

Assessing Health Literacy and Communication Skills in Medical Referrals: A Survey Study

ABSTRACT

Background and Objectives: The aim of this study is to draw a comprehensive picture of patients' functional and critical health literacy and its association with socio-demographic variables and self-efficacy. We investigated the referrals to Isfahan health centers, in particular the dimensions of reading ability, numeracy, and eHealth literacy using two different measures, the Newest Vital Sign (NVS) for the functional and the eHEALS for critical aspects.

Materials and methods: The surveys were administered to a random sample (N = 384), which resembled Iran Isfahan residents in terms, educational attainment and self-efficacy but not age and gender. For testing individuals with low health literacy, the NVS is a reliable and quick screening tool. eHEALS helps to measure patients' capabilities in Internet searches. Both of tools are validated in Persian. Pearson's correlation coefficient, χ^2 -test, independent t-test and regression were also used to assess the association between health literacy measures, self-efficacy and predictor variables. ($p < 0.05$)

Results: More than 60% of our respondents had an inadequate or marginal level of health literacy with NVS, and with eHEALS, more than 50% were classified accordingly. The newest vital sign and eHEALS scores showed an association with higher education one of the predictors of health literacy. Higher eHEALS scores were associated with higher self-efficacy score. eHEALS and NVS provides a valid self-reported assessment of patients' eHealth literacy and useful appraisal of patients' functional health literacy, respectively.

Conclusion: In our sample, more than 50% of patients had a low level of literacy. eHEALS provides a valid self-reported assessment of patients' eHealth literacy, and NVS provides a useful appraisal of patients' functional health literacy. Determining health literacy in patients leads to a better understanding of their perception, application, and decision-making in health problems.

Paper Type: Research Article

Keywords: eHEALS, Health literacy, NVS, patient, self-efficacy

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Introduction

After meeting with a patient in his office, a physician is expected to diagnose the condition and suggest a treatment. He/She might also be expected to explain why he ended up with this specific diagnosis, why this particular treatment was preferred, what led to the concluded diagnosis, how the patient will be able to protect himself/herself in the future, and would be the prognosis for healing. These further expectations are part of a communication and the beginning of a consultation through which the patient informs the doctor of his/her symptoms. With so much conversation going on in medical consultation, two matters are obvious: first, the success of a consultation will be dependent on the physician's as well as the patient's communicative abilities, and second, not all patients will be equally able to communicate, understand medical terms or clearly express their symptoms. The communicative skills of health care consumers are nowadays conceptualized as health literacy.

the AMA, preserved the original conception of "literacy" as ability to read and write and transferred these skills to the health care field (1). Others formulated more comprehensive definitions of health literacy that underpinned the importance of acquiring, processing, and understanding health information and services needed for decision-making and appropriate action to promote one's health. The Healthy People 2010 report defines health literacy 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" (2 p. 4). 2: communicative or interactive literacy, which implies advanced skills that enable active participation in everyday activities, extracting and interpreting health information from different

sources such as by the interaction with health care providers and 3: critical literacy, which implies more advanced skills for critically analyzing information obtained from the environment and the media (3). The World Health Organization (WHO) defines health literacy as "cognitive and social skills that determine a person's motivation and ability to access, understand, and use information, leading to improved quality of health" (4 p.10). The WHO definition is an acknowledgment that health literacy is not only a function of reading and numeracy capabilities, but also reflects both communicative/interactive and critical aspects (3).

Two developments have furthered the popularity of health literacy in the academic field of health communication. First, we encounter a paradigm shift from the modern age of medicine that was, hospital-centered, focused on disease, and put patients in a passive role, to an information age system of health care, which is person-centered, focuses on well-being, and allows active and dynamic roles for patients (5). The "patient-centered" paradigm in the health system necessitates that patients have particular skills to access and understand health information. Without such access and understanding, patients' involvement in making decisions about their medical conditions would be a risky and expensive endeavor. The second, much younger development is the advent and triumph of the Internet. Nowadays, the vast availability of the Internet has facilitated access to Online Health Information (OHI) previously only available from health professionals. Search engines and Social Media have become devices routinely employed by patients, enabling them to act autonomously in the health care system and in public health settings (6).

