Vaccine: X 20 (2024) 100544



Contents lists available at ScienceDirect

Vaccine: X

journal homepage: www.elsevier.com/locate/jvacx





Logistic and organizational barriers to herpes zoster vaccination in europe: A systematic review

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ARTICLE INFO

Keywords:
Herpes Zoster
Barriers
Vaccination
Systematic review

ABSTRACT

Background: The Herpes Zoster (HZ) poses a significant public health threat, leading to morbidity and occasional mortality in unvaccinated adults aged 50 and older. With over 95 % of individuals in this age group globally having prior exposure to Varicella-Zoster Virus, a substantial portion of the world's population is susceptible to developing HZ. Without vaccination, individuals reaching 85 years face a 50 % lifetime risk of HZ. Organizational and logistical barriers further hinder vaccination efforts, involving complexities in cost management, demanding vaccine storage requirements, supply limitations, distribution challenges, absence of a streamlined status collection system, and healthcare system deficiencies.

Methods: A systematic review was conducted on the studies that examined the logistical and organizational barriers to HZ vaccination among frail and older adults, aligning with the PRISMA guidelines. Eligibility criteria focus on English studies in Europe, excluding pediatric or irrelevant populations. Rayyan AI was used for data extraction, and bias was assessed using the AXIS tool.

Results: After excluding 841 based on titles and abstracts, 22 publications were selected. A thorough analysis identified 4 studies meeting inclusion criteria, conducted between 2009 and 2022, unveiling several barriers on HZ vaccination: challenges with healthcare professionals, obstacles related to patients' perceptions and knowledge, difficulties in accessibility, structural issues, social dynamics.

Conclusions: The study represents a comprehensive examination, emphasizing the need for targeted interventions to overcome these barriers. The findings underscore the urgency of addressing these challenges to enhance vaccination rates and mitigate the public health burden associated with HZ.

Introduction

Herpes zoster (HZ), a common, painful, and debilitating condition caused by a reactivation of the varicella-zoster virus (VZV) from a latent infection of sensory ganglia [1,2], presents a significant public health challenge, causing morbidity and, albeit less frequently, mortality in unvaccinated adults aged 50 years or older [3]. Patients affected by HZ typically endure significant pain [4], which substantially influences their health, quality of life, and healthcare expenditures [5]. This burden increases with age and is mainly attributed to potential complications of the condition [6].

Robust evidence indicates that the age-specific incidence of HZ has risen over the last seven decades, even in nations where varicella immunization has effectively eliminated varicella [7]. The global incidence rate of HZ varies from 3 to 5 per 1000 person-years, reaching 5.23 to 10.9 per 1000 person-years for those aged 50 years and above, with a lifetime risk of HZ surpassing 30% [8]. In the European Union, 1.7 million cases of HZ are estimated annually [9], causing substantial health, economic, and social burdens across the region [10].

Vaccination has become the standard of care in developed countries for mitigating the disease burden and complications associated with HZ in older adults [11]. In select European countries, routine vaccination schedules include Zoster Vaccine Live (ZVL) alongside the recombinant zoster vaccine (RZV), recommended for those aged 50 to 65 and older [12–15].

In the absence of universal immunization, the disease burden of

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https://doi.org/10.1016/j.jvacx.2024.100544
Received 29 April 2024; Received in revised form 17 June 2024; Accepted 1 August 2024
Available online 3 August 2024
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Varicella-Zoster Virus (VZV) would be substantial, with an annual total of 5.5 million cases across Europe, leading to 3–3.9 million varicella patients consulting a primary care physician, 18,200–23,500 hospitalizations, and 80 (95% CI: 19–822) varicella-related deaths [15]. Understanding the broader implications of varicella vaccination is crucial as it impacts the occurrence and severity of HZ, indirectly reducing both the frequency and severity of HZ cases [16–19].

Considering that over 95% of individuals aged 50 and above globally have previous exposure to VZV, a significant portion of the world's population is at risk of developing HZ [20]. Without vaccination, individuals who reach the age of 85 face an approximately 50% lifetime risk of developing HZ [21].

