Health literacy screening instruments in adults with cardiovascular disease and their importance to the nursing profession

AUTHOR

Alex Chan
RN, BN, GradDipCardiacNursing, MN, MEd
Lecturer, University of Tasmania, School of Health Sciences,
1 Leichhardt Street, Darlinghurst, New South Wales, Australia
a.chan@utas.edu.au

KEY WORDS

health literacy, measurement of health literacy, health literacy assessment, secondary prevention, cardiovascular disease, screening instrument

ABSTRACT

Objective
To provide context information about the currently available health literacy screening instruments that may be applicable to adults with cardiovascular disease and their importance to the nursing profession.

Primary argument
Cardiovascular disease is a major health concern in Australia. Most cardiovascular diseases can be prevented and managed by reducing the cardiovascular risk factors. However healthcare professions, including nurses, may overestimate the health literacy skills of adults, and result in ineffective communication and misunderstanding. Adults with inadequate health literacy skills are often less compliant with their prescribed preventive treatments. As such an accurate health literacy assessment would not only promote therapeutic communication and the relationships between nurses and adults but it would also improve the compliance of secondary preventive treatment and the overall health outcomes. So this leads to the question, what health literacy screening instruments are available to measure the health literacy skills of adults with cardiovascular disease?

Conclusion
A review of primary research dated from 2005 to 2014 indicated the derivative versions of TOFHLA and REALM are the two main instruments used to measure the health literacy skills of adults with cardiovascular disease. Accurate health literacy measures can assist nurses to develop strategies to improve the overall health outcomes of adults with complex needs and inadequate health literacy skills. As nurses comprise a substantial proportion of the healthcare workforce, they have the potential to make changes in the healthcare system and improve the quality of health education provided to this population group.

INTRODUCTION

Cardiovascular disease (CVD) is a major public health issue in Australia. It accounted for 31% of all deaths in 2011, and 482,000 hospitalisations in 2009 – 2010 (National Heart Foundation of Australia 2013). In 2008 to 2009, it is estimated over $7,000 million, approximately 12% of healthcare expenditure was spent on CVD care (Australian Institute of Health and Welfare 2014). With the advance of pharmacological therapies and interventional cardiovascular technology, many CVD patients survive from acute events but live with a chronic medical condition for the rest of their lives. In general, CVD is a preventable disease and many of the risk factors can be managed through lifestyle modification and preventive treatment (National Heart Foundation of Australia and Australian Healthcare and Hospitals Association 2010). However adults with limited or marginal health literacy may often misinterpret the health related information, resulting in ineffective communication with the healthcare professionals, including nurses, as well as under-utilising the healthcare services for secondary preventive treatment. Statistics show that only 41% of Australians aged 15 to 74 had an adequate health literacy skill (Australian Institute of Health and Welfare 2012). This literature review aims to provide context information about currently available health literacy screening instruments for adults with CVD and to highlight the importance of these tools for nursing professions.

Secondary prevention of CVD

Secondary prevention, commonly known as cardiac rehabilitation was first introduced in the early 1970s and became a multifaceted management in 1994 (Savage et al 2011). Today's secondary prevention/cardiac rehabilitation results in lifelong care for CVD patients. Evidence suggests compliance with the secondary preventive management can significantly lower mortality and morbidity (Hamm et al 2011; Neubeck et al 2011), as well as improve the clinical stability, prognosis and quality of life in adults with CVD (Piepoli et al 2010). However adults at high risk of CVD are often unlikely to attend the preventive program. Statistics show that approximately 70 to 85% of CVD patients would not adhere to their secondary preventive treatments (Neubeck et al 2011). As a result, these adults receive suboptimal management for their CVD risk factors leading to higher recurrence rates and medical costs.

