

Health Literacy and the College Student: Impact of a Medical Terminology Course on Intention to Use a Personal Health Record

A M Noblin, K Cortelyou-Ward, A Rutherford

Citation

A M Noblin, K Cortelyou-Ward, A Rutherford. *Health Literacy and the College Student: Impact of a Medical Terminology Course on Intention to Use a Personal Health Record*. The Internet Journal of Medical Informatics. 2015 Volume 7 Number 1.

DOI: [10.5580/IJMI.29867](https://doi.org/10.5580/IJMI.29867)

Abstract

Context: To examine the effect of a college level medical terminology course on students' comfort level with using the Internet for information about health, and ultimately his/her decision to use a personal health record (PHR) to collect, maintain and share information with health care providers.

Methods: An online survey tool was used to gather information about willingness to use a PHR as well as perceived health literacy levels at the conclusion of the course. Students were asked specifically if the medical terminology course provided the necessary skills to comfortably interpret health information they find online. An index was created to delineate perceived high literacy level versus low literacy level based upon survey responses.

Results: Eighty percent of students perceived their health literacy level to be "high" near the conclusion of the medical terminology course. In addition, a desired health outcome of willingness to adopt a PHR was confirmed with 68% of students indicating their agreement. However, the age group that indicated the least interest was the 18-19 year olds, with 63% expressing willingness to use a PHR.

Conclusions: As health information accessibility increases and patient engagement becomes more important for incentive payment reimbursement, providing tools such as a medical terminology course could improve adolescent and young adult self-confidence in interactions with health providers. Encouragement and education about the benefits of PHR adoption may improve overall engagement and health outcomes. Patient participation incentives may improve interest as well.

Implications and Contribution: Patient engagement in medical care is challenging in adolescents and young adults. Our research found that 18-25 year olds were least likely to use a personal health record. Improving education about maintenance of health information may increase commitment to prevention and treatment, and will likely impact overall health status.

CONTEXT

The American Recovery and Reinvestment Act of 2009 (ARRA) included the Health Information Technology for Economic and Clinical Health (HITECH) financial incentive programs for physician based and hospital electronic health record (EHR) implementations. One component of the HITECH Act will require patient engagement through portals and other means of secure messaging between patients and physicians to earn reimbursement as part of meaningful use requirements in the coming years. The meaningful use criteria are used to gauge whether a provider

is using the EHR to the extent required for financial subsidy programs provided by Medicare and Medicaid [1], and engaging 5% of patients is one of these requirements [2]. As a result of this legislation and general trends in information governance, the availability of health data to patients will become more commonplace as well.

At the center of this communication is a personal health record (PHR) that could be part of a physician's EHR, or wholly maintained by the patient. The PHR contains health related information, which aids in healthcare decision making [3]. The resulting link between the patient and

physician can improve communication and promote engagement in the healthcare process [4,5].

As the population becomes aware of this increased access to information and seeks additional information online prior to and after an encounter with their doctor, concerns arise about the individual's ability to comprehend sometimes technical jargon found online [6]. Misunderstanding of medical terms can cause fear and anxiety in patients who are unfamiliar with this complex language and is an indication of poor health literacy [7]. 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" [6].

To further investigate the concept of health literacy and willingness to adopt a personal health record, Bandura's framework for self-efficacy in achieving behavior change will be used. The framework states that efficacy beliefs or capability to perform a behavior and expectations about an outcome are functions of the willingness to change a behavior. In this research, the outcome is willingness to use a PHR for personal care.

Self-Efficacy: Self-efficacy is a major factor in a person's decision to change his or her behavior [8]. Possessing the self-confidence to be able to successfully complete a new behavior is considered an efficacy expectation [8]. Bandura [8] states that stronger self-efficacy (understanding) leads to more active efforts to engage in the desired behavior. For example, patients who review lab values and trends prior to an office visit report improved communication with health care providers [9]. In this type of circumstance, a PHR would be used with input from the provider(s). In addition to the improved patient-physician communication benefits of the PHR, patients are able to take control of their healthcare and be active participants in decision making [10]. Patients may need to be reminded frequently of the benefits of this form of communication by providers for the outcome to remain of interest to them.

