

ORIGINAL ARTICLE

Health literacy and education: a cross-sectional study using the Newest Vital Sign among patients in Abu Dhabi, United Arab Emirates

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ABSTRACT

Background: Few studies have examined health literacy in the United Arab Emirates and a limited number of tools for use in Arabic speaking populations exist. The aim of this study was to describe health literacy level and related factors such as education and exposure to nutrition education, among patients visiting the emergency room.

Methods: Data were collected from 590 patients in 2018 at the emergency department in a multinational setting. Univariate and logistic regression analyses were used to determine the association between health literacy, education and other demographic variables.

Results: The mean age of patients was 32.9 (± 10.7), of whom 44.3% had less than a college education. The average Newest Vital Sign score was 2.69 (± 2.33) out of 6. Over a third of the patients (38.5%) had a high likelihood of limited health literacy, 17.2% had the possibility of limited health literacy and 44.3% had adequate health literacy. Multivariable logistic regression analysis indicated that having less than a college level education was a significant predictor for inadequate health literacy among participating patients [odds ratio (OR) = 2.23; 95% confidence interval (CI): 1.52, 3.30, $p < 0.001$]. This was also true for those who never attended a nutrition education session (OR = 1.86; 95% CI: 1.24, 2.79, $p < 0.001$).

Conclusion: The current study results lend support to expanding health literacy research in this multinational population where the majority have a secondary education. How patients obtain information, interact with health care providers and become empowered to participate in their care must be further explored to improve health literacy outcomes.

Keywords: Education, health literacy, Newest Vital Sign, United Arab Emirates.

Introduction

Limited health literacy is broadly defined as the diminished capacity to obtain, understand, and act on basic health-related information, and can lead to a greater risk of negative health outcomes [1]. Limited health literacy has been linked to increased hospital admission, poor physical and mental health, psychological problems and unwillingness to disclose problems to health care providers [2], hospital reutilization after discharge [3] [4], and shorter life expectancy [4].

Patient education and effective communication are core elements of the health care profession, wherefore awareness of a patient's level of health literacy is critical to patient care, safety, and education. While chronically ill patients may have more difficulty to read, understand, and apply health information, studies have suggested that

health care providers overestimate their patient's health literacy [5]. Consequently, when discharged from the hospital chronically ill patients, often fail to understand important elements of their discharge and home care plan. This in turn increases the risk of non-compliance with treatment plans or adverse prescription drug use among this such patients [6].

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The Eastern Mediterranean Region (EMR) has experienced a high population burden of morbidity and mortality due to non-communicable diseases (NCDs) over the past decade [7]. More recently, studies examining the link between health literacy and health care utilization in this region have reemerged [8].

A recent study suggests that literacy levels have improved in the Arab World although limited literacy skills still persist in part due to the lack of reading habits. The authors suggest that poor reading comprehension is a result of poor reading [9]. The current study assumes that higher education coincides with improved reading habits and reading comprehension, with a linear relationship between education and health literacy. In clinical settings health literacy and health literacy assessments are critically needed for proper identification of health problems and strategies to improve long-term success in patient care [10]. The well-documented relationship between health literacy and health care utilization [11] may further provide incentives for health care systems to include health literacy assessments in routine clinic visits.

The concept of health literacy is comprised two domains: functional health literacy (FHL) which is concerned with an individual's ability to read and understand health-related information [12], and comprehensive health literacy, which represents an individual's ability to understand, appraise and apply health-related information to promote health or prevent diseases [13]. Up until now, there is no consensus on the most appropriate instruments for measuring health literacy [14]. Some instruments assess word recognition, while others focus on oral communication, and/or ability to understand terms related to health and numeracy [15,16].

The Newest Vital Sign (NVS)

Options for multi-dimensional tools for use among Arabic speaking populations are limited. The NVS provides a quick assessment of FHL, is relatively easy to apply and has been validated in different languages [17,18] in the U.S., Europe and the EMR [19,20]. The NVS has also shown to be an effective tool in clinical settings, and scores correlate with the more widely used, but lengthier validated instrument, the Test of Functional Health Literacy in Adults [21]. This tool has been used in Arabic speaking populations among caregivers of children with type 1 diabetes [22] and pharmacy customers [19].

