?' in Healey K (ed), *Children's Rights - Issues for the 90s*, vol 22, The Spinney Press, 1994, p6.

<sup>29</sup> Carey M, *op cit*, p7.

rights.<sup>30</sup>

The area of children's rights demonstrates an attempt to balance the interests of three key stakeholders: the independent interests of the child,<sup>31</sup> the family and the State. There are a number of inherent tensions in balancing the interests of these three parties. Rights for children are problematic because conceptually and practically children are not fully autonomous. It is therefore incumbent upon others to ensure that the rights of the child are recognised, fulfilled or enforced. Most often it is the child's parents, or failing that, the State that assumes this role. However, the potential for conflict lies in the fact that three different perspectives on any single issue may arise. The first perspective corresponds with the wishes of the child; the second with the wishes of the parents; and the third is that which is 'in the best interests of the child' as decided by government authorities or courts. The obvious dilemma is determining the appropriate mechanism whereby these different interests can be best reconciled. Attempts to reconcile the interests of the child with the interests of the parents, or to decide who is better placed, the parents or the State, to assess what is in the best interests of the child, reveal the tensions evident between the interests of the various stakeholders. The continuing controversy over the low child immunisation rate is a prime example of an issue on which there is an apparent divergence of opinion between some parents and the State.

(iii) Public rights v private rights

Another potential conflict in the immunisation debate, is whether the rights of the community should take precedence over the rights of the individual. Essentially what is being argued by those opposed to immunisation is that in a democratic society such as ours each individual has the right to freedom of thought and the right to hold opinions and express them. While it is true to say that such rights are provided for in instruments such as the International Covenant on Civil and Political Rights, they are qualified by the necessity to protect public safety, order, *health*, or morals, and the duty to respect the rights or reputations of others [emphasis added]. The Council of Civil Liberties has said in regards to the immunisation debate:

A review of the scientific evidence indicates that the case for immunisation is so overwhelming and conclusive that it is difficult to proceed with an argument against immunisation ... it is considered that immunisation is a public health issue. If the evidence supporting immunisation outweighs the evidence against immunisation then laws or practices designed to support it are not infringements of civil rights.<sup>32</sup>

Those in favour of childhood immunisation say there are a number of obvious answers to the 'freedom of choice' argument: parents who reject immunisation do so on behalf of young children who have no choice but to accept the additional risks of whooping

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<sup>30</sup> O'Neill O, 'Children's Rights and Children's Lives' in Alston P, Parker S and Seymour J (eds), *Children, Rights and the Law*, Clarendon Press, 1991, p66.

<sup>31</sup> Instruments such as the Convention on the Rights of the Child constitute children as independent actors with rights vis-a-vis their parents and vis-a-vis the State.

<sup>32</sup> Referred to in Scully C, *Immunisation: Is it worth the risk?*, 1992, p226.

cough, diphtheria, polio, tetanus, and the rest; the parental decision also affects other children at risk of infection, especially those too young to be safely immunised themselves; and it impacts on the community which must bear the other costs of unnecessary disease outbreaks.<sup>33</sup>

The argument is further put that since the majority of parents do not immunise their children for reasons other than opposition to immunisation itself, it would be in the public interest for immunisation to be made compulsory. It would appear, however, that although the State is prepared to countenance legislation requiring proof of immunisation on school entry, and to link child-related benefit payments to age-appropriate immunisation, it does not support taking away an individual parent's right to choose. The fact that we do not allow individuals to choose whether they wear a helmet when riding a motorbike or a push-bike, or a seat belt when driving a car, may be because the likelihood of injury in the event of non-compliance is more certain than the likelihood of a non-immunised child catching an infectious disease which has serious repercussions. Perhaps the act of injecting a substance into a human being against their will, places immunisation in a different category, regardless of the ultimate potential benefit to both the individual and the community. The difference could, however, be nothing more than an inconsistency. The need for compulsory immunisation is substantially lessened if the aim to increase uptake rates can be achieved by indirect or administrative means.