Health literacy and secondary preventive management

In a recent systematic review, Sørensen et al (2012, p3) defined health literacy as:

> *linked to literacy and entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course.*

That is to say, patients need to have the necessary reading and numerical skills to understand the health literature, and analyse the contents in order to make the decisions for their health. Many studies have suggested there is a close relationship between the levels of health literacy and utilisation of healthcare services (Morris et al 2006; Ko et al 2011; Safeer et al 2006; Adams 2010; Adams et al 2009). Patients who are functionally illiterate and/or are from culturally and linguistically diverse backgrounds have been found to be more often at risk of having difficulties in communicating with healthcare professions (Schyve 2007).

Many healthcare professions including nurses believe they use lay language to communicate with their patients but in fact, patients with inadequate health literacy may misinterpret the information and this possibility may result in different responses (Risser et al 2007). In general, adults who have not completed high school education are more unlikely to have adequate functional health literacy skills (Johnson et al 2013). In some cases, adults may be literate in one aspect of health literacy but may be illiterate in other areas, such as numeracy; therefore education level is not a good indicator of health literacy skills in general (Johnson et al

2013; Weiss 2007). A formal health literacy assessment would be helpful for the healthcare professions to identify patients with less than adequate health literacy skills. Without a health literacy assessment, healthcare professions may overestimate patients' literacy skills, thus leading to ineffective exchange of information between them and patients. As discussed earlier, adults living with heart disease are the most-at-risk population groups but are often less compliant with secondary preventive treatment and self-management of chronic conditions (Adams et al 2009). Although the reason for non-compliance in secondary preventive treatment can be multifactorial, the effects of health literacy should not be underestimated. From the public health prospective, limited health literacy could have a significant impact on the total healthcare budget and the attitude towards secondary preventive treatments by the general public (Kickbusch et al 2013).

In clinical settings, nurses play an important role in providing clear and accurate health education to patients (Johnson 2014). Nurses have the ability to make changes in the healthcare system and improve the communication between healthcare professions/organisations and patients (Dickens and Piano 2013). In general, adequate health literacy measures would not only identify patients with less than adequate health literacy skills but also assist nurses to provide relevant levels of health education to patients.

METHOD

A review of current literature was completed using CINAHL, PubMed and Medline databases. The selected search terms for the database search were 'measurement of health literacy', 'assessment of health literacy', 'health', 'literacy', 'cardiovascular disease', 'tool', 'instrument' and 'measure'. A total of 67 publications were retrieved. Each article was manually reviewed and only primary research dated from 2005 to 2014 with a tool, instrument or method to assess or measure health literacy in relation to a CVD management were selected for review. After the examination, five publications met the selection criteria.

DISCUSSION

All the selected studies were published in English. Accordingly, the two most popular health literacy screening instruments used to measure the health literacy of adult patients with CVD were the shortened version of the Test of Functional Health Literacy in Adults (S-TOFHLA) and the Rapid Estimate of Adult Literacy in Medicine (REALM) (table 1). Overall, most of these studies focused on native English speaking populations (Chen et al 2013; Ibrahim et al 2008; Giuse et al 2012). Giuse et al (2012) attempted to recruit Spanish speaking patients in their study but unfortunately, the response rate was very low (n = 1) in the first experiment. As a result, only English speaking patients were recruited in the second experiment. In another study conducted by Kim (2009), the Korean Functional Health Literacy test (numeracy: r = 0.82; reading comprehension: r = 0.78) was utilised to measure the health literacy in older Korean adults. To improve the accuracy of this functional health literacy test, part of the instrument was translated from the TOFHLA and part of the instrument was redesigned based on the Korean healthcare system and culture.

Both Fransen et al (2011) and Ibrahim et al (2008) aimed to evaluate and validate the applicability of the health literacy instruments developed in other countries. Ibrahim et al (2008) compared REALM (r = 0.70) that was originally designed for the American population with the British general literacy screening test, the Basic Skills Agency Initial Assessment Test (BSAIT) in the United Kingdom (UK). In a similar vein, Fransen et al (2011) translated four selected literacy screening instruments to Dutch and evaluated their applicability in the Netherlands. Instruments examined included REALM (r = 0.91), Newest Vital Sign (NVS) (r = 0.78), Set of Brief Screening Questions (SBSQ) (r = 0.67) and Functional Communicative and Critical Health Literacy (FCCHL) (r = 0.68).

