



IMPROVING HEALTH LITERACY IN THE VETERAN POPULATION

PREPARED FOR THE VA OFFICE OF HEALTH EQUITY

MEAGAN WALTERS // MAY 2020
FRANK BATTEN SCHOOL OF LEADERSHIP & PUBLIC POLICY

Disclaimer

The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other agency.

Honor Statement

On my honor as a student, I have neither given nor received unauthorized aid on this assignment.

A handwritten signature in black ink that reads "Meagan Walters". The signature is fluid and cursive, with "Meagan" on the top line and "Walters" on the bottom line.

Acknowledgements

First, I would like to thank everyone in the Office of Health Equity for their service to the veteran community and their support on this report. Thank you to Dr. Ernest Moy for allowing me to pursue my interests on this project, and for frequently offering your guidance and expertise. To Janice Burch for your technical assistance and patience. And to Lauren Russell, for your mentorship and friendship over the last 3 years. I am so grateful for your willingness to support the next generation of Batten students, and will always strive to emulate your generosity for those who come after me.

Thank you to the entire Batten community for shaping me into the leader I am today. I would like to acknowledge the valuable guidance I received from my advisors this year, Professors Andrew Pennock and Leora Friedberg. Thank you to my APP classmates and partners, who were always there to read drafts and offer suggestions, even while navigating their own project challenges. And to my entire Batten cohort, whose support and friendship in Garrett Hall made this program unforgettable.

Finally, I would like to thank my family. My time at the University of Virginia would not have been possible without my parents. Thank you both for showing me the value of education and effort from a young age. To my sister, Anna, for reminding me not to take life too seriously. And to my sister and brother-in-law, Erica and Charlie, for your service to this country. Your sacrifices inspire me every day to improve the lives of our military servicemembers and veterans.

Table of Contents

Acronym Definitions.....	5
Executive Summary.....	6
Problem Statement.....	7
Background.....	8
Veterans Health Administration.....	8
Office of Health Equity.....	8
Social Determinants of Health.....	10
Health Literacy.....	11
Criteria.....	16
Policy Alternatives.....	18
Option 1: Evaluate Written Health Education Materials.....	18
Option 2: Require Spoken Communication Training for Physicians.....	20
Option 3: Create an Electronic Health Literacy Training for Patients.....	22
Option 4: Let Present Trends Continue.....	24
Outcomes Matrix.....	25
Recommendation.....	26
Implementation.....	27
References.....	29
Appendix A: Patient Education Materials Assessment Tool (PEMAT).....	36
Appendix B: Technical Appendix for Cost Estimates	37

Acronyms

- AHRQ: Agency for Health Research and Quality
- CBOC: Community-Based Outpatient Clinic
- CMO: Chief Medical Officer
- CNO: Chief Nursing Officer
- NIH: National Institutes of Health
- OHE: Office of Health Equity
- PEMAT: Patient Education Materials Assessment Tool
- SDOH: Social Determinants of Health
- VA: Department of Veterans Affairs
- VACO: Veterans Affairs Central Office
- VAMC: Veterans Affairs Medical Center
- VHA: Veterans Health Administration
- VISN: Veterans Integrated Service Network

Executive Summary

For patients, navigating a health care environment requires well-developed reading and writing skills, spoken communication abilities, and knowledge of basic health care vocabulary. An inability to gather and comprehend health information makes accessing care, communicating with providers, and following self-care instructions more difficult. As a result, individuals without these health literacy skills suffer worse health outcomes, leading to greater health disparities based on socioeconomic status (DeWalt et. al., 2004).

In 2012, 55% of veterans demonstrated inadequate health literacy skills (Rodríguez et. al., 2013). To help the VHA improve health outcomes for veterans with limited health literacy, this report considers four distinct policy options.

1. Evaluate all written health education materials for understandability and actionability using an existing assessment tool
2. Require all VA primary care physicians complete oral communication training
3. Institute an electronic health literacy training for patients
4. Let present trends continue

I evaluated the options above using the following four criteria: effectiveness at improving health literacy, equity, administrative feasibility, and cost. Based on this analysis, **I ultimately recommend that OHE pursue option two: require all VA primary care physicians to complete oral communication training.**

The effectiveness of physician communication trainings is grounded in rigorous scientific evidence conducted directly with the Veteran population. While requiring trainings would be more administratively challenging than allowing present trends to continue or standardizing written material, it is predicted to be more effective at improving health literacy and health outcomes. Option two is also the most equitable option considered in this report, as it requires no additional time or effort on behalf of veterans.

The primary downside of requiring physician communication training is the opportunity cost of physicians' time. Adding a few hours of training to their workload will ultimately crowd out other important work, such as patient visits and health recordkeeping. This challenge should be considered during the implementation phase of the policy process, when VHA will need to overcome pushback from busy physicians by emphasizing the benefits of additional training.

Problem Statement

Less-educated individuals are more likely to experience poorer health outcomes (Braveman & Gottlieb, 2014). One mechanism through which education impacts health outcomes is health literacy. Health literacy is defined as “the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions” (Healthy People, 2020). An inability to gather and comprehend health information makes accessing care, communicating with providers, and following self-care instructions more difficult. Consequently, individuals with low health literacy experience worse health outcomes, leading to greater health disparities based on socioeconomic status (DeWalt et. al., 2004).

Only 45% of veterans using the VA Healthcare System demonstrated adequate health literacy skills in 2012 (Rodríguez et. al., 2013). These patients are at higher risk of hospitalization and mortality (DeWalt et. al., 2004). To improve health outcomes, the Veterans Health Administration should take action to help veterans understand complex health information.

Background

Veterans Health Administration

In 1930, President Herbert Hoover consolidated previous government entities serving the veteran population into the Veterans Administration. Today the Department of Veterans Affairs, this executive department consists of three branches offering services to former servicemembers. The Department of Veterans Affairs seeks to fulfill President Lincoln's promise "to care for him who shall have borne the battle and for his widow, and his orphan" (About VHA, 2019). Its largest branch is the Veterans Health Administration (VHA). The Veterans Health Administration's mission is to "honor America's Veterans by providing exceptional health care that improves their health and well-being" (About VHA, 2019). To accomplish its mission, the VHA operates the largest integrated health care system in the United States, including services at over 1,000 health care facilities across the nation and serving 9 million enrolled veterans (About VHA, 2019). Facilities include 170 full-service medical centers and over 1,000 "community-based outpatient clinics" or CBOCs (About VHA, 2019).

Because of its benefit criteria, VHA medical facilities provide most services at little or no out-of-pocket cost to patients. This allows low-income veterans to receive greater health care access than they could afford in the private sector. However, inequity remains across the various sub-populations of veterans in the form of health disparities. Particularly noticeable health disparities exist for female, racial minority, and rural veterans. For example, rural veterans enrolled in VA health care are 65% more likely to die by suicide than urban veterans (Bowser & Washington, n.d.). Additionally, "a higher proportion of African-American women Veterans have diabetes, hypertension and obesity compared with non-Hispanic white women Veterans" (Korschak, Washington, & Powell, n.d.). Although the VHA strives to serve all veterans equitably, many groups still fail to reach their highest possible level of health and well-being due to social and economic disadvantages.

Office of Health Equity

Creation and Mission

To combat veteran health disparities, the VHA created the Office of Health Equity (OHE) in 2012 to "champion equitable health care for all Veterans" (About OHE, 2018). The VHA established OHE as a national office with a mission to "position [VHA] as a national leader in achieving equity in health care and health outcomes among vulnerable populations" (About OHE, 2018). OHE works alongside other national offices such as the VA Office of Diversity and Inclusion and the VA Office of Rural Health to research and reduce health disparities for all veterans receiving health care through the VHA. One important responsibility of this office is to educate patients, providers, researchers, and policymakers about the definition of health equity and how it can be achieved within the health care system.

Understanding Health Equity

Health equity is defined as “the attainment of the highest level of health for all people” (About OHE, 2018). While this definition may appear short and simple, it may be easily confused with other concepts by many Americans. First, it is important to clarify that health equity does not mean that every individual achieves the same health outcomes. Underlying genetic factors and personal choices make each individual’s health outcomes unique to them. Second, health *equity* is not the same as health *equality*. Equality would indicate all patients receive the same amount of support and services from the VHA. However, equity in health care means each patient receives a different amount of support based on their needs, so that all individuals have the same *opportunity* to reach optimal health (Applying an Equity Lens, 2018). Health equity often means providing additional services to the least well-off members of a population to improve their opportunities. A visual representation of equity vs. equality is presented below.