Health Literacy: Indicators of low health literacy include English as a second language and low education level [11,12]. People who speak English as a second language are less confident in their ability to obtain needed health information [13]. Providing these patients with a copy of the most recent progress note along with a glossary of terms will aid them in interpreting and understanding the contents of the health record [10, 14]. Patients with low education

levels can also benefit from such tools [15]. Admittedly, college students generally have a high education level, however, lack of experience navigating in the healthcare system may impact their confidence levels in health information usage. A medical terminology course, in which students learn about the language of medicine, may improve self-confidence and "health literacy". In this instance, "health literacy" can be interpreted as understanding the content of the PHR, including diseases, medications, and terminology [16]. Improving this understanding will strengthen efficacy expectations, instill a sense of ownership, and allow patients to become engaged in their own healthcare via PHR usage.

Health outcomes: Many people find that the ability to participate in the formation and ongoing supervision of their own care improves their satisfaction and actually motivates them to follow instructions and treatment plans. Heisler and colleagues [17] focused on a common chronic condition, diabetes mellitus, and found that the most significant predictor of patient adherence to treatment recommendations (self-management) was provider communication including test results, treatment alternatives, and medication side effects. Pharmacy-based programs can utilize self-efficacy components to encourage patients to be compliant with their program [18]. In this manner, the pharmacist acts as a diabetes educator as well as an additional healthcare provider who the patient frequently interacts with for medications and supplies.

Figure 1
Conceptual Model



We believe this self-efficacy framework lends itself to the willingness to adopt a personal health record, which is the desired behavior (see Figure 1). It has been reported that young adults, ages 18 to 26 years, are less healthy than adolescents and those in the late 20s and 30s [19]. Because the students surveyed will become future consumers and providers of healthcare services, it is important to stress the need for patient engagement, especially in young adults. Those students who have taken a medical terminology

course and have therefore mastered concepts of the medical language should have a higher level of understanding of the content of a health record as well as options for the course of treatment. Therefore, it would seem reasonable that they would have an interest in the information contained within the health record. In addition, they should possess the self-confidence to create, use and maintain a personal health record in conjunction with their healthcare provider or independently if necessary. With this in mind, the following hypothesis will be addressed:

- Hypothesis 1: Students who have high levels of e-health literacy are more willing to adopt the PHR than those students with low levels of e-health literacy.
- Hypothesis 2: Taking a medical terminology class will increase a student's perceived ability to evaluate health information on the internet.

METHODS

The University Institutional Review Board approval was obtained prior to commencement of the research. A small pilot study in a health related course was completed to ensure the readability of the survey. The survey was made available as an online survey on Qualtrics during the final three weeks of the spring semester in April, 2013. All 1,023 enrolled medical terminology students, from five separate class sections, were invited to participate via weekly e-mail messages in Canvas, the learning management system used at our University. The first page of the survey included a consent form but no specific identifying information was collected.

Procedures: A Personal Health Record (PHR) was described as a medical record maintained by the patient and shared with health care providers (such as doctors) through a computer. The outcome to be measured was the student's willingness to adopt a PHR. In addition, the researchers attempted to define the demographic characteristics (gender, age, and ethnicity) of the students who are/are not comfortable with their ability to use the Internet for information about health. The scope of this research was developed to predict behavioral intention to adopt a PHR, not the actual usage of this tool.

Measures: To look at the literacy issue more closely, the eHEALS literacy scale was used to determine how students in a college level medical terminology class feel about their ability to find and appropriately use relevant health related information on the Internet. The questions are taken from the eHealth Literacy Scale (eHEALS) [20]. One substitution

was made to focus more clearly on the value of the medical terminology course. The statement which was removed asked broadly about skills the student felt he/she had to interpret health information online. The new statement asked specifically if the medical terminology course provided the necessary skills to comfortably interpret health information online. The instrument is a measure of a student's knowledge, comfort, and perceived skill level to find, evaluate, and apply electronic health information to health problems [20]. In addition to the ability to find information, being able to distinguish between high and low quality information is also included in literacy [21].

eHEALS addresses this with question number seven, "I can tell high quality health resources from low quality health resources on the Internet." Possible answers were: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.

