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Research Article

To vaccinate or not to vaccinate is this doubt justified?

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Abstract:

Immunization, one of the most successful and cost-effective public health interventions for reducing infant and child morbidity and mortality globally has been passing, in recent times, by a crisis of acceptance by the lay public, which has greatly reduced vaccine coverage worldwide. This article presents the importance of vaccines for individual and collective health, discusses about some adverse effects and the reasons for refusal to vaccinate, and proposals to overcome these barriers and to increase the effectiveness of vaccination programs.

Keywords: vaccine - vaccination - vaccine hesitance

Introduction

Immunization, one of the most successful and cost-effective public health interventions for reducing infant and child morbidity and mortality globally, is a core component of the human right to health and an individual, community and governmental responsibility (1). Since the first vaccine was discovered vaccination remains one of the greatest public health achievements, preventing millions of deaths each year and protected from the threat of vaccine-preventable diseases, and contributing to the eradication of diseases such as poliomyelitis and smallpox. [2,3,4].

Vaccines are among the most effective tools available for preventing infectious diseases and their complications and sequels. High immunization coverage has resulted in drastic declines in vaccine-preventable diseases, particularly in many high- and middle-income countries [5]. It is estimated that, in 2015, there were nearly 2,4 billion episodes of acute diarrhea in whole world, of which almost 1 billion occurred in children younger than 5 years, with approximately 500.000 deaths [6].

In the last 15 years great advances have been made in developing and introducing new vaccines and expanding the reach of immunization programming [4]. For the efficiency of this programming a high percentage of vaccinated people are essential, because in addition to individual protection, they contribute to held immunity [2].

Herd immunity is the indirect protection of unvaccinated people in a largely vaccinated population that provides a safety net for those who cannot receive vaccination [7]. To be effective herd immunity requires that approximately 95% of the population be vaccinated. Therefore, the decision to receive a vaccine has consequences not only for the individual but for others in community, since outbreaks of vaccine-preventable disease often start among persons who refused vaccination and spread rapidly within unvaccinated populations. [5,8,9].

Despite their effectiveness in preventing and eradicating disease routine childhood vaccine uptake remains suboptimal and, in some countries, rates of under vaccination in children under than 2 years continue to rise [10].

The decrease in the incidence of many vaccine-preventable disease leads to the perception that the severity of the disease and susceptibility to it have decreased. On the other hand, concern about real or perceived adverse events associated with vaccines has increased. This extended level of concern often results in an increase in the number of people refusing vaccines. [5].

Routinely vaccines are administered to healthy children to prevent, and not treat disease, and this can lead to the false impression that the risk of disease is low. Individual may not be aware of any immediate personal benefit because they are not ill when vaccinated and the health gain occurs in future disease episodes avoided [11]. Due to the child's vulnerability the risk and sequels of vaccine-preventable diseases are variable during childhood, and young children are at increased risk for illness and death related to infectious diseases. Children who did not receive pertussis vaccine had a 23-fold increased risk of developing the disease [5,12].

Vaccine components and safety

Vaccine is a specific immune preparation applied, usually through invasive means, into the human body, with the purpose of immunizing against pathogen infection [3]. Although there are historical records of some emerging practices for smallpox prevention in India, Turkey and the African continent, it is due to Edward Jenner the beginning of the modern era of vaccination when, in 1798, he published the results of inoculation of the bovine poxvirus in 23 individuals, initiating the first attempt of mass vaccination. Due to this

pioneering action, almost 200 years later the eradication of smallpox was achieved, with the last case described in 1977 in Somalia [14].

The journey since then has not been easy and without precariousness because like others pharmaceutical agents, vaccine may have unintended side effects though nearly 90% were not adverse events [15]. Common reatogenicity events reported occur due to a chemical irritation which can be caused by adjuvant (a substance that is incorporated into some vaccine formulations to enhance the immune response on the vaccinate subject) like phenol, 2-phenoxyethanol, and even natural latex present in the rubber stoppers of some vaccine vials and on the plugger in some prefilled syringes [16,17]. The majority of these events include injection site reactions (erythema, swelling, warmth) and pyrexia which were transient and occurred within 1 or 2 days of vaccination [18,19,20]. However, in very small situations, immunostimulatory effects that are necessary to increase the effectiveness of the vaccine can lead do undesirable effects if exceeding certain limits [16,21].