In 2014, the World Health Organization (WHO) recommended that countries capable of sustaining a vaccine coverage of at least 80% should consider introducing varicella into routine childhood immunization programs [22]. However, as of 2021, less than 50% of European countries have implemented Universal Varicella Vaccination (UVV) or have national recommendations for universal vaccination [23].

Vaccination uptake is influenced by multiple factors, including sociodemographic, cognitive, psychological, political, and cultural contexts [24]. Barriers to vaccination are often exacerbated by misleading news spread through media [25], with a clear and established correlation between belief in conspiracy theories and vaccine hesitancy and refusal [26]. Further barriers to vaccination arise from organizational and logistical challenges, including complexities in cost management, demanding requirements of vaccine storage, limitations in vaccine supply and distribution, the absence of a streamlined system to collect and consolidate individual vaccination statuses, and deficiencies in the overall organization of the healthcare system [27].

Despite the consistent body of literature regarding facilitators and factors influencing HZ vaccination, limited research has focused on organizational and logistic barriers to vaccination uptake. The aim of this systematic review is to comprehensively assess and analyze the barriers and challenges hindering the uptake of HZ vaccination among various populations. We intend to investigate and synthesize the existing evidence on factors that deter individuals from getting vaccinated against HZ, aiming to implement public health strategies and interventions that can effectively promote HZ vaccination. To the best of our knowledge, this systematic review is the first to address this topic.

Methods

This systematic review, focused on studies that examined the role of logistical and organizational barriers in the uptake of HZ vaccination among frail and older adults, was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [28].

Eligibility criteria

The study employed specific eligibility criteria (Table 1). These criteria included studies published in English, reporting original research (e.g., cohort studies, cross-sectional studies, case-control studies, or qualitative investigations), and conducted in Europe. We included studies focusing on older (age >65 years) and frail (age >18 years) population, defined as individuals with an elevated susceptibility to contracting or developing Herpes Zoster due to underlying immunodeficiency and immunosuppression stemming from either pathological conditions or therapies [29], regardless of gender, race, and socioeconomic status, as long as they met the eligibility criteria for HZ vaccination as per local vaccination guidelines and recommendations.

Studies exclusively involving paediatric populations (age <18 years), or specific sub-populations, not relevant to frail and older adults (e.g., pregnant women, individuals with contraindications to vaccination) were excluded. Studies that did not address logistical and/or organizational barriers to HZ vaccination were excluded. Finally, studies were excluded if full-text was not available.

Table 1
Eligibility criteria.

Inclusion Criteria	Exclusion Criteria
Published in English.	Non-Published in English.
Original research.	Non-original research (e.g., reviews, *meta*-analyses).
Conducted in Europe.	Conducted outside of Europe.
Involving older age > 65 years and frail population (age > 18 years).	Paediatric populations (age < 18 years).
Focused on logistical and/or organizational barriers.	Specific sub-populations not relevant to frail and older adults. Not focused on logistical and/or organizational barriers to vaccination. Other study types not meeting specified criteria (e.g., randomized controlled trials).

Search strategy

The primary search was conducted in PubMed. The research team developed the search strategy by examining relevant articles identified through their expertise and conducting exploratory searches on the logistic and organizational barriers associated with HZ vaccination within the PubMed database. Additional database searches mirrored the core PubMed search and encompassed the following databases: Embase, PsycINFO (EBSCOhost), Health Technology Assessment Database, and Web of Science (Clarivate). These searches covered the period from the inception of each database up to the search date, which was September 18, 2023.

The search strategy employed a combination of keywords and Boolean operators (Table 2). The keywords used to identify logistic and organizational barriers to HZ vaccination included terms such as *("Herpes Zoster Vaccines" OR "Herpes Zoster" OR "Shingles Vaccine" OR "HZV Vaccine" OR "Zostavax" OR "Shingrix" OR "Varicella Zoster Vaccine" OR "RZV" OR "ZLV") AND ("Barrier*" OR "Obstacl*" OR "Hesita*" OR "Constrain*" OR "Hurdle*" OR "Logistic*" OR "Organizatio*" OR "Operation*" OR "Administrativ*" OR "Health system" OR "Access")*.