Health literacy skills are critical in settings where health care providers are providing care in distraction-filled, limited-time setting, often with no knowledge of the patient's medical history such as emergency departments (EDs) [23]. It is unclear how the NVS fares in clinical settings where patient-provider communication can be immediately critical to health outcomes. This study will be among the first to examine health literacy and associated factors among ED patients. The aim is to use the NVS to investigate health literacy, and related factors such as a patient's overall education levels and their exposure to nutrition education.

Methods

Ethical clearance

The (name of institution) Institutional Review Board approved the survey and informed consent procedures used in this research study to examine the relationship between health literacy and related factors such as education and exposure to nutrition education, among patients visiting the emergency room.

Study site

The target population included patients visiting the (name of institution) ED, a large health care facility in the United Arab Emirates (UAE) where health care providers treat an average of 160 patients daily. Hospital records indicate that approximately three out of four patients (74%) visiting this ED are UAE nationals, while one out of four patients are non-UAE nationals (24.25%). The remaining patients (0.53%) are non-residents or visitors. At this hospital site, all information is presented in English and Arabic.

Study design

A cross-sectional design was used to collect a convenient sample for administration of the NVS in English and Arabic. Between January and December 2018, patients were approached in the ED to determine eligibility. Two trained bilingual research assistants used a standard script for describing the study, to ensure consistency in the explanation of the written and oral portion of the interview. Each research assistant had a college degree in an area of allied health and received training in language interpretation and protection of human subjects, in order to conduct patient interviews for this study.

Participants were recruited from the ED between January and September 2018. An attending physician first approached each patient to request their participation, and then referred participants to the research assistants. Data were collected through patient interviews conducted by research assistants using a standardized protocol and administered in English or Arabic (on the basis of the patient's stated preference). Participants were given the option of doing the interview while in the patient room or in the common patient area after discharge from the ED. Data collection comprised two parts: (a) a self-administered demographic set of questions (age, gender, marital status, number of children, level of education, experience with chronic disease, exposure to nutrition education, doctor's visit in the past 12 months), (b) an oral assessment of health literacy using questions from the NVS.

Variables

Age was self-reported as a continuous variable and described as a categorical variable with four groups: under 21, 21-30, 31-40, and over 40, for use in data analysis. Participant gender, marital status, doctor's visit in the past year, and exposure to nutrition education were treated as categorized variables. Patients were asked whether they had experienced diabetes, obesity, heart disease, or hypertension. Responses were then added up

and categorized from no experienced to experience with 1, 2, 3, or more of these chronic diseases.

Research instrument

FHL was measured using the six-question NVS research instrument, a tool which has previously been translated and validated for use in Arabic speaking populations [24]. The questions in the NVS refer to one's caloric and nutritional intake, a test of reading and numeracy, while questions about ingredients measure FHL. Each response is scored as correct (1) or incorrect (0). The scores between zero and one indicate "high likelihood of limited health literacy" (HLLHL), two to three indicate "possibility of limited health literacy" (PLHL), while four to six refer to "adequate health literacy" (AHL).

Cognitive interviews were conducted by trained research assistants, following the pre-test model for Croatia [25] using 10 patients visiting the ED using demographic characteristics of age, gender, low education level (no high school, high school). During the cognitive interview, each patient also provided their general impression of the research instrument (length and difficulty), portions they did not understand, and what the NVS item meant in their own words, with examples and suggestions for modifications. The cognitive interview results were reviewed by two public health experts with fluency in English, an Arabic language, and one Arabic non-UAE

native public health expert. When no more suggestions were presented, a combined version (Figure 1) of the NVS-English/Arabic (NVS-ENG/AR) was then used for data collection. The use of the (NVS-ENG/AR) mirrors the display on many food products in the UAE, where food labels in English include a secondary smaller label with only the ingredients and translated in Arabic.

