



ACTUARIAL SPECIALTIES | HEALTH

Addressing Inadequate Health Literacy

Contributing to the U.S. health care transformation through an innovative doctor-patient incented health literacy model initiative

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American health care spending is a complex and layered issue. While there is a strong correlation between low health literacy and increased health care spending, including unnecessary emergency room (ER) visits and hospitalizations, no systematic method has emerged to address the consequences of inadequate health literacy to create lasting behavioral change and improve health outcomes. The purpose of this article is to examine a doctor-patient incented health literacy model introduced by MedEncitive, a mobile-enabled, health care cost-containment software as a service (SaaS) firm.

Studies cited by the Centers for Disease Control and Prevention (CDC) found that inadequate health literacy is associated with higher rates of hospitalizations, ER visits and mortality.^{1,2,3} In one study, Veterans Affairs (VA) researchers found that veterans with inadequate health literacy consumed nearly twice as much health care as did veterans with adequate health literacy.⁴ A 2019 UnitedHealth Group study showed that 18 million hospital

ER visits by privately insured individuals were considered “avoidable” and added \$32 billion in costs to the U.S. health care system.⁵ According to this study, these patients could have been treated “safely and effectively in high-quality, low-cost primary care settings.”

Key stakeholders in both the public and private sectors see increased health care spending as an opportunity to innovate and influence consumer health behaviors through health promotion and disease prevention. For example, in 2015, most large firms offered incentivized wellness-type programs, including employee education initiatives, disease management programs and biometric screenings.⁶ These programs target employee health lifestyles as well as morale, productivity and stress levels. According to a 2017 report by the American Psychological Association, “Stress-related illness and injury are estimated to cost the United States more than \$300 billion per year, including costs related to stress-related accidents, absenteeism, employee turnover, diminished productivity, and direct medical, legal and insurance costs.”^{7,8} However, evidence suggests these programs do not have a significant effect on health behaviors or health care system savings.⁹ These findings put a spotlight on a costly gap in people’s knowledge of health management, thus creating the need to focus on health literacy.

HEALTH LITERACY AND HOW IT CAN BE IMPROVED

Only one in nine adults has the essential skills needed to manage their health. The Patient Protection and Affordable Care Act (ACA) of 2010, Title V, defined health literacy as “the degree to which an individual has the capacity to obtain, communicate, process and understand basic health information and services to make appropriate health decisions.” The CDC expands on this definition, noting that “health literacy skills are those people use to realize their potential in health situations ... either to make sense of health information and services or provide health information and services to others.” These skills are essential to “understand the choices, consequences and context of the information and services” and “to decide which information and services match their needs and preferences so they can act.”¹⁰ The U.S. Department of Health and Human Services (HHS) has recognized that this is a serious issue and in 2019 created the National Action Plan to Improve Health Literacy.¹¹ Unfortunately, the issue of low health literacy skills highlights a more profound societal issue: Nearly 50 percent of U.S. adults have reading comprehension at a fifth-grade level or lower.¹² This statistic translates to only about one in nine adults having the essential skills needed to manage their health.¹³ Furthermore, the children of parents with low literacy levels have a 72 percent chance of being at the lowest reading levels themselves, further perpetuating the problem. According to ProLiteracy, low health literacy skills in the United States have a price tag of more than \$230 billion a year.¹⁴

USING THE MUTUAL ACCOUNTABILITY AND INFORMATION THERAPY (MAIT) MODEL TO MITIGATE THE ILL EFFECTS OF INADEQUATE HEALTH CARE LITERACY

Actuaries use basic principles of actuarial mathematics to solve complex problems; perhaps it is time to consider this same strategy to address the complexity of health care spending and health literacy.

MedEncentive developed a model to mitigate the effects of inadequate health literacy. This model can be a means to improve health behaviors beyond the limited success of current strategies (e.g., biometric screenings and other wellness activities).

About MedEncentive

As a health care cost-containment SaaS firm, MedEncentive's core mission is to develop health care solutions to control health care costs by integrating behavioral science, technology and financial incentives to improve health behaviors, health outcomes and quality of life. (More can be found about MedEncentive's mission and values on the company's [website](#).)