Some commentators have said that compulsory immunisation would give rise to administrative problems such as monitoring the immunisation program, imposing fines or penalties on errant parents and enforcing the legislation, and that it would set a precedent in health care policies which could lead the way to more control of parents and children by professionals.<sup>34</sup>

### *Specific*

#### (i) Legislative responses

The approach to childhood immunisation varies from country to country. Some, such as Albania, the former Czechoslovakia, Hungary, Poland, the former Yugoslavia, the former USSR, Brazil and Mexico adopt a mandatory approach. Others such as Norway, Sweden, Finland and the Netherlands, have achieved a high immunisation rate without such laws, through efficient organisational structures and extensive motivation and education of immunisation providers and consumers. In between these extremes lie countries such as the United States and Australia, which link child immunisation to school entry requirements.

*United States:* All States have school entry laws requiring documentary proof of

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<sup>33</sup> 'Vaccination strategy to the point', *The Australian*, 27 February 1997.

<sup>34</sup> Orr J, 'Strong arm of the law', *Nursing Times*, Vol 82, 1986, pp34-36. It is interesting to note that administrative obstacles did not deter the introduction in 1952 of a scheme requiring people over the age of fourteen to undergo compulsory tuberculosis screening in New South Wales.

immunisation and there is an increasing trend towards comprehensive school attendance laws, where documentation of immunisation is required before allowing children of any age to attend school. Some States also have laws that apply to college students.<sup>35</sup> The history of these school immunisation laws dates back to the era of smallpox vaccination in the 19th century. In 1853 Massachusetts became the first State to require smallpox vaccination for schoolchildren. Enactment of compulsory school vaccination laws by other States followed, but enforcement was variable, depending on the degree of co-operation, apathy or opposition of local school boards. In 1895 in the face of a widespread smallpox epidemic, Pennsylvania passed a compulsory school vaccination law requiring that all children provide a doctor's certificate of vaccination or certified history of previous smallpox infection before being permitted to attend school. The enforcement of this law which had strong public support throughout the State was followed by a dramatic reduction in smallpox in the ensuing years.

Perhaps surprisingly for a country which places great store in protecting the rights of the individual, the constitutionality of compulsory school immunisation laws was upheld by the US Supreme Court in the 1922 case of *Zucht v King* 260 US 174. In this case the court held that:

city ordinances making vaccination a condition to attendance at public or private schools and vesting broad discretion in health authorities to determine when and under what circumstances the requirement shall be enforced, are consistent with the Fourteenth Amendment (due process and equal protection) and ... a contrary contention presents no substantial constitutional question.<sup>36</sup>

The extension of immunisation laws to vaccines other than smallpox began in the 1950s with the introduction of poliomyelitis vaccine and continued throughout the 1960s with the advent of measles, mumps and rubella vaccines. By 1972, 28 of the States had enacted laws requiring measles immunisation prior to school entry; and by 1976, 46 of the States had mandated such a law.<sup>37</sup> As of the 1990/91 school year all 50 states had school immunisation laws. All laws contain exemptions for medical contraindications, and 48 States allow exemptions for persons in organised religions which object to immunisation. 20 States allow persons with a philosophical objection to immunisation to be exempted.<sup>38</sup>

*Australia:* To date Australia has opted for 'compulsory choice' rather than 'compulsory immunisation' with most States introducing a requirement that children must show proof of vaccination on school enrolment. Until recently only New South Wales, Victoria and the Australian Capital Territory had made this a legislative requirement. In early 1997, the Federal Government announced that it had 'plans to expand to other States and

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<sup>35</sup> Carey M, op cit, p28.

<sup>36</sup> *Zucht v King* 260 US, p174.

<sup>37</sup> This material is taken from Robbins K, Brandling-Bennett A and Hinman A, 'Low measles incidence: Association with enforcement of school immunisation laws', *American Journal of Public Health*, 17(3), 1981, pp270-274.

<sup>38</sup> Orenstein W, Hinman A and Williams W, 'The impact of legislation on immunisation in the United States' in *Immunisation: the old and the new*, op cit, pp58-62, p60.

