Effectiveness of Seasonal Influenza Vaccines

Abstract.

Influenza infection is a common problem in the United States. This means that individuals are constantly affected by the virus from the fact that it is seasonal and constantly adapt. Therefore, there is a need for new vaccines to be implemented. This study is conducted to determine the vaccine effectiveness for this year. A study adapted from a previously controlled study has been adapted to identify the vaccine effectiveness for vaccines for influenza this year. The study was conducted on participants in different hospitals that were seeking treatment for Acute Respiratory Infection who had experienced symptoms for less than 7 days and were of ages 2 years and above. It was identified that for all types of vaccines, there was a 62% VE, whether they were inactivated or live attenuated vaccines. For individuals who are above 65 years, the vaccine was determined to have 49% VE. The VE for children between the years 2 and 6 was 60% on average where for partially vaccinated children the value was 54% while for fully vaccinated children while for children that had been fully vaccinated VE was 69%. It was concluded that vaccines can be effective for individuals of ages lower than 65 and less effective for individuals above that age. For children between the ages of 2 and 6 full vaccination is more effective at 69% as compared to 42% for partial vaccination.

Background.

Influenza is a common virus affecting individuals in the country in various seasons. According to Treanor et al (2012), the antigenic evolution of influenza viruses is that influenza vaccines must be evaluated before each Northern and Southern Hemisphere influenza sea7son and possibly reformulated to contain strains that are antigenically similar to the strains predicted to circulate in the upcoming season (p. 951). This indicates that constant analysis of the effects that vaccines have on individuals is necessary to ensure that vaccines can remain effective. They further observe that since influenza vaccines have a short manufacturing period and unpredictability of influenza manufacturing of vaccines is based on antigenic composition rather than on clinical trials which provides a need for constant examination of the effectiveness of vaccines.

According to CDC (2020), "recent studies show that flu vaccination reduces the risk of flu illness by between 40% and 60% among the overall population during seasons when most circulating flu viruses are well-matched to the flu vaccine". The study has been designed to identify the effectiveness of vaccines for this year. It is aimed at understanding whether vaccines are working effectively on populations as a preventive measure for influenza. It is hypothesized that in line with the observations of the CDC influenza vaccinations are have a 60% Vaccine effectiveness. The independent variable, in this case, will be the individuals that are determined to have influenza. The dependent variable will be the vaccine effectiveness. The individuals that are determined not to have influenza will be used as the control group.

Methods

The methods used in conducting this test were adopted from an article published by Oxford University Press titled *Effectiveness of Seasonal Influenza Vaccines in the United States during a Season with Circulation of All Three Vaccine* Strains written by Treanor et al. (2012). They conducted a similar study where they enrolled patients who were seeking treatment for Acute Respiratory Infection. They obtained samples of respiratory secretions for diagnostic testing and went ahead to conduct a test for influenza from the specimens. Where a single dose of the seasonal influenza vaccine was administered before the onset of the disease.

Data for this study were collected from different individuals that were seeking treatment for Acute Respiratory Infection at different public medical facilities which are Erie County Medical Center, Memorial Regional Hospital, Bergen Regional Medical Center, Grady Memorial Hospital, **Kings County Hospital Center, Maricopa Medical Center, University of Southern California Medical Center, Parkland Memorial Hospital, Sarasota Memorial Hospital, Westchester Medical Center, Carolinas Medical Center, Ben Taub General Hospital and Laguna Honda Hospital. Individuals identified to have ARI were spotted and requested for participation in the test.**

Participants that were included in the study had to be 2 years and above to ensure that respiratory secretions for diagnostic testing would be obtained from subjects by nasal swabs. They also had to have had the ARI for less than 7 days. Identifying such individuals required usage of hospital records for ARI conditions within the last 7 days. When participants had been identified and consented or their guardians consented to participation, an interview was conducted to ascertain the symptoms of the disease.