The MAIT Model

The MAIT model is a patient-physician focused program that combines financial incentives and web-based information therapy, which is defined as providing patients with the right information, at the right time, in the right way, so they are more knowledgeable and motivated to self-manage their health.^{15,16,17} Health plans purchase the MAIT program to control costs, but it is viewed as an additional health benefit by plan members and a reimbursable treatment by physicians.

At the start, the health plan customers electronically transmit member eligibility files to the MAIT program site, which, in turn, electronically sends orientation letters and ID cards to all plan members. Thereafter, the health plan transmits replicate insurance claims to the program on a daily basis. These claims are used to identify all office visits rendered by physicians and to notify physicians and patients of their opportunity to earn financial rewards for completing an "information therapy session" with each office visit.

The physician earns either \$7.50 for responding to a program notice or \$15 by logging onto the program website to enter an evidence-based medicine treatment guideline and select an educational article relevant to the patient's diagnosis. Physicians have a four-day time limit to respond to the program notices. Once expired, these program opportunities are automatically forwarded to the patients.

The patient earns a financial reward (typically a refund of a copay) by responding to the opportunity by logging onto the program's website within two weeks of the notice to complete an information therapy session involving these five tasks:

1. Read the educational article selected by their physician (or one they select themselves if the physician failed to participate).
2. Demonstrate understanding of the article by passing an online open-book test.
3. Declare adherence to the program (or provide a reason for non-adherence).
4. Agree to allow their physician to have access to their knowledge and adherence assessments outlined in the previous two steps.
5. Rate how aligned their physician's care is to what they learned in the article.

MAIT Model Evaluation

The *Journal of Medical Internet Research* evaluated the impact of the MAIT model over a five-year period (from 2013 to 2017) on an 1,800-member health plan of a nonprofit general hospital in a semi-rural community in the South Central United States. The health plan members comprised hospital employees (doctors, nurses, clinicians, other medical personnel and support staff) and their dependents.¹⁸

The evaluation analyzed the model's impact on hospitalizations, ER visits and costs over the five-year period (pre-implementation basis from 2013–2014 and post-implementation basis from 2015–2017). It also collected members' perceptions of the value of the program at the end of every visit through a series of open- and closed-ended survey questions. Open-ended questions related to the members' experience with the program and suggested program improvements, while closed-ended questions were geared toward the benefit of the program's educational content, members' level of adherence, how motivated they were to manage their health and the impact of their physician on their health behaviors.

MAIT Study Outcomes

After program implementation, there were notable decreases in hospitalizations and ER visits (per 1,000 members). There were also decreases in the plan's annual per capita costs relative to the pre-implementation baseline period.

- Hospitalizations decreased by 32 percent.
 - ER visits decreased by 14 percent.
 - Annual per capita expenditures decreased by 11 percent net of program cost.
- Open-ended survey questions, measured on a Likert scale of 1–5 (with 5 being the “most helpful”), showed:

- Members viewed the program’s educational content as helpful in managing their condition (4.4/5).
 - Members were either compliant or intended to be compliant with the guidance provided by the physician (4.7/5).
- Closed-ended survey questions, measured on a Likert scale of 1–10 (with 10 considered most important), showed:

- Members were motivated to improve their health literacy and behaviors knowing their physician had access to their questionnaire (8.8/10).
- It was important for members to know their physician was aware they understood how to self-manage their health (9.2/10).
- It was important for members to know their physician was aware they were trying to accomplish their health objectives (9.3/10).

Analysis of the MAIT Core Components

Incorporating **financial incentives alongside educational content** was well received by participants based on comments such as:

- “It is educational and beneficial. The financial incentive helps our family greatly as we use it for copays and supplies. We are very thankful for the program.”
- “This is [a] great incentive for patients to not only be aware of their own health and medication issues, but also an opportunity for them to read and learn more about these issues ... and there is financial incentive to completion.”

These comments also expressed gratitude and appreciation for the benefit that addressed their gap in health literacy.

The model relies on physician-selected web-based educational materials written at a fifth-grade literacy level. This format provides context through an easily digested medium, improves comprehension and mitigates the likelihood of confusion and misunderstanding following conversations with a physician.¹⁹ Self-confidence is an essential trait for active participation in one’s own health care journey.

The **patient educational content and testing** format improves awareness as participants gain a better understanding of their options for managing their health and provides them with the necessary knowledge to take appropriate actions. As one patient commented: “Many adults (old and young) rely upon the internet to diagnose and learn about health issues and medications. This format is associated with health professionals and would seem to contain more reliable information.”

