

UNIT NO. I

VALUE OF VACCINATION

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ABSTRACT

Healthcare workers have an important role in helping the public understand and maintain an informed view of the value of vaccinations. Anti-vaccine sentiments arise out of misunderstanding, true adverse effects, and scares from unproven associations. Personal experiences, value systems and level of trust in health professionals determine parental decisions to accept vaccination for their children. Vaccine advocacy implies the need on the part of healthcare workers for the best knowledge, the best moral attitudes, and the best public health practice in the use of vaccines to protect the population. The public needs to be aware of the contribution of vaccination to the reduction of vaccine-preventable disease burden. There is a need for surveillance for adverse events and to take action to reduce these if they are due to errors. Planning and delivery issues also need attention.

Keywords: Anti-vaccination movement, vaccine advocacy, impact of vaccination, adverse events, adverse event surveillance, human papilloma virus vaccine.

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INTRODUCTION

Healthcare workers have an important role in helping the public understand and maintain an informed view of the value of vaccinations. Anti-vaccine sentiments erode the trust in vaccines and avoidance of vaccination will result in loss of protection from infection and a rise in disease incidence, morbidity and mortality. Surveillance of adverse events and vaccine advocacy are needed. Beyond vaccination, the reduction of vaccine-preventable disease burden requires planning, and delivery of services, need for a balance of new and existing immunization activities, and developing a comprehensive system of disease control.

ANTI-VACCINATION MOVEMENTS

Anti-vaccination movements are due to one or more of the following factors: misunderstanding, true adverse effects, and scares from unproven associations.

Misunderstanding

Misunderstanding is an age-old problem. At the time of Edward Jenner, some were afraid that inoculation of bovine material could turn humans into cow-like hybrids. However, the anti-vaccine movement remained low-key and ineffective – in spite

of anti-vaccine riots in UK – because imaginary or real concerns about vaccine safety was of secondary relevance compared to the obvious benefits of disease control. Today, with the disappearance of vaccine-preventable diseases as the result of widespread vaccination, the anti-vaccination movement has regained its initial popularity. (Andre, 2003)¹.

True adverse effects

Most true adverse effects are benign: transient pain, redness and swelling at the site of injection. Systemic reactions such as fever (sometimes leading to febrile convulsions), malaise or headache can also occur.

Scientifically proven serious reactions to vaccines do occur. Examples are: anaphylaxis from any vaccine (1:50,000 – 1,000,000); paralytic polio from OPV (1:750,000 first doses); thrombocytopenic purpura from measles vaccine (1:22,300); intussusception from Rotavirus vaccine (Rotashield) (1:11,000), and meningoencephalitis from mumps vaccine (Urahe Am 9) (1:10,000). (Andre, 2003)¹.

Manufacturing errors such as the use of wrong diluents or the transmission of pathogens due to poor aseptic technique, or incompletely inactivated vaccines have happened before. With modern methods of manufacture, such preventable accidents are unlikely to occur. (Andre, 2003)¹.

Scares from unproven associations

One scare from most recent memory is the 1998 flawed paper where Andrew Wakefield published in the Lancet a study sample of 12 children claiming a link between gastrointestinal illness, an autism-like disorder, and the combined measles, mumps, and rubella (MMR) vaccine. In the eyes of the tabloid press his tiny skewed sample represented children in general. Measles returned and did considerable damage. The paper was officially retracted on 28 Feb 2010 by the Lancet. Although long overdue, the retraction is a good thing for science. (Greehalgh, 2010)².

Other unproven associations have been described e.g., neurological damage and DTPw vaccine (Scotland); unexplained death and DTPw vaccine (Japan); diabetes and Hib vaccine (US); and multiple sclerosis and Hepatitis B (France). (Andre, 2003)¹.

The way to counter such scares is to confront questions freely in the context of vaccine safety and efficacy. Attempts to investigate biologically plausible theories can be rapidly done using retrospective methods on large population-based databases. (Poland, 2010)³.

WHAT MAINTAINS PARENTAL SUPPORT

Leask et al explored how parents respond to competing media messages about vaccine safety using 6 focus groups of mothers of infants who were shown television vignettes of typical pro- and anti-vaccination claims. Thematic analysis of transcripts showed mothers expressed surprise and concern about alleged

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vaccine risks but quickly reinstated their support for vaccination by deference to authority figures; type-casting immunisation opponents; and notions of anticipatory regret, good parenting and social responsibility. (Leask et al, 2006)⁴.

The authors concluded that personal experiences, value systems and level of trust in health professionals are fundamental to parental decision making about vaccination. Convincing parents of the safety of vaccines using facts alone fails to account for the wider values and discourses that govern the parents' decisions. Stories of people affected by vaccine-preventable diseases need to be openly discussed. In this way, the discussions can shift from anti-vaccination rhetoric to more productive discourse on underlying infectious disease prevention.

