



Commentary

A clinical perspective of the U.S. anti-vaccination epidemic: Considering marginal costs and benefits, CDC best practices guidelines, free riders, and herd immunity

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In recent times, there has been an increase in vaccine hesitant families (VHFs): those who decline or delay their own or their children's vaccinations for non-medical reasons. As this trend continues, communities' herd immunity to vaccine preventable diseases (VPDs) will decrease. To guide providers caring for VHFs, the Center for Disease Control (CDC) published the *General Best Practice Guidelines for Immunizations* as developed by its Advisory Committee on Immunization Practices (ACIP) [1]. These guidelines are comprehensive, and include specific recommendations for infants, children, adolescents, and adults, addressing the education

and communication needs of VHFs. This paper argues, from the clinical perspective, that patients, US healthcare payers, providers, and national healthcare quality organizations (collectively hereinafter 'public health stakeholders') will benefit from the following two vaccination supportive measures improving care for VHFs during this anti-vaccination epidemic. First, physicians should have the full confidence that the use by insurance payers of future vaccination performance ratios (VPRs) and pay for performance (PFP) incentives will be updated to align fully with the CDC's current best practice guidelines for immunizations. Second, since clinical physicians and patients must confront a widely subscribed cultural VH community narrative, they need the additional support of community wide, professionally produced counter-marketing communication. Given the breadth and availability of rich evidence on

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effective means for physicians to promote vaccination in clinical settings [2,3], further detailed review of this literature is beyond the scope of this commentary. The authors, of course, encourage all physicians to continue employing this acknowledged rich evidence [2,3] for effective interventions for promoting vaccinations in clinical settings. However, because clinical physicians currently face overwhelming opposition from the existing cultural VH narratives, clinicians and VHF need more support to reach the accepted vaccination goals for herd immunity.

1. VPRs should align fully with all the CDC's current best practice guidelines for immunizations

The CDC guidelines recommend that physicians communicate with VHF using an empathetic approach to facilitate VHF's informed vaccination choices. There is no practical way to measure physicians' efficacy in using empathy. Nevertheless, national quality organizations and thus insurance payers have down-graded healthcare provider systems and physicians for increasing numbers of VHF in their VPRs, regardless of whether or not those physicians' practices embraced the full measure of the CDC's best practice guidelines for immunizations. Thus, current VPRs will reward physicians either to administer vaccinations by any means necessary or discharge VHF from their practices.

Of course, physicians may discharge VHF for a multiplicity of reasons other than current VPR incentives. For example, working with VHF takes extra time, which is of limited supply in the clinical setting, and thus an expensive resource. Seeing VHF in the office may risk VPD exposures to other vulnerable patients and to staff, or even create a feared legal risk for physicians. Regardless, lost VPR incentives further increases the marginal cost for physicians caring for VHF. Indeed, a majority of a group of physicians surveyed reported that VPR incentives were among the multiplicity of reasons why physicians discharged VHF from their practices [4,5]. Apparently, as currently designed, VPRs further dissuaded at least some physicians from caring for VHF, and also published literature shows this marginal effect is more than theoretical [5]. The investigators Flanagan-Klygis found that an estimated 75% of a group of pediatricians reported that the increased marginal costs of VPRs had influenced their decision to discharge VHF from their practices [5]. All this is evidently in opposition to the CDC best practice guidelines. The negative consequences of such VHF discharges include loss of primary care homes, loss of long-term relationships, and increased use of expensive emergency department episodic care. VHF once discharged from their medical home may then seek alternative medicine educators who do not teach germ theory, reinforcing VH and further eroding communities' herd immunity.

Though unintended, the consequences of current VPRs are two-fold. First, they increase the marginal cost of caring for VHF thus shrinking their access to necessary future health services. Second, VHF may perceive their physician's potential discharge as "persuading by using threats" [6]. Of course, it is the act of threatening patients, not any actual VHF discharge, that is contrary to ethical medicine [6], and conflicts with the recommended physician empathy from the CDC's best practice guidelines for immunizations. Consequently, those representing public health stakeholders should collectively embrace an effort to improve the current design and the use of future VPRs to align fully with the CDC's *general best practice guidelines for immunizations*. Such an updated VPR would separately track the VHF cohort so that VHF may be removed from any VPR incentive programs. Then health policy researchers also may study VPR data to increase vaccinations among VHF. The American Medical Association approved one or more ICD-10 diagnosis codes, such as z28.21 to z28.82, that could be used to identify

and study the VHF cohort data for health policy research. Thus, physicians applying these AMA approved diagnosis codes properly, will distinguish VHF in data, improve data for VHF research, and reduce some of the incentives to discharge VHF from their practices.