Data analyses: To provide a clearer picture of the results for analysis, the answers were dichotomized such that strongly disagree, disagree and neither agree nor disagree were considered disagree, with agree and strongly agree being agree. The researchers felt that if students were not sure about their intention (neither agree nor disagree), they would likely not be willing to use a PHR. Pearson chi-square test was used to determine statistical significance of the variables (and individual eHEALS statements) in terms of PHR usage.

RESULTS

Of the 1,023 students invited to participate in the online survey, 225 students completed the survey, yielding a 22% response rate. When compared to the demographics of the 1,023 medical terminology students during the spring semester, the sample is representative of this population. See Table I for comparisons.

Table 1

Comparison of Sample versus Population Characteristics

	Sample %	Population %
Gender		
Male	29%	31%
Female	71%	69%
Age		
18-19	12%	3%
20-25	72%	84%
26-30	7%	7%
31-35	3%	3%
36 and older	6%	2%
Race		
Asian	11%	11%
Black	12%	15%
Hispanic/Latino	24%	19%
White	51%	50%
Other	1%	5%

The internal consistency reliability and factor analysis results with the medical terminology question substitution were compared to the original eHEALS questionnaire. While Norman and Skinner [20] reported a Cronbach's alpha of .88 and item scale correlations from .51 to .76, data from our study revealed Cronbach's alpha of .93 for the eight items in the modified scale with item scale correlations ranging from .65 to .88. Principal components analysis produced a single factor solution with Eigenvalue of 5.63 and 70% of variance explained. These results suggest that the eight items on the revised survey tool still measure one common dimension or concept. In addition, factor loadings were reported to be .60 to .84 by Norman and Skinner [20] with our factor loadings being .72 to .91. Given the level of agreement in the internal consistency and factor analysis results with the original eHEALS tool, we believe the reliability was not adversely impacted on the revised version.

Health Literacy: Overall, 90% of those students intending to adopt a PHR indicated that the medical terminology class made them more comfortable evaluating health information on the internet and 80.4% of students consider their health literacy to be high (agree, strongly agree). This reveals that 87% of students who intend to adopt the PHR consider their health literacy to be high based on their perceived ability to find and interpret health information from the Internet. Conversely 13% of students who are willing to use a PHR lack the confidence in their skills (low literacy) to use the Internet for health information. In comparison, 66% of students who do not intend to adopt the PHR do consider their health literacy to be high while 34% of students

perceive their health literacy level to be low and they do not intend to use a PHR. See Table II.

Table 2

Modified eHEALS Responses versus Intention to Adopt a PHR

Question	Response	Intend to Adopt	Do not intend to Adopt	Total
1. I know what health resources are available on the Internet.	Agree	137 (90%) ^a	48 (67%) ^b	185(82%) ^c
	Disagree	16 (10%)	24 (33%)	40 (18%)
2. I know where to find helpful health resources on the Internet.	Agree	134 (88%) ^a	47 (65%) ^b	181(80%) ^c
	Disagree	19 (12%)	25 (35%)	44 (20%)
3. I know how to find helpful health resources on the Internet.	Agree	137 (90%) ^a	50 (69%) ^b	187(83%) ^c
	Disagree	16 (10%)	22 (31%)	38 (17%)
4. I know how to use the Internet to answer my questions about health.	Agree	144 (94%) ^a	55 (76%) ^b	199(88%) ^c
	Disagree	9 (6%)	17 (24%)	26 (12%)
5. I know how to use the health information I find on the Internet to help me.	Agree	139 (91%) ^a	55 (76%) ^b	194(86%) ^c
	Disagree	14 (9%)	17 (24%)	31 (14%)
6. The medical terminology class made me more comfortable to evaluate health information I find on the Internet.	Agree	138 (90%) ^a	46 (64%) ^b	184(82%) ^c
	Disagree	15 (10%)	26 (36%)	41 (18%)
7. I can tell high quality health resources from low quality health resources on the Internet.	Agree	133 (87%) ^a	43 (60%) ^b	176(78%) ^c
	Disagree	20 (13%)	29 (40%)	49 (22%)
8. I feel confident in using information from the Internet to make health decisions.	Agree	106 (69%) ^a	35 (49%) ^b	141(63%) ^c
	Disagree	47 (31%)	37 (51%)	84 (37%)