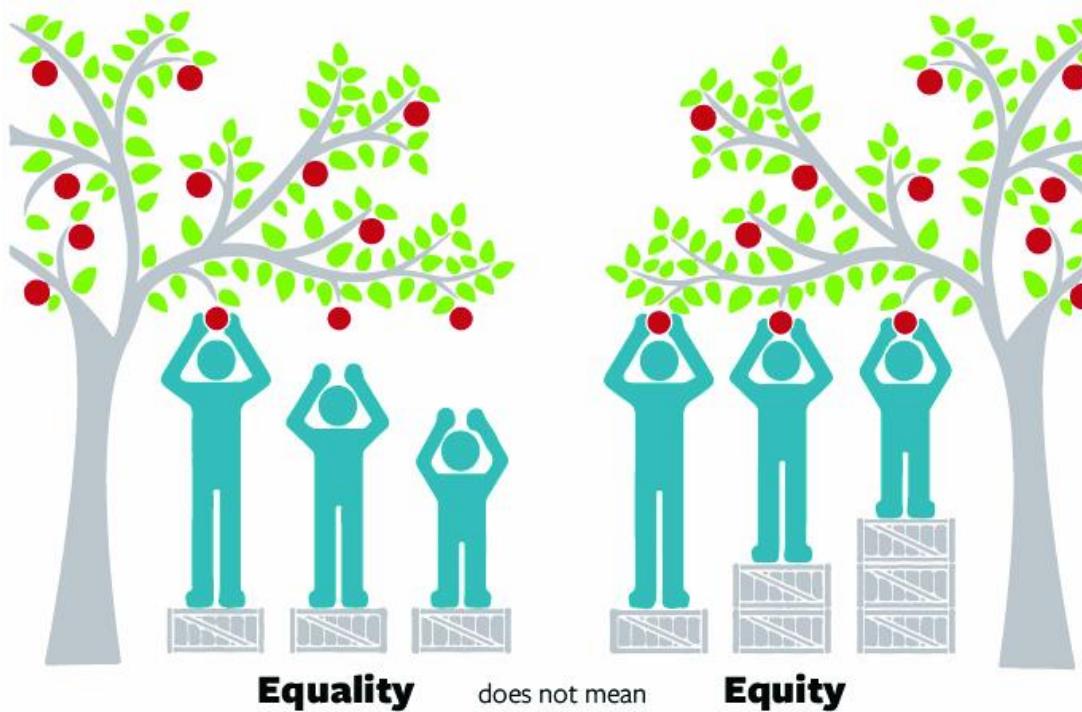


Figure 1: Equality vs. Equity. Retrieved from Florida Department of Health in Escambia County
<http://escambia.floridahealth.gov/programs-and-services/community-health-status/health-equity/index.html>

Achieving health equity in a population is inhibited by existing health disparities. Health disparities are a particular type of health difference that is closely linked with social or economic disadvantage (About OHE, 2018). One example is obesity, which occurs more frequently amongst low-income individuals. Social and economic barriers to health care are often systematically experienced by groups based on gender, race, sexual orientation, military era, geographic location, and age. While these populations are important to understand, additional social factors which lead to health disparities in the veteran population exist and merit consideration by the OHE.

Social Determinants of Health

Definition and Examples

Social determinants of health (SDOH) are the “conditions in the places where people live, learn, work, and play that affect a wide range of health risks and outcomes” (Healthy People, 2020). The federal government’s Office of Disease Prevention and Health Promotion categorizes social determinants of health into the 5 domains shown in the chart below. Examples of social determinants of health are also included, organized by category. All of these examples are social conditions which can positively or negatively influence a person’s health status.

Category	Examples
Economic Stability	Poverty, food insecurity, unemployment, homelessness
Neighborhood and Built Environment	Neighborhood crime and violence, housing quality, environmental conditions (i.e. water or air pollution)
Health and Health Care	Access to primary care, health literacy and numeracy
Social and Community Context	Civic participation, racial discrimination
Education	Graduation rates, early childhood education access, language proficiencies

Figure 2: SDOH examples. Data retrieved from Healthy People 2020. Office of Disease Prevention and Health Promotion. <https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health>

Social Determinants and Health Outcomes

One’s health outcomes are not solely determined by the quality of their health care services. In fact, many estimates suggest that health care and genetics determine less than 50% of a person’s health status (McGovern, Miller & Hughes-Cromwick, 2014). The remaining portion is determined by social and economic factors, the social determinants of health (SDOH). There is substantial evidence linking socioeconomic factors such as low educational attainment, poverty, and occupational class to worse health outcomes. Individuals living in low-income neighborhoods or nations have a lower life expectancy and higher incidences of asthma, diabetes, and heart disease (Blas & Kurup, 2010). Additionally, infant mortality rates in the United States are substantially higher in families with lower maternal education (Mathews & MacDorman, 2013). However, the frequent time lag between social determinant exposure and health outcomes presents a scientific challenge to establish a causal link between the two. Even for immediate effects such as food insecurity or homelessness, concerns of confounding variables and reverse causation further complicate identifying causal relationships. For example, while it may seem intuitive that homelessness would worsen health conditions, it is also possible that poor health could lead to unemployment, bankruptcy, and perhaps the loss of a home.

Although causal relationships are difficult to prove empirically, the theoretical mechanisms through which social determinants affect health outcomes are logically sound. Social determinants of health can impact health outcomes through many pathways, which are summarized into four categories by researchers from the UCSF School of Medicine. The impact of social determinants of health can happen rapidly after exposure, or be delayed many years later. Another dimension of their effect is whether health outcomes are impacted directly or indirectly. These two dimensions lead to four categories of the effect of social determinants of health on health outcomes: (1) direct and rapid, (2) direct and delayed, (3) indirect and rapid, and (4) indirect and delayed (Braveman & Gottlieb, 2014).

One example of a direct, rapid effect of a social determinant on health outcomes is lead exposure in substandard housing units (Braveman & Gottlieb, 2014). Lead poisoning quickly and directly stunts the neurological development in children's brains, harming their intellectual development. It is considered a direct effect because doctors and scientists can trace the biological pathways through which the change occurs. Another direct, but delayed, effect of social determinants is the impact of childhood stress levels on adult cognitive functioning. Stress levels, or allostatic load, are often caused by external social factors and can alter the chemical composition of a person's brain, leading to neurological and immune system diseases (McEwen, 1998). Social determinants of health can also affect health outcomes through indirect causal pathways. An example of an indirect, rapid effect is the amount of alcohol prevalence in a neighborhood leading to an increase in alcohol-related traumatic injuries (Braveman & Gottlieb, 2014). As the availability and abundance of alcohol consumption rises in an area, the number of drunk driving accidents and alcohol-induced domestic violence cases quickly rise as well, leading to injury and death for neighborhood residents. Finally, one indirect and delayed effect is the lack of fresh produce in a neighborhood leading to a rise in the prevalence of obesity over time (Braveman & Gottlieb, 2014). If residents cannot easily access healthy food options, their risk of significant weight gain rises substantially.

Health Literacy

Understanding Health Literacy

One of the critical social determinants of health is health literacy. Health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Healthy People, 2020). It is important to distinguish that health literacy is not the same skill as literacy. While they are interrelated, health literacy goes beyond the ability to read and comprehend language. Health literacy can be broken down into three smaller skills necessary to make appropriate health decisions. First, print literacy is "the ability to read and understand text and to locate and interpret information in documents" (Berkman et. al., 2011). Second, numeracy is the ability to properly use quantitative information for medical tasks, such as adhering to medication instructions (Berkman et. al., 2011). Third, oral literacy requires the patient to speak and listen effectively with their health care team (Berkman et. al., 2011). Taken together, these skills allow patients to understand information about their health status and treatment options. However, millions of Americans do not have these necessary skills to manage their own health care.