Territories, this immunisation certification program'<sup>39</sup> and such an approach was adopted at a meeting of State, Territory and Federal education ministers in Darwin on 12 June 1997.<sup>40</sup> Non-immunised children are still entitled to enrol, (provision is made for exemption on medical, personal or religious grounds) but must leave if there is an outbreak of one of the immunisable diseases. Moves to achieve a higher uptake rate by making immunisation a compulsory prerequisite for starting school had been proposed at a federal level,<sup>41</sup> but following decisions such as that taken by the New South Wales government to reject any such moves, a compromise position was found. It will now be compulsory for every child to present an immunisation record before school enrolment, regardless of whether the record is blank. Children without an immunisation record will be refused enrolment.<sup>42</sup>

(a) New South Wales

The requirement that children attending child care facilities and primary schools show proof of immunisation on entry was introduced through amendments to the *Public Health Act* (NSW) in 1992. This Act is concerned with the control of disease, rather than with treatment, and has as its primary focus the interests of the public who are not ill, rather than with any particular person who may be ill. The amending provisions came into effect in 1994 and place the onus on directors of child care facilities and school principals to record the immunisation status of children in their institutions. In addition, the provisions empower the Medical Officer of Health of the local Public Health Unit to direct that healthy but unimmunised children in contact with a case be excluded from the child care facility or school. The rationale for the amendments was to remind parents to have their children fully immunised. It was envisaged that proper documentation of immunisation would also help in controlling, for example, an outbreak of measles in a school or preschool by simplifying identification of unimmunised contacts. At the same time the recording of immunisation status can provide a valuable means of surveillance of immunisation coverage.

(b) Victoria

Victoria was the first Australian State to adopt school immunisation laws, with the introduction of the Health (Immunisation) Regulations in 1990.<sup>43</sup> The object of these regulations is to ensure that most children are immunised prior to starting school, with a target of 95% or higher set for compliance with the routine childhood immunisation schedule. Each child entering school at kindergarten level must have an immunisation certificate for the prescribed infectious diseases, and failure by a parent or guardian to provide such a certificate attracts a penalty. However, exemptions on medical and

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<sup>39</sup> 'Money talks in the immunisation crusade', *Sydney Morning Herald*, 26 February 1997.

<sup>40</sup> 'Backdown on immunisation', *Daily Telegraph*, 13 June 1997.

<sup>41</sup> 'Veto on compulsory school shots', *Daily Telegraph*, 30 January 1997.

<sup>42</sup> 'Backdown on immunisation', *Daily Telegraph*, 13 June 1997.

<sup>43</sup> The Regulations are made under the *Health Act 1958* (Vic).

conscientious grounds are allowed. Unlike New South Wales and the Australian Capital Territory, the provisions do not extend to pre-schools or child care facilities. Local government provides the majority of immunisation in Victoria and councils are the only authorities able to issue school entry immunisation certificates. Children who are not immunised are excluded from school if there is an outbreak of measles, diphtheria or poliomyelitis.

(c) Australian Capital Territory

Amendments were made to the Public Health (Infectious and Notifiable Diseases) Regulations in July 1993, to require evidence of a child's immunisation status to be produced at the time of school and pre-school enrolment from 1994. In the event of an outbreak of a vaccine preventable disease the Medical Officer of Health may send a notice to the parents or guardians of unimmunised children which requires certain action to be taken within a specified period or the child will be excluded. Where the Medical Officer of Health believes it to be in the *public interest*, she or he may direct a principal to notify parents or guardians that their child is excluded from school until the outbreak is over [emphasis added]. It is an offence for principals or parents/guardians to contravene these directions and notices. The Australian Capital Territory is the only State or Territory in Australia to require full immunisation of all children (unless exempt for medical reasons) on entry to long day care centres as a condition of licensing such centres (*Children's Services Ordinance 1986*).

(ii) Impact of legislative responses

While it is said that there are certain advantages in introducing laws to require documentation of immunisation at school entry, these need to be balanced against any disadvantages which may arise such as limiting a child's educational opportunities or treating an unimmunised child in a discriminatory fashion.