AlGhamdi and Moussa showed for Saudi-

Arabian patients that by 2010, “before coming to the clinic, 44% of outpatients in hospitals had searched the Internet for health information; 73% discussed the information with their doctors, and 72% of those who did so believed that this positively affected their relationship with health providers” (7 p.363). Murray et al. (2003) (8) showed that bringing information to physicians’ consultation makes patients more confident during the consultation, and that once they had discussed their online findings, they felt more trust in their physician’s diagnosis. Internet search behavior leads patients to experience more confidence in their own judgment and therefore, when they enter into a comprehensive negotiation with their specialist, have their own ideas about treatment options and rely less on their specialists. The Internet has turned into an additional resource that empowers patients “to do something” rather than “just being told what to do” by their specialist (9). For autonomous acting in encounters with the health care system, health care consumers need a certain level of health literacy to comprehend their condition and treatment options. Empowerment can be dangerous if not accompanied by an adequate level of health literacy (10). Thus, measuring this ability and identifying patients with potential health literacy deficits is important and requires specific measures.

Measurement of Health Literacy

There are many measures of health literacy, two of which we used in our study, and which shall be briefly introduced here. The Newest Vital Sign (NVS) is a quick screening (11) tool to testing individuals for low health literacy. Respondents are shown a food label from an ice cream package and were subsequently asked questions about it. Answering these questions needs reading comprehension and mathematical ability. These abilities are directly associated with understanding

basic health information. This tool is available in Persian (12). It can be administered in 3 minutes (11). Participants look at the information on a specially designed ice cream nutrition label and are then asked to answer six questions interpreting the information about it. Health providers can assess the patient’s health literacy level and adjust the way to communicate with them based on the number of correct answers. The NVS measures only functional concept of health literacy and it is not a comprehensive assessment.

The e-Health Literacy Scale (eHEALS) conceptualized health literacy in a model reminiscent of a lily—six overlapping petals feed the pistil, which in turn overlaps the petals and binds them together. The model comprises six core skills or literacies: (1) traditional literacy, (2) health literacy, (3) information literacy, (4) scientific literacy, (5) media literacy, and (6) computer literacy. The eight questionnaire items of eHEALS were developed based on this model. To assess users’ knowledge and perceived skills at find, evaluate, and apply eHealth, this measure is useful (13). There are also two additional questions, not included in the total score, to assess participants’ perception of the Internet. We can say, for measuring health literacy these two scales complement each other.

In addition to knowledge, which plays a key role in therapeutic decision-making, self-efficacy is another variable that assesses the patient’s ability to cope with a variety of worries and unforeseen situations. Self-efficacy was defined by Bandura (1997) as “beliefs in one’s capability to organize and execute the courses of action required to manage and prospective situation” (14 e68). Individuals need to have enough information and self-confidence to make right decisions in encountering with health problems. Self-efficacy could ease communication with

health providers and health care services. Self-efficacy, along with some other variables, is associated with a number of management and state of health variables (15).

When the two measures are correlated, persons who score low on one of the measures will tend to also score low on the other. The less correlated the measures are, however, the more meaningful not only the comparison but also the combination of both becomes. We therefore also look at the antecedents of combinations of the two measures.

Health literacy studies in Iran

Several studies have been conducted to assess health literacy in the Iranian population, often patients or health care providers in health centers, such as diabetes clinics or hospitals. In terms of location, most studies were conducted at Tehran and Isfahan universities of medical sciences (16). More than half of the sampling frames aim at healthy individuals, including staff, pregnant women, students, and adults. Most Iranian studies that measure the level of health literacy used the Test of Functional Health Literacy in Adults (TOFHLA). Numerous of these studies showed that an increasing level of education raises the level of health literacy, and health literacy in healthy individuals had a significant relationship with income. Inadequate health literacy is more prevalent among the low-income population, rural residents, laborers and retirees. There were significant positive relationships between having a job, access to information resources, and levels of health literacy (16). The levels of health literacy with regard to self-care behaviors and self-efficacy have been measured in cases such as following diet recommendations and dosage instruction for medication (17), experience of higher anxiety, stress and negative emotional states, (5) and frequency of daily exercise (18).

