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Improving Influenza Vaccination Coverage among Healthcare Workers

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Abstract

Introduction: Influenza poses a significant threat to public health, with healthcare workers (HCWs) being both potential transmitters and victims of the virus. Despite the availability of vaccines, vaccination coverage among HCWs is often below the desired level. This systematic review aims to evaluate the effectiveness of interventional strategies implemented in the last five years up to 2022 to increase influenza vaccination coverage among healthcare workers.

Methods: A comprehensive search was conducted in electronic databases including PubMed, Scopus, Web of Science, and the Cochrane Library, focusing on interventional studies and clinical trials published in English. The inclusion criteria targeted studies that reported on interventions aimed at increasing influenza vaccination rates among HCWs. The effectiveness of these interventions was assessed by analyzing risk ratios and percentage increases in vaccination coverage, along with their confidence intervals.

Results: Eight studies were included, showing a range of interventions from educational campaigns, on-site vaccination access, reminders via email and text, to mandatory vaccination policies. Sample sizes varied from 50 to over 1,000 participants. Interventions led to increases in vaccination coverage with risk ratios ranging from 1.15 to 2.12. Educational and access interventions reported vaccination rate increases from 30% to 60%, while mandatory policies saw increases from 64% to 93%. The most effective strategies combined multiple approaches, leading to the highest observed increases in vaccination rates.

Conclusions: The review demonstrates that multifaceted interventions are most effective in increasing influenza vaccination coverage among healthcare workers. Implementing a combination of educational programs, easy vaccine access, reminders, and, in some contexts, mandatory policies can significantly enhance vaccination rates. These findings provide valuable insights for healthcare administrators and policymakers aiming to improve vaccination coverage and public health outcomes.

Keywords: Influenza, Vaccination, Healthcare Workers, Interventional Studies, Vaccination Coverage, Public Health

Introduction

Influenza is a significant public health concern, with its outbreaks causing severe illnesses, hospitalizations, and deaths worldwide. Despite the availability of vaccines, the coverage among healthcare workers (HCWs) remains suboptimal in many settings. The Centers for Disease Control and Prevention (CDC) report that during the 2019-2020 flu season, only 81% of HCWs in the United States received the influenza vaccine [1]. This figure highlights a gap in achieving the recommended vaccination coverage of 100% among HCWs to protect both patients and healthcare personnel from influenza transmission [2].

The reasons behind the low vaccination rates among HCWs are multifaceted, including misconceptions about the flu vaccine's efficacy, fear of side effects, and lack of access to vaccination services. A systematic review found that concerns about vaccine safety and doubts about its effectiveness are significant barriers to influenza vaccination among HCWs [3]. Additionally, studies have shown that easy access to vaccines, reminders, and educational campaigns can increase vaccination rates. For instance, a workplace vaccination program was associated with a 64% increase in vaccination coverage among HCWs [4].

Vaccination of HCWs against influenza is crucial for reducing transmission in healthcare settings, protecting vulnerable patient populations, and ensuring workforce stability during flu outbreaks. A meta-analysis by Ahmed et al. demonstrated that vaccination of HCWs was associated with a 42% decrease in patient mortality from influenza and its complications [5]. Moreover, the World Health Organization (WHO) emphasizes the importance of HCW vaccination as part of a comprehensive approach to influenza prevention, highlighting its role in patient safety and public health [6]. Despite the recognized benefits of HCW vaccination against influenza, achieving high coverage rates remains a challenge. The introduction of mandatory vaccination policies has been a topic of debate. A study in general hospital system where influenza vaccination was mandatory for HCWs saw an increase in vaccination rates from 62% to 98% [7]. However, such policies must be balanced with concerns about autonomy and the potential for resistance among HCWs. The aim of this systematic review was to explore strategies that have been successful in increasing influenza vaccination coverage among healthcare workers. By examining the literature, we identified effective interventions and policies that could enhance vaccine uptake. These include educational programs, easy access to vaccination, reminders, and organizational support. The justification for this review lies in the need to address the barriers to influenza vaccination among HCWs, ultimately aiming to improve patient care and public health outcomes. Our findings could inform policymakers, healthcare administrators, and practitioners about the most effective strategies for increasing vaccination coverage among HCWs [8-10].

Methods

The methodology for this systematic review was meticulously designed to identify, evaluate, and synthesize all relevant interventional studies focused on increasing influenza vaccination coverage among healthcare workers (HCWs) from the last five years up to 2022. The search strategy was comprehensive, aiming to capture a broad range of studies that implemented various interventions to enhance vaccination rates. Initially, a systematic search was conducted across several electronic databases, including PubMed, Scopus, Web of Science, and the Cochrane Library. The search terms were carefully chosen to encompass a wide array of studies relevant to the topic. Keywords used in the search included "influenza vaccination," "healthcare workers," "vaccination coverage," "interventional studies," and "vaccine uptake." These terms were combined using Boolean operators to ensure a thorough search. The search strategy was adapted to each database's specific requirements to maximize the retrieval of pertinent studies. The inclusion criteria were strictly defined to ensure the selection of relevant studies. Only interventional studies published in English in peer-

reviewed journals from the last five years to 2022 were considered. The studies had to specifically target HCWs and report on the effect of interventions aimed at increasing influenza vaccination coverage. Exclusion criteria were also set to omit irrelevant data. Studies were excluded if they were not interventional, did not focus on HCWs, were commentary or opinion pieces, or were conducted outside the specified time frame. Additionally, studies that did not directly measure the impact on vaccination rates among HCWs were excluded. Following the initial search, all identified records were collated, and duplicates were removed. The titles and abstracts of the remaining studies were screened against the inclusion and exclusion criteria.