VACCINE ADVOCACY

More than just facts is needed to convince the public on the value of vaccinations. This brings us to the topic of vaccine advocacy which has been defined by Balinska as the promotion of the best scientific knowledge, best moral attitudes, and best public health practice with regard to vaccination. (Balinska, 2004)⁵.

Best knowledge

In our day and age, "best knowledge" must increasingly be rooted in information based on statistical evidence or, where sufficient power cannot be attained, on the best evidence available, based on accepted scientific methodology. The problem is not only one of increasing our knowledge and hard data in these areas, but of spreading such information. (Balinska, 2004)⁵. More specifically, we need to devise new ways of communicating with the four groups of stakeholders namely, people, press, policy makers, and profession.

Best moral attitudes

With regards to "best moral attitudes", vaccines should neither be under-used (lack of access), nor over-used (inappropriate) marketing. Today, one of the most crucial issues to be addressed is how to deal with unequal/inequitable access to vaccination, whether for reasons of limited stocks, unfavourable market forces, or lack of adequate health care infrastructure. (Balinska, 2004)⁵.

Best public health practice

With regards to "best public health practice", this can be summarized as follows: Optimising safety in the production, distribution, and administration of vaccines; systematic use of vaccines where and when needed; and research and development of those vaccines most needed to improve public health regardless of market interests. (Balinska, 2004)⁵.

Tools for advocating use of vaccines

There are several tools that can be used for advocating the use of vaccines. These are: generation of local burden of disease data (morbidity and mortality); demonstration of immunogenicity and/or efficiency and safety of vaccine in the population; presentation of information to opinion leaders and policy makers; and public enlightenment through appropriate media

(television, radio, newspapers, and public meetings). (Obaro & Palmer, 2003)⁶.

Improving cost effectiveness of vaccines

There is a need for a continuing drive to improve cost effectiveness of vaccines. Strategies are: encouraging local production in developing countries with supervision from established firms in developed countries; economies of vaccine dosage through evaluation of fewer doses, evaluation of fractional dose regimen, and alternative, cheaper regimens e.g. neonatal immunization. (Obaro & Palmer, 2003)⁶.

THE CONTRIBUTION OF VACCINATION

The public needs to be aware that vaccines have made a major contribution to public health, including the eradication of one deadly disease namely smallpox in 1979 and the near eradication of another namely poliomyelitis. (Diclos et al, 2009)⁷. Today, Afghanistan, Pakistan, India and Nigeria are the remaining four countries where indigenous wild poliovirus have never been interrupted. (CDC, 2009)⁸.

Smallpox used to be responsible for 8-20% of all deaths in several European countries in the 18th century. A review in 1985 by AJ Mercer and reported in the publication *Population Studies* showed that the introduction of vaccination at the beginning of nineteenth century coincided with the beginning of an unprecedented growth of population in Europe, that is with a widening of gap between crude birth and death rates. (Bonanni, 1999)⁸. WHO announced on 9 December 1979 that smallpox was finally eradicated. It had taken nearly 200 years. (Andre, 2003)¹.

The introduction of expanded programme of immunization (EPI) in the developing world by WHO in 1974 was another landmark in reducing vaccine-preventable deaths. In the mid-1990s it was estimated that at current levels of vaccination, almost 3 million children are saved annually, but there are still 2 million children dying because they are not immunized. (Bonanni, 1999; UN, 1996)^{9,10}.

Through the introduction of new vaccines, such as those against rotavirus and pneumococcal diseases and with further improvements on coverage, vaccination can significantly contribute to the achievement of the health-related United Nations Millennium Development Goals.

The Global Immunisation Vision and Strategy (GIVS) was developed by WHO and UNICEF. The most striking recent achievement has been that of reduction of global measles mortality from an estimated 750,000 deaths in 2000 down to 197,000 in 2007. (Diclos et al, 2009)⁷.

NEED FOR SURVEILLANCE FOR ADVERSE EVENTS

There is a need for surveillance for adverse events and to take action to reduce these if they are due to errors. (Wharton, 2010)¹¹. Towards developing an ideal vaccine postlicensure safety system, information systems need to be expanded to include reliable information on vaccination and health outcomes in large populations. (Griffin, 2009)¹².

OTHER CONSIDERATIONS BEYOND VACCINATION

Planning and delivery of services

Elements that have contributed to the gain in immunization coverage include national multi-year planning, district-level planning and monitoring, re-establishment of outreach services and the establishment of national budget lines for immunization services strengthening. (Diclos et al, 2009)⁷.

Need for a balance

Although introduction of new vaccines is important, this should not be at the expense of sustaining existing immunization activities. Instead the introduction of new vaccine introduction should be viewed as an opportunity to strengthen immunization systems, increase vaccine coverage and reduce inequities of access to immunization services. (Diclos et al, 2009)⁷.