Still, updating current VPRs will not, in isolation, be sufficient to remedy the fact that VHF are becoming more prevalent, cases of VPDs are increasing, and herd immunity is dwindling. Importantly, VHF should understand the full consequences of rejecting vaccinations for themselves and their children as well as for the communities in which they live, work, and play. Because vaccination herd immunity depends on the collective sum of individual choices, then widely communicating the relevant and practical community benefits of vaccination herd immunity seems reasonably appropriate.

2. A tragedy of the commons: Free-rider VHF threaten herd immunity as free-riders risk the lives of the medically vulnerable

The community benefits of herd immunity are greater than the possible sum of all personal benefits of immunization [6]. However, accepting vaccinations is not devoid of individual "small, but non-zero risks associated with vaccines" [7]. VHF may even read on the CDC website that "...there is a very remote chance of a vaccine causing a severe allergic reaction, other serious injury, or death" [8]. Consequently, VHF may decide that even small, non-zero risks outweigh their own child's vaccination benefit. Since participation is dependent upon personal motives, the authors assert that some VHF may choose to decline vaccines as free-riders because they seek the community's herd immunity benefit without even the small personal risks associated with vaccines. The challenge then becomes how to educate these free-rider VHF to accept the small, non-zero vaccination risks, even as the risk of VPDs continues to decrease due to the success of herd immunity?

Often, the focus of public policy seems to be on minimizing the personal marginal vaccination costs by removing vaccine barriers and decreasing financial burdens. The proposal offered here requests that public health stakeholders create and provide counter-marketing, that should be broadly deployed in communities. Widely provided counter-marketing should not only correct the ubiquitous false vaccine information but also publicize that free-rider VHF should share in their community's efforts to support herd immunity. The fairness narrative may result in a decline in the number of free-rider VHF.

Public health communication with counter-marketing campaigns are an existing public health strategy [9]. Public health stakeholders have not yet extensively recommended counter-marketing to promote the uptake of vaccinations in the US; however, these types of campaigns have been highly effective in reducing tobacco use and smoking in the US [9]. If these stakeholders employed counter-marketing strategies also to promote wider public awareness for community-centered values, while still including the personal benefits for individual VHF, then there could be downward shift in the number of free-rider VHF. The US is a largely individualistic society, yet community-centered counter-marketing may have the potential to be a necessary means to reach the free-rider VHF. Many people value being known for making the best decisions possible for themselves, their families, and their communities. Such counter-marketing may also expand social civility for the apparent hostility surrounding the current U.S. anti-vaccination epidemic [10].

In conclusion, we believe that the CDC's *General Best Practice Guidelines for Immunizations* require vaccine providers to employ

an empathetic approach to understand the concerns of VHF. Further, if VHF remain decidedly hesitant, then their providers should not be accountable through VPRs or other incentives. Thus, any such incentives should be updated to align with the CDC guidelines more fully. Freeing providers from the increased marginal cost of VPR accountability for determined VHF is a worthy goal that is in alignment with the CDC guidelines, improved patient care outcomes, and the maintenance of herd immunity. Additionally, public health stakeholders should create and widely provide counter-marketing that not only corrects the ubiquitous false vaccine information but also will publicize that free-riders should share in their community's efforts to support herd immunity. A fairness narrative may result in a decline in the number of free-rider VHF. Such renewed efforts by all public health stakeholders to reach VHF could be the impetus for increasing vaccination uptake.

CRediT authorship contribution statement

Michael G. Anderson: Conceptualization, Project administration, Visualization, Writing - original draft, Writing - review & editing. **Eric A. Ballinger:** Conceptualization, Writing - original draft, Writing - review & editing. **David Benjamin:** Conceptualization, Writing - original draft, Writing - review & editing. **Lawrence D. Frenkel:** Conceptualization, Writing - review & editing, Supervision. **C. William Hinnant:** Conceptualization, Writing - review & editing. **Karin W. Zucker:** Conceptualization, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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