

Literacy, readability and cultural barriers: critical factors to consider when educating older African Americans about anticoagulation therapy

FELETA L. WILSON PhD, RN

Associate Professor, College of Nursing, Wayne State University, Detroit, MI, USA

ERIC RACINE Pharm D

Coordinator of Clinical Services, Detroit Medical Center, Detroit, MI, USA

VIRGINIA TEKIELI RPh

Clinical Pharmacist, Detroit Medical Center, Detroit, MI, USA

BARBARA WILLIAMS MSN, RN

Senior Lecturer, College of Nursing, Wayne State University, Detroit, MI, USA

Accepted for publication 12 June 2002

Summary

- The number of patients on anticoagulation therapy has increased dramatically over the past two decades. Yet, few studies have examined the psychosocial barriers of low literacy, culture and inappropriate patient education materials used to teach older African Americans about their anticoagulation therapy.
- The aims of this study were to investigate literacy levels among older patients, and evaluate the readability and determine the cultural sensitivity of written information used in an anticoagulation management clinic.
- A descriptive, correlational design was used. Patients' ($n = 62$) knowledge levels and the readability and cultural sensitivity of written materials were examined. The Rapid Estimate of Adult Literacy in Medicine (REALM) was used to measure reading skills of patients, while the SMOG formula (a formula for assessing readability) was used to test the readability of written educational materials used in an Anticoagulation Management Clinic. A Knowledge Information Profile, developed for this study by one of the authors (Wilson), was used to measure patient knowledge about warfarin, medication side-effects and food sources of vitamin K. A modified, culturally sensitive and easy-to-read pamphlet was used as an alternative teaching tool in the study.
- The results of the study revealed the average self-reported for highest grade completed in school was twelfth grade; however, the actual mean reading skills were between seventh and eighth grade. The readability of the written

Correspondence to: Feleta L. Wilson, 19371 Chapel, Detroit, MI 48219, USA (tel.: 313/577-2915; e-mail: aa3107@wayne.edu).

information was three to four grades higher than patients' reading abilities. None of the patient education materials were culturally sensitive.

- This study underscores the importance of having information that is understandable and culturally relevant to prevent the outcome of internal bleeding. Nurses have a vital role in educating patients and ensuring that teaching materials are appropriate for the target population.

Keywords: medication management, patient education, patient literacy, warfarin.

Introduction

For nearly 50 years, oral anticoagulation therapy has been an aggressive and widespread treatment frequently used to manage thromboembolic events. The number of patients receiving oral anticoagulation medications has increased dramatically over the past decade (Arnsten *et al.*, 1997), yet few studies have examined the psychosocial barriers of low literacy, readability of written education materials, and culture that can influence the outcomes of educational strategies targeted for older African Americans receiving this treatment. The success of anticoagulation treatment is dependent upon the patient's knowledge and understanding about the serious risk of life-threatening bleeding associated with oral anticoagulants. This potential for an adverse reaction is greater for older adults who lack full knowledge about their treatment. Interactions with other drugs, dietary intake, poor compliance with medication and inadequate teaching are factors associated with non-therapeutic treatment outcomes (Sawicki, 1999).

In addition to medication knowledge, patients taking anticoagulants need to be aware of the food–drug interaction between anticoagulants and vitamin K. Gallus (1999) suggests that equally important in management of anticoagulation therapy is maintaining the balance between the medication and vitamin K. Nurses, pharmacists and other health care professionals responsible for teaching patients about anticoagulation therapy depend on written patient materials to increase awareness and promote healthy behaviours. However, many patients cannot read or comprehend the information and therefore are not benefiting from the material. People who are unable to read essential information may not be able to recognize the need for medical interventions if signs of internal bleeding occur.

Reading is a complex process that requires processing and interpretation information. Baker *et al.* (2000) emphasize other cognitive functions including memory, concentration, word recognition and adequate vision as additional factors that influence reading skills. Any deficit in these will affect reading and also may explain the prevalence

of low literacy among older people. Given the serious implications associated with anticoagulation therapy, older African American patients need information that is comprehensible, age-appropriate and culturally sensitive.

