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Influence of vaccination on hospitalization and mortality in a heart failure population: A narrative review

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ABSTRACT

Nowadays, heart failure is one of the leading cardiovascular diseases. The available guidelines from European Society of Cardiology suggest considering vaccination against influenza, pneumococcus, and SARS-CoV-2, along with the American Heart Association suggesting vaccination against respiratory illnesses in a heart failure population. This review aims to conisder available evidence on the influence of vaccination on hospitalization and mortality rate in a heart failure population. There is some data suggesting lower mortality risk in a vaccinated heart failure group, depending on the vaccine. However, data on hospitalization rate is not homogenous. Future studies may be essential to verify the vaccination administration in this population as a valuable intervention.

Keywords: Vaccination, heart failure, cardiac failure

1. INTRODUCTION

Heart failure is a global urgent issue with high prevalence in the aging population (Emmons-Bell et al., 2022). It is considered to be one of the most common causes of hospitalization in a population aged at least 65 years (Savarese et al., 2023). In a systematic review from 2017, the assessed annual cost of heart failure ranged from $908 to $40,971 per patient (Shafie et al., 2018). In another systematic review, quality of life in a population with heart failure was decreased (Moradi et al., 2020). A lower quality of life was associated with higher mortality and risk of hospitalization in patients suffering from heart failure (Johansson et al., 2021). In a population of 1077 cases, the most shared reason for hospitalization after a heart failure diagnosis was respiratory tract infections (Dunlay et al., 2009).

In another analysis of 1933 patients, pneumonia was common and related to higher mortality risk. However, only C-reactive protein (CRP) was correlated

with long-term mortality (Jobs et al., 2018). According to European Society of Cardiology (ESC) guidelines, vaccination against influenza, pneumococcus, and COVID-19 should be considered in a population with heart failure (McDonagh et al., 2022). Similarly, the American Heart Association (AHA) suggests that it may be useful to vaccinate patients suffering from heart failure against respiratory illnesses (Heidenreich et al., 2022). We aimed to discuss how vaccination administration may affect hospitalization and mortality rates in a population suffering from heart failure and to consider the clinical implications of vaccinations' outcomes.

2. METHODS

This narrative review was conducted on a PubMed search performed in October 2024 and citation searching for relevant articles. Search strategy was based on Medical Subject Headings and keywords. Suitable articles in English were included based on the scope of the review and critical assessment by the author responsible for a full-text of the review.

3. RESULTS AND DISCUSSION

In a recent meta-analysis concerning population with heart failure, administration of influenza vaccination was associated with lower mortality during the first year after vaccination. However, there were no significant outcomes concerning the hospitalization rate, and heterogeneity among studies included in the analysis was detectable. Similarly, vaccination against influenza was associated with lower all-cause mortality, but hospitalization rate and cardiovascular mortality were not significantly correlated with vaccination. However, a high risk of bias was detected (Rodrigues et al., 2020). In another meta-analysis, the risks of all-cause mortality and cardiovascular mortality were higher in a non-vaccinated group.

On the contrary, the risk for hospitalization was higher in a vaccinated population, but high heterogeneity among studies was reported (Gupta et al., 2022). Mortality risk was also lower in a vaccinated group with heart failure and was decreased during a 4-year follow-up, as observed in another meta-analysis (Fukuta et al., 2019). Interestingly, in a retrospective analysis of 114 patients, a positive test for influenza was associated with a higher risk of admitting to a hospital for a heart failure. In another database analysis, in-hospital mortality was higher in patients hospitalized with heart failure and influenza. Additionally, this population required more extended hospitalization and was at higher risk of acute respiratory failure, including patients in need of mechanical ventilation and acute kidney injury, covering also dialysis cases (Panhwar et al., 2019).

Influenza might be a reason for 2.6% of all-cause deaths among the heart failure population and 2.9% of cardiovascular mortality (Modin et al., 2024). The increased risk for hospitalization with heart failure during the 12 months after influenza infection was observed not only in the older adults but also in the population aged 18-44 years (Chair et al., 2021). As increased mortality is an urgent issue, it may be beneficial to investigate the influence of influenza vaccination on heart failure. In a population aged 80 years and more, pneumococcal vaccination was correlated with a lower risk of all-cause mortality and heart failure development (Ahmed et al., 2015). In a recent meta-analysis, lack of specific data caused the inability to investigate the influence of 23-valent polysaccharide pneumococcal vaccination on heart failure.