Target population

Participants were categorized as UAE nationals or non-UAE Nationals with Arabic or non-Arabic as their primary language. It should be noted that English is commonly used language in most public and private places in the UAE, and the chosen language of communication in health care systems. Therefore, this study did not consider other languages which may also be highly prevalent among UAE residents, such as Urdu and Tagalog. Patients were initially approached by an attending physician in the ED and asked if they were willing to participate in a brief interview. Upon written consent, each patient was handed a printed copy of the demographic questions to complete the written portion of the interview, and subsequently handed a copy of the NVS-ENG/AR ice cream label for review. When ready, the research assistant read each of the six questions to the patient and recorded the response. One point was given for each correct answer of the NVS test.

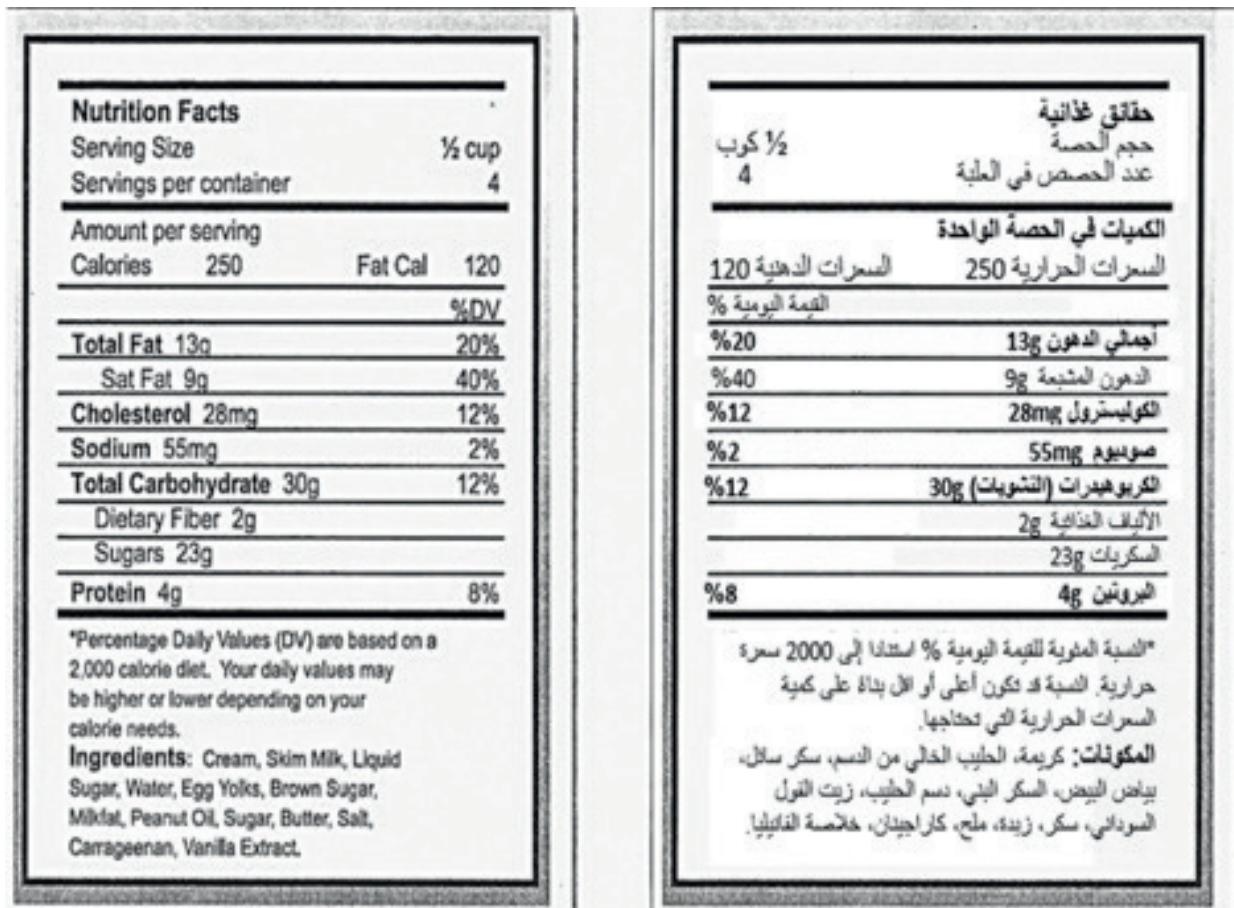


Figure 1. The NVS food label in English and Arabic.

