



Ecological model of health behavior as a methodology for reducing anti-vaccination trends

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Introduction

Vaccines are one of the effective measures of public health practice and preventative medicine to protect the population from diseases and infections. They have contributed to decreasing rates of common childhood diseases and infant and childhood mortality. In some cases, vaccination wiped out diseases that were common in years past, such as smallpox, and have nearly eradicated polio [1].

Resistance to and rejection of vaccination is not a novel phenomenon. There have been anti-vaccination movements at least since 1796 when Edward Jenner invented the smallpox vaccine; however, then, most of the claims against vaccines were witchcraft/religion related. Later, in the nineteenth century, debates around vaccination shifted toward a more scientific approach, but lack of understanding of immune mechanisms still left the vaccination phenomenon unexplained and suspicious. The modern version of the phenomenon can be traced to two significant events: first is the infamous Cutter incident in 1955, in which due to a failure during the production, some batches of polio vaccine given to the public contained live polio virus and as a result significantly undermined the public trust in vaccination, even though it has a factual basis of a real polio outbreak; however, in 1982 anti-vaccination trends turned into the pseudo-scientific direction when NBC broadcasted a documentary, “DPT: Vaccine Roulette”, which discussed controversy spreading in the UK: a suspected connection between the vaccine for pertussis and seizures in young children [2]. Despite the confusion from the public response and appar-

ent confidence of the medical society in vaccination safety, fear started to spread. It suggests that the anti-vaccination sentiment is probably mostly related to the breach/lack of trust between medical professionals and the public. The magnitude of the problem caused the World Health Organization to declare vaccine hesitation as one of the global threats to public health and to declare it a target [3]. A comprehensive analysis of this breach of trust demands establishing behavioral patterns that lead to vaccine hesitancy among the parents. Hornsey et al. [2] work, which mapped behavioral reasoning among the parents of 24 nations for refusing scientifically based vaccinations, found that the phenomenon is global and shares several common traits.

Conspiracy theories

The most common reason for the refusal of vaccinations is conspiratory beliefs [2]. Conspiracy theories, rooted in lack of trust in governmental bodies, cause developing paranoid-like beliefs that “government hiding something.” The major problem of such theories is the almost complete inability to refute them by governmental agencies. Furthermore, attempts to respond to such theories, sometimes perceived as additional attempts of “covering the truth,” and the vicious cycle continues. Another relatively easy target for conspiracy beliefs are large corporations. Due to the significant influence on the population and appearance of “back-door” cooperation with the government—many conspiracy theories connect corporations, governments, and secret, fraternity-like organizations, e.g., the Freemasonry.

Pharmaceutical corporations are not excluded and probably the most defamed corporations in conspiracy theory circles. Most famous vaccine-related conspiracy theories are probably “Mumps, Measles and

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Rubella Vaccine(MMR)-autism theory,” which claims the causality relationship between MMR vaccinations and later diagnosis of autism [4]. Another “theory” claims that the human immune system does not need vaccines, and “natural immunization” is more effective and safe and many other theories and claims that parents sometimes quickly adopt and bring them to refrain from the vaccination [5].

Non-conspirative behavioral patterns

Another pattern of anti-vaccination behavior lies in “reactance” and “individualism.” Anti-conformism and willingness to make personal decisions may lead some people to refuse to accept anything that they cannot understand or perceive in their *OWN* way [2]. This group requires a personal approach and much patience. These people need to be provided with all possible information and be given time to make their conclusion and decision. Another, relatively small group of vaccination objectors is people with underlying fear of medical procedures, needles, and medications. Those cases should be faced with classical psychological management of phobia and can be excluded from this discussion.

Ecological model factors and intervention methods

An ecological approach focuses on both population-level and individual-level determinants of health and healthcare-related interventions. In the ecological model context, factors determine health based on several influence levels: from a public policy level, community, institutional, interpersonal, and intrapersonal factors.

