Review

To vaccinate or not: literacy against hesitancy

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Abstract. *Background and aim:* Vaccines currently represent the most efficient tool to prevent the spread of potentially life-threatening infectious diseases. However, in the Western world, the widespread nature of vaccinations has led to a reduction in the incidence of these diseases, with a consequent progressive decline in vaccination practice. This phenomenon is further fueled by the anti-vaccine movements which today find fertile ground thanks to the rapid dissemination of information through social media. The present review focuses on three different vaccination target groups, pregnant women, parents, and healthcare professionals, in order to analyze vaccine hesitancy factors and suggest strategies aimed at improving vaccination empowerment. *Methods:* The literature search was conducted on the PubMed database using the keywords "vaccine hesitancy", "mandatory vaccination", "vaccine acceptance", "vaccination barriers", "vaccine AND pregnancy", "vaccine AND healthcare workers", "vaccine AND parents". Only publications in English and Italian were selected. A total of 51 articles were selected for this narrative review in relation to their relevance to the topic under study. *Results and conclusion:* This review highlights the heterogeneity of the reasons behind vaccine hesitancy. Poor adherence to vaccinations should not be interpreted exclusively as an unconditional refusal but rather as an indicator of the lack of information provided by health professionals. In this perspective, a need emerges to strengthen the therapeutic alliance between healthcare workers and patients. Considering the low vaccination coverage rates among health professionals, programs aimed at implementing both their vaccine education and trust in healthcare systems are essential.

Key words: vaccine hesitancy, vaccine literacy, vaccine uptake determinants.

Introduction

Vaccines currently represent the most efficient tool to prevent the spread of potentially life-threatening infectious diseases (1), such as smallpox, pneumococcal infections, polio, and currently the Covid-19 disease (2). Their distribution has allowed for a drastic reduction in the incidence of highly disabling infectious diseases and, in the case of smallpox, has led to its eradication. However, in the Western world, the spread of vaccination has resulted in a "paradoxical effect", since the reduction in the outbreak frequency of these diseases has induced a poor perception of their danger with a progressive decline in vaccination practice. To date, an increasing number of individuals are uncertain about vaccine safety and efficacy and refuse immunization for themselves and their children. This phenomenon is further fueled by anti-vaccine movements, whose roots go back to the adoption of artificial vaccination. This was introduced to the scientific com-

munity by Edward Jenner, who presented the possibility of preventing smallpox by inoculating people with biological material taken from the pustules of infected individuals. After the first mandatory vaccination in history, dictated by the English "Vaccination Act" of 1853, the forerunner of anti-vaccination movements began a battle to counter this obligation. During the nineteenth century, following the discovery of the rabies vaccine by Louis Pasteur, vaccination became increasingly widespread and research on vaccines exploded in the modern age, when artificial immunization represents the safest procedure in the prevention of life-threatening diseases.

In the modern era, anti-vaccine movements have revived following the publication of a study that correlated autism with the anti-MMR vaccine (against measles, mumps and rubella), which was subsequently retracted by the journal because a conflict of interest had emerged. Today, the anti-vaccine movements find fertile ground thanks to the rapid social media dissemination of information which is not anchored to scientific evidence. However, anti-vaccination movements are completely different from so-called vaccine hesitancy, defined by the SAGE working group as *"the delay in acceptance or refusal of vaccination despite the availability of vaccination services"*. Vaccine hesitancy has been an obstacle in achieving herd immunity, so much so that the World Health Organization has defined it as *"one of the 10 greatest threats to global health"*. This complex phenomenon has changed over time and is linked to different geographical areas, periods of history, religious reasons, political backgrounds, personal beliefs, and vaccine types.

Therefore, barriers to vaccine hesitancy can vary according to different population groups and depend on specific determinants which must be considered when facing this problem. With the introduction of vaccinations against the Covid-19 disease, the context of the current pandemic has renewed the focus on this aspect of public health, further influenced in the modern era by the spread of news online (3). In this scenario, it is essential to promote so-called health literacy, defined by the WHO as *"the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways that promote and maintain good health"*. Vaccination literacy aims to promote knowledge commensurate with age, mental capacity, sex, and environment in order to overcome vaccination barriers.