Additional relevant papers were manually searched for reference lists of collected studies and reviews. Grey literature was not considered, as well as conference papers, dissertations, letters, and editorials.

Data extraction and quality assessment

Three reviewers (AB, MM, MS) autonomously examined all citation titles and abstracts to assess eligibility, utilizing Rayyan Artificial

Table 2
Search terms used for papers' identification.

Terms for Herpes Zoster Vaccines	AND	Terms for Barriers
"Herpes Zoster Vaccines"		"Barrier*"
OR		OR
"Herpes Zoster"		"Obstacl*"
OR		OR
"Shingles Vaccine"		"Hesita*"
OR		OR
"HZV Vaccine"		"Constrain*"
OR		OR
"Zostavax"		"Hurdle*"
OR		OR
"Shingrix"		"Logistic*"
OR		OR
"Varicella Zoster Vaccine"		"Organizatio*"
OR		OR
"RZV"		"Operation*"
OR		OR
"ZLV"		"Administrativ*"
		OR
		"Health system"

Intelligence [30] to identify those adhering to the inclusion criteria. Duplicate entries were eliminated, and in cases where the abstracts lacked sufficient information to ascertain eligibility, the complete papers were retrieved for additional evaluation. Any uncertainties regarding the articles were resolved through discussions involving the senior reviewer (RP) in the decision-making process.

Subsequently, the three reviewers extracted data from included studies on study setting, participant characteristics, healthcare setting, interventions, and outcomes measured.

As appropriate for the prevalent study design risk of bias was assessed for the included studies using AXIS tool [31].

Results

Study selection

Initial search yielded a total of 873 studies. Using the Rayyan application, duplicate studies were removed, resulting in a database of 863 studies. After evaluating their titles and abstracts, 841 studies were excluded. The remaining 22 publications underwent a full-text review, which led to the selection of 4 studies. The 18 studies were excluded for the following reasons: 5 studies did not assessed logistic and organizational barriers, 1 study was a review without barriers assessment, 2 studies were reviews of recommendations, 2 studies were consensus statements, 3 studies were commentaries, 1 study focused on global vaccination propensity determinants, 1 study reported barrier-related data without statistical analysis or supporting data, and 1 study was a review that relied solely on grey literature data without peer review, 2 studies lacked full-text availability. The PRISMA diagram provides a visual representation of the selection process and the reasons for exclusion (Fig. 1).

Study characteristics

Key characteristics of studies included are provided in Table 3. The articles were published between 2009 and 2022 [32,33,34,35]. One prospective study, conducted in the Netherlands, focused on individuals over 65 [35]. Additionally, two cross-sectional studies in the UK targeted age groups of 70–79 and over 79 [33,34], while a multicenter retrospective observational study in Italy involved individuals aged 65, 66, and 67 [32]. Barriers have been identified, with general practitioners (GPs) playing a role in some instances [32,33,35]. Additionally,

