Cost-Effectiveness Analysis of a Television Campaign to Promote Seasonal Influenza Vaccination Among the Elderly

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A B S T R A C T

Background: The U.S. policy goals regarding influenza vaccination coverage rate among the elderly include the increase in the coverage rate and the elimination of disparities across racial/ethnic groups. **Objective:** To examine the potential effectiveness of a television (TV) campaign to increase seasonal influenza vaccination among the elderly. **Methods:** We estimated the incremental cost-effectiveness ratio (ICER, defined as incremental cost per additionally vaccinated Medicare individual) of a hypothetical nationwide TV campaign for influenza vaccination compared with no campaign. We measured the effectiveness of the nationwide TV campaign (advertised once a week at prime time for 30 seconds) during a 17-week influenza vaccination season among four racial/ethnic elderly groups (N=39 million): non-Hispanic white (W), non-Hispanic African American (AA), English-speaking Hispanic (EH), and Spanish-speaking Hispanic (SH). **Results:** The hypothetical campaign cost was $5,960,000 (in 2012 US dollars). The estimated campaign effectiveness ranged from −1.1% (the SH group) to 1.42% (the W group), leading to an increased disparity in influenza vaccination among non-Hispanic white and non-Hispanic African American (W-AA) groups (0.6 percentage points), W-EH groups

(0.1 percentage points), and W-SH groups (1.5 percentage points). The estimated ICER was $23.54 (95% confidence interval $14.21–$39.37) per additionally vaccinated Medicare elderly in a probabilistic analysis. Race/ethnicity-specific ICERs were lowest among the EH group ($22.27), followed by the W group ($22.47) and the AA group ($30.55). The nationwide TV campaign was concluded to be reasonably cost-effective compared with a benchmark intervention (with ICER $44.39 per vaccinated individual) of a school-located vaccination program. Break-even analyses estimated the maximum acceptable campaign cost to be $14,870,000, which was comparable to the benchmark ICER. **Conclusions:** The results could justify public expenditures on the implementation of a future nationwide TV campaign, which should include multilingual campaigns, for promoting seasonal influenza vaccination.

Keywords: cost-effectiveness, elderly population, influenza vaccination, television campaign.

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Introduction

Influenza-associated disease is a major cause of death in the United States [1,2]. Influenza and pneumonia ranked ninth among all causes of death for all age groups [1] and seventh for the elderly in 2010 [3]. The elderly (65 years and older) accounted for 90% of deaths due to flu diseases [2]. In addition, the total economic costs of influenza amounted to $29 billion annually (adjusted to 2010 US dollars) including the direct medical costs ($10.2 billion) and the indirect costs (loss of productivity $18.8 billion) among the entire US population [4]. Specifically, the annual burden of medical costs on the elderly was $5.5 billion (adjusted to 2010 US dollars) [5].

Despite this, the influenza vaccination coverage rate among the elderly has been far from the 2020 Healthy People goal of 90% [6]. It fluctuated around 70%, on average, from the 2000 to 2001 influenza season to the 2012 to 2013 influenza season [7–10]. Also,

persistent racial/ethnic disparities in influenza vaccination have been reported [7–10]. For instance, the influenza vaccination rates among racial/ethnicity groups for the 2012 to 2013 season were 67.9%, 54.5%, and 65.8% in non-Hispanic white (W), non-Hispanic African American (AA), and Hispanic (H) groups, respectively [9]. Disparities in influenza vaccination among W-AA and W-H groups were 13.4 and 2.1 percentage points, respectively [9].

Several potential determinants were suggested to explain why the vaccination rates remained at a suboptimal level among the Medicare elderly. One potential determinant is the time cost of vaccination, which was empirically suggested by a study of the nationally representative Medicare elderly [11]. The importance of time cost is also implied by the elimination of the out-of-pocket expenditure on influenza vaccination under Medicare since 1993 [12]. Options to reduce such time cost include a standing order vaccination program for patients admitted to a hospital [13] and taking advantage of clinic visits primarily for

medical care other than vaccination to vaccinate for influenza [11]. Other potential determinants include individual-level demographic characteristics, socioeconomic factors, influenza vaccine supply, and influenza epidemic activity levels [11,14].

Potential determinants for racial/ethnic disparities are exemplified by racial/ethnic differences in perceptions about influenza vaccination [15]. For instance, the AA elderly had a distrust of the vaccine effectiveness [16] and hence were three times more likely to never receive influenza vaccination during their lifetime than were the W elderly [17]. Other determinants include less use of general preventive care among minority groups, provider bias, and differences in vaccine availability among minority groups [14,18].

On the basis of the recent literature and the potentially large positive impact of a nationwide television (TV) campaign, we focused on a nationwide TV campaign in this study. Our previous study found a strong association between nationwide TV network coverage on influenza-related topics and influenza vaccination among the Medicare elderly by analyzing the 1999 to 2001 Medicare Current Beneficiary Survey (MCBS) data [19]. In addition, the TV campaign was reported to be generally effective in changing health behavior (e.g., nutrition, physical activity, and use of tobacco, alcohol, and illicit drugs) and health service utilization (e.g., cancer screening, prevention of heart disease, immunization programs [for measles, mumps, and rubella], and antibiotic use) [20–22].