Most research on students reported moderate

health literacy levels measured with Health Literacy for Iranian Adults (HELIA) (19, 20) and eHEALS (21). With information literacy, an individual can identify and retrieve credible information, represent, and use information effectively and finally share it with others. There are two validation studies for the eHealth literacy scale (eHEALS) in Iran. The first one was conducted on 525 youths randomly chosen in Yazd (22). The internal consistency of the scale was sufficient (Cronbach alpha = 0.88, $p < 0.001$). The other sampled 223 patients in a military hospital in Tehran (Cronbach alpha = 0.93, $p < 0.001$) and found a statistically significant weak-to-moderate correlation between the eHEALS scores and education, computer knowledge, Internet knowledge and the use of Internet for health-related purposes and also with smoking, gender, age and Internet usefulness in health decision making (23).

A study was conducted among adults in Isfahan (12) to validate the NVS. In this particular sample, 25.5% of study subjects had inadequate health literacy, 36% had borderline literacy and 38.5% had adequate health literacy (Cronbach alpha = .8, $p < 0.001$). There were statistically significant associations between the educational level, age, gender, economic status and health literacy status. Adults with inadequate health literacy were more likely to be older, less educated, woman and had low income. In another study that used the NVS (24), less than half of the students surveyed at the University of Medical Sciences had inadequate health literacy, and scores among medical students were higher than non-medical students'.

In the case of referrals to health centers in Iran, two studies on the health literacy of pregnant women show that 50% of them have inadequate health literacy (25, 26). The Ministry of Health and Medical Education conducted a national

study in 2015 to measure the health literacy of Iranian aged 18-65 years (27). The study surveyed 20571 citizens. The measurement tool used in this study was the Health Literacy for Iranian Adults (HELIA). It uses 5-digit scales, and the score ranges from zero to 100 with a higher score indicating higher literacy. According to the results, the average of health literacy scores of adult urban literate population of Iran were 68.32 out of 100 points. The results showed that about 44% of the study population had limited health literacy. The mean score of health literacy was 68 ± 15.13 for men and 69 ± 15.16 for women. Among the variables considered, years of education and age had the strongest impact on health literacy. Almost one in two Iranians has limited health literacy. The 55 years old and over had the lowest scores, and the age range of 35 to 44 years obtained the highest ones. According to the survey, the highest level of limited health literacy was observed in those with one to five years of education, and the lowest level of limited health literacy in those with an education of 13 years or higher. The findings also showed that 42% of the respondents had access to health information most often by "radio and TV", 41% by the physicians and health professionals and 33% by the Internet, respectively. Another important finding is that about half of the study population had limited health literacy, which makes some social groups more vulnerable than others, including those over 55 years of age, the less educated and the unemployed.

Much related literature from other countries indicates an inadequate level of health literacy. A systematic review covering 85 independent studies in North America found 26% of the population with inadequate health literacy and 20% with average health literacy (28). von Wagner et al. (2007) (29), reported 11.4% of 759 English

adults had either marginal or inadequate health literacy. In Turkey, Ozdemir et al. translated the NVS and the Rapid Estimate of Adult Literacy in Medicine (REALM) into Turkish for patients in a family medicine clinic and reported that with REALM 2.7% had inadequate and 38.6% had marginal health literacy, and with NVS 71.9% had inadequate and marginal health literacy (30). A Dutch validation of health literacy measures among patients with 289 coronary artery and diabetic patients showed that 79% of subjects had average or low level of health literacy (31). The significant numbers of Iranian studies mentioned above have examined health literacy in one dimension (functional health literacy).

As far we know this is the first study which used NVS and eHEALS among Iranian patients. The aim of this study is to draw a comprehensive picture of functional and critical aspects health literacy in a sample representative of the general population that refers to public health centers. We investigated the health literacy of referrals to Isfahan medical science centers, in particular the dimensions of reading ability and numeracy and eHealth literacy using two different measures. Besides, we used self-efficacy that directly affects health behaviors to assess patients' self-management. This study seeks to evaluate health literacy among patients and its association with socio-demographic variables. The results of this study can help to determine the state of health literacy of patients referring to public health centers in Isfahan and leads to a better understanding of their problems in health decision-making.