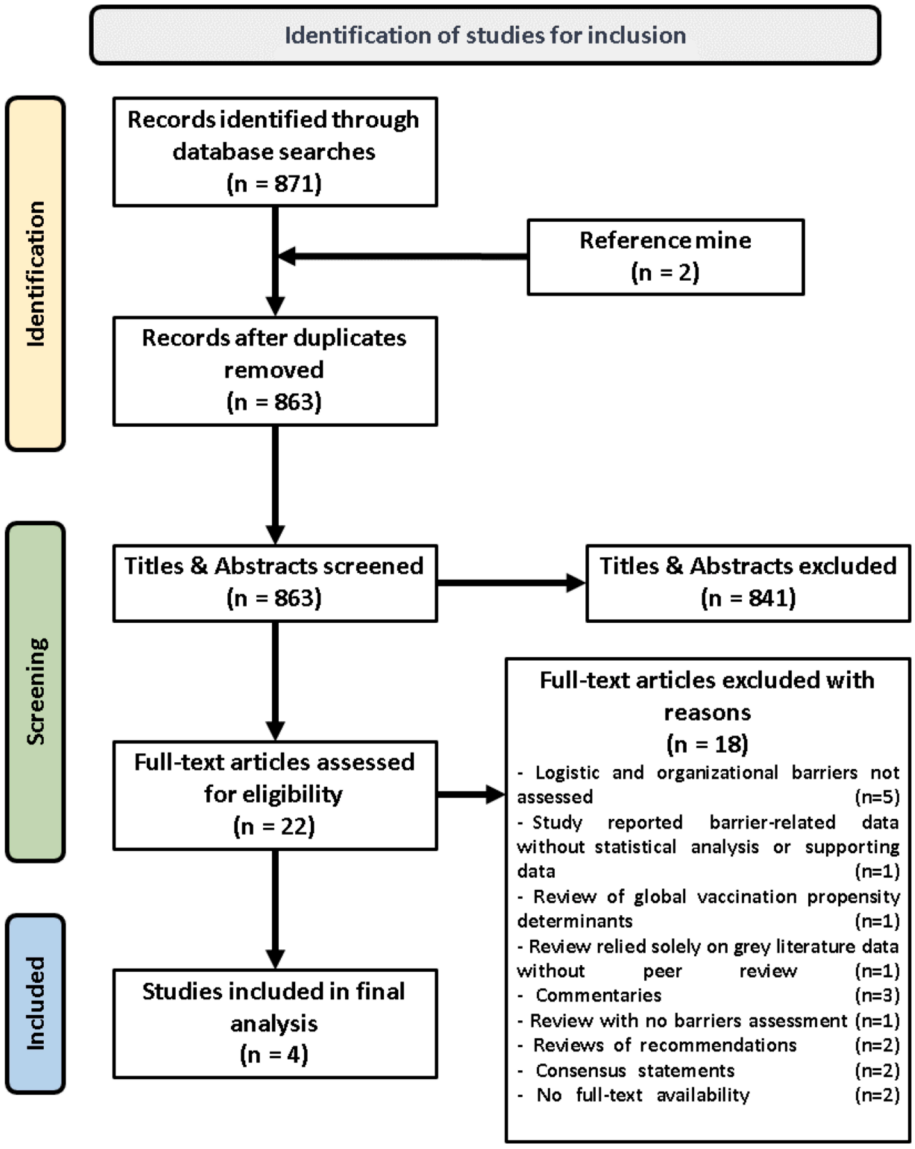


Fig. 1. PRISMA Flow diagram of literature search, abstract screen, full article assessment for exclusion and inclusion criteria with most common reasons for exclusion detailed.

Table 3
Characteristics of the included studies.

First author [cit.]	Year	Country	Study tipe	Population	Barriers	Facilitators
Opstelten W [35]	2009	Netherlands	Prospective study	> 65 years	Perception that the GP does not recommend the vaccine. Refusal to follow the doctor's advice. Perception of low risk of contracting HZ. Perception of short duration of PHN. Belief that vaccines lower an individual's natural defenses. Difficulty in accessing the GP's office.	Recommendation by the GP. Informative letter from the GP about the HZ pathology and its vaccine. Vaccine offered free of charge. Co-administration with flu vaccine. Appointment reminder. GP outpatient clinic as preferred setting for administration. Dedicated vaccination schedules. Home vaccination for nonambulatory individuals.
Bricout H [34]	2019	UK	Cross-sectional study	79 years	Perception of disease control. Belief that vaccination is unnecessary. History of shingles.	Vaccine against HZ offered by one's GP. Information about HZ from one's GP. Advice from vaccinated relatives/friends. Knowing someone vaccinated against HZ. Advice from GP or other HcW may reverse an initial reticence.
Nicholls LAB [33]	2021	UK	Cross-sectional study	70–79 years	Perception of limited health and social support. Lack of awareness about health professionals' recommendations about the HZ vaccine. Lack of awareness about HZ vaccine eligibility. Failure to offer the vaccine in the past. Low awareness and misinformation about the risks of the disease and the vaccine. Concerns and fear of vaccine side effects. Sense of distrust or skepticism in health care organizations. Concerns of vaccine speculation.	Accessibility. Availability of free vaccines. Ease of getting vaccinated. Targeted public health actions.
Ceccarelli A [32]	2022	Italy	Multicenter retrospective observational study	65, 66 e 67 years	Little synergy between members of the scientific community and GPs. The use of Short Message System (SMS) alone is not enough.	Sponsor extraordinary vaccination campaigns well in advance through local media and Internet. Information sources (Short Message System (SMS), GP, family, web, local media, other). The most impactful activity on catch-up was text messaging. 15 % of vaccination center #2 reported adherence through word of mouth among friends and family, local media, or internet. GP plays a vital role in recommending vaccination to eligible patients. Media coverage, conferences and promotion campaigns held by subject matter experts rooted in the local area.