With the focus on vaccine safety D'Alo et al [22] analyzed the possible adverse reactions of some products and found that it is not possible to conclude with scientific rigor on casual relationships (or the lack thereof) between vaccines and adverse event [23,24]. With this same objective some authors concluded that infection with measles, mumps or rubella cause more severe adverse effects than the respective vaccine [25]. Studies suggest that influenza infection has a stronger association with Guillain-Barrè Syndrome (GBS) than does the vaccine [26,27] and the hypothetical risk of GBS, if any, cannot be considered a legitimate reason to limit MMR administration [28].

Immunization safety concerns have become increasingly prominent with the near elimination of many vaccine preventable diseases worldwide. With the enormous success of vaccines, public awareness has shifted from vaccine effectiveness to vaccine safety with most vaccines being administered to healthy individuals, safety assessments are crucial to maintaining public trust in immunization programs. WHO/UNICEF have made great strides to implement the Global Vaccine Action Plan and to establish National Immunization Technical Advisory Groups in whole world. [29].

Vaccines are administered as prophylactics to healthy individuals and the risks of vaccines (real or alleged) are visible while their benefits are impossible to evaluate from an individual perspective. Individual decision-making regarding vaccination is complex and involves emotional, cultural, social, spiritual and political factors as much as cognitive factors [30].

Vaccine hesitance and refusal

Opposition to vaccination has occurred since smallpox vaccination was introduced in Europe, in the 18th century [31] and nowadays it is more common to be afraid of vaccination than the disease against which we are fighting [32].

One of the reasons for low vaccination rates is currently called "vaccine hesitancy movement" that can be understood as a worldwide social phenomenon which can reach not only the unvaccinated individuals but also the entire population due to not enable the held immunity and increase the risk of outbreaks of many infectious diseases [33].

World Health Organization describe vaccine hesitancy as the delay in acceptance or refusal of vaccination despite availability of vaccination services [34,35]. This phenomenon is globally increasing influenced by some characteristics as education level, socioeconomic status, ethnicity, race, religious beliefs, ethical, philosophic and ideological concerns, and contribute to the persistence of outbreaks of vaccine-preventable diseases. Vaccine hesitancy is associated with increased morbidity, higher emergency department utilization rates, inpatient admission, and death [10,36,37].

Vaccine refusal or hesitancy has been associated with perceptions of susceptibility/risk and severity of disease, safety and effectiveness of vaccines, in addition to the trust in healthcare providers and system [38]. Younger generations have forgotten the real importance of vaccination and ignore the fear of diseases which in the past caused enormous number of victims [32]. Individuals and physicians living in areas with successful immunization programs are likely to lack experience with some vaccine-preventable diseases. This reduction in incidence leads to a decreased perception of the severity and susceptibility to these diseases [25,29].

Before the 21st century vaccination programs were commonly recognized as one of the most cost-effective public health interventions and the arrival of new vaccines was almost always welcomed by public health decision-makers and clinicians [30]. Nowadays, outbreaks of disease due to vaccine hesitancy cause unnecessary suffering and potential death of young children and are wasteful of limited local health department resources [38,40].

Some people understand that vaccines are an unwelcome and unnatural incursion into a natural body which they view as unneeded or unbeneficial [41]. Due to the reduction in the incidence of vaccine-preventable diseases, the memory of several infectious diseases has faded from the public consciousness and the risk–benefit calculus seems to have shifted in favor of the perceived risks of vaccination in some parents' mind [5].

Reasons not to vaccinate

One of the most important arguments used by parents not to vaccinate their children is philosophical one that is, based on a liberal conception of individual's rights to self-determine about her/his health, body, and life [13]. Several anti-vaccine arguments have caused a great drop in immunization rates in many countries [10,42], and many parents consider vaccines unsafe and unnecessary because diseases that were once the cause of loss of health and life are now rarely seen, virtually unknown to the general population, precisely because they have been prevented by vaccines [43,44]. Among the various reasons for not vaccinating some can be highlighted: [10,13,17,33,34,42,44,45,46,48]

1) immune system, and the natural immunity is better than

immunity induced by vaccines;
2) diseases declined on their own due to improved hygiene and sanitation;
3) the child's immune system is too immature to handle vaccines;
4) vaccines had never been tested in true vaccinated versus unvaccinated study;
5) vaccines are toxic and contain dangerous chemicals that can lead to hazard conditions;
6) the use of vaccines contributes to the increase in the number of autoimmune diseases;
7) mistrust of the seriousness of the vaccine industry;
8) worry and anxiety about the vaccine;
9) vaccines are not necessary if people have good living conditions and use natural medicines;
10) influence of information from several and not official sources;
11) previous negative personal experiences with vaccination;
12) low perceived susceptibility and severity to illness;
13) no vaccine recommendations by health professionals;
14) vaccine is not effective;
15) difficulty to remembering vaccination schedule.