On the one hand, the advantages of such legislative requirements are that: <sup>44</sup>

- parents are required to make a choice about whether to immunise their child, and it becomes easier to immunise the child rather than not immunise the child. This reduces the number of children not immunised because of ignorance or apathy.
- documentation of immunisation provides the basis for accurate surveillance of immunisation levels. Parental recall of immunisation status has been shown to be unreliable; and
- the existence of accurate immunisation records for schoolchildren facilitates outbreak investigation and disease control in this population.

On the other hand, the *Education Reform Act 1990* (NSW) gives an unequivocal right to every child to receive an education, <sup>45</sup> and attendance at school is compulsory for

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<sup>44</sup> Carey M, op cit, p29.

<sup>45</sup> Section 4.

children between the ages of six and fifteen.<sup>46</sup> The possibility that unimmunised children may be excluded from school on several occasions throughout their schooling has obvious implications for their education. The rationale for such removal is seen by those opposed to immunisation as not only flawed on medical grounds, but discriminatory in its impact. They argue that as vaccines do not give guaranteed immunity, some children who have been vaccinated will not have acquired immunity or the requisite degree of immunity, and therefore are at risk during an outbreak but they are allowed to remain at school, while children who have not been immunised but may have natural immunity are excluded. They say that the only way to verify the immunity level of each particular child would be to conduct a blood test and that this should be done before a child is excluded.<sup>47</sup> While such testing would put beyond doubt the immune status of individual children for each disease, thus justifying their exclusion, this measure is generally not considered practical or cost effective.

*Beattie v Maroochy Shire Council*<sup>48</sup>

The broader question of whether excluding unimmunised children from child care centres is discriminatory was considered recently by the Human Rights and Equal Opportunity Commission (HREOC) in the above case. The two Beattie children had been denied entry to a child care centre in Queensland because neither had been medically immunised against preventable illness and disease. The council did not deny this but stated that the decision was in accordance with its policy for any child wishing to attend a centre controlled by the council. Unlike other Australian jurisdictions, there is no specific Queensland legislation dealing with this issue. The parents lodged the complaint with the HREOC, alleging that the child care centre had acted in an unlawful discriminatory manner contrary to the *Disability Discrimination Act 1992* (Cwlth) (referred to hereafter as 'the Act').

For the purposes of the Act, the Beatties had to demonstrate: (i) that their children were unlawfully discriminated against by the council on the grounds of 'disability'; and (ii) because of such disability they were treated less favourably than someone without the disability.<sup>49</sup> Establishing that the children were suffering from a 'disability' was not difficult due to the extended definition given to the term 'disability' under section 1(4) of the Act to include both presently existing diseases or illnesses, as well as those which may exist at some future point in time. The Inquiry Commissioner, W Carter QC, noted that the definition includes:

The presence in the body at any future time of organisms which cause, or are capable of causing, illness or disease. Such diseases, on the evidence, may include diphtheria, pertussis, measles, poliomyelitis, and others against which h

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<sup>46</sup> Section 23. Although provision is made for children to be educated at home in certain circumstances - sections 70-73.

<sup>47</sup> Hon Scully C MP, *Immunisation: Is it worth the risk?*, 1992, p18.

<sup>48</sup> Unreported decision, No H96/87, heard by Commissioner W Carter QC, 20 December 1996, discussed in an article by Linden-Laufer S, 'Immunisation and discrimination', *Australian Health Law Bulletin*, 5(5), 1997, pp52-54.

<sup>49</sup> Section 5.

vaccination is available.<sup>50</sup>

Although the children did not presently have any infectious illness, the fact that they had not been immunised against childhood illnesses meant they could, at some time in the future, contract such an illness and as such were subject to a ‘disability’ as required by the Act. Having established that the children were in fact suffering from a disability, the complaint that they were treated less favourably by the council on account of that disability *prima facie* amounted to unlawful discrimination. The council, however, relied on an exception in the Act which allows what would otherwise amount to unlawful discrimination if ‘the discrimination is reasonably necessary to protect public health’.<sup>51</sup> As such, the real issue to be resolved by the Commissioner was whether the decision of the council to exclude the unvaccinated children from its child care centre was one which is ‘reasonably necessary to protect public health’. Both sides led evidence regarding the differing positions and views on the subject of the benefits of child immunisation. The Beatties were strongly opposed to vaccination and asserted their ‘fundamental right ... to choose vaccination or otherwise ...’.