obstacles related to patients' perceptions and knowledge [33,35], as well as challenges in accessibility and structural issues [32], and social and support dynamics [32], have been acknowledged. On the other hand, several facilitators have been identified, including healthcare provider-related factors [34,35], economic and access-related facilitators [33], and communication-related facilitators [33].

Quality evualation

The assessment of the quality of individual studies was performed with the Appraisal Tool for Cross-Sectional Studies (AXIS) that addresses study reporting and overall quality [31]. The included studies met criteria ranging from 70% to 95% across twenty quality indicators, with an average adherence of 86%. This suggests a generally high level of quality, with main issues arising with respect to ethical considerations, sample size justification, representativeness, and measurement precision. Detailed results of the quality evaluation are presented in Table 4.

Discussion

The primary outcome of this study was to investigate the logistical and organizational barriers that impact on HZV vaccination' uptake among frail and older adults. As part of the systematic review process, 841 articles were excluded based on titles and abstracts, eventually narrowing down to 22 publications selected for full-text review. Finally, four studies were identified as meeting the search criteria. The selected studies, conducted between 2009 and 2022, collectively offer insights into strategies for improving HZ vaccination rates and understanding factors influencing acceptance or non-compliance.

The analysis identified various barriers to HZ vaccination. Notably, issues involving GPs, such as the perception that GPs do not endorse the vaccine [35] and patient reluctance to follow medical advice [35], underscore the pivotal influence of healthcare providers in shaping vaccination decisions. Perceptions of risk, including a perceived low risk of contracting HZ [33,35] or the belief in the short duration of Postherpetic Neuralgia (PHN) [35], coupled with misinformation about the vaccine [33], specifically, the misconception that HZ vaccine compromise natural defenses and is unnecessary [34], emphasize the imperative for precise and targeted communication strategies. Recognizing the inadequacy of using SMS alone in effective communication [32] introduces a pragmatic dimension, urging refinement in intervention strategies: in fact, a significant proportion of non-vaccinated against HZ are unaware of the existence of the vaccine or do not feel sufficiently informed by the public awareness initiatives [36]. However, it has been shown that other factors, such as the level of knowledge and trust in vaccines, the assessment of the risk of contracting the infection, the ease of access to health facilities and the general health status, influence the propensity to vaccinate [23,37].

The complexity intensifies with challenges related to healthcare accessibility, disease control attitudes, and historical factors like a prior history of shingles [34], all contributing to the intricate landscape of decision-making. These factors affect the socio-psychological dimensions of vaccination behaviors, such as social and health support dynamics [33], awareness gaps [33], and concerns about vaccine side effects [33]. Therefore, even though patients might have a high willingness to get vaccinated, they may encounter barriers, either real or perceived, that result in vaccine hesitancy [38]. There are different factors that can counteract vaccine hesitancy and consequently improve the vaccination coverage against HZ in adults, such as sending automatic reminders to patients, implementing public education campaigns, and offering the vaccine in co-administration, and training and encouraging GPs to actively recommend vaccination to their patients [39].

Moreover, trust issues [33], skepticism within healthcare organizations [33], and limited collaboration between the scientific community and GPs [32] underscore the necessity for effective strategies. Physicians

Table 4
Risk of bias assessment. *N.A. = Not Applicable.