A nationwide test of health literacy conducted in 2003 revealed that only 12% of Americans had proficient health literacy skills (Koh et. al., 2012). Meanwhile, 35% of the population scored basic or below basic on the health literacy test (Koh et. al., 2012). Another study concluded that around 80 million U.S. adults have limited health literacy (Berkman et. al., 2011). The prevalence of limited health literacy skills is not equal among subsets of the American population. Many observational studies find a relationship between health literacy scores and demographic characteristics such as age and race. Populations at greater risk of experiencing limited health literacy include racial minorities (non-white populations), low-income Americans, adults without a high school degree, non-native English speakers, and Americans age 65 and older (Office of Disease Prevention and Health Promotion, 2010). In fact, a study done by the National Institutes of Health found that only 3% of the American 65+ population had proficient health literacy skills, compared to 12% proficiency in the total population (Xie, 2012).

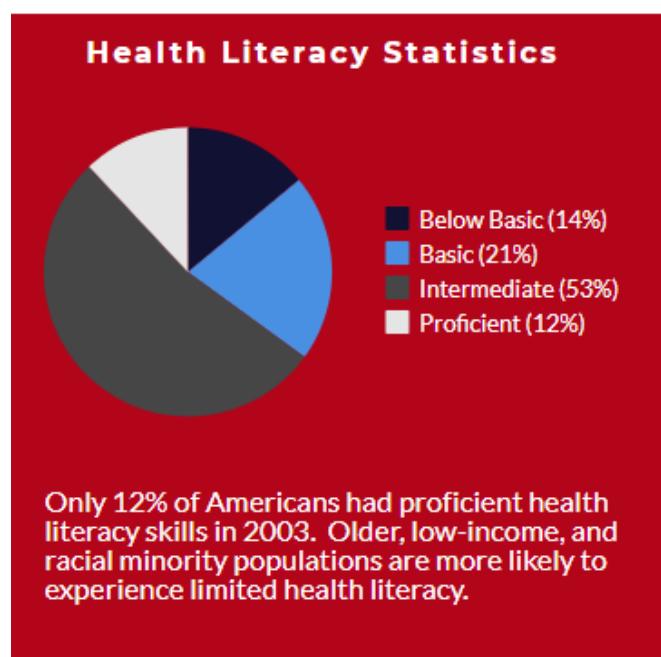


Figure 3: Health Literacy Statistics. Based on data from the U.S. Department of Health and Human Services. Data retrieved from <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2011.1169>

These demographic differences in health literacy proficiency were also studied within the veteran population seeking care at VHA medical facilities. Using a cross-sectional survey of 502 veterans, researchers measured health literacy and numeracy of veterans by age and race. Overall, 29% of veterans had low health literacy, 26% marginal, and 45% had adequate health literacy skills (Rodríguez et. al., 2013). Racial discrepancies between white and African American veterans mirrored the American population as a whole, as inadequate levels of health literacy were more common in African American veterans (Rodríguez et. al., 2013). However, this study did not find greater health literacy challenges amongst older veterans (Rodríguez et. al., 2013). This survey, conducted almost ten years ago, appears to be the only major research specifically focused on health literacy in the veteran population, indicating an important topic for future studies to investigate.

Health Literacy and Health Outcomes

Health literacy is an important topic for research and intervention because it affects patients' health outcomes. Researchers describe three points of influence through which limited health literacy can lead to worse health outcomes. First, access to and utilization of health care services may be impacted by health literacy skills (Paasche-Orlow & Wolf, 2007). For example, the complexity of medical insurance options may deter low-literacy individuals from enrolling in a health insurance plan or scheduling a potentially expensive appointment. Strong evidence suggests that access to health insurance improves health outcomes (Freeman et. al., 2008). Second, the quality of the interaction between patient and provider is impacted by health literacy (Paasche-Orlow & Wolf, 2007). If patients do not understand questions and instructions from their providers, an incorrect diagnosis or treatment plan may harm health outcomes. Third, limited health literacy can worsen self-care capabilities, affecting a patient's ultimate health outcomes (Paasche-Orlow & Wolf, 2007). The inability to follow correct timing and dosage instructions for important medications often results in worse health outcomes (Bitton et. al., 2013). A generalized summary of this connection is presented below.

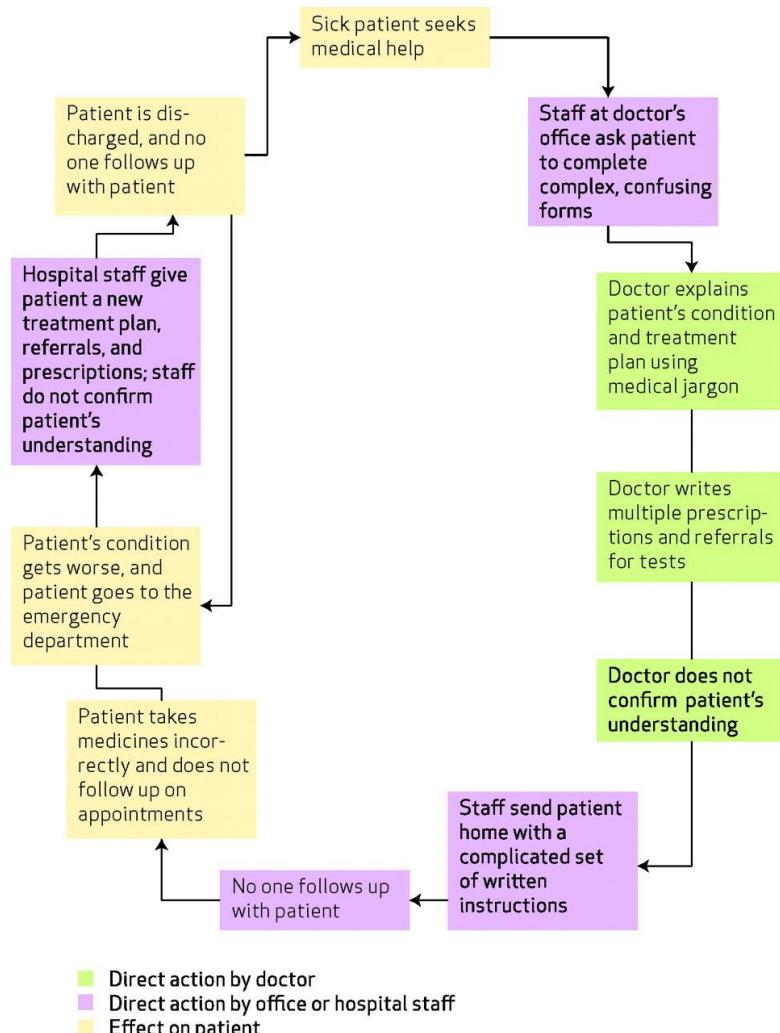


Figure 4: The Cycle of Crisis Care. Retrieved from <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2011.1169>

The link between health literacy and health care behavior has been established through empirical research as well. Two meta-analyses of research studies on the connection between health literacy and health behaviors reached almost identical conclusions on the elements of health care impacted by health literacy. First, they concluded that lower health literacy is associated with greater emergency room utilization and higher rates of hospitalization (Berkman et. al., 2011). One specific cohort study found that lower health literacy made patients 1.69 times more likely to be hospitalized that year (DeWalt et. al., 2004). Second, low health literacy is associated with less frequent immunizations and preventative screenings, controlling for age, gender, race, and income (Scott et. al., 2002). For example, patients with limited health literacy skills were less likely to have received a flu vaccine and less likely to have completed recommended mammography screenings (Berkman et. al., 2011). The third consistent finding between the two meta-analyses is a greater difficulty understanding and following written health instructions, such as medication directions, among low health literacy patients (Berkman et. al., 2011).

These analyses confirm that health literacy skills impact patients' health care utilization and self-care capabilities. Behaviors such as these, which are negatively impacted by limited health literacy skills, can ultimately affect patient health outcomes. Preventive medicine, such as immunization and cancer screening, significantly reduces the prevalence of disease and lengthens lifespans (Goldberg & Chavin, 1997). Thus, the finding that patients with limited health literacy are less likely to use such services is concerning. Additionally, the ability to follow written instructions is an important aspect of self-care which improves outcomes. For example, failure to adhere with cardiovascular medication directions is associated with greater risk of morbidity and mortality (Ho, Bryson, & Rumsfeld, 2009). Improving patients' health literacy would increase their ability to access health care, communicate with providers, and follow self-care instructions. Consequently, health outcomes such as lifespan and morbidity rates would also improve.