After reading the educational content, participants complete an online open-book multiple-choice test to measure their comprehension level. Studies show that multiple-choice tests are most effective for recalling information, thereby aiding retention and reinforcement of what participants learned about their condition through their reading.²⁰

There is an extensive list of auxiliary positive side effects of the delivery method, such as improved self-confidence—an essential trait for active participation in one’s own health care journey—personal accountability, empowerment and an augmented belief in one’s ability to manage one’s health, all of which are linked to lower hospital utilization.²¹

The physician is viewed as the expert and the ultimate authority figure—the one who knows best and will have a direct impact on a person’s health. The survey results show **the role and impact of the physician**: There is a correlation between the indirect influence of the physician and the members’ motivation to improve their health. Interestingly, patients deemed it quite important that their physician was aware they were taking appropriate steps to self-manage their health and accomplish their health objectives. This finding indicates that the presence of a physician alone can influence changes in a patient’s behavior.

An authority figure has a strong influence on obedience with altering behavior to comply for fear of the consequences if they do not. Consider how people’s littering habits and the prevalence of bike theft improve when there is an illusion of being watched,²² or the fact that a group of trick-or-treaters was more likely to comply with the neighbor’s order to take just one candy when they saw their reflection in a mirror placed near the candy jar.²³ Fear, dependency and inequality of roles can strongly influence people’s behaviors. Fear, dependency and inequality of roles can strongly influence people’s behaviors.

However, positive reinforcement delivered through a strong partnership may have an even more powerful and longer-lasting role in influencing behaviors. In the 2010 study “Considering Culture in Physician–Patient Communication During Colorectal Cancer Screening,” published by the U.S. National Institute of Health (NIH), patients of various backgrounds and ethnicities were receptive and more likely to foster a longer-lasting patient-physician relationship when the physician was approachable, trusting, open and personable.²⁴ Knowing someone cares about you and has a vested interest in your well-being can bring about lasting behavioral changes, particularly with regard to an area as vulnerable as health. As Carl Jung writes, “In the final reckoning, it is not knowledge, not technical skill, that has a curative effect, but the personality of the doctor.”²⁵

BARRIERS TO WIDESPREAD ADOPTION

Current wellness-type programs do not directly address the costly gap in health literacy. Despite the comprehensiveness of the MAIT model, the ease of implementation and the potential to yield significant cost savings, it has not yet achieved widespread attention. Why?

- **Limited results.** The results of this MAIT evaluation are compelling, but further research is needed to confirm the cost-containment capabilities of the model and its impact on health since the results of this study are based on a

small sample size of one hospital's nonprofit health plan with high-functioning and educated members. Furthermore, normalization techniques need further peer review. Such limiting conditions may lead to skepticism of the results and efficacy of the model. Therefore, additional case studies to test the MAIT model under more general conditions, such as randomized and larger control groups differing across a variety of geographies and socioeconomic populations (i.e., race, age, gender, social and financial class, etc.) is recommended.

- **Fear of change.** On a macro level, people fear and resist change for a variety of reasons ranging from potential loss of control, uncertainty and confusion, concerns about a lack of required competency or skills, and prior bad experiences.²⁶ In other words, “sameness = safety and change = danger.”²⁷ Similarly, it has been shown that people experience difficulties in making decisions because “the abundance of choices and information may make us falsely believe that the stakes are higher than they really are regarding the outcome of our decision.”²⁸
- **Web access.** The web-based method of delivering educational content may not appeal to a plan's total population; the MAIT model assumes that participants have access to a computer and the internet, and that they can confidently navigate the web. This risk can be shown by looking at the impact the COVID-19 pandemic has had on access to online education—more than 25 percent of students in the United States did not have a computer,²⁹ and many households could not afford internet access during the pandemic.³⁰
- **Adaptability.** It may not be obvious to potential users how quickly the content of educational articles can change with factors such as advancements in technology, age or comorbidity. In a similar vein, clarity may be needed around whether treatment guidelines consider alternative therapies, such as acupuncture, yoga, mindfulness, meditation and psychotherapy.
- **The “other” factor.** It is widely believed that “content is king” due to its direct influence on advertising, opinions and the possibility of “going viral.”³¹ However, the research of [Julianne Wurm](#), founder of TEDxEast, tells a different story. She conducted a survey of thousands of TEDx participants in more than 50 countries that indicated “idea carriers” are the “impeccable storytellers, thinkers or writers”³²—not necessarily the ones who perform the research—and it is these communicators who bring ideas into the common vernacular. Her research showed that “it's the carrier who gets the audience to open up, trust and ultimately spread the idea.”
- **Short-term vs. long-term results.** A 2005 study, “The Economic Implications of Corporate Financial Reporting,” surveyed more than 400 financial executives and found the majority would avoid investment opportunities to meet short-term earnings expectations and smooth earnings.³³ This study highlights a potential barrier for MedEncentive since the model thrives on a long-term investment. Additionally, the time and costs associated with program implementation, training and maintenance may be viewed as arduous and expensive in the long term.