Need for developing a system of disease control

A paper by Sankaranayanan et al on human papillomavirus infection and cervical cancer prevention in India highlights the need for developing a system of disease control in India, Sri Lanka, and Nepal. Together these countries have one-third of the cervical cancer burden of the world. Beyond research studies, demonstration projects and provincial efforts in selected districts, the authors perceive that there are no serious initiatives to introduce population-based screening by public health authorities in these countries. (Sankaranayanan et al, 2008)¹³.

Cervical cancer is a relatively neglected disease in terms of advocacy, screening and prevention in these four countries of the Indian subcontinent. While HPV vaccination provides hope for the future, high costs and low public awareness of cervical cancer prohibit the introduction of prophylactic vaccines in these countries. Efforts to implement screening offer the only currently viable means of rapidly reducing the heavy burden of disease. (Sankaranayanan et al, 2008)¹³.

CONCLUSIONS

Health care providers need to create an awareness of the positive value of vaccination in the public particularly parents who will

make decisions based on their understanding and perceived safety of vaccination for their children.

Health care providers also need to understand the various aspects of vaccination that are relevant: anti-vaccination movements, parental support for vaccination, vaccine advocacy, the contribution of vaccination, surveillance for adverse events, and considerations beyond vaccination.

REFERENCES

1. André FE. Vaccinology: past achievements, present roadblocks and future promises. *Vaccine*. 2003 Jan 30;21(7-8):593-5. PubMed PMID: 12531323.
2. Greenhalgh T. Why did the Lancet take so long? *BMJ*. 2010 Feb 2;340:c644. doi: 10.1136/bmj.c644. PubMed PMID: 20124363.
3. Poland GA, Spier R. Fear, misinformation, and innumerates: how the Wakefield paper, the press, and advocacy groups damaged the public health. *Vaccine*. 2010 Mar 11;28(12):2361-2. PubMed PMID: 20199766.
4. Leask J, Chapman S, Hawe P, Burgess M. What maintains parental support for vaccination when challenged by anti-vaccination messages? A qualitative study. *Vaccine*. 2006 Nov 30;24(49-50):7238-45. Epub 2006 May 23.
5. Balinska MA. What is vaccine advocacy? Proposal for a definition and action. *Vaccine*. 2004 Mar 29;22(11-12):1335-42. Review. PubMed PMID: 15063555.
6. Obaro SK, Palmer A. Vaccines for children: policies, politics and poverty. *Vaccine*. 2003 Mar 28;21(13-14):1423-31. Review. PubMed PMID: 12615439.
7. Duclos P, Okwo-Bele JM, Gacic-Dobo M, Cherian T. Global immunization: status, progress, challenges and future. *BMC Int Health Hum Rights*. 2009 Oct 14;9 Suppl 1:S2. PubMed PMID: 19828060; PubMed Central PMCID: PMC2762311.
8. Centers for Disease Control and Prevention (CDC). Progress toward poliomyelitis eradication - Afghanistan and Pakistan, 2009. *MMWR Morb Mortal Wkly Rep*. 2010 Mar 12;59(9):268-72. PubMed PMID: 20224544.
9. Bonanni P. Demographic impact of vaccination: a review. *Vaccine*. 1999 Oct 29;17 Suppl 3:S120-5.
10. United Nations. Report of the Secretary-General on progress at mid-decade on implementation of General Assembly resolution 45/217 on the World Summit for Children. *A/51/256*, 1996.
11. Wharton M. Vaccine safety: current systems and recent findings. *Curr Opin Pediatr*. 2010 Feb;22(1):88-93. PMID: 19952750.
12. Griffin MR, Braun MM, Bart KJ. What should an ideal vaccine postlicensure safety system be? *Am J Public Health*. 2009 Oct;99 Suppl 2:S345-50. PMID: 19797747.
13. Sankaranarayanan R, Bhatla N, Gravitt PE, Basu P, Esmy PO, Ashrafunnessa KS, Ariyaratne Y, Shah A, Nene BM. Human papillomavirus infection and cervical cancer prevention in India, Bangladesh, Sri Lanka and Nepal. *Vaccine*. 2008 Aug 19;26 Suppl 12:M43-52. PMID: 18945413.

LEARNING POINTS

- **Healthcare workers have an important role in helping the public understand and maintain an informed view of the value of vaccinations.**
- **Anti-vaccine sentiments arise out of misunderstanding, true adverse effects, and scares from unproven associations.**
- **Personal experiences, value systems and level of trust in health professionals determine parental decisions to accept vaccination for their children.**
- **Vaccine advocacy implies the need on the part of healthcare workers for the best knowledge, the best moral attitudes, and the best public health practice in the use of vaccines to protect the population.**
- **The public needs to be aware of the contribution of vaccination to the reduction of vaccine-preventable disease burden.**
- **There is a need for surveillance for adverse events and to take action to reduce these if they are due to errors.**
- **Beyond vaccination, the reduction of vaccine-preventable disease burden requires planning, and delivery of services, need for a balance of new and existing immunization activities, and developing a comprehensive system of disease control.**