In the following sections, the most important findings and scientific comparisons will be discussed for each health literacy instrument that was used in the selected studies.

Rapid Estimate for Adult Literacy in Medicine (REALM)

REALM is one of the most common and reliable adult health literacy screening tests (Bass et al 2003; Baker et al 1999; Ibrahim et al 2008; Conlin and Schumann 2002). This expression, 'recognition test' was first developed by Davis in 1991 to evaluate patients' reading abilities in primary care settings in the United States of America (USA) (table 2). Individuals were tested on their reading and pronunciation skills (Davis et al 1991). The original REALM test consisted of 125 common medical terms and the participants were scored from 0 to 115+ (grade 3 to high school level). The duration of this test was approximately 3–5 minutes. The test format was revised in 1993 and the length of the shorter version (REALM-S) was reduced to 66 items with administration time of 1–2 minutes (Davis et al 1993). The coefficient alpha (Cronbach's coefficient of internal consistency) of these tests was 0.98 and 0.99 (Jordan et al 2011). Since then many derivative versions were developed to suit the needs in different clinical settings and target groups, these include REALM-R, REALM-SF and REALM-Teen (Jordan et al 2011).

However the REALM test is only in English and pronunciation may vary from one population group to another, such as between American and British English (Jordan et al 2011). In addition, an individual may correctly pronounce the medical terms yet not understand the meanings (Dewalt et al 2004).

Test of Functional Health Literacy in Adults (TOFHLA)

TOFHLA measures the ability of an individual's reading and understanding of health information using health-related materials. The original TOFHLA test was developed in 1995 to measure the understanding of health information among adult clients in healthcare facilities (Jordan et al 2011). Unlike REALM, TOFHLA not only measures the ability of reading but also the comprehension of passages and numerical information (Parker et al 1995). The main focus of TOFHLA is the health literacy skills of adults at the functional level. The test consists of 50 reading comprehension questions and 17 numerical questions. Individuals are given actual hospital forms, referral letters, patient information and medication labels to read, and then required to verbally respond to a series of questions in relation to the materials (Parker et al 1995). The average administration time is 22 minutes (Jordan et al 2011). Individuals are scored from 0 to 100, from inadequate to adequate health literacy.

In addition to the English version, Parker et al (1995) created a Spanish version (TOFHLA-S) at the same time. Both English and Spanish TOFHLA tests have the coefficient alpha of 0.98 (Jordan et al 2011; Parker et al 1995). TOFHLA has been considered as the most accurate assessment tool to evaluate the comprehension ability of adults. However the duration of administration may take up to 22 minutes therefore it is not very practical in busy clinical settings. As a result, many derivative versions were developed to shorten the administration time with some modifications in the content to suit the needs of different target populations such as the short form TOFHLA (S-TOFHLA) (Baker et al 1999) and the Health Literacy Test for Singapore (HLTS) (Ko et al 2011).

Newest Vital Sign (NVS)

NVS is a streamlining functional health literacy screening instrument aimed to identify individuals with poor literacy skills in the primary care setting. Compared to TOFLHA and REALM, NVS is quick – the test can be completed in three minutes (Adams et al 2009). It was developed based on the concept of TOFLHA and was made available in English and Spanish (Weiss et al 2005). During the assessment, individuals are given a nutritional label to read, and then they answer a series of six questions to measure their level of understanding and ability to utilise the text and numerical information provided on the label (Weiss et al 2005; Adams et al 2009). The coefficient alpha of NVS was found to be > 0.76 in English and 0.69 in Spanish (Weiss et al 2005).

It is important to note that the legal requirements for nutritional labels are not internationally standardised. The differences in layout and content on the labels may have an impact on the cross-cultural applicability and psychometric quality of the instrument (Fransen et al 2011). In comparison, NVS may be more sensitive than TOFHLA in detecting marginal health literacy, but possibly it may overestimate the ability of individuals with limited literacy skills (Adams et al 2009).