EMPOWERING ACCOUNTABILITY WITH CONFIDENCE

As health care costs continue to rise in the United States, it is clear that effective and innovative practices are needed to help tackle this pervasive and longstanding problem. The research shows that along with the socioeconomic disparities that directly affect an individual's mental and physical health, there is a lack of essential health literacy skills among the U.S. population, which has a notable impact on the cost of health care.³⁴

MedEncentive's MAIT program effectively addresses the harmful effects of inadequate health literacy by using financial incentives to tap into the doctor-patient relationship and promote patient education, knowledge assessment and declaration of compliance. This unique model provides patients with the knowledge they need to make choices appropriate to their condition as well as improved confidence in their ability to manage their health. Thus, this feeling of personal accountability has the potential to lower the cost of health care in the United States.

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REFERENCES:

1. Baker, D.W., J.A. Gazmararian, M.V. Williams, T. Scott, R.M. Parker, D. Green, J. Ren, and J. Peel. 2002. Functional Health Literacy and the Risk of Hospital Admission Among Medicare Managed Care Enrollees. *American Journal of Public Health* 92, no. 8:1,278–1,283.
2. Balakrishnan, M.P., J. B. Herndon, J. Zhang, T. Payton, J. Shuster, and D. L. Carden. 2017. The Association of Health Literacy With Preventable Emergency Department Visits: A Cross-sectional Study. *Academic Emergency Medicine* 24, no. 9:1,042–1,050.
3. Bostock, S., and A. Steptoe. 2012. Association Between Low Functional Health Literacy and Mortality in Older Adults: Longitudinal Cohort Study. *BMJ* 344:e1602.
4. Haun, J.N., N.R. Patel, D.D. French, et al. 2015. Association Between Health Literacy and Medical Care Costs in an Integrated Healthcare System: A Regional Population Based Study. *BMC Health Services Research* 15, no. 249.
5. [UnitedHealth Group. 18 Million Avoidable Hospital Emergency Department Visits Add \\$32 Billion in Costs to the Health Care System Each Year. UnitedHealth Group, July 2019 \(accessed April 30, 2020\).](#)
6. [Kaiser Family Foundation. 2015 Employer Health Benefits Survey. Kaiser Family Foundation, September 22, 2015 \(accessed April 30, 2020\).](#)
7. [American Psychological Association, APA Working Group on Stress and Health Disparities. 2017. Stress and Health Disparities: Contexts, Mechanisms, and Interventions Among Racial/Ethnic Minority and Low-Socioeconomic Status Populations. American Psychological Association.](#)