However,the vaccinated group presentes a lower risk of all-cause mortality and cardiovascular mortality (Marra et al., 2020). In a population of 8142 cases, all-cause mortality and hospitalization due to heart failure were lower in a group vaccinated against influenza and pneumococcus compared to influenza vaccination only (Chang et al., 2012). In a cohort study of 4988 cases, pneumococcal bacteriemia in 98 patients was correlated with a higher risk of heart failure incidence (Eurich et al., 2017). Additionally, pneumococcal pneumonia was associated with a higher risk for a heart failure development or worsening in a 170 cases (Musher et al., 2007). Pneumococcal infection and vaccination against it require investigation in a more significant sample of a heart failure population.

Vaccination against SARS-CoV-2 was protective against heart failure development for up to 1 year in a cohort study (Mercadé-Besora et al., 2024). Another analysis of 4243 patients' vaccinations against SARS-CoV-2 was inconclusive as it was correlated with a higher hospitalization rate and lower all-cause mortality during 90 days but not after 1 year. However, vaccination against influenza and SARS-CoV-2 was associated with lower hospitalization rates and all-cause mortality up to 1 year (Miró et al., 2025). In a cohort study of 7094 cases, a group fully vaccinated or after booster administration against SARS-CoV-2 had lower mortality and hospitalization rates, including admission to the intensive care unit.

Additionally, all-cause mortality and hospitalization rates in the vaccinated group with positive COVID-19 tests were lower compared to the non-vaccinated population (Johnson et al., 2022). In a vaccine safety analysis of 101,786 patients, the all-cause mortality

was lower in a vaccinated group with heart failure. Additionally, there were no significant differences between the vaccinated and non-vaccinated groups concerning hospitalization or heart failure decompensation (Sindet-Pedersen et al., 2023). The risk of heart failure during 12 months was higher in a group with a positive COVID-19 test (Xie et al., 2022). Hospital mortality was higher in a 979-case group with a record of heart failure from a cohort of 8920 patients (Goyal et al., 2021). In a recent meta-analysis, the population with heart failure and COVID-19 was at higher risk for hospitalization and death.

The risks of severe infection, admission to the intensive care unit, and ventilation requirements were also higher. However, there was high heterogeneity in the included studies (Yonas et al., 2021). In a recent analysis of 2042 patients hospitalized with an infection caused by respiratory syncytial virus (RSV), the hospital admission rate was 8 times higher for a group with congestive heart failure (Kujawski et al., 2022). Similarly, hospitalization due to RSV infection was also higher in a group suffering from congestive heart disease and longer in-hospital stay was required (Prasad et al., 2021). Recently, in a prospective study of 105 patients with high-risk heart failure, vaccination against influenza and RSV at the same time was reported to be safe in an early follow-up stage.

However, the follow-up was 4 days following the vaccination visit (Biegus et al., 2024). There is a new direction for upcoming studies in a heart failure population regarding the RSV vaccination. Influenza and pneumococcal pneumonia were the two most common infections during hospitalization among patients suffering from heart failure with reduced ejection fraction (Del-Cid-Fratti et al., 2022). Both of these diseases are preventable with appropriate vaccination. In the Brazilian population, the influenza and pneumococcal vaccination rate was low (Martins et al., 2011). In the U.S., one in three patients was unvaccinated against influenza or pneumcooccal infection (Bhatt et al., 2018). The initial low level of vaccination administration against influenza and pneumococcous in a heart failure population improved after applaying the written protocol followed by the vaccination visit (Hebert et al., 2010).

4. CONCLUSIONS

There is some evidence, which support the vaccination against influenza, pneumococcal infection, or SARS-CoV-2 in a heart failure population. A new direction is a potential RSV vaccination administration. Currently, data from large-scale prospective studies is limited. Upcoming research may critically assess the use of available vaccinations in a heart failure population with a focus on probable factors modifying the outcomes. This review is limited due to its narrative form without a structured and comprehensive analysis of available data. It does not cover the topic of vaccination mechanisms' of action in a heart failure population, which may be included in the future studies.

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Authors' contributions

Methodology: Aleksandra Garczyk; original draft: Aleksandra Garczyk; writing and editing: Dagmara Skowrońska, Katarzyna Cierpiszewska, Jakub Klamecki, Dominika Kuc.

Ethical approval

Not applicable.

Informed consent

Not applicable.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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