Health Literacy Interventions

Social determinants of health are difficult for health systems to address alone. Improving a patient's living situation outside the hospital or doctor's office often requires cross-sector collaboration with educational partners, housing agencies, and private entities. However, governmental policymakers and private health systems have each attempted to improve health literacy skills among patient populations. Health system interventions to improve health literacy typically fall into three broad categories: provider communication training, patient literacy improvement, and patient health material simplification. These actions seek to simplify the complex health information being shared with patients or empower patients to gather and understand more of this information. Frequently, interventions take advantage of new technologies available for communication and information provision (Office of Disease Prevention and Health Promotion, 2010). For example, the My HealtheVet electronic portal allows veterans to digitally communicate with providers to ask questions and receive test results (Lakshmanan, 2016).

There is reliable evidence to suggest health literacy interventions can improve health outcomes. A randomized control trial evaluating the effectiveness of a medication adherence technology found significant decreases in blood pressure and body weight in patients using the technology six months after the training concluded (Zullig et. al., 2014). Another study sought to determine the effect of physician communication training on the health outcomes of diabetic patients. A multivariate logistic regression revealed that patients with low health literacy were more likely to have hemoglobin A1c levels below the mean (a positive result) if their physician used strategies presented in the communication training (Schillinger et. al., 2003). These studies provide evidence that health systems can overcome health literacy challenges to improve patient outcomes.

Criteria

Low levels of health literacy are causally related to worse health outcomes. To reach OHE's goal to "improve [the] health and health care outcomes for Veterans experiencing health disparities", increasing health literacy of the least-educated Veterans is imperative (About-Office of Health Equity, 2018). This report will propose and analyze four policy alternatives to improve veteran health literacy. The following criteria will be used to evaluate and compare the alternatives and recommend a course of action for the VHA.

Effectiveness

How much does the intervention improve health literacy levels?

This criterion will measure how well each alternative increases the health literacy of Veteran patients. Effectiveness is a high priority of the Veterans Health Administration. If all patients can find and comprehend information critical to their personal health care decisions, the gap in health outcomes based on education level can be reduced.

Because the Veterans Health Administration does not currently measure and monitor the health literacy of its patients nationwide, this criterion will necessarily be an estimate based on comparable literature of other populations and interventions. Existing studies use a variety of measures to determine intervention effectiveness. Some do so in terms of health literacy test scores, such as the Test of Functional Health Literacy in Adults (Parker et. al., 1995). Others use ultimate improvements in health outcomes, such as weight loss or blood pressure changes. In order to capture both health literacy and health outcome improvements, and compare across alternatives using different units of measurement, this analysis will translate existing research into a scale of low, medium, or high effectiveness for each alternative.

Equity

Does the intervention address health literacy of all Veteran populations equitably?

The population served by Veterans Health Administration facilities is heterogeneous. It is composed of Veterans of various ages, races, genders, and geographic locations. It is important to the Office of Health Equity that all Veterans receive equitable care, irrespective of group identification (About- Office of Health Equity, 2018). The equity criterion will represent this value. It will measure how well each proposed intervention addresses health literacy across subgroups of the Veteran population. For example, if a policy would improve health literacy through technology, elderly Veterans without access to technology would not be helped as much. This would be a less equitable alternative due to age discrepancies.

This analysis will translate each alternative's equity considerations into a low, medium, high rating. To determine this score, various factors will be considered. These factors include:

- Does the intervention require access to technology or physical mobility which might disadvantage older individuals?
- Are racial and cultural minority viewpoints considered in the design and implementation?
- Can this intervention be implemented in both rural and urban facilities, where the former may have fewer staff and less access to external partnerships?

Administrative Feasibility

Can the Veterans Health Administration effectively implement the intervention?

To ultimately improve health outcomes of Veterans, the proposed interventions must be implemented nationwide in over 1,200 VHA facilities (About VHA, 2019). A project of this scale requires substantial organizational activity. Administrative feasibility “entails an assessment of a department’s or agency’s capacity, a projection of available resources and agency behavior that may be difficult to estimate” (Caputo, 2013). For example, a project would have higher administrative feasibility if it could be implemented by one team in central office, rather than requiring coordination between various groups across geographic regions. This criterion will measure if the VHA has the capacity to effectively implement the proposed actions.

To estimate the administrative feasibility of each alternative, this analysis will again translate a qualitative criterion into a low, medium, or high rating. This score will be determined based on a consideration of three factors: number of additional regulations necessary, geographic dispersion of resources, and length of expected implementation time. More new regulations, wider geographic span of involvement, or a longer timeline would make implementation more challenging, and therefore less feasible.

Cost

What is the estimated cost to the Veterans Health Administration?

In 2019, VHA’s budget for medical care was almost \$77 billion, which goes toward providing medical services to 9.3 million enrolled Veterans across the nation (*Budget in Brief*, 2020). However, less than half of this money is discretionary spending (*Budget in Brief*, 2020). Additional spending on health literacy initiatives would reduce money available for other priorities of the VHA, such as suicide prevention or infrastructure investments. While these outlays may pay off in the long run in the form of improved health and reduced expenditures on health care provision, it is important to minimize the amount of upfront spending required to improve health literacy levels.

Calculating the costs of proposed alternatives will require financial data from the VHA’s budget proposals and their internal databases. To estimate the total cost of an intervention, this analysis will include the cost of physical resources (paper, ink, medical equipment, etc.), staff time (hourly salary of VA employee multiplied by number of hours worked on the project), and facilities usage for trainings, townhalls, or other events (overhead costs per hour times number of hours used times number of facilities hosting).

Alternatives

Option #1: Evaluate all written health education materials for understandability and actionability using the Patient Education Materials Assessment Tool

The Agency for Healthcare Research and Quality (AHRQ) produces research and tools aimed to improve the health literacy of American healthcare consumers. One tool available for public use is the Patient Education Materials Assessment Tool (PEMAT). The PEMAT allows healthcare systems to evaluate their written health education materials, such as diagnosis brochures and procedure preparation and recovery instructions, for understandability and actionability by an average patient (AHRQ, 2019). Part of the PEMAT tool is included in Appendix B. This alternative would use the PEMAT to evaluate all written health education materials produced and distributed by VACO. VACO employees would use the PEMAT checklist to ensure written materials are at the proper reading level, and include graphics and images to enhance readability for less-educated veterans.

This alternative would simplify complex health information to be digestible for patients with low health literacy. Medication guides and written packages are often written at a tenth-grade level or above (Shrank & Avorn, 2007). However, many older Americans read at or below the sixth-grade level (Shrank & Avorn, 2007). This gap leaves some patients confused and uneducated about their healthcare options. By simplifying written health materials, the VHA can ensure all veterans, regardless of literacy status, can gather the same information critical to their health.

"The PEMAT gives us greater precision in the assessment of our materials...This empowers our patients to make more informed decisions, participate more in their care, and ultimately leads to better outcomes."

- Dr. Chasity Burrows Walters, Director of Patient and Caregiver Education, Memorial Sloan Kettering Cancer Center

Effectiveness

I estimate that using this tool to evaluate written health education materials will not be highly effective at improving patient health literacy and subsequently improving health outcomes. Thus, I assign option 1 to be "low" on the effectiveness criterion. A study of a similar tool used to improve readability of health documents found that short documents revised with the tool were easier to read and understand than the old documents (Brega et. al., 2015). However, they found "the readability, understandability, and actionability of lengthier patient education materials were poor and did not improve over the 6-month implementation period." (Brega et. al., 2015). Because the tools are very similar, and have the same purpose, it is reasonable to expect similar results would occur if option 1 were implemented in the Veterans Health Administration. A tool which does not improve lengthy, complicated documents would likely not impact the health outcomes of the least health literate patients in VA facilities.

Equity

This option is highly equitable for most members of the Veteran population, thus receiving an equity rating of “high”. The Patient Education Materials Assessment Tool (PEMAT) would be used to evaluate all written health education materials created in VA Central Office. These materials would then be distributed to local VA facilities throughout the nation. This distributional model would ensure that all Veterans, regardless of geographic location, would have access to understandable and actionable information. However, this option is not perfectly equitable because it does not mandate PEMAT usage for local facilities. Thus, community-specific documents not drafted in Washington, D.C. may not match the understandability and actionability standards of the tool. For example, if the VA Medical Center in Beckley, West Virginia drafts a new brochure, it is not required to be evaluated using the PEMAT. This could lead to geographical inequities in standards.

