Impact of vaccination on mortality in geriatric populations

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INTRODUCTION AND BACKGROUND

In the United States, pneumococcal (recommended after 65 yrs) and influenza (recommended annually) vaccinations are the two most associated with prevention of pneumonia. They remain staples of preventative care to protect geriatric populations against infection and associated medical complications. The increasing number of patients with chronic conditions are at an increased risk of acquiring preventable diseases, like influenza and pneumococcal pneumonia, due to their impaired host defense mechanisms. For example, approximately 60% of seasonal flu related hospitalizations are those over 60 years old

However, reported efficacy has varied and not all developed countries utilize a vaccination protocol for geriatric patients. Other issues involve barriers to vaccination, seasonality, and higher rates of cohabitation amongst elderly people, such as overcrowded nursing homes. In addition, bias is another obstacle that may confound reported efficacy rates associated with pneumococcal and influenza vaccination. Our goal was to address the issues related with vaccination for pneumococcal pneumonia and influenza in geriatric populations.

METHODOLOGY

The literature search utilized PubMed to access articles pertaining to vaccination rates and mortality in the elderly population. Search terms utilized *included (with appropriate variations): geriatrics, elderly, vaccination, influenza, pneumococcal, mortality, treatment efficacy*. Additional criteria for the search required English language, date range from Jan. 2000 to present, and free to access. Articles that met criteria were individually read and filtered by sample population age over 60 years, use of 23 valent pneumococcal vaccine, and mortality/hospitalizations analysis. Background information on current guidelines for vaccinations over 60 years old was retrieved from CDC.gov and Uptodate.com

RESULTS

Citation	Design	Population	Conclusions	Limitations
J. Nordin et al., 2001	Retrospective Cohort Study	2 cohorts: (N= 122,974) from 1996-1997 (N=161,608) from 1997-1998.	57.4% of subjects received annual influenza vaccinations in both groups 1996-1997 - 60 (55-65)% cases of death prevented with vaccination. (p<0.001) 1997-1998 - 39 (33-44)% cases of death prevented with vaccination. (p<0.001).	Study utilizes electronic data sets which may have misclassification in parameters such as vaccination status (<3%). Uncontrolled variables include smoking status and functional status.
T Maruyama et al., 2010 (Fig 2. Fig 3.)	Prospective, Randomized double blind study	(N = 1006) Nursing home residents in Japan.	Death from pneumococcal pneumonia in the placebo group than in the vaccine group (35.1% (13/37) v 0% (0/14), P<0.01). Death rate from all cause pneumonia (vaccine group 20.6% (13/63) v placebo group 25.0% (26/104), P=0.5) and from other causes (vaccine group 17.7% (89/502) v placebo group (80/504) 15.9%, P=0.4) did not differ between the two study groups	The use of specimens from non-sterile sites may affect the accuracy of a test for identifying causative organisms. Antibody responses to vaccination were not measured and correlated with clinical outcomes.
L Jackson et al., 2006	Retrospective cohort study	N=72,527 persons 65 years of age and older followed during an 8 year period from Group Health Co-op HMO	Death for vaccinated persons compared with unvaccinated persons, RR=0.39 [95% confidence interval (95% CI), 0.33–0.47] before influenza season, 0.56 (0.52–0.61) during influenza season, and 0.74 (0.67–0.80) after influenza season.	Outcomes specifically due to influenza infection were not analyzed, due to nature of diagnosis.
D Rimple et al., 2006 (Fig. 1)	Prospective cross sectional study	N=674 patients presenting to an inner city level 1 trauma, for 3 weeks	Influenza High Risk: N=447 already vaccinated (16%) 296 administered vaccine (83%) Pneumococcal High Risk: N= 295(18%) 194 administered vaccine, 248 vaccinated total (84%)	Race, education, SES, PCP were not accounted for. Did not confirm vaccination status, unless unknown

Figure 2.