Table 1. Patient characteristics by level of health literacy using NVS scores.

Variable	Total		HLLHL (score: 0 to 1)		PLHL (score: 2 to 3)		AHL (score: 4 to 6)		p-value
<i>n</i> (%)	506	100	195	38.5	87	17.2	224	44.3	
Demographics									
Gender									
Male	184	36.4	71	36.4	29	33.3	84	37.5	0.790
Female	322	63.6	124	63.6	58	66.7	140	62.5	
Age									
<30 years	212	41.9	92	47.2	35	40.2	85	37.9	0.388
30-45 years	239	47.2	85	43.6	43	49.4	111	49.6	
>45 years	55	10.9	18	9.2	9	10.3	28	12.5	
Marital status									
Single, divorce, widow	216	42.7	89	45.6	35	40.2	92	41.1	0.563
Married	290	57.3	106	54.4	52	59.8	132	58.9	
Nationality by category									
UAE	276	54.5	105	53.8	67	77.0	104	46.4	< 0.001
Arab and others	230	45.5	90	46.2	20	23	120	53.6	
Education									
< Completed college	224	44.3	101	51.8	52	59.8	71	31.7	< 0.001
≥ Completed college	282	55.7	94	48.2	35	40.2	153	68.3	
Ever attended nutrition education session									
No	361	71.3	157	80.5	63	72.4	141	62.9	<0.001
Yes	145	28.7	38	19.5	24	27.6	83	37.1	
Chronic diseases									
No	393	77.7	147	75.4	70	80.5	176	78.6	0.582
At least 1 (diabetes, hypertension, or obesity)	113	22.3	48	24.6	17	19.5	48	21.4	
Patient had children									
No	227	44.9	90	49.2	37	42.5	100	44.6	0.849
Yes	279	55.1	105	53.8	50	57.5	124	55.4	

Inclusion and exclusion criteria

All patients who agreed to participate and were included in this study, had some degree of literacy that enabled them to read the NVS label and answer questions.

The following patients were excluded from participation: (a) patients who were vision or cognitively impaired (b) patients who were too ill to participate.

Statistical analysis

Statistical analysis was conducted using Statistical Package for the Social Science [26]. Various methods were used. Means, standard deviation, frequencies, and percentages of participant characteristics such as age, gender, and levels of education were measured.

First, Chi-square test was applied to analyse categorical data based on the three categories of health literacy as established in the design of the NVS: 0-1 was labelled as HLLHL, 2-3 as PLHL, and 4-6 as AHL. Univariate and logistic regression analysis was used to determine the association between health literacy and sociodemographic/health characteristics such as gender, marital status, age, nationality, education, nutrition education, and present or absent of chronic diseases. In

logistic regression, health literacy scores were collapsed into two categories, namely poor health literacy (NVS score <4) and AHL (NVS score ≥ 4).

To control for confounding factors all variables included in univariate analysis were entered in multivariable logistic analysis with health literacy as the dependent variable (AHL was coded as 0 and poor health literacy was coded as 1). Odds ratio (OR), adjusted odd ratio and 95% confidence interval (CI) were calculated with a significance level of $p < 0.05$.