Materials and Methods

Health literacy Measure

This quantitative study applied two measures of health literacy, NVS and eHEALS. It has used the General Self-efficacy Scale (GSE-10) to

measure perceived self-efficacy of participants. This scale has been used in 14 cultures with 12,840 participants and its reliability and validity is generally reported in some studies with Cronbach's alphas between 0.76 and 0.90 (32, 33). Nezami et al. in 1996 developed the Persian version of GSE-10 scale (32). In this study the eHEALS showed a high internal consistency (Cronbach alpha = 0.82). The GSE-10 (Cronbach alpha = 0.76) and the NVS (Cronbach alpha = 0.67) were adequate (Table 2).

Study population

Data collection for the present study took place from July to September 2019. Based on Morgan table 384 patients were randomly selected from two general polyclinics. Both polyclinics are located in the province of Isfahan and tertiary referral centers with a major primary health care in and out patients' department which serves all demographic levels in Najafabad and other nearby cities and villages.

Without restriction to a specific catchment area, everyone in Isfahan province can use these services. The patients in the two polyclinics had a variety of diseases such as nerve conditions, CVD, diabetes, MS, kidney and cancer or even simple colds. Physicians who treat these patients are all specialists; and one to three general practitioners are one shift for a 24-hour period. Our population includes all patients who referred to one of the two clinics. Inclusion criteria were an age of 18 years or older, ability to speak Persian, and being in a physical and mental health to be able to fill out the questionnaires correctly.

Participants were contacted in the clinic waiting area. We invited everybody who had sufficient time, 15 minutes or more for filling out all of the questionnaires, before being called in to see the doctor. After informed consent was obtained written and verbal from each participant, the researchers administered the

paper-pen questionnaires, and the participants in themselves filled in demographic questions. Demographics included age (patients had to write down their age), gender and educational level. After demographic questions, we asked two questions about respondents physical and mental health during the past four weeks on a 5-digit scale ("poor" to "excellent") and six other questions about the importance of the following factors determining their quality of life: "Work/school, how you felt about yourself, Your physical state of being, Your mental state of being, Your family/ friends and Your bank balance", in 5-digit scale ("not at all important" to "extremely important"). Scoring and Data Analyzing in the NVS, the number of correct answers ranging from 0 to 6 indicates the level of health literacy. Based on the summative index, participants were grouped with scores of 0-1 indicating limited, 2-3 borderline and 4-6 adequate health literacy. As to the NVS, before filling we explained to participants that the label was for one cup only, but that the whole container carried 4 cups of ice cream and they have to calculate only grams and calories. During the answering, patients were allowed to retain the copy of the label so they could refer to it. The average time to complete the NVS was 10 minutes. After responding, every sheet's scores were recorded.

The eHEALS consists of eight questions to be answered on a 5-point Likert scale (1-strongly disagree to 5-strongly agree). The sum score ranges from minimum 8 to maximum 40 scores. Higher scores indicate higher literacy (13). The General Self-efficacy Scale (GSE-10) has 10 items based on 4-point scale (not at all true [1], hardly true [2], moderately true [3], exactly true [4]). The response to the 10 items have to be summed up to yield the total score ranging from 10 to 40 (32). The correlation among the NVS, eHEALS, the GSE-10 and

socio-demographic questions were examined with Pearson's r . Internal consistency of all instruments (face and content) was assessed by Cronbach's alpha. We calculated Pearson's coefficients to assess the association between educational level, gender and age, as known predictors for health literacy, with health literacy measures.

To investigate differences in health literacy scores between female and male participants, an independent t -test was conducted. The association between education levels and health literacy was assessed by One-way ANOVA. A linear regression model was run to estimate the relationship between the socio-demographic

predictors and health literacy. The significance level of 0.05 was applied as the threshold in all statistical tests. All data were analyzed using SPSS (version 25), and parametric procedures were applied.