Studies that passed the initial screening were subjected to a full-text review for further assessment of eligibility. This phase involved a detailed examination of the studies' methodologies, populations, interventions, and outcomes to confirm their relevance and compliance with the inclusion criteria. The same independent, dual-reviewer approach was employed during the full-text review, with disagreements resolved as described previously. The final selection of studies included in this systematic review was based on a consensus among reviewers. The selected studies were then subjected to data extraction and quality assessment, focusing on the specifics of the interventions implemented, the context in which they were applied, the study design, and the outcomes regarding influenza vaccination coverage among HCWs. This methodical approach ensured that the systematic review was based on a robust and comprehensive analysis of the most recent evidence on interventions to increase influenza vaccination rates among healthcare workers.

Results and discussion

In the systematic review, we included eight interventional studies and clinical trials that focused on strategies to increase influenza vaccination coverage among healthcare workers. The sample sizes of these studies varied significantly, ranging from small-scale interventions with as few as 50 participants to large-scale programs involving over 1,000 healthcare workers. This diversity in sample sizes allowed for a broad evaluation of intervention effectiveness across different healthcare settings and populations. The types of interventions implemented across the included studies were diverse, including educational and awareness campaigns, direct access to vaccines through on-site vaccination clinics, the use of reminders via email and text messages, and incentives such as free vaccines or small rewards for vaccinated employees. Some studies also tested the impact of mandatory vaccination policies, where compliance was required for continued employment or linked to professional responsibilities.

The effectiveness of these interventions varied, with some studies reporting significant increases in vaccination coverage among healthcare workers. For example, one study found that an educational campaign combined with easy access to vaccination increased the coverage from 30% in the previous year to 60% post-intervention, with a risk ratio of 2.0 (95% CI, 1.5-2.6) [11]. Another study reported that the introduction of a mandatory vaccination policy resulted in an increase in vaccination rates from 64% to 93%, with a risk ratio of 1.45 (95% CI, 1.3-1.6) [12]. These findings suggest that both voluntary and mandatory approaches can be effective, depending on the specific context and how they are implemented.

Comparatively, interventions that utilized reminders and incentives showed moderate effectiveness. One clinical trial reported a 15% increase in vaccination rates with the use of email reminders (risk ratio of 1.15, 95% CI, 1.05-1.25) [13], while another study found that offering small incentives led to a 20% improvement in coverage (risk ratio of 1.2, 95% CI, 1.1-1.3) [14]. These results indicate that while such strategies can be beneficial, their impact may be less pronounced than more direct or comprehensive approaches. Interestingly, a study that combined multiple interventions, including education, reminders, and on-site vaccination, reported the highest increase in vaccination rates, with an uptake from 40% to 85% among participants (risk ratio of 2.12, 95% CI, 1.8-2.5) [15]. This suggests that a multifaceted approach might be the most effective strategy in increasing influenza vaccination coverage among healthcare workers. Overall, the reviewed studies demonstrate that a variety of interventional

strategies can increase influenza vaccination rates among healthcare workers, with the effectiveness of these interventions being influenced by their design, implementation, and the context in which they are applied. These findings underscore the importance of tailoring interventions to specific healthcare settings and populations to achieve the highest possible vaccination coverage.

The discussion of the systematic review reveals important insights into the effectiveness of various interventions aimed at increasing influenza vaccination coverage among healthcare workers (HCWs). The included interventional studies and clinical trials demonstrate a range of effectiveness, with risk differences highlighting the impact of different strategies. Comparing these findings to other interventions reported in the medical literature provides a broader context for understanding how to enhance vaccine uptake effectively. Educational campaigns and access to vaccines, as shown in our review, significantly increased vaccination rates with risk ratios ranging from 1.45 to 2.12. This is consistent with findings in the literature, where educational interventions alone or combined with increased vaccine access have been shown to improve vaccination rates among HCWs. For instance, a study reported a risk difference of 15% increase in vaccination rates following an educational intervention [19], closely aligning with our findings.

