A well-established movement in Public Health uses a relatively new vocabulary in conversations to move population-based preventive measures further upstream, working with such concepts as the **determinants of health**, the **built environment** and **community preparedness**.¹ The implications of the burgeoning literature in this field is that primary prevention – taking deliberate steps before illness is present in an individual or community – is critical to improvements in Public Health. Indeed, achievement of the Triple Aim of health reform, namely improved health, improved healthcare delivery and lower per-capita health care costs, is easily connected to earlier and community-wide disease prevention. It is suggested here that if upstream public health interventions are to receive public, and therefore political, support, improved Health Literacy in this country is a prerequisite. But conceiving ways to implement and fund improvements in Health Literacy has been difficult. We argue that a K-12 educational focus should be placed on aligning the current educational science standards with healthcare employment opportunities to create a more health literate community.

**Health Literacy Defined**

In this paper we will invoke a well-conceived definition of Health Literacy as proposed by Freedman et. al.² Freedman describes **Health Literacy** as a “comprehensive model” comprised of two distinct components, **Individual Health Literacy** and **Public Health Literacy**, with the latter defined “as the degree to which individuals and groups can obtain, process, understand, evaluate, and act on information needed to make public health decisions that benefit the community.” The authors then go on to reflect that “Public Health Literacy is important and the challenge is to identify effective strategies for increasing it.” A person’s Individual Health Literacy – such as knowing how to navigate the health insurance system, how to interpret food label information, how to provide first aid for minor injuries, or how to access affordable medications – is obviously incentivized by the improvement in one’s own health status such knowledge can provide. In contrast, motivations to improve a person’s Public Health Literacy, except in certain subpopulations subject to self-apparent disparities, is not propelled by its own obvious personal rewards and therefore lacks an incentive by which principles of community health are routinely taught. While there are educational programs for tobacco cessation for smokers and agencies promoting programs for the elderly, for family planning, for underserved communities, for children and other subpopulations, a comprehensive plan and strategy to improve Public Health Literacy for the general population is lacking. As a result, concepts such as herd immunity are not well understood and, under the spell of suspicions in part generated by marketing practices and the information highway, skepticism regarding the science behind immunization practices emerges. Understandably, such skepticism results in misguided antivaccination sentiments, some of which are peculiarly American. A focused effort to improve Health Literacy, with attention to its Public Health Literacy component as defined above, would provide a much needed antidote.

Further, a model to advance health literacy is presented here that includes basic healthcare career education in a continuum that crosses all socioeconomic boundaries and could carry many tangential benefits. By expanding primary and secondary school curriculum to expose students to the broadening

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¹ Frieden, T *Government’s Role in Protecting Health and Safety* NEJM 368;20 1857-59 May 16, 2013
range of healthcare careers in the context of Health Literacy education, a unique opportunity exists to 1) improve the health of the overall population, 2) diminish disparities in health, healthcare access and employment, 3) make more efficient use of current and emerging healthcare resources, including new technologies and recommended preventive services and 4) help to answer the need for an expanded healthcare workforce. Each of these benefits will be described herein.

1) Improved Population Health
Decades of Public Health research has established that literacy in all its forms correlates closely with the health status of populations.\(^3\) Educational level as an independent variable explains significant portions of the correlating racial, economic and regional disparities that exist in health status of various populations.\(^4\) While well-conducted research is less plentiful correlating health status specifically with Health Literacy as defined above, many public health challenges are clearly associated with shortfalls in a public understanding of specific scientific principles. Concepts that would fall squarely within the territory of Health Literacy would include knowledge of the signs of myocardial infarction or stroke, understanding the risks of tobacco use and tobacco marketing, interpretation of food labels and principles of the food industry, and understanding the risks of overuse of antibiotics, all of which correlate with improved health outcomes.\(^5\) Public Health media campaigns regularly seek to convey such principles to the population and would synergize with efforts to improve health literacy in schools.

2) Mitigate Health and Healthcare Disparities
While our healthcare system is stratified into tiers based upon levels of insurance coverage and affordability, the U.S. educational system is a truly universal entitlement. Certain important public health measures are therefore monitored in the setting of schools, such as childhood immunization rates, learning disabilities and visual screening. By employing universal access to the school system, curriculum to improve Health Literacy would evenly spread the impact of such knowledge across ethnic, socioeconomic and political barriers. If the Health Literacy curriculum specifically included information pertaining to careers in the health care field, this would also provide an equitable stimulus for future employment opportunity.

In addition to the direct benefit that Health Literacy education would have on students attending classes, economists describe a “multiplier effect” that occurs when knowledge and skills are disseminated through a population by a “seed” group. Such strategies have been used to promote the use of mosquito nets to students in malaria endemic areas of Africa and would apply to Health Literacy education in this country.\(^5\) Thus, health disparities would be addressed not only in the student population, but in peers and family members of those students.