There were several TV campaigns to promote seasonal influenza vaccination, such as a Centers for Disease Control and Prevention–promoted campaign through various media including TV [23], a California statewide TV campaign [24], and corporate campaigns [25]. Nevertheless, to our knowledge, the effectiveness or the cost-effectiveness of these TV campaigns was not quantitatively evaluated, probably because of the methodological difficulties. Two foreign studies reported the effectiveness of a TV campaign for adult vaccination. One study from Sweden reported that the mass media campaign (including TV, newspapers, and posters) in a local community decreased the influenza-associated hospital treatments among the elderly [26]. The other study from Australia found that a local TV advertisement for free pneumococcal immunization (targeting community-dwelling individuals 50 years and older) statistically increased the vaccine order among physicians by 4.5% in 2006 [27].

To our knowledge, there is no study that has performed an economic evaluation (e.g., the cost-effectiveness) of a nationwide TV campaign for seasonal influenza vaccination operated by a single institution in the United States. To fill the gaps in the literature, the present study aimed to perform a cost-effectiveness analysis to examine whether the hypothetical nationwide TV campaign for seasonal influenza vaccination would be reasonably cost-effective among the US Medicare elderly as compared to no nationwide TV campaign. The present study focuses on the Medicare elderly population, mainly because the nationally representative data required to test the research question are available only among the Medicare population. This is also because the TV campaign is expected to be more effective among the elderly population than among the younger population because of the following reasons: The elderly (65 years and older) spent three times more time watching TV than did young adults (15–64 years) in 2006 [28]. Specifically, the elderly (65 years and older) were estimated to spend 2.9 to 4.5 hours per day (half of their leisure time) watching TV in 2012 [29]. TV was the second most widely used information source (the first source among mass media), after medical professionals, which was the most popular information source, on influenza vaccination among the elderly in 2000 [30].

This study reveals 1) whether the nationwide TV campaign for seasonal influenza vaccination is cost-effective compared with a benchmark intervention for influenza vaccination (for details, see the Methods section) and 2) the maximum total campaign cost allowable to be compared with this benchmark in cost-effectiveness. The results help justify the implementation of a future nationwide TV campaign for seasonal influenza vaccination and possibly other vaccinations.

Methods

Model Description

We developed a decision-analytical model to evaluate a hypothetical nationwide TV campaign to promote seasonal influenza vaccination among the US Medicare elderly from the societal perspective. The societal perspective was adopted because a federal or state government agency is more likely to financially support a future actual TV campaign than do other stakeholders because of the great benefits of the TV campaign for the general public. Despite the societal perspective, we focused on the intermediate outcome (i.e., vaccine receipt) without accounting for final outcomes such as influenza vaccine preventable medical care expenditure and productivity loss among the working population. This was because this potential cost-saving amount depends on influenza vaccine effectiveness (varying substantially across years owing to vaccine-antigen match), timing and severity of epidemic activity, and other year-specific factors [31–33]. Consequently, the present cost-effectiveness analysis focuses on the uncertainties regarding the TV campaign's narrowly defined cost and intermediate health outcome (i.e., vaccine receipt), excluding another set of uncertainties regarding year-to-year variations in potential cost savings.

This hypothetical TV campaign was assumed to be aired during a single influenza vaccination season in 2012. The target population is a hypothetical cohort of 2012 Medicare elderly 65 years and older (N = 39 million) [34], including only four racial/ethnic groups of non-Hispanic white (W), non-Hispanic African American (AA), English-speaking Hispanic (EH), and Spanish-speaking Hispanic (SH) [14,35]. Because past studies found that disparities in influenza vaccination among the non-Hispanic white and Hispanic groups are largely explained by language differences [14,36–38], EH and SH individuals were distinguished on the basis of whether Spanish was used in an interview in the MCBS.

The parameters in the decision tree model (Fig. 1) are listed in Table 1, reflecting the racial/ethnic differences in parameters including population proportion, baseline vaccination coverage rate, and effectiveness of the TV campaign [8–10,14,35,39]. All costs were converted to 2012 US dollars by using the consumer price index [40]. The decision tree model was constructed using TreeAge Pro 2013 software [41]. The MCBS data analysis used STATA version 12 [42].

Cost Parameter

The hypothetical TV campaign costs consisted of the one-time advertisement production cost and the broadcasting cost (Table 1) [43,44]. The latter covered the cost of airing for 30 seconds during prime time (8:00–11:00 PM) once a week on the three nationwide TV networks—ABC, CBS, and NBC—for 17 weeks from September 1, 2012, to December 31, 2012.

Effectiveness Parameters

Intervention effectiveness was defined in two ways. The primary analysis assumed that the increase in the vaccination rate is multiplicative to the baseline vaccination rate. For instance, an increase in the vaccination rate among the W vaccination group