In determining the main question, Commissioner Carter made some important distinctions between public and individual or private health. He noted that the term ‘public health’ in this context is to be understood as:

A reference to the general health and well being of a total community. The health of any particular individual is a personal matter and may be quite idiosyncratic. Public health, on the other hand, refers to the widespread state or level of health throughout a whole community. Whilst the health of an individual may be determined by individualistic matters of lifestyle and personal characteristics, the public or general health of a community will almost invariably be determined by matters of public hygiene and other features of life in a society which will determine the level of quality of health in that community, irrespective of the personal characteristics of the individual.

The incidence of serious infectious diseases in a community is a matter relevant to public health ... The illness in one person may be the source of infection in another. The seriousness of the illness and the virility of the process of infection may be such as to affect the health and well being of the wider community. On the other hand, the level of morbidity in the case of a less serious infectious illness may be seen not to raise public health issues because it is within the capacity of the individual to take appropriate remedial or preventative action.<sup>52</sup>

Commissioner Carter then proceeded to explore in more detail the implications raised by public health issues, for both government authorities and individuals, in terms of social responsibility and again notes the distinctions between public health and private health interests:

While the state of one’s own health will to some extent be the responsibility of

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<sup>50</sup> Linden-Laufer, *op cit*, p52.

<sup>51</sup> Section 48.

<sup>52</sup> Linden-Laufer, *ibid*, p53.

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the individual and within his or her own control, matters of illness and disease may arise in epidemic proportions which can only effectively be addressed by so called health authorities in the community and will, as a matter of community responsibility, need to be addressed because of the widespread and serious consequences for the good of the whole community. The possibility of the spread of serious infectious illnesses and diseases fall into this category, and is a matter which raises issues of public health which need to be addressed in the best interest of the community as a whole.

Serious infectious illnesses and disease such as diphtheria, pertussis, measles and poliomyelitis were noted, as was the higher public health risk when children in particular are congregated in schools or child care centres. Because of the nature of such diseases, their disabling consequences and more importantly their infectious nature, the risk that the infection may assume epidemic proportions is seen to give rise to public - in addition to private - health concerns, and so those whose statutory or other responsibilities it is to address matters of public health are required to responsibly address it by appropriate remedial and preventative action.<sup>53</sup>

Commissioner Carter reviewed the evidence and the competing arguments regarding immunisation, in particular whether or not it is an effective preventative public health measure, and then proceeded to determine whether the decision to exclude the Beattie children from the child care centre was a decision 'reasonably necessary to protect public health'. In relation to what constitutes a 'reasonable' decision, Commissioner Carter said:

What is reasonably necessary will depend on the circumstances of the individual case and, in the present context, will depend very much upon the present state of acceptable scientific knowledge and research in order to determine whether a particular act or decision can be said to be reasonably necessary to protect public health. If such a decision is made arbitrarily, or for irrelevant and improper reasons, then it clearly fails the test of reasonableness. On the other hand, it seems to me that if a decision is taken for the alleged purpose of protecting public health, that decision will be seen to be reasonably necessary for that purpose if properly qualified and appropriately experienced persons, after taking into account and balancing all of the relevant competing circumstances and by using and relying upon the results of current medical knowledge and research, decide honestly and with integrity that the particular decision needs to be taken in the best interests of the general health of the community. The test so formulated immediately rejects any whimsical, arbitrary or intellectually dishonest process of decision making. It necessarily involves the making of a decision which is professionally qualified, soundly based on appropriate expertise and scientific experience and which is supported by valid objective criteria and which rejects irrelevant considerations in favour only of those which are designed to achieve the optimal result in terms of the public health of the community.<sup>54</sup>

Applying that formula to the council's decision to exclude non-vaccinated children, the

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<sup>53</sup> Linden-Laufer, op cit, p54.