Parents obtain information from different sources not always reliable. Internet websites, blogs, and articles discussing the risks and dangers of vaccines have caused confusion and uncertainties about the role of vaccines for human health [49,50].

What to do to increase acceptance of vaccines

Migratory movements, displacement in the socioeconomic status, and climatic changes have contributed to the emergence of a new situation related to the epidemiology of infectious diseases. Therefore, effective global prevention requires coordinated public health action, continuation of vaccinations in the population and the improvement in their accessibility [33].

Making appropriate attitudes toward vaccination is a long-term and complex process involving different segments of society. A fundamental action in effective vaccine communication is convincing parents that not vaccinating is the greater risk, that the probability of disease contraction is high if they don't vaccinate their children and the consequences of getting these illnesses are severe [51].

Communication is the most effective tool to increase knowledge and awareness about vaccines and oppose all the prejudices due to current generalized misinformation. It is necessary to establish an openly, honest, interactive and respectful dialogue with parents and family in which natural concerns and fears must be listened and understood [31,34]. Since mothers play an important role in decisions on vaccination of their children, they should be one of the primary targeted publics from perspective of vaccination planning [2].

Public health professionals need to understand the various characteristics of parents and the reasons for the doubts about vaccination, so that they can be effectively addressed [52]. Understanding the arguments and concerns that individuals have about vaccines can allow for better communication regarding vaccines on the part of scientists [45]. Physicians and other health care providers play a crucial role in parental decision making with regard to immunization. Health care providers are still considered to be the most credible source of information on vaccination [33,34,55] cited by parents, including parents of unvaccinated children (30), and has been reported that they are the main reason for following the recommended vaccine schedule [10,54,55,56].

Efforts to support the professional endorsement of health professionals and confidence in vaccination are essential to restore and maintain vaccination as a standard among health communities [49]. For this two actions can be implemented: a) to remove socioeconomic barriers and disincentives to vaccination; b) to oppose misinformation regarding vaccines.

Having received a recommendation by their pediatrician to fully vaccinate their children appears to have significantly affected parental decision about vaccination [57]. Parents generally prefer to consult their pediatrician, who know their child's full clinical history, and acts as the guardian of the protection of the life and health of the children [3], that than the immunization services which are perceived on as a place for vaccine administration [34,38].

And, in order for the doctor-patient relationship to be successful, medical practice must always more centered on the respect of patient autonomy, and, for that, it is necessary to supporting health professionals in their communication, demonstrating a willingness to listen respectfully, providing accurate information about both risks and benefits, encouraging questions, and acknowledging parental concerns are essential elements of this strategy [3]. Add to this some measures like establishing routine monitoring of vaccination attitudes to provide early warning in order to guide timely action (2); and maintain an effective follow-up program in childcare [58].

Finally, clinicians must set an example. We're unlikely to achieve optimal vaccination rates until health care professionals comply with vaccine recommendations for themselves and their children [59].

Conclusion

The benefits of vaccination are demonstrated by the eradication or enormous decline in the incidence of many vaccine-preventable diseases and the importance, effectiveness and safety of vaccines in individual and collective protection against infectious disease and quality of life are unquestionable [28,57]. Vaccination must be a part of a holistic medical child treatment associated to breastfeeding, healthy food and protection against unintentional injuries.

The multifactorial and complex causes of vaccine refusal require a broad range of approaches, interventions, and system changes on the individual, provider, health system, and national levels [38]. All considerations on this subject indicate a need to consolidate the capacity of countries to locally identify the relevant causal factors of vaccine hesitancy and to develop strategies [34,60].

The interaction between patients and providers is the

cornerstone of maintaining confidence in vaccination [30,57]. Interventions are needed on the individual level for parents who have vaccine concerns. First-time pregnant women are an ideal population to target, because first pregnancy is the "teachable moment" and attitudes and beliefs about childhood vaccines are frequently not fully formed at this point [38].

Vaccination has a broad societal and public health impact that is best understood at a population rather than at an individual level. [11]. Transparency in policy-making decisions regarding vaccination programs, providing education and information to the public and health providers about the rigorous process that leads to approval of new vaccines and diversified post-marketing surveillance of vaccine-related events should complement the actions in favor of vaccination [30]. All must take responsibility to encourage and provide the opportunities to vaccinate.

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