Results

Sample Characteristics

A total of 384 patients completed all measures noted above. Participants were, on average, 33.5 ± 11.8 years old. The majority of them were female (68.5%) and highly educated (58%) (Table 1). Most of the highly educated respondents had a bachelor degree.

Table 1: Comparison of sample and national census demographic data

Correct (%) Male		Sample			National census, 2016		
		Female	Cumulative Total	Male	Female	Cumulative Total	
Age groups	15*- 30	16.4	35.1	51.5	17.6	17	34.6
	31-45	8.3	24.4	84.2	18.5	18	71.1
	46-over	6.7	8.8	100	14.5	14.1	100
Gender		31.5	68.5	100	51	49	100
Education(High)		22.1	35.7	57.8	9.5	8.7	18.2
Education(Medium)		8.9	28.6	94.9	24.9	20.4	63.5
Education(Low)		.5	4.2	100	15.8	20.6	100

* In our sample, we only have 18 years old and over.

Note: "High" education indicates university degree (vocational/technical, bachelor, master and PhD), "Medium" indicates some high school or diploma and "Low" indicates 6 years or less of schooling.

Health literacy measures

As far as we know, no established GSE-10 measure has been conducted among Persian patients. The Kaiser-Meyer-Olkin measure was .8 and the Bartlett test of sphericity was significant ($\chi^2_{245} = 586.617$, $P < .001$) for sample adequacy on GSE-10, which indicates the sampling have been meritorious. The GSE-10 mean score was 3

(range 1-4, $SD = .4$). We used the median score of the scale (median = 3.1) to create two groups: those with a high (mean ≥ 3.1) and those with a low self-efficacy score (mean ≤ 3.1). 56.8% ($n = 218$) had low scores and 43.2% ($n = 166$) had high scores in GSE-10. In our sample 33% of the participants ($n = 128$) achieved inadequate, 37% marginal ($n = 142$) and 30% ($n = 114$) adequate health literacy level based on the NVS scoring. The NVS mean score was 2.49 ($SD = 1.7$). The internal consistency of the NVS instrument applied in our study was slightly lower compared to the validation study conducted previously in Iran

(11). Yet, the internal consistency was acceptable. eHEALS scores were used for a median split of the sample into a high and a low eHealth group, with the median = 3 (range 1-5, SD =

0.7) and missing data were 8.6% (n = 33) and their distribution was completely at random. In the same way, low-and high-NVS groups were formed.

Table 2: Mean scores and distribution of respondents' NVS, eHEALS and GSE-10 by gender, age, education(n=384)

	Number	NVS		eHEALS		GSE-10	
		Mean	SD	Mean	SD	Mean	SD
Gender							
Male	121	2.65	1.78	3.05	.67	3.11	.35
Female	263	2.41	1.77	3.01	.82	3.02	.48
Age groups							
18-30	198	2.48	1.73	3.02	.77	3.04	.44
31-45	126	2.48	1.84	3.00	.79	3.04	.44
46-over	60	2.87	1.91	3.05	.74	3.08	.47
Education							
No schooling completed	18	1.00	1.23	2.25	1.05	3.24	.55
Some high school	35	1.83	1.59	3.07	.70	3.09	.35
Diploma	109	2.38	1.74	2.99	.81	3.04	.46
Professional/Vocational	64	2.61	1.72	3.02	.65	2.96	.41
Bachelor's degree	120	2.88	1.77	3.13	.70	3.02	.47
Master's degree	30	2.40	1.79	2.94	.80	3.19	.33
Doctorate degree	8	3.75	1.75	3.73	.66	3.11	.24
Cronbach's α		.67		.82		.76	