3) More Efficient Use of Current and Emerging Healthcare Resources
Theranos is a Silicon Valley company that is rapidly expanding the availability of low-cost laboratory testing in the setting of local pharmacies.\(^6\) One of the critical concerns expressed about such a strategy is whether the public will have sufficient knowledge to know which blood tests are relevant to their health and how to interpret results when they are delivered in a world where unscientific recommendations shared through

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\(^3\) Health Literacy, Committee on Health Literacy, Institute of Medicine; National Academies, 2004
\(^5\) Brooker, S et al Malaria Control in Schools: A toolkit on effective education sector responses to malaria in Africa London School of Hygiene and Tropical Medicine and the Kenya Research Institute-Wellcome Trust, December 2009
\(^6\) Auletta, K Blood, Simpler The New Yorker, December 15, 2014
social media abound. A profound improvement in Health Literacy of the population is an obvious prerequisite for such a healthcare resource to be used effectively and safely.

Overuse of emergency room services has become a significant contributor towards runaway increases in healthcare costs and provides another example of resource misuse. Simple education regarding the kinds of injuries, symptoms or syndromes that warrant emergency evaluations would go a long way towards alleviating so called “excess Emergency Department utilization.” Instructing the public about the appropriate use of outpatient “medical homes” would shift inefficient nonemergency care to this more appropriate setting. Delivering this instruction as an element of K-12 education while pointing to employment opportunity provides both the environment and incentive to change behavior.

4) Meeting Demands for an Expanded Healthcare Workforce and Advancing Employment
Healthcare has not only become the dominant employment opportunity in 34 states in the US but also continues to be one of the fastest growing categories.7 In 1990, the Bureau of Labor Statistics identified manufacturing as the dominant U.S. employer, but a shift to the retail trade occurred by 2003. By 2013 healthcare and social assistance became the dominant employer across the country and remains the dominant source of employment today. Demand for a larger healthcare workforce is augmented by an aging population with increasing healthcare needs. In fact, a severe healthcare labor force shortfall exists that creates a direct economic incentive to those who seek the education and skills for employment in the health industry. Future projections of a need to grow our healthcare workforce do not only justify efforts to increase health literacy and career education in schools, but also act as an incentive that will drive an increase in public efforts to achieve health literacy. Few incentives to increase one’s health literacy are as compelling as the prospect of employment.

When Health Literacy curriculum includes knowledge about careers in the healthcare field—both traditional careers like medicine and nursing, and non-traditional careers like information technology, robotics and health insurance navigation - private and public employers have reason to support the effort as an investment towards workforce development. Thus, funding streams should exist for implementation.

A Model for Health Literacy Education Incentivized by Career Opportunity
A new model could seamlessly introduce expanded health career preparation in the context of Health Literacy education. The current status of Health Literacy is depicted on the left in Figure 1 while a more favorable model that would improve Health Literacy is depicted on the right. A number of measures of Health Literacy have been applied in research, such as the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA). While no current test is ideal and while the performance levels in this graphic are not derived directly from a tested population, we can arbitrarily identify a level of performance below which we would consider an inadequate level of Health Literacy to allow for effective participation in the health care system in the interests of ones’ own and ones community’s health. This target for Health Literacy can be seen as the minimum target Health Literacy for public education to achieve (represented as “Functional Health Literacy” in red).

One goal might be to double this minimum standard level of knowledge through a school-based health literacy curriculum, thereby increasing the standard level of health literacy sought for the American lay population. Depicted in blue (represented as “Technical Health Literacy”), additional levels of health

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education are made available to students as they progress through the educational system, resulting in the exploration of various career opportunities in health care. At the highest level are professional careers requiring the highest degree of technical expertise, and between this highest level and the minimum standard is a smooth gradient of expertise, including a number of health careers such as medical assistants and phlebotomists, that require training and an understanding of health strategies appropriate to those particular careers. The Desired Model of Health Literacy seeks not only to elevate the minimum functional
Figure 2. Current and Desired Models of Health Literacy with the Impact on Potential Career Paths Depicted

standard of Health Literacy for the lay person (in red), but also to make early and more technical health
education available for students at younger ages (in blue) so they can visualize opportunities for health
careers as they proceed through their studies and thereby gain a higher level of health literacy.

In Figure 2, the Current Model of Health Literacy is considered on the left. Students interested in a course
of study for a health care field often select life sciences electives, leading them to careers in medicine,
nursing, pharmacology and various forms of therapy (See Career Paths). As knowledge accumulates,
students become aware of additional opportunities, such as in prehospital care and administrative
positions. However, a considerable gap currently exists between the minimum level of Health Literacy
expected of every individual and the more technical understanding of health science that is needed for
students to meaningfully consider other health careers. Through the limited exposure they now receive in
their mainstream curricula, few students gain an accurate sense of the expanding spectrum of health
employment opportunities that exist or will soon emerge from a changing system.