Administrative Feasibility

Using the PEMAT to evaluate written health education materials created in central office is highly administratively feasible, despite the breadth of the undertaking. I estimate option 1 to be “high” on this criterion. Experiences from other health systems can be used to predict the feasibility of VHA implementation. In 2015, Memorial Sloan Kettering Cancer Center in New York City began using the PEMAT in their bi-annual review of their virtual library materials (AHRQ Tool, 2016). A case study of their implementation revealed that a variety of hospital professionals, and even former patients, used the tool to evaluate reading materials. Evaluators were surveyed afterward, with 92 percent reporting the tool was easy to use (AHRQ Tool, 2016). This case is promising for the VHA, as it indicates non-clinical staff in central office can easily understand and use the PEMAT.

Mandating PEMAT use in central office would not pose a heavy regulatory burden on VA officials. Additionally, because this work would be completed in central office, it is more feasible than a project implemented by collaborating medical centers across the country. While these factors support this option’s high administrative feasibility, the timeline for implementation presents an administrative hurdle. A health system in the southeast region of the U.S. with only 15 medical centers spent at least a year evaluating their 1,000 patient-focused health education materials and 5,500 forms (Novant Health, 2016). With over 170 medical centers in the VHA health system, PEMAT evaluation is expected to take at least a year to accomplish.

Cost

I estimate this option will cost \$234,000. The primary cost of using the PEMAT to evaluate written health education materials is the staff time required to review documents. To calculate this cost, I approximated the number of documents requiring VHA review, the average review time per document, and the average salary per hour of VA employees. I then multiplied the total number of documents by the average review time per document to estimate the total amount of time this project will take, 6,500 hours. Finally, I multiplied the number of total review hours by the average hourly salary of VA employees to reveal the total cost of staff time spent on this option. Detailed cost calculation details are located in Appendix C.

Option #2: Require all VA primary care physicians complete oral communication training in the Health Literacy Universal Precautions Toolkit

AHRQ has produced additional health literacy improvement tools. The Health Literacy Universal Precautions Toolkit includes 21 3-5-page lessons to improve spoken communication, written communication, self-management and empowerment, and supportive systems (AHRQ, 2019). One spoken communication tool for physicians outlines the Teach Back Method, where providers ask patients to repeat oral instructions back to them as a comprehension check (AHRQ, 2019). This alternative would require all primary care physicians in the VA Health System to complete the Teach Back training materials from AHRQ and spend one hour practicing these skills with their primary care team. Primary care physicians will have one year to complete required training, to remain consistent with other training requirement timelines.

Physicians often suffer from the curse of knowledge: It is difficult to communicate what we know because it is hard to imagine what it is like to not know it (Heath & Heath, 2006). For professionals who spent years mastering a particular disease or treatment option, it is challenging to clearly communicate this knowledge to a novice listener. Option two would attempt to correct this curse. A meta-analysis of physician communication found “Physician communication is significantly positively correlated with patient adherence; there is a 19% higher risk of nonadherence among patients whose physician communicates poorly than among patients whose physician communicates well” (Zolnierenk & DiMatteo, 2009). Thus, training physicians to communicate more clearly should improve patient understanding and adherence.

Effectiveness

Requiring primary care physicians to complete oral communication training is anticipated to be highly effective at improving patients’ health literacy and health outcomes. A randomized control trial evaluating the effectiveness of oral communication training in the VA found promising results with the veteran patient population. Patients whose providers underwent health literacy communication training received colon cancer screenings at a rate 8.9 percentage points higher than patients whose physicians did not receive training (Ferreira et. al., 2005). The difference jumped to 25.7 percentage points for patients with “limited literacy” (Ferreira et. al., 2005). This randomized experiment provides strong causal evidence that provider training can improve healthy behaviors and outcomes.

Another health system in the United States implemented two of the oral communication tools in the Universal Precautions Toolkit, Teach-Back and Ask Me 3. To evaluate their effectiveness, patients in one hospital were given a test to assess their health literacy before and after the tools were implemented. Before the intervention, the average test score was 38.5% (Novant Health, 2014). After the toolkit techniques were implemented, the average score rose to 85% (Novant Health, 2014). Perhaps most promising was their finding that test score gains held for two years post-intervention. One important caveat from this study is that there was no control group to compare the intervention to. Unlike the randomized control trial in the VA, the findings from this study cannot be interpreted as causal. However, it is important evidence to consider, as this study analyzed the same provider training required by this policy option.

Equity

Option two receives a “medium” rating for equity in the veteran population. It is equitable because it does not require any patient action or time. This is beneficial because patient ability to act might vary depending on socioeconomic status or education level. Because all VA patients are assigned a primary care provider to coordinate their care, this intervention would reach a large portion of the veteran population in the same way. Option 2 may not be perfectly equitable because enforcement relies on local facilities. If leadership in some areas do not see the value in oral communication trainings, they may not enforce the policy as firmly. In this case, some patients will not be treated by physicians who have learned the skills presented in the toolkit.

Administrative Feasibility

Implementing a nationwide requirement of all primary care physicians is a large administrative undertaking. Although possible, I estimate this option would be challenging for the VHA to implement, assigning it an administrative feasibility rating of “low”. This evaluation is based on the experiences of 12 other primary care practices during their implementation of the Health Literacy Universal Precautions Toolkit. Qualitative results following their six-month implementation of the toolkit indicated the practices struggled due to competing time demands, technological challenges, and limited leadership support, among other administrative hurdles (Mabachi et. al., 2016). Two differences between this study and the environment surrounding this analysis should be noted. First, the primary care practices in this study attempted to implement all 21 tools from the toolkit, rather than only the spoken communication tools called for in this option. Secondly, these 12 practices were independent, while the VA would need to implement the toolkit in hundreds of “practices” throughout their health system.

To ensure uniform implementation across the country, option 2 would require significant changes in regulation, detailing for whom, when, and how these oral communication trainings should take place. Additionally, geographic variability poses an administrative challenge, as teams in different locations would need to collaborate and share information to implement the toolkit. However, once organized, option 2 could be implemented quickly since the toolkit already exists and is not lengthy at 3-5 pages per tool (AHRQ Health Literacy, 2019).

Cost

The primary cost of this option is again VA staff time. In total, I estimate the cost of option 2 to be \$1,315,800. The Health Literacy Universal Precautions Toolkit has already been developed and revised by the Agency for Healthcare Research and Quality. It is an electronic resource that can be accessed for free via the internet, so no printing or distribution costs would be incurred by the VA (AHRQ Health Literacy, 2019). Therefore, the cost of option 2 is the time for primary care physicians to read and practice the trainings from the toolkit. To estimate this cost, I determined an approximate time to complete the oral communication tools in the toolkit by completing them myself. I then found the average hourly salary of primary care physicians in the U.S. to be \$86/hour. Finally, I found the number of primary care physicians in the VA healthcare system. I multiplied these three numbers together to reach a final cost of \$1.3 million for option 2.

Option #3: Institute an electronic health literacy training for patients

Option three would involve the VHA designing, developing, and distributing a new health literacy training program for their patient audience. This training would be housed on the VA website and mobile app for veterans to access in their homes. A health literacy training program would include video lessons and interactive modules to help patients learn common health care vocabulary terms and skills for navigating health care environments. Participation would be entirely voluntary and open to all patients seeking care at VA facilities. To increase participation among patients, a nationwide marketing strategy would also be developed.

The goal of an electronic training program for patients is to improve patient literacy and confidence in a health care setting. A similar model of patient training for senior citizens is already used by the National Institutes of Health. After the NIH training completion, over 75% of participants responded to a survey that information from the class affected their decision about a health- or medically-related issue (Xie, 2012). If the VA health literacy training was similarly successful, veterans would make better-informed health care decisions.

Effectiveness

Developing an electronic health literacy training app for patients would be highly effective at improving health literacy and outcomes among Veterans. First, research indicates patient education interventions can have substantial impacts on health outcomes. A randomized control trial studied the effects of a congestive heart failure self-management program on health outcomes. It found that patients who participated in the self-care training experienced 35% lower hospitalization and mortality rates than patients in the control group (DeWalt et. al., 2006). Another study evaluated the effect of an electronically-delivered patient training on medication adherence. This research found that medication adherence rates significantly increased among patients with initial adherence lower than 95% (Ownby et. al., 2012). These rigorously designed studies provide evidence that electronic health literacy trainings can change patient behavior and ultimate health outcomes. However, the generalizability of these studies is not as strong as their causal findings. Since patients participating in the trainings had to voluntarily sign up for a trial in the first place, the results may not apply to the patient population more broadly.