The present narrative review focuses on three different vaccination target groups, pregnant women, parents, and healthcare professionals, to analyze vaccine hesitancy factors and suggest strategies aimed at improving vaccination empowerment.

Methods

The literature search was conducted on the PubMed database using the search strings "vaccine hesitancy", "mandatory vaccination", "vaccine acceptance", "vaccination barriers", "vaccine AND pregnancy", "vaccine AND healthcare workers", "vaccine AND parents". Only publications written in English and Italian were selected. Articles of interest were selected by referring to the abstract. Moreover, the references of the selected articles were also reviewed. A total of 51 articles were included in this review in relation to their relevance to the topic under study.

Results and Discussion

Pregnancy

The Centers for Disease Control and Prevention (CDC) recommends seasonal influenza vaccination, Tdap vaccination (Tetanus, Diptheria, Pertussis) and Covid-19 vaccination during pregnancy and suggests the meningococcal vaccine and vaccine for hepatitis A and B if necessary (4). Immunization of pregnant women has a dual benefit since it reduces maternal mortality and morbidity and protects the fetus in the perinatal period by transferring antibodies via transplacental or breastfeeding. For this reason, pregnant women represent an important target for vaccination. Nonetheless, in industrialized countries, adherence to influenza vaccination has not been optimal for this population group (5). Most of the published studies on vaccine hesitancy during pregnancy concern influenza and highlight that knowledge is the key factor for vaccination acceptance. Due to a lack of information, pregnant women are often unaware of the importance of influenza vaccination for themselves

and their babies and are uninformed about the high risk of complications related to contracting the virus during pregnancy (6,7). A second relevant element is the perception of risk. Poor compliance with vaccination is associated with an impression of influenza and whooping cough as "non-serious" diseases (8-12). An American study showed that the leading determinant of pregnant women getting vaccinated against H1N1 was their awareness of being a risk category. Further determinants in the lack of immunization were distrust in vaccination efficacy and fear of side effects (13,14). An additional element is previous vaccination experience, which is related to greater adherence to immunization (15).

Regarding cultural factors, a higher level of education appears to be associated with greater compliance (16); indeed, a study conducted in Saudi Arabia showed that women in their first pregnancy with a limited cultural level are less informed about the importance of vaccination (17). Regarding the recent Covid-19 pandemic, a recent study shows that the determinants of Covid-19 vaccine hesitancy are varied and include a low perception of the risk of contracting the disease, distrust in the healthcare system, and doubts related to the lack of data from clinical studies. Pregnancy is an event with strong psychological implications, so it is necessary to provide valid scientific and media support to promote vaccinations, given their fundamental role for maternal-fetal well-being. In particular, adequate information about the covid-19 vaccination is required especially for the psycho-social implications that such treatment can have.

Health care workers (HCW)

Healthcare professionals have a higher risk of exposure to serious diseases than the general population and play a major role in transmitting nosocomial infection, which can have a significant impact on hospitalized patients (18), especially the most vulnerable such as the elderly, and oncologists. Despite this, vaccine hesitancy is still common among health workers. Vaccination rates vary in different countries and according to the type of disease, with heterogeneous reasons. As regards influenza, although the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) recommend an annual vaccination, about 76% of HCWs reported having vaccination during the 2020-21 season. Several studies show that the vaccination rate is higher among physicians than nurses and that older healthcare operators adhere more to immunization campaigns. One of the major determinants of this phenomenon is the low perception of the risk of infection and its impression as a "mild illness". As expected, confidence in vaccine efficacy increased compliance with immunization. Koh et al. (found that risk perception appears to be influenced by numerous factors. In the case of severe acute respiratory syndrome, a greater perception of risk was found in health workers who knew people affected, in those who worked in non-university hospitals, and in those who worked in the initial phase of the epidemic. Regarding the Covid-19 vaccine, HCW hesitancy has led some countries to establish mandatory vaccination for health professionals (19). The main reason to refuse this vaccine was the fear of short and long-term side effects, especially considering the speed with which the vaccines were developed and authorized. In addition, a key role was played by a lack of information on such a recently launched vaccine. A further contributing factor was the lack of trust in public health authorities and in pharmaceutical companies.