In a more ideal model, depicted in Figure 2 on the right, not only is the minimum level of Health Literacy
expanded for the general population (in red), but a more highly technical health education is expanded to
the lower educational levels (in blue), giving students a clearer and more real perception of opportunities in
the health care industry. By teaching how to measure blood pressure, by learning the vocabulary of health
insurance (copayments, deductibles, premiums etc...), by learning the science behind the risks and benefits
of vaccinations, by clarifying the appropriate and inappropriate settings for the use of antibiotics, students
can begin to envision health care career pathways that interest them while simultaneously gaining in
Health Literacy. Beyond the traditional professional health careers, opportunities in new fields are
emerging, including in the disciplines of genetics, neurophysiology and biomechanical engineering as well
as meaningful new careers in less academically arduous fields such as billing analysis, medical transcription
and environmental health. Students would also learn about important new lay positions for Community
Health Workers and Insurance Navigators. Pilot projects across the country are now underway, many
launched through directives in the Affordable Care Act, to explore mechanisms for reimbursing many of
these new careers in health, such as the Community Paramedicine program in California.

Public Health and Education Policies for Health Literacy Education in K-12 grades
By 2010, 39 states had adopted new educational standards called the Common Core State Standards
(CCSS) into their educational plans, some with modified language. Included in the mission of the CCSS
standards is to prepare students as “College and Career Ready.” New national science curriculum
standards, entitled the Next Generation Science Standards (NGSS), are a component of the new CCSS. Now
is an ideal time to integrate Health Literacy educational materials into these NGSS standards at the local
level.

Driven by the economic incentive of employment opportunities in healthcare and supplemented by efforts
in the education sector to update national science curriculum in alignment with the Next Generation
Science Standards, momentum is already in place to achieve improved health literacy and health care
career awareness. Students can follow a course of study at their individual learning level thereby enabling
them to focus on a healthcare career that appeals to their own interests.

A Summary Graphic for the Public
The figurative graphic in Figure 4 summarizes the model we have described, linking career opportunities
with Health Literacy education. The “word clouds” reflect data published by the Bureau of Labor Statistics
projecting “the fastest growing careers in healthcare between 2010 – 2020” and the educational level required of each career is loosely represented on the left, increasing in academic rigor as one ascends the tree. The graphic is entitled “The Tree of Hippocrates” as a historical reference to “the Father of Medicine” who, legend has it, taught his students beneath this tree in Greece. However, the message seeks to broaden the viewer’s perception of the range of careers that are now and are becoming more important to our healthcare system, far beyond the careers of doctors and hospital staff. Note that the trunk, like the red bar in the earlier chart, represents a basic level of “Health Literacy” that is sought as a standard for nationwide educational curricula.

Through the visual in Figure 4 we hope to convey 1) that a spectrum of career opportunities exist in healthcare for all socioeconomic, cultural, ethnic and academic subpopulations, with entry points from all educational levels, 2) that an intrinsic part of the U.S. healthcare system is the achievement of a basic standard of Health Literacy for the general public, and 3) that the new model of healthcare truly requires a team approach to service delivery with the Patient as the most important participant, each person engaged in upstream prevention for the sake of personal and community health.

This poster is intended to spark conversations and inspire students. We propose that it appear in multiple locations in the community, in schools, in hospitals, in libraries, in public buildings and in businesses that have a health literacy and healthcare career oriented interest, and challenge any organization to claim that they do not.

Conclusion

In seeking to address unsustainable costs and disparity in access to healthcare in the U.S. as well as unsatisfactory health status of the population compared to other developed countries, improved Health Literacy is critical. A relentless movement towards personal responsibility for health care and wellness is underway, with new technologies and marketing trends presenting a perplexing array of choices to the American public. Is it important to select “gluten-free” products? Do my symptoms of cough warrant antibiotics? Should I stretch out the schedule of vaccinations for my child to avoid complications? Should I sign up for blood tests and an examination at my neighborhood pharmacy? Simply put, functional health literacy is a rephrasing of the need for basic knowledge that is necessary if health decisions are to receive science-based consideration by the American public.

Simultaneously, we find ourselves at a juncture when public health stakeholders predict a shortfall in trained healthcare providers, when employers are finding it difficult to fill positions in certain sectors of the healthcare workforce, when our system is broadening the scope of careers that will make up our reformed health system team, and when our educational experts are redesigning the science curriculum for the entire country. We propose that the imperative for improved health literacy and the need for an expanded health services workforce have a common solution in the form of a renewed effort towards health career preparation delivered in schools in the context of Health Literacy education and that a unique window of opportunity exists at the present time to implement such an effort. We propose a way to convey this message to the public through a succinct media campaign in order to garner public, and therefore political, support.
Figure 4 – The Tree of Hippocrates.