Note: All responses were significant at the $p < .01$ level based on Pearson chi-square test.

^aMean overall percentage for those patients who intend to adopt a PHR and agree with the above statements (indicating high health literacy) is 87%

^bMean overall percentage for those who do not intend to adopt a PHR but agree with the above statements (indicating high health literacy) is 66%

^cMean overall percentage for those who agree with modified eHEALS statements is 80.4%

Health outcomes: Overall, the majority of students (68%) do indicate they would be willing to adopt a PHR. Those students in the 18-19 year old age group were least likely to adopt (63%), with 65% of the 20-25 year olds indicating willingness to adopt. As noted in table 3, gender did not have an impact on a student's willingness to use a PHR. Black students seem most interested in using a PHR. The majority of these students (78%) are in the 20-25 year age group, and 59% are female.

Table 3

Demographic Characteristics versus Intention to Use a PHR

	% Willing to Adopt PHR	X ²
Gender		
Male	69%	.801
Female	68%	
Age		
18-19	63%	.000
20-25	65%	
26-30	65%	
31-35	88%	
36 and older	77%	
Race		
Asian	73%	.000
Black	78%	
Hispanic/Latino	62%	
White	65%	
Other	67%	

The hypothesis testing results are as follows:

- Hypothesis 1: Students who have high levels of health literacy are more willing to adopt the PHR than those students with low levels of health literacy. This hypothesis was supported because the health literacy questions were significant at the $p < .01$ level based on Pearson chi-square testing.
- Hypothesis 2: Taking a medical terminology class will increase a student's perceived ability to evaluate health information on the internet. This hypothesis was supported because 82% of the students indicated that they agreed with this statement.

CONCLUSIONS

Health literacy: Our results indicate that most students feel confident about their health literacy, with 80.4% considering health literacy to be high. In spite of this high level of self-efficacy, 63% of students agreed with the statement, "I feel confident in using information from the Internet to make health decisions." This was the lowest scoring statement from the modified eHEALS list. It is possible that the relatively young age and lack of experience with the health care system in general attributed to this lack of self-confidence in Internet searches. One student commented that "Basing any personal health decision on information

obtained through any source other than a physician, physician assistant or nurse practitioner who has either examined you or is familiar with your medical history is folly."

Health outcomes: Our aim was to determine college students' willingness to adopt a PHR near the completion of a medical terminology course. Overall results showed that 68% of the students are willing to use a PHR. Prior research in an internal medicine practice indicated a 74% willingness to adopt the PHR overall [22]. The population of the medical practice was less educated (52% high school education or less) and older (89% > 26 years old). Pew Research has indicated that 97% of those in the 18-29 year old age range use the Internet, which corresponds to traditional university student [23]. Therefore, even with a higher perceived health literacy rate and younger age, the medical terminology students are not as willing to adopt and use a personal health record as the less educated patients of the medical practice previously studied. As noted, students (younger patients) may need reminders of the benefits of this form of communication with providers for the outcome expectation to remain of interest to them. Since about one third of students overall are not willing to adopt a PHR, they may need more information about PHRs to change their efficacy expectations. Austin and colleagues [21] also noted that students find it important for information to be easily accessible which may also improve the possibility of future usage of the PHR. Mobile phone apps are a convenient way to improve accessibility.