8. 8. [Mohney, Gillian. Stress Costs U.S. \\$300 Billion Every Year. *Healthline.com*, January 15, 2018 \(accessed April 13, 2020\).](#)
9. 9. [Amber. Biometric Screenings Are Not a Wellness Strategy. *IncentFit* \(accessed April 13, 2020\).](#)
10. 10. [Centers for Disease Control and Prevention. What Is Health Literacy? *Centers for Disease Control and Prevention*, May 19, 2021 \(accessed April 15, 2020\).](#)
11. 11. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. 2010. National Action Plan to Improve Health Literacy. Washington, D.C.
12. 12. Goodman, M., R. Finnegan, L. Mohadjer, T. Krenzke, and J. Hogan. 2013. Literacy, Numeracy, and Problem Solving in Technology-Rich Environments Among U.S. Adults: Results From the Program for the International Assessment of Adult Competencies 2012: First Look. U.S. Department of Education. Washington, D.C.: National Center for Education Statistics.
13. 13. [U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Simply Put: A Guide for Creating Easy-to-Understand Materials. *Centers for Disease Control and Prevention*, July 2010 \(accessed April 15, 2020\).](#)
14. 14. [ProLiteracy. U.S. Adult Literacy Facts. *ProLiteracy*, May 6, 2016 \(accessed August 20, 2020\).](#)
15. 15. [Healthwise Digital Health Programs. *Healthwise, Inc.* \(accessed July 12, 2021\).](#)
16. 16. Mitchell, D. J. 1994. Toward a Definition of Information Therapy. *Proceedings. Symposium on Computer Applications in Medical Care*, 71–75.
17. 17. Chesser, A. K., N. C. K. Woods, A. A. Davis, and C. J. Bowers. 2012. Prescribing Information Therapy: Opportunity for Improved Physician-Patient Communication and Patient Health Literacy. *Journal of Primary Care & Community Health*, 6–10.
18. 18. Greene, J. C., J. N. Haun, D. D. French, S. L. Chambers, and R. H. Roswell. 2019. Reduced Hospitalizations, Emergency Room Visits, and Costs Associated with a Web-Based Health Literacy, Aligned-Incentive Intervention: Mixed Methods Study. *Journal of Medical Internet Research* 21, no. 10:e14772.
19. 19. Consumer Reports. Doctors' Use of Medical Terminology Can Leave Patients Poorly Informed. *The Washington Post*, July 14, 2014.
20. 20. [Testing Can Be Useful for Students and Teachers, Promoting Long-Term Learning. *Association for Psychological Science*, October 5, 2012 \(accessed May 2020\).](#)
21. 21. [Nunlist, Mark M., Jill Blumberg, Sean Uiterwyk, and Toni Apgar. 2016. Using Health Confidence to Improve Patient Outcomes. *Family Practice Management* 23, no. 6:21–24.](#)
22. 22. [Van der Linden, Sander. How the Illusion of Being Observed Can Make You a Better Person. *Scientific American*, May 3, 2011 \(accessed May 2020\).](#)
23. 23. [Goldman, Jason G. How Being Watched Changes You—Without You Knowing. *BBC*, February 9, 2014 \(accessed June 2020\).](#)

24. 24. Gao, Ge, N. Burke, C. P. Somkin, and R. Pasick. 2009. Considering Culture in Physician-Patient Communication During Colorectal Cancer Screening. *Qualitative Health Research* 19, no. 6:778–789.
25. 25. Jung, Carl G. 1954. The Gifted Child. In *The Collected Works of C. G. Jung: Vol. 17. Development of Personality*, p. 133–145. Princeton University Press.
26. 26. [Kanter, Rosabeth Moss. Ten Reasons People Resist Change. *Harvard Business Review*, September 25, 2012 \(accessed July 2020\).](#)
27. 27. [Kunst, Jennifer. There’s Only One Way to Change: Slowly, Over Time. *Psychology Today*, September 21, 2011 \(accessed July 2020\).](#)
28. 28. [Scheve, Tom. Why Does Having Too Many Options Make It Harder to Choose? *HowStuffWorks*, September 23, 2020 \(accessed April 15, 2020\).](#)
29. 29. [Li, Cathy, and Farah Lalani. The COVID-19 Pandemic Has Changed Education Forever. This Is How. *World Economic Forum*, April 29, 2020 \(accessed July 2020\).](#)
30. 30. [Duffy, Connor. Coronavirus Opens Education’s Digital Divide, as COVID-19 Forces Schools Into Online Learning. *ABC News*, March 23, 2020 \(accessed July 2020\).](#)
31. 31. [Olenski, Steve. Why Content Will Always Be King. *Forbes*, June 21, 2017 \(accessed July 2020\).](#)
32. 32. [Wurm, Julianne. The Other Factor That Makes an Idea Spread. *Harvard Business Review*, February 17, 2014 \(accessed July 2020\).](#)
33. 33. [Grahama, John R., Campbell R. Harvey, and Shiva Rajgopal. The Economic Implications of Corporate Financial Reporting. *Duke University Fuqua School of Business*, January 11, 2005 \(accessed July 2020\).](#)
34. 34. Supra note 4.
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