<sup>54</sup> Ibid.

sole question relating to that decision concerned the extent to which it was supported by valid medical and scientific experience. This required the Inquiry Commissioner to review the evidence on the use of vaccine and the risks in terms of side effects and to balance those risks against the risks of non-vaccination. In this respect, the evidence presented on behalf of the council by its expert witnesses was accepted in preference to the evidence led by the Beatties' expert witness, whose formal qualifications and professional experience did not satisfy the Inquiry Commissioner of her capacity 'to provide a valid professional opinion on the complex subject of immunology and its application in the present context'. Consequently Commissioner Carter held that the council's decision was one 'reasonably necessary to protect public health'. He concluded by noting:

A proper regime of vaccination will, in most cases, protect children against the onset of vaccine preventable illnesses and diseases, that any risks associated with side effects are heavily outweighed by the protection that vaccination affords, and that the only practical and effective means of raising the herd immunity in any community so as to block the transmission of vaccine preventable disease is by a widespread program of immunisation. It follows that any measure which results in increasing vaccination levels above the critical threshold necessary to block the transmission of disease within the community is one which is reasonably necessary to protect public health.<sup>55</sup>

The outcome of this case may have been different if the children had been refused entry to school as school attendance between certain specified ages is a legislative requirement. While the decision to place a young child in child care may be due to economic necessity, it is nonetheless a voluntary decision.

To ensure that non-immunised children are not discriminated against the New South Wales *Public Health Act 1991* provides specifically that 'staff of schools and child care facilities are not to subject a child ... to any detriment because of the child's immunisation status'.<sup>56</sup>

### (iii) Policy responses

While a move towards compulsory immunisation through legislation has been ruled out by the Federal government for the reasons canvassed above, other means of achieving a higher immunisation rate have been formulated. The most significant of which is the linking of child-related benefit payments to proof of immunisation.<sup>57</sup> Unless children are fully immunised parents stand to lose the child care rebate and child care assistance. (It is estimated that one third of Australian children under five attract either child care assistance or the child care rebate.) The maternity allowance will be increased from the current \$882 to \$950 but eligible mothers will now receive only \$750 on the birth of their child. The additional \$200 will be paid after 18 months provided the child is fully immunised.

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<sup>55</sup> Linden-Laufer, op cit, p54.

<sup>56</sup> Section 42D(7).

<sup>57</sup> 'Money talks in the immunisation crusade', *Sydney Morning Herald*, 26 February 1997.

There will still be provision for exemption on medical grounds or conscientious objection, and benefits will be available to parents who decide not to immunise their children for these reasons. However, those who decide not to immunise their children for reasons other than medical contraindications will have to sign a statutory declaration conscientiously objecting to immunisation and they must provide evidence that they have discussed with a doctor the consequences of leaving their children unimmunised. The aim as expressed by Dr Wooldridge, the Federal Minister for Health, is 'to make it as tough not to immunise your kids as it is to immunise'.<sup>58</sup>

It is likely that civil libertarians will criticise the government's proposal as being coercive and a means of achieving de facto compulsory immunisation, but Dr Wooldridge has pre-empted their criticisms by saying: 'I believe society has a right to infringe someone's civil liberties when the person is putting substantial numbers of other people at risk. We are not promoting compulsory vaccination but rather compulsory effort'.<sup>59</sup>

The Federal government's scheme also contains measures aimed at health care professionals as it has been estimated that 93% of children under two see a general practitioner seven times a year or more. Under the proposal, general practitioners will be responsible for checking to make sure the children in their practices are fully immunised. Data from Medicare and the Australian Childhood Immunisation Register will enable the Department of Health to monitor progress in this area and whether the level of children being immunised is increasing. Apart from any encouragement to participate to avoid criticism, (immunisation register data will be published annually to encourage competition and inspire those with low rates to improve their coverage), there will also be financial incentives to general practitioners who achieve higher levels of immunisation in their practices. At this stage it is speculated that general practitioners will qualify for a grant of approximately \$2500 if 90% of the children attending their practice are fully immunised.<sup>60</sup>

Similar schemes are in place overseas. In New Zealand general practitioners receive an immunisation benefit for each immunisation given, and immunisation coverage is monitored by vaccine doses distributed and the number of general practitioner benefits paid. In the United Kingdom, a financial incentive system for general practitioners exists with differential payments according to the percentage cover of the target two year old population achieved.<sup>61</sup>

Another aspect raised by this proposal is that of privacy. At present there is no uniform Australia-wide collection of immunisation related data. In most States where data is collected it is kept at a local level only, and not always on a computer system. In

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<sup>58</sup> Ibid.