“Patients who participated in the self-care training experienced 35% lower hospitalization and mortality rates than patients in the control group.”

- DeWalt et. al.

Equity

Instituting an electronic patient training program receives an equity score of “low”. Option 3 is an inequitable option for two reasons. First, it requires patient time and action, which may be more challenging for low-income Veterans with little spare time. Second, the training would be delivered through an electronic app. For older Veterans who are less comfortable with technology, the challenges of downloading and using an app may be too daunting. Additionally, some older or low-income Veterans may not have smartphones to access the app.

Administrative Feasibility

This option would be difficult for the VHA to implement, therefore receiving a “low” administrative feasibility rating. This option would require content development, coding, dissemination, training, and evaluation by VA Central Office. To complete these tasks, many additional regulations would be required to set guidelines for usage and privacy, and set standards for evaluation of the program. This project would take years to complete, potentially spanning multiple presidential administrations and VA Secretaries. A long timeline could complicate implementation if leadership’s priorities shift. However, since the bulk of the work will be completed by central office, geographic variation does not pose a significant administrative barrier to implementation.

Cost

The primary costs of option 3 include content development and app development/design. Together, these costs total to \$364,500. To develop content for the app, a team of VA employees including a physician, nurse, public health specialist, patient advocate, and writer would need to dedicate substantial time to the project. For this analysis, I will assume a team of this size could develop sufficient content in six months, all working full-time. Thus, the total cost for content development is one-half the sum of their annual salaries, \$214,500. The cost to develop the technology for the app itself is estimated to be \$150,000. This is based on known costs of similar apps. An important cost which is not quantified in this analysis is the value of patient time.

Option #4: Let present trends continue

Currently, the VHA takes limited explicit action to address health literacy among veterans. However, present trends in VA healthcare may improve care for patients with low health literacy indirectly. All physicians are required to complete cultural competence training upon employment with the VA (Moy, personal communication, 2020). Cultural competence training includes some verbal communication skills which may help overcome the curse of knowledge. However, these skills focus on speaking with veterans of varying racial and ethnic backgrounds, rather than veterans with low health literacy.

Additionally, technological services such as the My HealtheVet patient portal allow veterans to virtually communicate with providers. Through My HealtheVet, patients can securely message their care team with follow-up questions or concerns and receive a timely reply to read in their homes. This program allows veterans to ask additional questions they may not have the time or ability to during a short in-person appointment. It also gives patients more time to digest and research information provided by their care team, improving comprehension. Allowing present trends such as cultural competence training and interactive patient portals to continue could slowly address health literacy disparities in the VHA.

Effectiveness

The effectiveness of allowing present trends to continue in the VA is low. There is not currently a targeted health literacy intervention project in the VA's central office. Active projects involving other social determinants of health do exist, but health literacy is not currently a high priority among them. Although local facilities may be taking steps to improve patients' health literacy, these efforts are not coordinated or tracked at the national level. I do not predict local projects, due to their limited scope, will improve the health literacy of a significant portion of the Veteran population.

Equity

This option receives an equity score of "low". It is inequitable because it does not take active steps to improve the health literacy and outcomes of Veterans not currently achieving their highest possible level of health. Any action to improve health literacy in the near future would come from regional offices or local facilities. This could worsen inequities based on geographic location.

Administrative Feasibility

Allowing present trends to continue is highly feasible, resulting in the best possible feasibility score, "high". It requires no additional regulatory action, no long-distance coordination, and no complicated timeline for action. Option 4 does not involve additional bureaucratic action by employees in VA Central Office, making it easy to implement.

Cost

I do not anticipate allowing present trends to continue to add significant costs to the VA's baseline budget. The Office of Health Equity may continue to partially sponsor local projects which aim to improve health equity among Veterans. A small project such as this is estimated to cost \$18,000.

Outcomes Matrix

	Effectiveness	Equity	Administrative Feasibility	Cost
1 – Standardize written material	Low	High	High	\$234,000
2 – Require oral communication training for physicians	High	Medium	Low	\$1.3 million
3 – Electronic patient training program	High	Low	Low	\$364,500
4 – Let present trends continue	Low	Low	High	\$18,000

Recommendation

Considering the projected outcomes above, **I ultimately recommend Option 2: Require all VA primary care physicians complete oral communication training in the Health Literacy Universal Precautions Toolkit.** The effectiveness of physician-centered communication trainings is grounded in rigorous scientific evidence conducted directly with the Veteran population. Thus, option two's "high" effectiveness rating makes it a viable solution to address health disparities caused by limited health literacy. While requiring trainings would be more administratively challenging than allowing present trends to continue or standardizing written material, it is predicted to be far more effective at improving health literacy and health outcomes. The additional regulations and oversight necessary to implement physician trainings are offset by their greater effectiveness.

Option 2 is preferred over option 3, an electronic patient training program, because it is a more equitable solution. An option which requires no additional action or effort on behalf of patients allows all Veterans, regardless of circumstance, to benefit from the intervention. However, while option two's effectiveness and equity ratings are positive, this alternative is not without tradeoffs. One downside of this recommendation is its cost. Taking valuable time from in-demand physicians incurs a high opportunity cost. Time spent reviewing the training materials and practicing new skills with their teams will ultimately crowd-out other important tasks such as patient visits and electronic health record keeping. Additional anticipated implementation challenges are discussed further below.

Implementation

Key Actors in Implementation

Implementation of initiatives from the Office of Health Equity typically follow one of two distinct paths forward. One option is a top-down approach through mandates from VA Central Office (VACO). Programs and policies proposed by OHE can be required in facilities nationwide by top leadership within the VA. Positions of leadership with jurisdiction to make such changes include the Secretary of the Department of Veterans Affairs, currently Robert Wilkie, and the “Executive in Charge, Veterans Health Administration”, Dr. Richard Stone (Executive Biographies, 2019). If these leaders support a policy, they hold the power to mandate nationwide change throughout the VA Healthcare System. Local implementation would then be directed by VA Medical Center Directors in each of the 170 facilities across the country.

The second method of implementation for OHE is a slower, bottom-up approach. This process entails speaking directly with leaders of local VA Medical Centers, and convincing them to implement a new policy in their hospital. Key stakeholders in this scenario include Chief Medical Officers and Chief Nursing Officers at individual facilities (Moy, personal communication, March 2020). CMOs and CNOs are in positions to make health policy changes which affect health literacy. Starting in local facilities allows awareness of the program to spread organically to other sites. The key advantage to this approach is the ability to discover implementation challenges on a small scale and build local support for the initiative. While this process initiates voluntary implementation amongst interested facilities, it does not mandate nationwide adoption. For this reason, the following analysis will focus on implementing the recommended action through the top-down approach in VACO. It will outline next steps and anticipated reactions and barriers to a nationwide implementation of provider communication training by VA leadership in Central Office.

Next Steps

The first step for leaders in VACO is to consult with Medical Center Directors to explore what timeline and methods would be feasible for the implementation of this policy. Then, they could draft a memo regarding the provider oral communication training policy. VACO should communicate what the trainings entail, and why they are important for physicians to complete. This memo should also include details such as when, how, and who must complete trainings from the Health Literacy Universal Precautions Toolkit. VACO can send this memo to Medical Center Directors to inform them of the upcoming policy change and allow them to distribute it to physicians in their facility. Medical Center Directors should then draft more detailed information to share with their physicians. Step-by-step instructions on how to access the Health Literacy Universal Precautions Toolkit and how to document their training completion are important details to publicize.

Anticipated Reactions from Stakeholders

Medical Center Directors- I anticipate that Directors across the nation will react with varying levels of both support and resistance to this policy change. Because the enforcement of additional training requirements will largely fall to them and their teams, it will add to their already full workload. This aspect will likely draw resistance from this stakeholder group. To address this barrier, VACO needs to communicate the reasons for implementing this policy to Directors, with a focus on long-term improvements in health for veterans.