Health-care workers play a key role in promoting vaccination campaigns and are clearly able to influence the population. also in this case, clear and complete information, including the risks and benefits of vaccines, is essential to create a virtuous circle able to counteract the spread of infectious diseases, in particular covid-19, while relieving the wards of the wards with relative advantages in the economic-health field

Parents

Several factors influence the decision of parents to vaccinate their children. Previous experience with vaccination-preventable diseases (VPD) is associated with increased awareness of the risk of infection; on the other hand, a lack of first-hand knowledge of VPDs such as measles or polio reduces the awareness that these represent a health hazard to their children and shifts the focus from the importance of immunization to possible side effects. To this end, parents often

report that they prefer disease-induced immunity over that provided by the vaccine.

A study on parenting decision determinants on MMR immunization highlighted thatsocio-economic factors such as low income and poor education, poor knowledge, and misconceptions about vaccines are associated with lower vaccination adherence (20). Parental opposition to mandatory vaccinations often arises from false beliefs about vaccine safety. Indeed, some parents are still influenced by an incorrect association between vaccination and autism or Guillain Barre syndrome, although the causal link between immunization and these neurological diseases has never been demonstrated; others are concerned about the presence of mercury in vaccines, whereas it is no longer used as a preservative. Among religious factors, false beliefs about using cells derived from aborted fetuses lead some religious groups to refuse vaccination. An additional fear about papillomavirus (HPV) vaccination is the belief that the vaccine may affect adolescent sexual behaviors.

In this category, it will be crucial to provide adequate information to parents, with targeted campaigns in order to raise awareness about the importance of vaccination for themselves and their children, especially in an era marked by a global pandemic, which saw the spread of psychological discomfort in the youth population due to the lockdown.

Conclusion

This narrative review highlights the heterogeneity of reasons behind vaccine hesitancy. Healthcare professionals play a crucial role in modifying the hesitant behaviors of specific population subgroups such as pregnant women and parents, whose sociocultural phenotype is identified with low education and income (21). For this reason, poor adherence to vaccinations should not be interpreted exclusively as an unconditional refusal but rather as an indicator of the lack of information provided by health professionals. Unfortunately, to date, there appears to be poor awareness of the importance of the information process in changing public misconceptions in order to improve compliance with immunization by health professionals.

A Cochrane review has shown that information provided to parents is often lacking, which raises questions about their decision-making choices.

In addition, there is often a gap in health professionals' knowledge about immunization in children and during pregnancy, which affects the decisions made by this target group. From this perspective, a need emerges to strengthen the therapeutic alliance between HCWs and patients by implementing vaccination education programs for health professionals and introducing modules and good clinical practices in health-related degree courses to solidify effective communication between professionals and citizens. This is aimed at filling the information gap, also fueled by the *filter bubble* phenomenon on the internet, which contributes to radicalizing general opinion through a form of cognitive isolation.

However, it is important to point out that education does not necessarily coincide with health-related literacy; this is no surprise if the low vaccination coverage rates among health professionals are taken into consideration, probably because higher education leads to a more critical attitude towards vaccinations. The crucial role of healthcare professionals in vaccinations requires a local identification of barriers to vaccination acceptance and the development of context-specific national strategies and programs to implement vaccine education and foster trust in healthcare systems.

In the globalized world where diseases can spread more easily and quickly than in the past, since travels and trades are frequent from one continent to another, the approach with the health sector is based on global health (Global Health), with which each National Plan of vaccination prevention must confront each other to ensure to any individual in every part of the the same inalienable rights to health (22,23).

In Italy, Superior Health Institute defined the "Guide to contraindications to vaccinations", which stands as a tool of reference for health professionals working in the field of vaccinations and is intended to provide technical support, based on evidence, for a correct evaluation of contraindications, precautions and warnings to the administration of a vaccine (24,25). The guide is based on, above all, on the unanimous indications of international organizations and official institutions of our and several other countries

that have been elaborated by interpreting scientific knowledge and are aimed at respond correctly not only to the most ordinary evidence but also to situations that are complex or that are rarely presented on the occasion of a vaccination(26,27). The purpose of the guide is, therefore, to make evidence-based operational decisions available to healthcare professionals that allow you to increase the levels of security and appropriateness of the vaccination offer.

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