<sup>59</sup> 'Money talks in the immunisation crusade', *Sydney Morning Herald*, 26 February 1997.

<sup>60</sup> 'Calling the shots: Immunisation spotlights falls on GPs', *Australian Doctor*, 25 April 1997, pp25-27, p25.

<sup>61</sup> Carey M, op cit, p108.

accordance with the scheme to be introduced by the Federal Government, from January 1998 the Department of Social Security's computer system will allow applications for child care assistance to be matched with the child's immunisation history. The potential privacy implications of this will need to be addressed.

#### **4 CONCLUSION**

It can be seen from the above that to date legislatures in Australia have opted for 'compulsory choice' rather than 'compulsory immunisation' by introducing a requirement for school entry certificates in a number of jurisdictions. This compromise position aims to achieve maximum childhood immunisation, without taking away from individual parents the right to make decisions concerning their children. It would appear that in balancing the competing 'rights' and 'interests' of the various stakeholders in the immunisation debate, the State has determined that in the area of public health, individual rights of children or parents, come second to the community's collective right to be safe from illness and disease.

### *Appendix A*

The effects of the diseases and the side effects of their vaccinations have been described in *The Australian Immunisation Handbook* as follows:

<i>Disease</i>	<i>Effects of Disease</i>	<i>Side Effects of Vaccination</i>
<b><i>Polio</i></b>	About 1 in 20 hospitalised patients dies and 1 in 2 patients who survive is permanently paralysed.	Less than 1% of recipients develop diarrhoea, headache, and/or muscle pains, 1 in 2.5 million recipients or close contacts develops paralysis.
<b><i>Diphtheria</i></b>	About 1 in 15 patients dies. The bacteria release a toxin which can produce nerve paralysis and heart failure.	DTPw* vaccine - About 50% have discomfort or local inflammation. About 30% have fever. Occasionally, a small lump appears at the injection site - it slowly disappears over several weeks. About 1 in 1 million develops encephalitis (brain inflammation) but there is no clear evidence that this is caused by the vaccination.
<b><i>Tetanus</i></b>	About 1 in 10 patients dies. The risk is greatest for the very young or old.	See above - side effects of DTPw vaccine.
<b><i>Pertussis</i></b>	About 1 in 200 whooping cough patients under the age of 6 months dies from pneumonia or brain damage.	See above - side effects of DTPw vaccine.
<b><i>Haemophilus influenzae type B (HiB)</i></b>	About 1 in 20 meningitis patients dies and 1 in 4 survives but has permanent brain or nerve damage. About 1 in 100 epiglottitis patients dies.	About 5% have discomfort or local inflammation. About 2% have fever.
<b><i>Measles</i></b>	1 in 25 children with measles develops pneumonia and 1 in 2,000 develops encephalitis. For every 10 children who develop measles encephalitis, 1 dies and up to 4 have permanent brain damage. About 1 in 25,000 develops SSPE (brain degeneration), which is always fatal.	About 10% have discomfort, local inflammation or fever. About 1% develop a rash, which is noninfectious. 1 in 1 million recipients may develop encephalitis.
<b><i>Mumps</i></b>	1 in 200 children develops encephalitis. 1 in 5 males past puberty develops inflammation of the testicles. Occasionally, mumps causes infertility or deafness.	1 in 100 recipients may develop swelling of the salivary glands. 1 in 3 million recipients develops a mild encephalitis.
<b><i>Rubella</i></b>	50% develop a rash and painful swollen glands; 50% of adolescents and adults have painful joints; 1 in 6,000 develops encephalitis; 90% of babies infected during the first 10 weeks after conception will have a major congenital abnormality (such as deafness, blindness, brain damage or heart defects).	About 10% have discomfort, local inflammation or fever. About 5% have swollen glands, stiff neck, or joint pains. About 1% have a rash, which is noninfectious.

\* DTPw is the current whole-cell vaccine. Side effects with the acellular DTP vaccine are less frequent.