- On the policy level, there is a place to establish a mandatory vaccination routine for educational establishments (e.g., schools, kindergartens). It may increase the ratio of vaccination just by “forcing” parents with legislation; however, it may increase anti-governmental attitude and deepen conspiracy theories. Thus, policy-based action cannot be a “stand-alone” measure.
- On the community level, we find not only a classical community but also the internet medium. Current research in anti-vaccination incidence finds many similarities between developed countries with advanced internet access [2]. Open and unmediated access to medical information online has dramatically changed the healthcare industry dynamics and patient-physician interactions in recent years. Medical knowledge that was previously bound solely to textbooks and journals, and held primarily by medical professionals, is now accessible to anyone; however, an average online user may not distinguish between reliable and bogus sources; thus, the Internet became a vital tool in the hands of anti-vac-

ination “gurus” [4]. Online anti-vaccination publishers use various tactics to promote their ideas. They include but are not limited to pseudo-science, using medicine-like terminology, aggressive censorship of any opposition, attacking critics, claiming to be “pro-safe healthcare,” and not “anti-vaccine,” claiming that vaccines are toxic or unnatural. Most of the online activity brings us back to conspiracy theories, and due to the nature of the internet medium, it is very hard to deploy effective behavioral interventions. The positive online campaign to promote vaccination and show transparency regarding the mechanism of research and vaccine development may have desirable effects; however, it should include the option of two-way communication via the Internet to answer questions and address issues in real-time. An additional factor that should receive attention on the community level is the increased incidence of anti-vaccination-related diseases and conditions (e.g., autism). An increased number of cases of the specific, conspiracy-related diseases in a relatively small geographic area may lead to a more rapid expansion of anti-vaccination theories and undermine any attempt to correct the situation [6].

- On an institutional level, a positive behavioral intervention can be done by promoting vaccination among employees based on the personal example of influential persons, e.g., institutional management and celebrities, to help people assume behavior based on social cognitive theory.
- Interpersonal and Intrapersonal factors are crucial for effective behavioral intervention, and leading roles in these interventions lay on the medical professional community. Several conversation strategies are recommended for use when interacting with vaccine-hesitant parents. These include managing honest and respectful dialogue, refraining from paternalism, which has been suspected as a contributing factor for malicious provider-patient relationships [4]. Acknowledging the risks of a vaccine is also essential but balancing them against disease risk is the right way to present them. No less crucial is referring parents to reputable sources about vaccination and maintaining ongoing conversations with vaccine-hesitant families. Additional aspects of intervention on an interpersonal level lay with community-level interaction. Several studies showed that information disseminated by peer parents is usually better assumed and accepted than information from official and medical sources [7]. Thus, it might be useful to interact with positively oriented families within the community to provide them with relevant information and to allow them to interact with anti-vaccination families directly. An additional crucial contributing factor to anti-vaccination trends comes from religion: Hinduism, Ultra-Orthodox Judaism, Jehovah’s Witnesses, and several more [4]. Healthcare

providers from the same religion can do the most successful intervention in these cases, and all possible religions and confessions are represented in the modern healthcare system and must be utilized to address specific issues of these populations.

Conclusion

Vaccine hesitancy and vaccine refusal are incredibly complex social issues that require interventions at the individual, provider, healthcare system, and national levels. The rise of anti-vaccination movements in different parts of the world poses an immediate danger to public health, especially for vulnerable groups that cannot be vaccinated, such as immune-suppressed patients [5]. As a result, people of all ages are affected by recent outbreaks of measles, one of the most notable eliminated diseases that made a comeback as a direct consequence of not reaching the immunization threshold due to anti-vaccination trends [8]. From a public health perspective, the phenomenon may impact beyond just specific disease incidence but extend across the life course of a vaccinated person, prevent outcomes on the broader community, reduce healthcare spending and hospitalization ratio, stabilize health systems, promote health equity, and benefit economies on the local and international levels. The degree to which vaccinations provide comprehensive public health benefits is more substantial than for other preventive and curative interventions; thus, the intervention to correct anti-vaccination behavior should be located on the list of national priorities of all countries. Current research regarding vaccine hesitation suggests that the vast majority of the vaccine hesitation exhibits behavior patterns consistent with the ecological model of health behavior. Structured intervention at all levels may contribute to reducing the phenomenon among hesitating parents and declining the power of anti-vaccination gurus. It is essential to combine any legislation attempt with a comprehensive behavioral approach on the healthcare provider level to diminish conspiracy beliefs, which appear to be the most significant factors in bringing parents to

endanger their children based on pseudo-scientific information doubtful sources.

Conflict of interest A. Braverman declares that he/she has no competing interests.

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