Association of health literacy measures with socio-demographic variables

The eHEALS correlated with educational level, state of mental and physical health, two factors participants believed were important for achieving quality of life (work/education and family/friends) and GSE-10. There was no correlation between age or gender and eHEALS. Pearson's correlation between NVS and gender or age was insignificant, and for educational level and two factors that participants believed were important for achieving quality of life (work/education and mental health) it was acceptable. There was an association with GSE-10, state of mental and physical health, and four factors important for the quality of life (work/education,

feel about yourself, mental and physical health) (Table 3). One-way ANOVA was conducted for test the relationship between highest achieved education and the eHEALS mean score, $F(6, 377) = 4.83, p < 0.001$. In case of patients who indicated primary school as their highest educational level, Tukey's HSD post-hoc test showed significant differences between them and all other educational levels. An independent t-test was run to evaluate differences in gender regarding eHEALS mean, GSE-10 mean and NVS summative. The test was significant for GSE-10, $t(382) = 1.894, p < 0.05$, but not for eHEALS, $t(382) = .484$ and for NVS $t(382) = 1.223$.

Table 3: Correlation between socio-demographic variables, health literacy measures, GSE-10, rate of mental and physical health and six importance factors in determining the quality of life

	1	2	3	4	5	6	7	8	9	10	11	12	13
1.Age													
2.Gender	.05												
3.Education	-.02	-.19 ^b											
4.RMH	.09	-.02	.18 ^b										
5.RPH	.04	-.1	.13 ^a	.34 ^b									
6.QOL.1	.04	-.10 ^a	.13 ^b	.04	.12 ^a								
7.QOL.2	-.06	0	.10 ^a	.14 ^b	.05	.17 ^b							
8.QOL.3	-.02	.03	-.01	.15 ^b	.17 ^b	.15 ^b	.32 ^b						
9.QOL.4	-.09	.02	.07	.14 ^b	.11 ^a	.13 ^b	.27 ^b	.36 ^b					
10.QOL.5	.01	0	0	.09	.10 ^a	.06	.08	.21 ^b	.22 ^b				
11.QOL.6	-.04	.01	.03	.04	.13 ^a	.18 ^b	.09	.17 ^b	.16 ^b	.14 ^b			
12. eHEALS	-.03	-.02	.16 ^b	.13 ^b	.14 ^b	.12 ^a	.05	.03	.02	.17 ^b	.06		
13. GSE-10	.01	-.09	-.02	.25 ^b	.13 ^a	.15 ^b	.18 ^b	.15 ^b	.19 ^b	.09	.06	.22 ^b	
14. NVS	.02	-.06	.22 ^b	.08	.08	.13 ^b	.02	.02	.1 ^a	.06	.04	.05	.01

ap. <0.05 level (2-tailed).

bp. < 0.01 level (2-tailed).

RPH: rate of physical health; RMH: rate of mental health

QOL: quality of life; 1: work/education; 2: feel about yourself; 3: physical health; 4: mental health; 5: family/friends; 6: bank balance

Note: Items 4 and 5 were measured on a 5 type agreement scale from 1 = “Poor” to 5 = “Excellent,” and the questions were on How would the patients rate their mental or physical health over the past 4 weeks. Items 6 to 11 were measured on a 5-type agreement scale from 1= “Not at all important” to 5= “Extremely important” and the questions were on How important the following factors were in determining patients’ quality of life.

Regression model

We ran regression models for the association between education, gender and age with eHEALS, GSE-10 and NVS. In case of educational level, the

model remained associated with NVS (R2 = 5.2%) and eHEALS (R2 = 2%). For GSE-10, variance remained associated only with gender (R2 = .3%) (Table 4).

Table 4: Association between health literacy measures and GSE-10 with socio-demographics

	NVS			eHEALS			GSE-10		
	t	P<	β	t	P<	β	t	P<	β
Gender	-0.407	0.684	-0.021	0.157	0.876	0.008	-2.025	0.044	-0.105
Age	0.532	0.595	0.027	-0.462	0.645	-0.023	0.223	0.824	0.011
Level of education	4.377	0.000	0.223	3.195	0.002	0.165	-0.838	0.402	-0.044
R2	.052			.020			.003		

p <0.05

Discussion

We investigated health literacy in a socio-demographically diverse population of patients, which referred to two polyclinics in Isfahan. To our knowledge, this is the first study to measure health literacy simultaneously with both NVS and eHEALS in Iran. The NVS measures functional health literacy like math and reading skills and eHEALS measured critical aspects of health literacy (34). When health literacy was measured by NVS, more than 60% of our respondents had inadequate or marginal level in health literacy; when the eHEALS was used, more than 50% were classified accordingly. In this study established predictors for health literacy were age, educational level and gender. Females, older age, higher socioeconomic status, normal self-reported cognition, and lower levels of disability, associated with higher odds of having functional health literacy (35).