Results

Cognitive analysis

First, cognitive analysis was conducted using feedback from a pilot sample of 10 patients. Pilot data (Table 1) was categorized by nationality, and the language preferred for reading health related information although the NVS nutrition label was presented in English and Arabic for all participants. All participants responded that they understood the nutrition label although there were some differences in the average completion time, based on native language spoken. The average completion time for all participants was 6.02

minutes, while participants who spoke and preferred Arabic took a little longer (6.26 minutes) than those who preferred English (5.44 minutes). It should be noted that participants who preferred English were not necessarily native English speakers. Most of the participants found the calculations to be the major challenge, as well as the interpretation of the serving size. When all feedback from the cognitive interviews was considered, the experts agreed that no changes to the final draft were necessary and proceeded with data collection using the draft as presented in the cognitive interviews.

Patients

A total of 590 patients agreed to participate in the study, but only 506 those who completed surveys were eligible for inclusion in the analysis. Where patients failed to complete the demographic information correctly, surveys were removed from the final dataset. The average age of the participants was 32.9 (± 10.7), of whom 184 (36.4%) were males and 322 (63.6%) females. The participants were classified into two groups according to their education degree, 224 (44.3%) did not complete a college level education, and 282 (55.7%) completed at least a college level education or more. More than half (71.3%) of participants had never attended a nutritional education session.

Health literacy

The overall mean NVS score was 2.69 (± 2.33) out of 6. An overview of results on the NVS test showed that 38.5% of participants had HLLHL, 17.2% had PLHL, and 44.3% had AHL.

Health literacy was further analysed in the context of education and other demographic characteristics of the target population (Table 1). Chi-square tests were initially performed to compare the percentage of participants with high likelihood, possibility of high likelihood or AHL across demographic and education related variables. In this sample of UAE nationals or non-UAE National patients, there was no significant relationship between demographic variables such as age, gender, marital status, having children, and self-reported experience with chronic disease. A significant difference was found in the HLLHL ($p < 0.05$) and PLHL for UAE nationals ($p < 0.001$) and those with less than a college education ($p < 0.001$).

When health literacy scores were further collapsed into two categories, inadequate health literacy (NVS score < 4) and AHL (NVS score ≥ 4), rates were 282 (55.7%) and 224 (44.3%) respectively. Univariate analysis indicated a significant association ($p < 0.05$) between those who completed less than a college level education, those who had never attended a nutrition education session, nationality, and inadequate health literacy. As shown in Table 2, education level was an independent predictor of inadequate health literacy. After adjustment for all other factors, patients who had less than a college level education were 2 times more likely (OR = 2.23; 95% CI: 1.52, 3.30, $p < 0.001$), and those who never attended a nutrition education session were almost twice as likely (OR =

1.86; 95% CI: 1.24, 2.79, $p = 0.003$) to have inadequate health literacy. Non-UAE nationals were less likely (OR = 0.55; 95% CI: 0.39, 0.79, $p = 0.001$) than UAE nationals to have inadequate health literacy although this prediction was not consistent after adjusting for other variables (Table 2).

Discussion

This study is one of the first to examine the relationship between education and health literacy among patients in an ED setting in Abu Dhabi. In this population with diverse health care needs and diagnoses, the authors found that both educational attainment and exposure to nutrition education is significantly associated with the likelihood of limited health literacy. The likelihood of AHL increased with higher levels of education. While health literacy was associated with nationality, this was no longer true when adjusting for demographic variables.

A previous study has shown that patients with higher education were more eager to take part in sharing the responsibility with their practitioner throughout the care process. Such patients recognized that doctors are imperfect and are not necessarily their first point-of-call in case of a health issue. These patients also wanted to verify the credibility of information and explore options beyond those presented within the limits of the clinical visitation [27]. In this same study, patients who had lower levels of education were less likely to engage in the care process. This has important implications for the patient-provider relationship and influence how patients experience their involvement and engagement with practitioners, when seeking care.

With the recent surge in health literacy research, most regions of the world have reported concerns for limited health literacy amongst their populations. More specifically, research shows that it impacts persons with limited educational attainment, those whose primary language is not that of the main language used in the given country, the disabled and the chronically ill. These categories are not the only ones that affect a person's understanding of health information and their ability to navigate complex health care system and related health information. Embarrassment and shame are common in these patients, and physicians have expressed that patients with limited health literacy are good at concealing their deficits, making it difficult to detect a problem [28].