Set of Brief Screening Questions (SBSQ)

According to Fransen et al (2011), SBSQ is a subjective measure but the cross-cultural applicability is relatively high. It consists of three 5-point Likert scale questions: "how often do you have someone help you read …", "how confident are you filling out medical forms …" and "how often do you have problem learning about …". Overall, the design of these questions is insensitive to the identification of individuals with marginal and inadequate health literacy skills (Chew et al 2004). The confidence interval for identifying inadequate or marginal health literacy ranged from 0.53 to 0.72. Similar results (0.62 to 0.72) were found in a validation study in 2008 (Chew et al 2008). There are very few studies available for review.

Functional Communicative and Critical Health Literacy (FCCHL)

FCCHL was originally created to measure the functional, communicative, and critical health literacy of Japanese people with type-2 diabetes. This Japanese health literacy screening instrument not only measures functional health literacy but also the ability to analyse, understand and utilise health-related information (Ishikawa et al 2008). It consists of 14 questions, and individuals respond to each question on a 4-point Likert scale. The overall coefficient alpha of this test is 0.78. However FCCHL was specifically designed for the Japanese, and therefore the results may not be generalisable to other population groups. Additionally, the two most commonly used health literacy instruments—TOFHLA and REALM—are unavailable in Japanese. As a result, the correlations between FCCHL and these measures were not examined (Ishikawa et al 2008). Fransen et al (2011) indicated that the correlation of the translated Dutch version of REALM with FCCHL was weak ($r = 0.15$, $p = 0.04$). Apart from Fransen et al (2011) and Ishikawa et al (2008), FCCHL has not been applied in other studies. Therefore, further study is required to validate this instrument especially with the English speaking population.

CONCLUSION

The concept of health literacy screening to identify adults with limited or marginal health literacy is not new, and the effects of health literacy on adults with chronic medical conditions have been well established. The two main instruments reviewed here are the derivative versions of TOFHLA and REALM. As nurses comprise a substantial proportion of the healthcare workforce, nurses have the potential to make changes in the healthcare system. This would improve the quality of health education provided to adults with less than adequate health literacy skills, as well as improving their overall health outcomes. Accurate health literacy measures not only assist nurses to identify adults with limited or marginal health literacy but also facilitate the development of strategies to address the complex needs of this population group. However this literature review reveals that study of health literacy in adults with CVD in the last 10 years is very limited. Further research is needed to develop instruments that can assist nurses to identify adults with inadequate health literacy more efficiently and accurately in busy clinical settings.

Table 1: Instruments used to measure health literacy in adults with cardiovascular disease

	(Giuse et al 2012)	(Fransen et al 2011)	(Ibrahim et al 2008)	(Kim 2009)	(Chen et al 2013)
Purpose	To investigate the impact of administering health information based on the health literacy level alone or in combination with the participants' preferred learning style.	To evaluate and validate the applicability of the REALM, NVS, SBSQ and FCCHL instruments in the Netherlands.	To validate REALM for use in the UK against the British general literacy screening test, the BSAIT.	To investigate the relationships of health literacy and functional health status in Korean older adults.	To examine the relationships of health literacy, heart failure knowledge, self-efficacy and self-care behaviours.
Health literacy screening instrument(s)	S-TOFHLA	REALM, NVS, SBSQ and FCCHL	REALM and BSAIT	The Korean Functional Health Literacy test.	S-TOFHLA
Validity of the instrument(s)	Not established	r = 0.91 (REALM-D) r = 0.78 (NVS) r = 0.67 (SBSQ) r = 0.68 (FCCHL)	r = 0.70	r = 0.82 (numeracy subscales) r = 0.78 (reading comprehension subscale)	Not established
Target population	English and Spanish speaking patients at an emergency department.	Dutch speaking patients in the community.	English speaking patients admitted to hospital for coronary heart disease investigation.	Korean older adults in the community	English speaking patients presented to the heart failure clinics.