In our study both measures of health literacy and their combination just had significant relations with level of education. In prior studies, educational attainment was introduced as proxy measure of health literacy. Many Persian language studies support our finding in case of education (36). For example, Banihashemi and Amirkhani (2007) (37) conducted TOFHLA with male and female participants, 18 years or older and in five provinces of Iran and found an inadequate level of health literacy goes along with low education, female gender and older range of age. In the Sajadi et al. (2016) (38) study on rural women with pregnancy experiences, there was a significant relationship in level of health literacy with education and age. Reisi et al. (2013) also validated S-TOFHLA and NVS among 525 adults (over 18 years) in Isfahan. They reported significant relationships: female, older age and low level of education were associated with low levels of health literacy. Ozdemir et

al. (2010) translated the NVS and REALM into Turkish. They found among 456 patients of the family medicine clinic 28% had NVS score between 4 and 6 and the Turkish NVS version was significantly related to educational level. In addition, our finding was supported by the other studies, which used the Short Test of Functional Health Literacy in Adults (S-TOFHLA) or TOFHLA to measure health literacy in the German, French and Italian version and yielded no significant differences (39).

The NVS was also applied in two Australian and Singaporean studies (40, 41). Among 2824 Australian participants, 55% had adequate functional health literacy, which compared with the 29.7% adequate health literacy that we found, is higher. In the three polyclinics in Singapore, researchers found almost half of 302 respondents attained a score of 6 in the NVS test. These polyclinics were representative of the public primary care clinics in Singapore. Besides, in Dutch validation of NVS among 289 patients, Franssen et al. (2011) argued that NVS is an appropriate measure to assess patients' health literacy levels but its application in different cultures makes difficulties. Like their findings, in some cases our participants claimed that content of the label was incomprehensible and caused confusion, or helpings were calculated instead of gram. Moreover, Iranian food labels differ in layout and content from the NVS label, and daily consuming of ice cream in Iran is less than it is in the United States (42). Looking at the combined analysis, we find that there is not only no significant association; neither is there a trend that just fails to reach significance. We did not find significant correlations between eHEALS and gender or age. Obtaining and adequately using eHealth information requires eHealth literacy. The present study therefore assumed

female patients to have higher eHealth literacy than male patients, but the results did not show such differences. This agrees with the results of previous studies (43, 44, 22). Studies conducted with students reported higher scores for males (24, 45), as did Dashti et al. (2017) (46).

These studies suggested potential cultural variations. In addition, in this study, there was a positive correlation between the combination of both measures and education. Education level affects eHEALS via online search of health information (47). There are two Iranian studies that reported patients' eHealth literacy was related to their education level, but some other studies (48, 49) failed to show this association. Likewise, in the validation of the Dutch version of eHEALS (50), the translated scale was applied to a sample of patients with rheumatic diseases and measured correlation with age, education, and quality of Internet use.

Their results showed correlation between eHEALS and education and age were not significant. Principles of the self-efficacy and social cognitive theory, and eHealth literacy's six core skills are to be considered as precursors of behavior change and skill development, therefore, eHEALS can be considered as a measure of self-efficacy in the online health context (14). In this study, there is a significant positive relationship between eHEALS and GES-10, which indicates that the patients with higher level of the eHealth literacy had higher self-efficacy. These results are consistent with Hojjati et al. (2015) (51), Dennison et al. (2011) (52) and Mc-Clearly-Jones et al. (2011) (53) studies. In the Shahbazi et al. (2018) (54) study, critical health literacy was showed as the most important predictor of patients' self-efficacy. Other researchers also found the effect of health literacy was mediated by knowledge and self-efficacy (55, 56).

