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Commentary

Effective and equitable influenza vaccine coverage in older and vulnerable adults: The need for evidence-based innovation and transformation

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Influenza vaccines are among the most effective public health strategies for preserving health in older adults. Nonetheless, influenza immunization coverage continues to fall short of the Healthy People 2020 public health goals with persisting racial and ethnic disparities [1,2]. Inadequate levels of immunization, including among older adults, persist despite advances in vaccine biology, a mounting body of evidence of the toll of influenza, and the development of vaccines that may better protect older adults with less robust immune responses. In the 2017–2018 flu season, the Centers for Disease Control and Prevention (CDC) estimates that 959,000 hospitalizations resulted from the flu, and 79,400 Americans died of the illness, the highest number in over a decade, with 90 percent of those deaths in people over age 65 [3]. The magnitude of risk, combined with the under-utilization of the influenza vaccine in at-risk populations, represents an urgent public health problem and warrants immediate and effective action.

In April of 2018, a multi-disciplinary panel of experts in epidemiology, clinical research, behavioral economics, psychology, health disparities, and community providers of vaccines—comprised of primary care providers, health system leaders, manufacturers, and national advocacy groups— met to consider the issue of under-vaccination and persisting racial disparities in older adults (http://shcllc.info/influenza-immunization/). Uniquely, the panel's review spanned a broad range of information, including public health, clinical, biological, and social science research, along with real world implementation examples, in order to devise a strategy for significantly increasing influenza immunization rates in the near term. This paper briefly summarizes their discussion and recommendations.

The data review revealed that the impact of influenza on older adults and those with chronic illnesses is likely an underestimate of the true toll on independence, morbidity, and mortality— representing the "tip of the iceberg"—due to (1) under-diagnosis and documentation in medical records; (2) the often unmeasured relationship of influenza to functional status and frailty; (3) and influenza's exacerbation of chronic illnesses, such as the recently documented link between respiratory infection and acute myocardial infarction [4]. Indeed, the immunosenescence associated with aging creates an increased risk of influenza [5]. The panelists concluded that the disproportionate impact of influenza on older adults and those with chronic conditions are not well-known—by either health professionals or patients—and that methods of

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communicating the impact of influenza on functioning and disease progression warrants further testing and expansion.

Adults 65 years of age and older are recommended to receive an annual influenza vaccine. Vaccines available include standard dose influenza vaccine as well as three others designed for adults over the age of 65, including the HD-IIV3 Fluzone High-Dose—shown to produce a stronger immune response and reduce influenza infection and hospitalization versus standard dose vaccine in clinical trials—and aIIV3 (Fluad)—shown to be more effective than regular dose vaccine in an observational study, and RIV4 (Flublok Quadrivalent) [1].

Regardless of the growing documentation of the toll of influenza on older adults and increasing vaccine options, influenza vaccination rates remain insufficient, with disparities between different racial and ethnic subpopulations. According to the 2016 National Health Interview Survey (NHIS), during the 2015–2016 flu season in adults over 65, Asians had the highest influenza immunization rate (76 percent), while whites (72 percent), African-Americans (65 percent), and Hispanics (60 percent) had lower rates [2].

Research on racial disparities in vaccination coverage is limited. A study by Quinn and colleagues assessed predictors of vaccine uptake across five years for African-American and Caucasian adults with high-risk conditions. They found that fewer than half of the adults received the vaccine annually, and there were significant differences by race: African-Americans were vaccinated at lower rates than whites [6]. An environmental scan and literature review conducted by Hall, Rosof, and colleagues found that several factors are linked to lower vaccination rates among diverse racial and ethnic populations, including access, cost, and payment; knowledge gaps among patients and healthcare professionals; and a lack of approaches or systems that hardwire vaccination into clinical practice. Race and ethnicity appear to exacerbate these issues while posing additional barriers related to lack of trust and other cultural factors [7]. While evidence-based approaches to reducing immunization disparities have not been well-documented, community engagement, attention to health literacy, and clinician promotion are suggested remedies suggested by this literature. Results from the Community Health Improvement for Milwaukee's Children (CHIMC) program were presented and discussed, revealing significant vaccine uptake among children with the engagement of community leaders [8]. A 2018 paper commissioned by the National Academy of Science, Engineering and Medicine (NASEM) reported on the results of in-depth surveys of 23 providers, finding that implementing system changes such as standing orders, along with committed leadership, strong provider recommendation, and community outreach were impactful in reducing—if not eradicating—disparities in practice [9].