For every sample obtained from the participants, it was tested for the presence of influenza using the rRT-PCR protocol. The samples that were identified to have no presence of influenza were used as the control group. The test design adopted from Treanor et al. (2012) required that individuals Cases to be defined as individuals meeting the medically attended ARI definition with rRT-PCR–confirmed influenza, and controls were individuals with similar illnesses in whom rRT-PCR was negative for influenza (p. 952). Then the Vaccine effectiveness was estimated using the formulae 100% × (1 – adjusted odds ratio). Separate effectiveness of Inactivated and live attenuated vaccines was examined. An analysis was conducted to obtain comparisons between cases and controls also between vaccinated and unvaccinated patients.

Results

During the entire specimen collection period, the number of individuals that were enrolled in the study was a total of 1150 individuals. Of the number of individuals that were enrolled for the test, a total of 160 (14.5%) individuals tested positive for influenza. Of all individuals that participated in the test, 27 individuals were eliminated from the analysis since their medical history data was not possible to validate. Numerous individuals had not been included in the study for failing to meet qualifications on various grounds such as age.

The individuals that received the vaccine showed vaccine effectiveness that was similar among all individuals that participated in the study. Recording a 62% VE for receipt of inactivated or live attenuated vaccine indication a confirmation of the hypothesis. There was however an indication of a decline of VE in individuals of ages 65 and above was determined to be 49%. The VE for children between the years 2 and 6 was 60% on average where for partially vaccinated children the value was 54% while for fully vaccinated children while for children that had been fully vaccinated VE was 69%.

The analysis was conducted to identify the effects of the vaccines depending on the different regions that samples were collected from. No significant difference was obtained from the samples associated with different regions or the different hospitals from where the samples were collected. Of the two doses employed in the entire experiment, there was no significant difference in the results expected. For both inactivated influenza vaccines and live attenuated influenza vaccines, the response of the participants was not found to have a difference that had any statistical significance.

Discussion.

From the results obtained there are numerous similarities with the study conducted by Treanor et al. (2012), they observe that VE among individuals aged ≥65 years appears to have been lower than in the other age groups. In this study, it was identified that individuals were determined to be 49% indicating that they an extremely low response rate to vaccines. The results also indicate a VE of 62% of inactivated influenza vaccines (IIV) and live attenuated influenza vaccines (LAIV). Minor differences in the type of vaccines used do not seem to indicate any statistical differences for both types of vaccines, similar observation in this study was on the regions that the study groups were observed. There were no differences, an indication that the region where an individual is given the vaccine makes no differences in the outcome of the results. A difference was however detected in whether a child has been vaccinated partially or fully. In children of the ages between 2 and 6 years, there is a significance in whether the vaccine was offered fully or partially. If a vaccine is given fully to a child they have a VE of 69%, as compared to when partially given, they have a VE of 42%.

Conclusion.

As observed by Treanor et al. (2012) influenza vaccination offers a health benefit in individuals aged <50 years and is likely beneficial in older age groups as well. This study has identified that vaccination for influenza can be very beneficial for individuals that are 65 years of age and below. It has also indicated that for children between the ages of 2 and 6 years full vaccination is preferable as it has a higher rate of VE. It has also determined that it does not matter the type of vaccination or where the vaccination is carried the results are likely to be effective the same. This study however did not make consideration of race and demographics that might affect the results. It is also possible that it has been biased by the fact that it is a replicated test and therefore may have followed similar procedures that favor obtaining the results that it did.

References.

CDC. (2020, January 03). Vaccine Effectiveness: How Well Do the Flu Vaccines Work? Retrieved October 23, 2020, from https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm

Treanor, J. J., Talbot, H. K., Ohmit, S. E., Coleman, L. A., Thompson, M. G., Cheng, P., . . . Shay, D. K. (2012). Effectiveness of Seasonal Influenza Vaccines in the United States During a Season With Circulation of All Three Vaccine Strains. *Clinical Infectious Diseases,* *55*(7), 951-959. DOI:10.1093/cid/cis574