Limitations: Although the sample size represents 22% of the medical terminology student population, based on the characteristics of the sample, we feel it is a representative sample of students enrolled in medical terminology during the spring 2013 semester. While these findings may be generalizable to other college medical terminology students, they are not generalizable to all college students (including at our university). Students who do not take science courses and are unfamiliar with the vast number of medical terms may struggle with health literacy in the future. In addition, we relied on the perceptions of the students about their ability to use the knowledge they had gained about medical terminology, and therefore health literacy was not measured directly.

Alteration of one of the original eHEALS questions to more closely align with the medical terminology course may have had an impact on the results. However, based on original

findings by Norman and Skinner [20] with a coefficient alpha of .88 and our result of .93, the internal consistency of the items remains high.

Dichotomization of the variables for a more clear analysis included categorization of “neither agree nor disagree” as a disagree statement. This may have skewed the results slightly but the agree responses were in the majority across the board.

Future Research & Conclusions: The HHS Health System Measurement Survey data in 2012 found that 66.2% of the adults in the 19-25 age group reported a usual source of medical care and 74.8% reported good communication with their healthcare provider [24]. Therefore, it is likely that at least one third of this population regularly turns to the Internet for healthcare advice, and would benefit greatly from educational resources to improve efficacy expectations. Young adults who have a good relationship with a healthcare provider are prime candidates for PHR usage and other forms of patient engagement.

Future research should consider additional variables of individual annual income, healthcare resource use (such as frequency of physician, clinic, or pharmacy visits), and insurance status. It would be interesting to further explore whether more education in general (such as degrees earned) or specific types of education (such as health or medical education) influence patient engagement. Although younger generations are better educated, specifically in terms of college degrees, than their older counterparts, they generally consume less healthcare resources, are risk-takers, and are less likely to be insured (even after controlling for income) [25]. In 2014, 20.9% of young adults in the 19-25 age group were uninsured, representing the largest percentage for any of the age groups [26]. Furthermore, because young adulthood involves critical transitional steps, such as the transition from pediatric to adult medical care and from parental involvement to individual responsibility, this population is an important group to consider from the policy, research, and future planning perspectives [19].

Overall, this study demonstrates that college students with a high health literacy have a higher chance of adopting a PHR. Knowing that a successful outcome (long term health and/or short term healthy behavior change) can be achieved with the use of a PHR will be important for busy college students to engage them in health information exchange with their providers. Although technology may not be a barrier

for most students, if the PHR application is difficult or cumbersome to use, long term usage may be jeopardized. Therefore, skills for using the technology in addition to understanding the content of the health record along with some type of incentive will likely help ensure success.