Question	Study [cit.]			
	Opstelten W et al. [35]	Bricout H. et al. [34]	Nicholls LAB et al. [33]	Ceccarelli A et al. [32]
Introduction				
Were the aims/objectives of the study clear?	Yes	Yes	Yes	Yes
Methods				
Was the study design appropriate for the stated aim(s)?	Yes	Yes	Yes	Yes
Was the sample size justified?	Yes	Yes	No	Yes
Was the target/reference population clearly defined? (Is it clear who the research was about?)	Yes	Yes	Yes	Yes
Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	Yes	Yes	No	Yes
Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	Yes	Yes	No	Yes
Were measures undertaken to address and categorise non-responders?	Yes	Yes	No	Yes
Were the risk factor and outcome variables measured appropriate to the aims of the study?	Yes	Yes	Yes	Yes
Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted, or published previously?	Yes	Yes	Yes	No
Is it clear what was used to determined statistical significance and/or precision estimates? (e.g. p-values, confidence intervals)	Yes	Yes	Yes	Yes
Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	Yes	Yes	Yes	Yes
Results				
Were the basic data adequately described?	Yes	Yes	Yes	Yes
Does the response rate raise concerns about non-response bias?	No	No	Yes	Yes
If appropriate, was information about non-responders described?	N.A.*	N. A. *	No	No
Were the results internally consistent?	Yes	Yes	Yes	Yes
Were the results presented for all the	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 4 (*continued*)

Question	Study [cit.]			
	Opstelten W et al. [35]	Bricout H. et al. [34]	Nicholls LAB et al. [33]	Ceccarelli A et al. [32]
analyses described in the methods?				
Discussion				
Were the authors' discussions and conclusions justified by the results?	Yes	Yes	Yes	Yes
Were the limitations of the study discussed?	Yes	Yes	Yes	Yes
Other				
Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	No	Yes	No	No
Was ethical approval or participant consent obtained?	No	Yes	Yes	Yes

encounter significant obstacles in promoting HZ vaccination, such as safety concerns and a lack of clear guidelines [40,41], hindering their ability to communicate the importance of vaccination to their patients. These barriers create a disconnect between medical professionals and patients, hindering the dissemination of crucial information.

Despite the challenges posed by reduced HZ vaccine effectiveness in older adults [42], ongoing surveillance programs ensure the safety and efficacy of the vaccine [43,44], which alleviates the burden of disease in this vulnerable population [45], underscoring the critical role of ongoing surveillance programs in informing public health decisions and ensuring the optimal protection of elderly individuals. As a result, there is a pressing need to recognize and overcome barriers to the uptake of HZ vaccination to prevent outbreaks of this debilitating disease.

The research not only identifies logistic and organizational barriers within the healthcare system that contribute to low vaccination rates [46] but also underscores the critical need for effective strategies to overcome these obstacles. Importantly, the study reveals key factors facilitating adherence to HZ vaccination. It emphasizes the pivotal role of GPs in recommending the HZ vaccine and addressing individual hesitations [34,35]. Successful strategies, such as the distribution of informative letters strategically coordinated with influenza vaccination reminders [35], have proven effective. The majority of vaccinations occur at GPs offices, where specific appointment times and the option of home vaccination for non-ambulant individuals enhance accessibility [35]. Overcoming economic barriers necessitates ensuring free services and streamlining processes [33]. Information from GPs [35], SMS communication [32], and personal networks [32] significantly influences vaccination decisions.

Collaboration among healthcare professionals, policymakers, researchers, and public health experts is imperative in developing innovative solutions to the barriers to HZ vaccination. Educating the public about the importance of vaccinations, addressing concerns or misconceptions, and promoting awareness of the benefits can contribute to increased vaccine uptake [47], thereby safeguarding public health. Active engagement with physicians is equally crucial, as they play a pivotal role in counseling patients and recommending vaccinations. Providing healthcare professionals with up-to-date information, resources, and tools can empower them to communicate effectively with patients about the importance of HZ vaccination.

By ensuring methodological rigor and addressing key areas of improvement, future research can contribute to the development of effective vaccination strategies, ultimately ensuring widespread protection against Herpes Zoster.