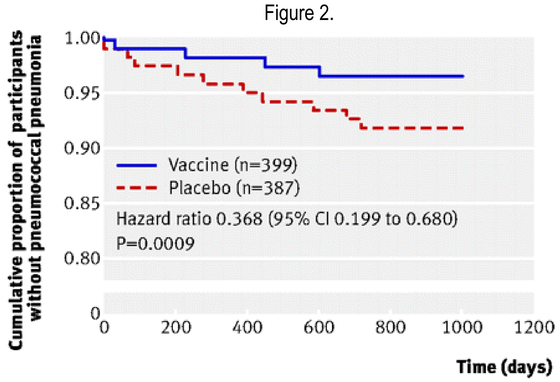
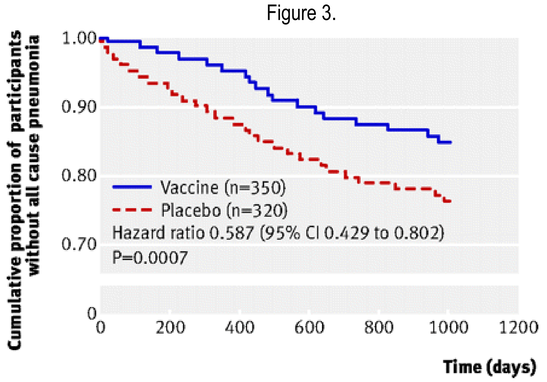


Figure 3.



DISCUSSION / CONCLUSIONS

By establishing criteria to identify those with high risk of influenza and pneumococcal disease, a vaccination program could be implemented in a primary care setting as well as the emergency room setting. The most prominent barriers to vaccination centered around the patient's perceived lack of need for vaccinations. Based on our survey of studies, we recommend developing a criteria for identifying high risk patients in an effort to increase communication between physicians and patients on the importance of vaccination against these diseases. Since there is significance between mortality and lack of vaccination, implementing routine communication and education about vaccination between geriatric patients and physicians would produce better health outcomes.

A vaccination program could be implemented in the Emergency Department during peak times, as another significant barrier to immunization was lack of insurance coverage. Identifying and counseling those who are high risk has the benefit of providing a one time vaccination for both influenza and pneumococcal disease, which can be administered in an ED. Furthermore, with increased average wait times in emergency departments, there is ample time for patient counseling in the need for vaccination, overcoming that barrier as well. Although there is some bias in reported efficacy rates regarding vaccination, it does not supersede the benefits of a vaccination program.

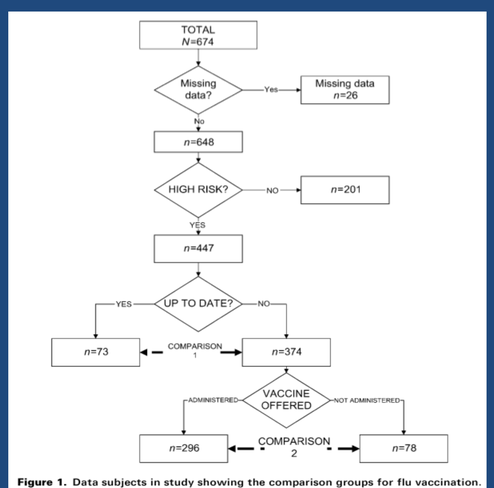


Figure 1. Data subjects in study showing the comparison groups for flu vaccination.

1. CDC Vaccination for Adults: http://www.cdc.gov/vaccines/adults/rec-vac/index.html?s_cid=cs_650
2. Jackson, L. A et al.. "Evidence of Bias in Estimates of Influenza Vaccine Effectiveness in Seniors." International Journal of Epidemiology 35.2 (2005): 337-44. Web.
3.. Maruyama, T. et al. "Efficacy of 23-valent Pneumococcal Vaccine in Preventing Pneumonia and Improving Survival in Nursing Home Residents: Double Blind, Randomised and Placebo Controlled Trial." BMJ 340.Mar08 1 (2010): C1004. Web.
4. Nordin, J. et al. "Influenza Vaccine Effectiveness in Preventing Hospitalizations and Deaths in Persons 65 Years or Older in Minnesota, New York, and Oregon: Data from 3 Health Plans." The Journal of Infectious Diseases 184.6 (2001): 665-70. Web.
5. Rimple, D. et al.. "An Emergency Department–based Vaccination Program: Overcoming the Barriers for Adults at High Risk for Vaccine-preventable Diseases." Academic Emergency Medicine 13.9 (2006): 922-30. Web.