Notes: S-TOFHLA, Short form of the Test of Functional Health Literacy in Adults; REALM, the Rapid Estimate of Adult Literacy in Medicine; SAHLSA, Short Assessment of Health Literacy for Spanish-speaking Adults; VARKTM, Visual, Aural, Read/Write, Kinesthetic Inventory; NVS, Newest Vital Sign; SBSQ, Set of Brief Screening Questions; FCCHL, Functional Communicative and Critical Health Literacy; BSAIT, Basic Skills Agency Initial Assessment Test

Table 2: Functional health literacy instruments available in adults with cardiovascular disease

	TOFHLA	S-TOFHLA	REALM	NVS	FCCHL
Author	***(Parker et al 1995)***	***(Baker et al 1999)***	***(Davis et al 1991)***	***(Weiss et al 2005)***	***(Ishikawa et al 2008)***
Purpose	To develop an English and Spanish instrument to measure adults' ability in reading health-related materials.	To develop a shorter version of the TOFHLA to assess adults' ability in reading and understanding health-related materials.	To develop a rapid-screening instrument to directly assess the adults' ability of reading common medical and lay terms that adults are expected to recognise in primary care setting.	To develop a quick and accurate English and Spanish screening tool to identify adults with low health literacy.	To examine the psychometric scales for measuring three different health literacy levels in Japanese adults with diabetes.
Duration	Up to 22 minutes	Up to 12 minutes	3 to 5 minutes	3 minutes	Not identified
Design	The reading comprehension section is a 50-item test using the modified cloze procedure. The passages are selected from instructions for preparation for an upper gastrointestinal procedure, the patient rights and responsibilities section of a Medicaid application form, and a standard hospital informed consent form. The numeracy section consists of 17-items. It assesses adults' numerical skills of interpreting the instructions for taking medication, monitoring blood glucose level, keeping clinic appointments and obtaining financial assistance.	The reading comprehension section is reduced to 36 cloze items. Four numeracy items are selected from the original 17-items in TOFHLA.	A reading recognition test. It consists of 125 words. Adults are assessed on their ability to read and pronounce common medical words and lay terms for body parts and illness.	Adults are given a nutritional label from an ice cream container to read and then asked 6 questions about their interpretation of the information contained on the label.	The instrument contains a total of 14 items: 5 items are designed to assess adults' functional health literacy 5 items are in relation to the ability in communicative health literacy 4 items are created to measure the ability in critical health literacy.

Table 2: Functional health literacy instruments available in adults with cardiovascular disease, *continued*

Scoring	0–59: inadequate health literacy 60–74: marginal health literacy 75–100: adequate health literacy	0–53: inadequate health literacy 54–66: marginal health literacy 67–100: adequate health literacy	0–78 (below 4th grade): may not be able to read most low literacy materials 79–103 (4th to 6th grade): may need low literacy materials 104–114 (7th to 8th grade): may struggle with most patient education materials 115–above (high school level): able to read most patient education materials	0–1: greater than 50% chance of having marginal or inadequate literacy skills 2–3: marginal health literacy 4–6: indicate adequate literacy skills	Each item was scored on a 4-point scale, ranging from 1 (never) to 4 (often). Higher mean scores indicate higher health literacy level.
Validity	REALM: r = 0.84 (English) WRAT-R: r = 0.74 (English)	REALM: r = 0.80 (overall) REALM: r = 0.61 (numeracy) REALM: r = 0.81 (reading)	SORT: r = 0.95 PIAT-R: r = 0.94	TOFHLA: r = 0.59 (English) TOFHLA: r = 0.49 (Spanish)	Total health literacy: Diabetes knowledge: r = 0.37 Number of information sources: r = 0.40 Self-efficacy: r = 0.30
Reliability	Cronbach's α = 0.98 (English & Spanish)	Cronbach's α = 0.68 (numeracy) Cronbach's α = 0.97 (reading)	Cronbach's α = 0.98	Cronbach's α = 0.76 (English) Cronbach's α = 0.69 (Spanish)	Cronbach's α = 0.78

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