Limitations

While the study offers valuable insights into the logistical and organizational barriers impacting HZ vaccination uptake among frail and older adults, it is crucial to acknowledge several limitations. Herpes Zoster vaccination has been approved and integrated free-of-charge, for over 65 and frail adults in Europe since 2006 [47]. Still, as a hard-to-reach population, the overall vaccination uptake still falls short the optimal rate and present several barriers. These barriers, however, might be specific for this vaccination and this population and therefore not extended necessarily to any other vaccination. The review's inclusion criteria, which resulted in the exclusion of 841 studies based on titles and abstracts, might have introduced a selection bias, potentially overlooking relevant studies and limiting the comprehensiveness of the findings. However, it is crucial to highlight that the risk of this bias is mitigated by the rigorous methodology employed during the subsequent screening and evaluation of the included studies. Additionally, the restricted number of studies ultimately included (four in total) poses a constraint on the generalizability of the conclusions, as the effectiveness of interventions and strategies may vary across diverse populations and healthcare settings. Another limitation of the study arises from the impossibility to grade the impact of the identified barriers. While it would have been beneficial to evaluate the effects of various barriers systematically, there is a lack of existing research on this topic. Future studies are expected to facilitate this type of evaluation.

The selected studies of this review cover a limited time period (from 2009 to 2022) therefore, further barriers may affect Herpes Zoster vaccination uptake and this review since the limited numberer of articles fitting the inclusion criteria might frame a fraction of the organizational and logistic barriers involved in vaccination uptake. Nonetheless, no publishing time restriction was applied when searching for suitable articles, as full disclosed within method section. Further studies may improve knowledge regarding barriers to Herpes Zoster vaccination uptake. It's important to note that the 2009 study pertained to a vaccine different from the one used in the subsequent studies, which is no longer available. Therefore, the obstacles identified in this particular study were likely different at the time of its introduction. Given the dynamic nature of healthcare systems, evolving vaccination policies, and changing patient demographics, the findings may not fully capture current challenges and opportunities in HZV vaccination. Furthermore, relying solely on published literature for the review may introduce a publication bias, favoring studies with positive outcomes or significant findings over those with null or negative results.

Furthermore, the review predominantly focuses on identified barriers without delving deeply into potential contextual nuances or variations in healthcare systems. Differences in healthcare infrastructure, cultural factors, and regional disparities may contribute to variations in the impact and effectiveness of proposed strategies. Importantly, the exclusion of studies outside the European Region introduces an additional limitation. Health systems organization can differ considerably across regions, potentially leading to distinct barriers, including financial barriers, that were not explored in this review.

Lastly, a notable limitation is the exclusion of studies written in languages other than English, representing a fundamental flaw in the study. This limitation may result in an incomplete understanding of the global landscape of HZ vaccination barriers, potentially overlooking valuable insights from non-English literature. Recognizing and addressing these limitations is crucial for interpreting the study's findings accurately and for guiding future research efforts in this critical area. Considering a broader global scope to examine barriers would account for variations in healthcare systems, cultural factors, and regional policies, thereby enhancing the comprehensiveness and applicability of findings.

Conclusion

This systematic review has provided valuable insights into the logistical and organizational barriers associated with HZ vaccination, underscoring their profound impact on healthcare systems.

The primary focus of the study was to explore these barriers to HZ vaccination, and it identified and analyzed four key studies. These studies revealed obstacles such as a lack of recommendation or information from GPs, the perception of low risk or severity of HZ, fear or distrust of the vaccine, and difficulty in accessing the vaccination service. This comprehensive examination stands as the sole study dedicated to unraveling the logistical and organizational barriers to HZ vaccination.

Moreover, in this review some facilitators were identified, such as recommendation or information from the GP, advice or experience from vaccinated relatives/friends, availability of free or co-administered vaccines, and targeted public health interventions.

Therefore, the success of HZ vaccination programs depends on the concerted efforts of healthcare professionals, policymakers, researchers, and public health experts in addressing logistical and organizational challenges. Embracing collaborative strategies, implementing targeted education campaigns, and actively engaging with healthcare providers offer pathways to overcome barriers, ensuring the widespread and effective implementation of HZ vaccination programs.

Funding

This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

CRediT authorship contribution statement

Michele Sorrentino: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Alessandro Belpiede:** Writing – original draft, Investigation. **Claudio Fiorilla:** Writing – original draft, Investigation. **Michelangelo Mercogliano:** Writing – original draft, Investigation. **Maria Triassi:** Writing – review & editing, Writing – original draft. **Raffale Palladino:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation.

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.

Data availability

Data will be made available on request.

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