Physicians- Physicians required to complete oral communication trainings will likely express resistance to this policy change. Because they are already required to meet continuing education requirements and participate in many online trainings through the federal government, physicians may view this training as an unnecessary addition to their schedules. Taking additional time away from direct patient care is a challenging task to require of busy physicians. To mitigate resistance, VACO should emphasize the short length and time commitment necessary to complete these tools.

Patients- I anticipate strong support from patients who are made aware of this training policy. These trainings aim to improve the quality of patients' health care without directly adding costs or time to Veterans. However, it is not likely that a significant portion of the patient population will know about this policy change. Because communication is focused on physicians and Directors, most patients will not see the training requirement change. To help improve the image of the VA and prime patients to pay more attention to the instructions they get, VACO could establish communications directly to veterans advertising this policy after initial implementation.

Potential Barriers to Success

One potential risk to successful implementation of this policy option is a change in VA leadership to those who may be unsupportive of this training requirement. As presidential administrations change, secretaries and undersecretaries are often replaced as well. If a new leader who does not agree that this training is worthwhile is appointed, they could unilaterally remove the policy. It is important that VACO inform leadership of the potential cost-effectiveness of this policy, to minimize the risk of its removal. Another potential barrier is a lack of training completion by physicians. If there is lax enforcement in their facilities, or no punishment for failing to complete the training, physicians may choose to ignore the policy. This challenge is the most important to consider when designing an implementation plan. VACO and Medical Center Directors should work together to develop a fair, but strict enforcement policy to incentivize compliance.

References

About- Office of Health Equity. (2018, November 20). Retrieved October 3, 2019, from

https://www.va.gov/HEALTHEQUITY/Facts_About_OHE.asp.

About VHA. (2019, July 14). Retrieved October 3, 2019, from

<https://www.va.gov/health/aboutVHA.asp>

AHRQ Health Literacy Universal Precautions Toolkit. Content last reviewed July 2019. Agency for Healthcare Research and Quality, Rockville, MD. <https://www.ahrq.gov/health-literacy/quality-resources/tools/literacy-toolkit/index.html>

AHRQ Tool Helps Memorial Sloan Kettering Cancer Center Improve Patient Education Materials. Content last reviewed May 2016. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved from <https://www.ahrq.gov/news/newsroom/case-studies/201603.html>

Applying an Equity Lens. (2018, July 9). Retrieved March 20, 2020, from

https://www.va.gov/HEALTHEQUITY/Applying_an_Equity_Lens.asp#differencesp1

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: an updated systematic review. Annals of internal medicine, 155(2), 97-107.

Bitton, A., Choudhry, N. K., Matlin, O. S., Swanton, K., & Shrunk, W. H. (2013). The impact of medication adherence on coronary artery disease costs and outcomes: a systematic review. The American journal of medicine, 126(4), 357-e7.

Blas, E., & Kurup, A. S. (Eds.). (2010). Equity, social determinants and public health programmes. World Health Organization.

Bowser, L.N., & Washington, D. L. (n.d.). Access to Care Among Rural Veterans Fact Sheet. Access to Care Among Rural Veterans Fact Sheet. Office of Health Equity, Veterans Health Administration. Retrieved from

https://www.va.gov/HEALTHEQUITY/docs/Access_to_Care_Fact_Sheet.pdf

Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. *Public health reports*, 129(1_suppl2), 19-31.

Brega, A. G., Freedman, M. A., LeBlanc, W. G., Barnard, J., Mabachi, N. M., Cifuentes, M., ... & West, D. R. (2015). Using the health literacy universal precautions toolkit to improve the quality of patient materials. *Journal of health communication*, 20(sup2), 69-76.

Caputo, R. K. (2013). Policy analysis for social workers. SAGE Publications.

Department of Veterans Affairs—*Budget in Brief*. (2020). 38. Retrieved February 2, 2020, from <https://www.va.gov/budget/docs/summary/fy2020VAbudgetInBrief.pdf>.

DeWalt, D. A., Berkman, N. D., Sheridan, S., Lohr, K. N., & Pignone, M. P. (2004). Literacy and health outcomes. *Journal of general internal medicine*, 19(12), 1228-1239.

DeWalt, D. A., Malone, R. M., Bryant, M. E., Kosnar, M. C., Corr, K. E., Rothman, R. L., ... & Pignone, M. P. (2006). A heart failure self-management program for patients of all literacy levels: a randomized, controlled trial [ISRCTN11535170]. *BMC health services research*, 6(1), 30.

Executive Biographies. (November 22, 2019). Retrieved March 17, 2020, from

<https://www.va.gov/opa/bios/>.

Ferreira, M. R., Dolan, N. C., Fitzgibbon, M. L., Davis, T. C., Gorby, N., Ladewski, L., ... & Bennett, C. L. (2005). Health care provider-directed intervention to increase colorectal cancer screening among veterans: results of a randomized controlled trial. *Journal of Clinical Oncology*, 23(7), 1548-1554.

Freeman, J. D., Kadiyala, S., Bell, J. F., & Martin, D. P. (2008). The causal effect of health insurance on utilization and outcomes in adults: a systematic review of US studies. *Medical care*, 1023-1032.

Goldberg, T. H., & Chavin, S. I. (1997). Preventive medicine and screening in older adults. *Journal of the American Geriatrics Society*, 45(3), 344-354.

Healthy People 2020 [Internet]. Washington, DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Available from:

<https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health>.

Heath, C., & Heath, D. (2006). The curse of knowledge. *Harvard Business Review*, 84(12), 20-23.

Ho, P. M., Bryson, C. L., & Rumsfeld, J. S. (2009). Medication adherence: its importance in cardiovascular outcomes. *Circulation*, 119(23), 3028-3035.

- Koh, H. K., Berwick, D. M., Clancy, C. M., Baur, C., Brach, C., Harris, L. M., & Zerhusen, E. G. (2012). New federal policy initiatives to boost health literacy can help the nation move beyond the cycle of costly ‘crisis care’. *Health Affairs*, 31(2), 434-443.
- Korschak, L., Washington, D. L., & Powell, T. (n.d.). Female African American Heart Disease Disparities Fact Sheet. Female African American Heart Disease Disparities Fact Sheet. Office of Health Equity, Veterans Health Administration. Retrieved from <https://www.va.gov/HEALTHEQUITY/docs/FemaleAfricanAmericanHeartDiseaseFactSheet.pdf>
- Lakshmanan, I. (2016). Improving Doctor-Patient Communication In A Digital World. Diane Rehm [podcast]. Retrieved from <https://dianerehm.org/shows/2016-02-09/improving-doctor-patient-communication-in-a-digital-world>
- Lastovetska, A. (2019, April 18). App Development Cost: Understand Your Budget To Build Powerful Apps. Retrieved April 8, 2020, from <https://mlsdev.com/blog/app-development-cost>
- Mabachi, N. M., Cifuentes, M., Barnard, J., Brega, A. G., Albright, K., Weiss, B. D., ... & West, D. (2016). Demonstration of the health literacy universal precautions toolkit: Lessons for quality improvement. *The Journal of ambulatory care management*, 39(3), 199.
- Mathews, T.J., MacDorman, M.F. (2013). Infant mortality statistics from the 2009 period linked birth/infant death dataset. *Natl Vital Stat Rep* 2013;61:1-28.
- McEwen, B. S. (1998). Stress, adaptation, and disease: Allostasis and allostatic load. *Annals of the New York academy of sciences*, 840(1), 33-44.

McGovern, L., Miller, G., & Hughes-Cromwick, P. (2014). The relative contribution of multiple determinants to health. *Health Affairs Health Policy Briefs*. Published August, 21.

Novant Health Boosts Patient Understanding and Outcomes with Health Literacy Toolkit.

Content last reviewed September 2014. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved from <https://www.ahrq.gov/news/newsroom/case-studies/201416.html>

Novant Health Uses AHRQ Tool to Assess and Improve Patient Communications. Content last reviewed April 2016. Agency for Healthcare Research and Quality, Rockville, MD.

<https://www.ahrq.gov/news/newsroom/case-studies/201602.html>

Office of Disease Prevention and Health Promotion. US Department of Health and Human Services. (2010). National action plan to improve health literacy. US Department of Health & Human Services.