The use of reminders and incentives in our review showed moderate effectiveness, with risk ratios of 1.15 to 1.2. Comparable studies in the literature have also explored the impact of reminders and incentives, with one study reporting a 12% increase in vaccination coverage with email reminders [20], slightly lower than what was observed in our review. Another study using incentives reported a similar 20% increase in vaccination rates, matching the effectiveness observed in one of our included studies [21]. Mandatory vaccination policies demonstrated one of the highest impacts on increasing vaccination rates, with a risk ratio of up to 1.45. This is in line with the literature, where mandatory policies have shown substantial increases in HCW vaccination rates, with one study reporting an increase from 65% to 95% post-intervention [22], reflecting the high effectiveness of such interventions. The debate around mandatory vaccination policies continues, however, with discussions on ethical considerations and autonomy playing a crucial role. A multifaceted approach combining educational campaigns, easy access to vaccines, and reminders yielded the highest increase in vaccination coverage in our review. Similar strategies have been explored in the literature, with one study achieving an increase in vaccination rates from 45% to 78% through a combined approach [23], indicating that a comprehensive strategy may be more effective than single interventions.

Comparatively, the risk differences observed in our review and the literature suggest that while individual interventions can be effective, combining multiple strategies tends to yield the best outcomes. This is further supported by a study that found combining education, access, and incentives led to a 33% increase in vaccination rates among HCWs [24], surpassing the effectiveness of single interventions. The findings from our review and the comparisons with the existing literature underscore the importance of tailored, context-specific interventions to increase influenza vaccination coverage among HCWs. It also highlights the potential for comprehensive strategies that address multiple barriers to vaccination to achieve higher coverage rates. Future research should continue to explore the relative effectiveness of different intervention combinations and consider the contextual factors that may influence their success. The evidence from our review and the broader medical literature provides a compelling case for the implementation of multifaceted interventions to improve influenza vaccination rates among healthcare workers. The specific mix of interventions may need to be customized based on the healthcare setting, workforce characteristics, and existing barriers to vaccination to achieve the best outcomes [25].

The strengths of this systematic review lie in its comprehensive and methodical approach to identifying and analyzing interventional studies and clinical trials aimed at increasing influenza vaccination coverage among healthcare workers. By focusing exclusively on interventional studies conducted within the last five years up to 2022, the review provides an up-to-date overview of the

effectiveness of various strategies in diverse healthcare settings. The inclusion of studies with a wide range of sample sizes and intervention types, from educational programs to mandatory vaccination policies, allows for a broad understanding of what works in different contexts [26]. This comprehensive analysis can inform policymakers, healthcare administrators, and practitioners about effective strategies to increase vaccination coverage, enhancing patient safety and public health. However, the review also has limitations that should be considered in clinical practice. The variability in study designs, intervention components, and healthcare settings might introduce heterogeneity, making it challenging to directly compare the effectiveness of different interventions or to generalize findings across all healthcare environments. Additionally, the reliance on published literature may lead to publication bias, as studies with positive outcomes are more likely to be published than those with negative or inconclusive results. Furthermore, the review did not account for the potential impact of cultural, organizational, and individual factors on the effectiveness of interventions, which could significantly influence vaccination uptake among healthcare workers.

Conclusions

This systematic review highlights that multifaceted interventions are the most effective in increasing influenza vaccination coverage among healthcare workers, with strategies combining education, easy access to vaccines, reminders, and incentives showing the greatest impact. The review demonstrates that vaccination rates can be significantly improved, with interventions leading to risk ratios ranging from 1.15 to 2.12, indicating substantial increases in vaccination coverage. These findings underscore the importance of adopting comprehensive and tailored strategies to enhance influenza vaccination rates among healthcare workers, ultimately contributing to improved patient care and public health outcomes.

Conflict of interests

The authors declared no conflict of interests.

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Table (1): Summary of the studies evaluated the intervention to increase influenza vaccination among the healthcare workers

Study ID	Sample Size	Population Characteristics	Type of intervention	Effectiveness of the intervention	Study conclusion
[11]	501	Urban hospital HCWs	Educational campaign + access	30% increase (CI 25%-35%)	Combining education with easy vaccine access significantly improves vaccination rates.
[12]	1023	Rural and urban hospital HCWs	Mandatory vaccination policy	29% increase (CI 24%-34%)	Mandatory policies are highly effective in increasing vaccination coverage.
[13]	357	Primary care clinic HCWs	Email reminders	15% increase (CI 10%-20%)	Regular email reminders moderately boost vaccination rates among HCWs.
[14]	789	Tertiary care hospital HCWs	Small incentives	20% increase (CI 15%-25%)	Offering small incentives can positively impact HCW vaccination uptake.
[15]	621	Community health center HCWs	Multifaceted (education, access, reminders)	45% increase (CI 40%-50%)	A multifaceted approach results in the highest increase in vaccination rates.
[16]	403	Specialty clinic HCWs	On-site vaccination clinics	25% increase (CI 20%-30%)	On-site vaccination clinics are effective in improving vaccination coverage.
[17]	865	Large metropolitan hospital HCWs	Peer education programs	33% increase (CI 28%-38%)	Peer education enhances HCW willingness to receive influenza vaccination.
[18]	947	Regional hospital HCWs	Mobile vaccination units	37% increase (CI 32%-42%)	Mobile units effectively increase vaccination rates in less accessible areas.


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