Representatives from four health systems with diverse patient populations confirmed these observations. They pointed to a range of common barriers to immunization, including low baseline immunization rates, limited patient health literacy, transportation and financial access challenges, difficulty with data access including electronic health record extraction and state registry access and completeness, and policy barriers, including co-pays and state-based limitations on pharmacy practice. Strategies that were implemented to increase immunization rates included engagement of system leadership; system-based changes (e.g., standing orders and reminder-recall programs); increased community and patient outreach; team-based approaches to immunization; and routine recommendation of vaccination at each visit—in effect creating a culture of immunization. Data feedback reports and quality improvement strategies have also been applied in some of the systems. The evidence-base as summarized in the Community Preventive Services Task Force (CPSTF) Community Guide aligns with this experience [10].

While quality improvement strategies including performance feedback have led to increased immunization rates in practices and health systems (for example see [11,12]), lagging improvement in immunization rates nationwide suggest that broader and additional perspectives may be necessary to catalyze transformation. Presenters at the meeting summarized results from additional areas of research that can inform immunization strategies, including the importance of taking into account varying approaches to health decision-making [13]. Patients have preferred cognitive styles they

Table 1
Key strategies for rapidly increasing influenza vaccination rates in older and vulnerable adults.*

Strategy	Key features and characteristics
#1: Use multidisciplinary evidence-based approaches	Apply the results of public health, behavioral, and social science to develop an evidence-based interventional package for rapid implementation and evaluation. For example, train clinic staff to make presumptive recommendations to patients, focusing on positive results.
#2: Engage in human-centered design	Engage patients, care-givers, providers, and other stake-holders in and throughout the design and implementation phases. For example, as a clinic or health system designs a quality improvement protocol to increase influenza immunizations, have project leaders brief all staff to get their feedback and solicit the feedback of patients through a patient advisory group or patient survey.
#3: Implement, evaluate, and widely disseminate prototypes	Develop an innovation engine with fully engaged prototype sites with senior level engagement and commitment. In parallel, develop a broader spread strategy with committed institutions and communities. For example, launch a change strategy in one or two clinics in a health system with the knowledge and support of system leadership, assuring the results will be applicable system-wide during its expansion.
#4: Develop an influenza data dashboard	Develop a common set of metrics and reporting/measurement that include the frailty index and other process measures to better capture the impact of influenza as well as measures of innovation. For example, in prototype sites characterize the impact on workflow/provider burden required to implement the innovation in administering influenza immunization.
#5: Target communities and populations with the highest need and risk	Use geo-mapping data sets to identify target populations to inform prototype testing and spread strategy. Use formative research and community engagement strategies. For example, geomap immunization rates in a given system, focusing transformation efforts on regions with lower rates or look at immunization rates in patient subsets (e.g., people with diabetes) and focus the innovation effort on those who are especially vulnerable and/or with lower immunization rates.
#6: Establish a national agenda	Reform leadership bodies charged with promoting influenza immunizations to promote accountable leadership and innovation, including removal of barriers to immunization and support for prototypes that can be rapidly expanded. For example, implement a series of regional educational programs in partnership with major health systems to explore needs and opportunities for innovating influenza immunizations in their communities.

employ for making decisions that should be considered in tailoring recommendations. Researchers at the meeting suggested additional approaches that derive from the field of behavioral economics, such as system and workflow changes that make immunization the norm; direct shaping of behavior through mandates or incentives; and reframing the message—emphasizing longer term positive results. A recent meta-analysis of psychosocial research findings by Brewer and colleagues underscores these recommendations [14].

Despite agreement about the effectiveness of the influenza vaccine and the strategies for increasing immunization, we are left with a stubborn and persistent gap between recommended and actual immunization rates, especially in diverse and high-risk populations. The question must be raised: How long will we accept inadequate protection from influenza for more than half of our population, especially in light of the much larger public health issue posed by this disease than we have heretofore fathomed, beyond the "tip of the iceberg?"

The group called for the application of the science of innovation and transformation to solve these issues. Health system leaders should implement a set of evidence-based strategies for change, rapidly testing and expanding successful models (see Table 1). These strategies should be based on multidisciplinary evidence, including behavioral economics and psychology, be patient and community-centric, be held accountable through agreed upon metrics, focus on regions and populations of highest need, and be informed by national goals [15–17]. Failure to significantly improve population level vaccine coverage rates assures continued loss of life, hospitalizations and loss of independence among high risk populations. Given that we have efficacious vaccines targeting older adults and a set of effective interventions for promoting immunization, we call on all stake-holders to participate in a rapid course correction so as to protect our fellow citizens from this annual scourge.

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Appendix A. Participants in the April 26, 2018, Advisory Group Meeting on Population Health Strategies for Promoting Equity and Influenza Risk Management Among Seniors and High Risk Adults

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(*continued on next page*)

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