Furthermore, health literacy has been reported as a critical factor in empowering patients to manage their own well-being and improve their health outcomes in an increasingly complex health system [29]. In 2013, 65.0% of all deaths in the UAE were due to NCDs. One of the challenges of Abu Dhabi's model of care is the lack of sufficiently self-management support and prevention (screening programs and diagnostic services are not integrated into care plans) [30]. A model of care with unlimited patient access to health services may lead to an inappropriate use and over-supply of department-specific services, especially the ED.

Table 2. Factors associated with likelihood of limited health literacy (NVS score below 4) among ED patients.

	Unadjusted			Adjusted		
	OR	95%CI	p-value	OR	95%CI	p-value
Gender						
Male	0.92	0.64, 1.32	0.636	1.003	0.68, 1.48	0.986
Female						
Age						
<30 years	1.55	0.85, 2.81	0.150	1.65	0.81,3.37	0.170
30-45 years	1.20	0.67, 2.15	0.550	1.33	0.70, 2.51	0.381
>45 years						
Marital status						
Single, divorce, widow	1.13	0.79, 1.61	0.512	1.09	0.59, 2.02	0.786
Married						
Nationality by category						
UAE	0.55	0.39, 0.79	0.001	0.71	0.48, 1.04	0.079
Arab and others						
Education						
< Completed college	2.56	1.77, 3.69	<0.001	2.23	1.52, 3.30	<0.001
≥ Completed college						
Ever attended nutrition education session						
No	2.09	1.41, 3.09	< 0.001	1.86	1.24, 2.79	0.003
Yes						
Chronic diseases						
No	0.91	0.60, 1.39	0.665	0.82	0.51, 1.30	0.391
At least 1 (diabetes, hypertension, or obesity)						
Patient had children						
No	1.02	0.71, 1.45	0.930	0.78	0.41, 1.46	0.430
Yes						

Strengths and limitations

The strength of this study is that the results contribute to the gap in research on multi-lingual application of health literacy measures. This is essential for future development of health literacy research in the UAE, and encourages further evaluation of multi-lingual evaluation, particularly in the EMR. One of the limitations of this study is the inability to compare the current measures to a valid standardized instrument for multi-lingual populations. The findings from this study are limited to a single hospital site primarily serving UAE nationals, and thus may not be generalizable to the wider population of Abu Dhabi, where the majority are non-UAE nationals. Despite this, the results mirror those of previous research indicating the relationship between low educational attainment and the likelihood of limited health literacy. Another limitation is that the focus for this study was on education and health literacy, and therefore other potentially mediating factors of education on health literacy and patient-provider engagement was not measured. Patient, provider, and environmental factors that influence the success or failure of information exchange during the clinical experience may also influence health literacy scores. This includes cultural differences often associated with language differences and a potential barrier to effective communication.

Conclusion

The current study results lend support to expanding health literacy research in this multinational population where the majority have a secondary education. How patients obtain information, interact with health care providers and become empowered to participate in their care must be further explored to improve health literacy outcomes. This requires more than just measuring FHL and the application of interpersonal and negotiation skills. The findings highlight a need to capture additional competencies reflected in the definitions of health literacy and calls for the development of comprehensive tools for examining the influence of education on health literacy in clinical settings.

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List of Abbreviations

AHL	Adequate health literacy
ED	Emergency department
EMR	Eastern Mediterranean Region

FHL	Functional health literacy
HLLHL	High likelihood of limited health literacy
NCDs	Non-communicable diseases
NVS	Newest Vital Sign
NVS-ENG/AR	Newest Vital Sign-English/Arabic
PLHL	Possibility of limited health literacy
UAE	United Arab Emirates

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate

Written informed consent was obtained from all the participants prior to their completion of the research instrument

Ethical approval

Ethical approval was granted by Institutional Review Board/ via reference/letter number A-2017-036, dated: October 25, 2017.

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