Office of Personnel Management. (2020). Salary Table 2020-DCB. Retrieved from

<https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2020/DCB.pdf>

Oppel, R. A., & Goodnough, A. (2014, May 29). Doctor Shortage is Cited in Delays at V.A. Hospitals. New York Times. Retrieved from

<https://www.nytimes.com/2014/05/30/us/doctor-shortages-cited-in-va-hospital-waits.html>

Ownby, R. L., Waldrop-Valverde, D., Caballero, J., & Jacobs, R. J. (2012). Baseline medication adherence and response to an electronically delivered health literacy intervention targeting adherence. *Neurobehavioral HIV medicine*, 4, 113.

Paasche-Orlow, M. K., & Wolf, M. S. (2007). The causal pathways linking health literacy to health outcomes. *American journal of health behavior*, 31(1), S19-S26.

Parker, R. M., Baker, D. W., Williams, M. V., & Nurss, J. R. (1995). The test of functional health literacy in adults. *Journal of general internal medicine*, 10(10), 537-541.

Patient Advocate Salaries (2020). Indeed. Retrieved from

<https://www.indeed.com/cmp/Department-of-Veterans-Affairs/salaries/Patient-Advocate>

Primary Care Physician Salaries. (2020). Glassdoor. Retrieved from

https://www.glassdoor.com/Salaries/primary-care-physician-salary-SRCH_KO0,22.htm

Rodríguez, V., Andrade, A. D., García-Retamero, R., Anam, R., Rodríguez, R., Lisigurski, M., ... & Ruiz, J. G. (2013). Health literacy, numeracy, and graphical literacy among veterans in primary care and their effect on shared decision making and trust in physicians. *Journal of health communication*, 18(sup1), 273-289.

Schillinger, D., Piette, J., Grumbach, K., Wang, F., Wilson, C., Daher, C., ... & Bindman, A. B. (2003). Closing the loop: physician communication with diabetic patients who have low health literacy. *Archives of internal medicine*, 163(1), 83-90.

Scott, T. L., Gazmararian, J. A., Williams, M. V., & Baker, D. W. (2002). Health literacy and preventive health care use among Medicare enrollees in a managed care organization. *Medical care*, 40(5), 395-404.

Shrank, W. H., & Avorn, J. (2007). Educating patients about their medications: the potential and limitations of written drug information. *Health affairs*, 26(3), 731-740.

The Patient Education Materials Assessment Tool (PEMAT) and User's Guide. Content last reviewed July 2019. Agency for Healthcare Research and Quality, Rockville, MD.

<https://www.ahrq.gov/ncepcr/tools/self-mgmt/pemat.html>

Veterans Health Administration Salaries of 2018. (n.d.). Retrieved April 8, 2020, from

<https://www.federalpay.org/employees/veterans-health-administration>

Washington D.C. Registered Nurse Salary. (2020). Glassdoor. Retrieved from

https://www.glassdoor.com/Salaries/washington-dc-registered-nurse-salary-SRCH_IL.0,13_IM911_KO14,30.htm

Xie, B. (2012). Improving older adults' e-health literacy through computer training using NIH online resources. *Library & information science research*, 34(1), 63-71.

Zolnierk, K. B. H., & DiMatteo, M. R. (2009). Physician communication and patient adherence to treatment: a meta-analysis. *Medical care*, 47(8), 826.

Zullig, L. L., McCant, F., Melnyk, S. D., Danus, S., & Bosworth, H. B. (2014). A health literacy pilot intervention to improve medication adherence using Meducation® technology. *Patient education and counseling*, 95(2), 288-291.

Appendix A: Patient Education Materials Assessment Tool

ACTIONABILITY

Item #	Item	Response Options	Rating
20	The material clearly identifies at least one action the user can take.	Disagree=0, Agree=1	
21	The material addresses the user directly when describing actions.	Disagree=0, Agree=1	
22	The material breaks down any action into manageable, explicit steps.	Disagree=0, Agree=1	
23	The material provides a tangible tool (e.g., menu planners, checklists) whenever it could help the user take action.	Disagree=0, Agree=1	
24	The material provides simple instructions or examples of how to perform calculations.	Disagree=0, Agree=1, No calculations=NA	
25	The material explains how to use the charts, graphs, tables, or diagrams to take actions.	Disagree=0, Agree=1, No charts, graphs, tables, or diagrams=N/A	
26	The material uses visual aids whenever they could make it easier to act on the instructions.	Disagree=0, Agree=1	

Total Points: _____

Total Possible Points: _____

Actionability Score (%): _____
 $(\text{Total Points} / \text{Total Possible Points}) \times 100$

Appendix B: Technical Appendix for Cost Estimates

Option #1:

In order to calculate the total cost of reviewing all written health education materials using the PEMAT, I calculated the total time VA employees would spend working on this project. This was done by multiplying the total number of documents to review by the amount of time it takes per document, for a total of 6,500 hours of review time. To estimate the cost of this time, I multiplied it by the average hourly salary of a VA employee (\$35.93/hr). This yielded a total cost of approximately \$230,000 for option #1.

Total cost = Total number of documents requiring review * Average review time per document * Average hourly VA salary

Number of documents to review = 1,000 written health education materials + 5,500 forms
= **6,500** (Novant Health, 2016).

Review time per document = 30 minutes review of checklist + 30 minutes material correction/improvement =**1 hour** (Author's testing of tool).

Average hourly VA salary = \$71,269 annual salary / 2,000 work hours per year = **\$35.93 per hour** (Veterans Health Administration Salaries of 2018, n.d.).

Total cost = 6,500 * 1 * \$35.93 = **\$233,545**

Option #2:

To determine the cost of requiring VA primary care physicians to complete spoken communication training, I first completed the training myself to estimate the amount of time it would require of physicians. It took approximately 2 hours to finish, plus an additional hour for practice with care teams. If each of the 5,100 physicians in the VHA system spent 3 hours on this training and practice, 15,300 hours total would be spent. 15,3000 hours multiplied by an average physician hourly salary of \$86/hour results in a total of \$1.3 million for this initiative.

Total cost = Number of hours required to complete training per physician * Number of primary care physicians in VHA * Average hourly salary of a primary care physician

Number of hours required for training = 2 hours to read and watch toolkit videos + 1 hour to practice skills with PACT team = **3 hours** (Author's testing of tool).

Number of primary care physicians in VHA = **5,100** (Oppel & Goodnough, 2014).

Average hourly salary of a primary care physician = \$172,000 average annual salary / 2,000 work hours per year = **\$86 per hour** (Primary Care Physician Salaries, 2020).

Total cost = 3 hours * 5,100 doctors * \$86 per hour = **\$1,315,800**

Option #3:

Implementing a digital patient training module would require two phases: developing content for the training, and creating the technology to deliver this content. Content development is estimated to cost \$214,500, which is the sum of 6-months of salary for a five person VA team. Technical app development is more difficult to quantify prior to implementation, as app costs vary greatly depending on their size and complexity. This analysis will use the known cost of developing a similar app as an estimate.

Total cost = Cost of content development by staff + Cost of technical app development

Content Development = 5-person team working for 6 months

1. Physician- \$172,000 annual salary / 2 = \$86,000 (Primary Care Physicians Salary, 2020).
2. Nurse- \$64,000 annual salary / 2 = \$32,000 (Washington D.C. Registered Nurse Salary, 2020).
3. Public Health Specialist- \$60,000 annual salary / 2 = \$30,000 (Office of Personnel Management, 2020).
4. Patient Advocate- \$73,000 annual salary / 2 = \$36,500 (Patient Advocate Salaries, 2020).
5. Writer- \$60,000 annual salary / 2 = \$30,000 (Office of Personnel Management, 2020).

Sum of team salaries = \$86,000 + \$32,000 + 30,000 + \$36,500 + \$30,000 = **\$214,500**

Technical App Development = average of range for large, complex development [50,000 – 250,000] = **\$150,000** (Lastovetska, 2019).

Total cost = \$214,500 + 150,000 = **\$364,500**

Option #4:

Allowing present trends to continue does not require significant financial investment. This cost is based on the salary of a GS-11 employee, typical of program managers with previous experience. If this employee spent 10 hours per week working on a small health literacy project, $\frac{1}{4}$ of their \$72,000 salary would be spent on option #4.

Total cost = $\frac{1}{4}$ of a GS-11 salaried employee

GS-11 Salary = \$72,000 (Office of Personnel Management, 2020).

Total cost = \$72,000 / 4 = **\$18,000**