References

1. Hogan SO, Kissam SM. Measuring meaningful use. *Health Affairs*. 2010; 29(4):601–606.
2. Tagalicod R. Stage 2: engaging patients in their health care. Centers for Medicare and Medicaid website. http://www.cms.gov/eHealth/ListServ_Stage2_EngagingPatients.html. Published September 18, 2013. Accessed May 27, 2015.
3. Burrington-Brown J, Fishel J, Fox L, Friedman B, Giannangelo K, Jacobs E, et al. Defining the Personal health record. *Journal of AHIMA*. 2005; 76(6):24–25.
4. Wolter J, Friedman B. Health records for the people. *Journal of AHIMA*. 2005; 76(10):29–32.
5. Survey finds Americans want electronic personal health information to improve own health care. Markle Foundation website. http://www.markle.org/sites/default/files/research_doc_120706.pdf. Published November 2006. Accessed May 27, 2015.
6. Health Literacy. Department of Health and Human Services. Cited in National Network of Libraries of Medicine website. <http://nnlm.gov/outreach/consumer/hlthlit.html>. Last updated August 5, 2014. Accessed May 27, 2015.
7. Halamka J, Mandl K, Tang PC. Early experiences with personal health records. *Journal of the American Medical Informatics Association*. 2008;15(1):1–7.
8. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychology Review*. 1977;84(2):191–215.
9. Cimino J, Patel V, Kushniruk A. The patient clinical information system (PatCIS): technical solutions for and experience with giving patients access to their electronic medical records. *International Journal of Medical Informatics*. 2002; 68(1-3):113–127.
10. Tang PC, Lansky D. The missing link: bridging the patient-provider health information gap. *Health Affairs*. 2005;24(5):1290–5.
11. Heubusch K. Access + understanding: the role of health literacy in patient-centric health IT. *Journal of AHIMA*. 2010; 81(5):32–34.
12. Schwartzberg J, VanGeest J, Wang C. (Editors). *Understanding Health Literacy: Implications for Medicine and Public Health*. [Chicago, IL]: AMA Press, 2005.
13. Moen A, Brennan P. Health@Home: the work of health information management in the household (HIMH): implications for consumer health informatics innovations. *Journal of the American Medical Informatics Association*. 2005;12(6):648–56.
14. Maly RC, Bourque LB, Engelhardt RF. A randomized controlled trial of facilitating information giving to patients with chronic medical conditions: effects on outcomes of care. *Journal of Family Practice*. 1999; 48(5):356–63.
15. Paasche-Orlow MK, Parker RM, Gazmararian JA, Nielsen-Bohman LT, Rudd RR. The prevalence of limited health literacy. *Journal of General Internal Medicine*. 2005;20(2):175–184.
16. Lober WB, Zierler B, Herbaugh A, Shinstrom SE, Stolyar A, Kim EH, Kim Y. Barriers to the use of a personal health record by an elderly population. *AMIA Annual*

- Symposium Proceedings. 2006;514-8.
17. Heisler M, Bouknight RR, Hayward RA, Smith DM, Kerr EA. The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. *Journal General Internal Medicine*. 2002;17(4):243-52.
18. Johnson JA. Self-efficacy theory as a framework for community pharmacy-based diabetes education programs. *Diabetes Education*. 1996;22(3):237-41.
19. Stroud C, Walker LR, Davis M, Irwin, CE. Investing in the health and well-being of young adults. *J Adolescent Health*. 2015;56(2):127-129.
20. Norman C, Skinner H. eHEALS: the eHealth literacy scale. *Journal of Medical Internet Research*. 2007;8:e27.
21. Austin EW, Pinkleton BE, Austin BW, Van de Vord R. The relationship of information efficacy and media literacy skills to knowledge and self-efficacy for health-related decision making. *Journal of the American College of Health*. 2012;60(8):548-54.
22. Noblin AM, Wan TT, Fottler M. The impact of health literacy on a patient's decision to adopt a personal health record. *Perspectives in Health Information Managment*. 2012;9:1-13.
23. Internet Users Demographics. PewResearchCenter Publications website. <http://www.pewinternet.org/data-trend/internet-use/latest-stats/> Accessed May 27, 2015.
24. Health System Measurement Project. Department of HHS. Cited in the Assistant Secretary for Planning and Evaluation (ASPE) website. <https://healthmeasures.aspe.hhs.gov/> Accessed May 27, 2015.
25. Rice T, Unruh, L. *The Economics of Health Reconsidered* (3rd ed.). [Chicago, IL]: Health Administration Press, 2009.
26. Finegold K, Gunja, MZ. Survey data on health insurance coverage for 2013 and 2014. ASPE Issue Brief. National Center for Health Statistics website. http://aspe.hhs.gov/health/reports/2014/InsuranceEstimates/ib_InsuranceEstimates.pdf Published October 31, 2014. Accessed May 27, 2015.

Author Information

Alice M. Noblin, PhD, RHIA

Department of Health Management & Informatics, University of Central Florida
Orlando, Florida
Alice.Noblin@ucf.edu

Kendall Cortelyou-Ward, PhD

Department of Health Management & Informatics, University of Central Florida
Orlando, Florida

Ashley Rutherford, MPH

Department of Health Management & Informatics, University of Central Florida
Orlando, Florida