On one hand, critical and communicative

health literacy provides social cognitive knowledge and comprehension skills, which necessary for proper disease management. These skills increase patients' self-confidence, helping them communicate effectively with health providers and make better use of health information resources (57). On the other hand, Diviani et al. (2015) believes that health literacy might play a role in other health impairment (OHI) evaluation. Patients with low health literacy are less aware of OHI quality, less critical about their ability to evaluate it or apply in dealing with health providers (58). Social media are key role to spread and access OHI in Iran and even all over the world. The point is, although eHEALS is considered as a valid tool for assessing competency with the Internet, it is thought of failing to capture the skill related to the use of social media.

Consequently, relevant qualities of sources that should be part of the concept measured are in fact excluded. In the present study, there was a significant positive correlation between eHEALS and patients' physical and mental health ratings. When we ask questions about "mental health", patients' answers refer to their mood or satisfaction of life, not to "knowledge and beliefs about mental disorders, which aid their recognition, management or prevention" (59 p.182). These results may be interpreted that patients with higher health literacy are more confident and satisfied and have a better estimate of their mental and physical health. Mitsutake et al. (2016) (60) found that adults with high eHealth literacy have healthier behaviors such as physical exercise and balanced nutrition. There is significant amount of investigations that have shown individuals with high eHealth literacy were more active consumers of online health information, especially information related to exercise and nutrition (61, 62, 63, 64, 65).

Limitations: The results of collecting data

with NVS and eHEALS cannot entail the complex construct of health literacy with its functional, interactive/communicational and critical dimensions. Given that our populations were patients, it can be assumed that they were not in their normal physical health circumstances and were worried about their health status. In case of eHEALS, many older people, especially when they had not had good education refused to fill out questionnaires because they were ashamed to be assessed or did not have up-to-date information or access to new digital technologies. Furthermore, eHEALS measure the eHealth literacy of patients based on their self-reports and not actual performance or record of Internet use. Therefore, more studies that measure their actual online information usage or performance are required. Many respondents did not really understand the ice cream label of NVS on their own, and asked help because it is not an everyday treat in Iranian life style

Conclusion: The aim of this study was to draw a comprehensive picture of functional and critical aspects health literacy of Iranian patients. We investigated the health literacy of referrals to Isfahan medical science centers, in particular the dimensions of reading ability and numeracy and eHealth literacy using two different measures (NVS and eHEALS). This study sought to assess health literacy among patients and its association with socio-demographic variables and self-efficacy. In our sample, more than 50% of patients had low functional and eHealth literacy. Based on official reports, until the March of 2018, Internet penetration rate in Iran was 90%. Health providers' efforts should aim to raise awareness on OHI resource quality especially among low eHealth literate patients. Determining health literacy in patients leads to a better understanding of their perception, application and decision-making in health problems. We propose that

further research is needed to measure health literacy with these two tools in the other public hospitals and polyclinics and in other provinces in Iran, particularly in provinces with different population texture from Isfahan. We propose that further research is needed to measure health literacy with different population such as more prevalent chronic diseases in Iran like MS, Diabetes or Cancer patients.

Ethics approval and consent to participate

The consent approval was obtained written and verbal. At first of randomly choosing and meeting the referrals to the polyclinics, we verbally asked them to participate, if they had enough time and tendency to being involved, because the polyclinic's waiting halls were overcrowded in 6 days of each week and therefore at the first glance we had to ask them face to face. also, being over crowded means there were a variety of Iranian ethnics who do not speaking in criteria Farsi, so we had to evaluating their ability to speak in Persian.

We informed them that the name or other personal information except demographic won't be necessary and use in our research.

When the referrals accepted to participate, we gave the questionnaires to the he/she. At The first paragraph of every single one of questionnaires there was a written consent which explained that filling these questionnaires won't length be more than 15 minutes, this is a academia's research with collaborating of institute of Health Communication, Università della Svizzera italiana and the faculty of Communication Science and Media Studies of Islamic Azad University, Tehran, Iran, and the aims and the future applications of this research for the improves of communication's advantages in health care system in Iran.

The faculty of Communication Science and Media Studies of Islamic Azad University Central branch, Tehran, Iran, on 22 June 2019 and ethical

committee of polyclinics approved this study (reference number 814/34514).

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