Accordingly, the purpose of this study was to: (a) assess the readability and cultural sensitivity of written anticoagulation therapy patient education materials used in an anticoagulation management clinic, (b) evaluate the reading skills of patients seen in the clinic, (c) assess the discrepancy between these reading skills and the reading demands of the education and instructional materials and (d) examine knowledge levels about warfarin and food–drug effects of vitamin K.

ACTIONS OF WARFARIN AND INTERNATIONAL NORMALIZED RATIO

The anticoagulant warfarin is increasingly becoming the drug of choice for outpatient therapy. Warfarin has become a successful agent for medical management of thromboembolic diseases such as chronic atrial fibrillation, mechanical replacement heart valves, deep vein thrombosis, pulmonary emboli, valvular heart disease and acute or recurrence of myocardial infarction. Anticoagulants work by suppressing the activity of vitamin K. This action minimizes the liver's synthesis of four vitamin K dependent coagulation factors. A change in dietary patterns of vitamin K intake can cause fluctuations in blood clotting, can cause a multitude of food–drug interactions and, lastly, may result in poor therapeutic outcomes (Brigden, 1996). Adhering to prescribed recommendations during treatment is essential (Booth *et al.*, 1997), but managing and educating patients with low literacy skills is a challenge for health care providers (Oremann & Wilson, 2000).

The effectiveness of the treatment is determined by several factors including the prothrombin time (PT). The World Health Organization initiated the internal normalized ratio (INR) to ensure global consistency and reliability in reporting PT levels (Gibbar-Clements *et al.*, 2000). In the USA, the Committee on Antithrombotic Therapy of the College of Chest Physicians (ACCP) and

the National Heart, Lung, Blood Institute make recommendations regarding optimal therapeutic ranges for INRs. In most instances, an INR ranging from 2.0 to 3.0 is acceptable (Hirsh *et al.*, 1998). Given the importance of maintaining this critical balance of blood-clotting levels, lack of understanding about anticoagulants can increase the risk of an elevated INR ratio by eightfold (Estrada *et al.*, 1999).

CULTURALLY SENSITIVE PATIENT EDUCATION MATERIALS

Culturally sensitive written patient education information generally refers to the appropriateness and representation of the target group in the printed information (Freidenberg *et al.*, 1993). Written patient education and information materials should reflect the language, beliefs, experiences and values of the target audience. How diverse cultural groups interpret written materials is determined by their values, rules of behaviour consistent with their culture and whether the information fits with their own health care practices (Guidry & Fagan, 1999).

It is essential for professionals responsible for health education to understand the cultural and communication patterns of diverse cultural groups when determining the best approach to patient teaching. One's culture and communication patterns have an integral relationship (Lipson & Steiger, 1996). Each cultural group has codes, symbols, language and values that are meaningful attributes of their communication pattern. Without a basis for clear communication, both patient and provider will have difficulty during the teaching and learning process.

LITERACY AMONG OLDER AFRICAN AMERICANS

Recent studies suggest that poor readers are likely to reside in urban settings, be poorly educated, have low income, and be disproportionately from minority groups, older and people for whom English is a second language (Weiss *et al.*, 1995). Older people are overrepresented among those with low literacy skills and that number is increased among older African Americans. Although research focused on literacy among older African Americans is limited, the landmark National Literacy Survey (NALS) (Kirsch *et al.*, 1993; Brown *et al.*, 1996) presents a clearer picture of literacy among older people.

The survey measured three dimensions of literacy: prose, document and quantitative. *Prose literacy* is defined as the ability to understand written news stories, poems and editorials; *document literacy* is the ability to understand bus or train timetables, charts, maps and graphs; and

quantitative literacy includes the skills needed to use arithmetic operations such as balancing a chequebook, working out a tip and understanding fractions. For each of the literacy dimensions, five levels of proficiency were defined. Level 1 represented the lowest level and scores, while level 5 represented the highest ranking.

The study (Brown *et al.*, 1996) revealed a sharp decline in the three dimensions of literacy based on age. At least 47% or 37 million adults 60 years and older scored at the level 1 on the literacy proficiency tests. Approximately 71% or 29 million older adults scored at the two lowest levels of prose literacy. For African Americans, the performance of literacy proficiency was even more alarming. Webb (1996) reported that African Americans were more likely to perform at the two lowest levels. Less than 0.5% of African Americans scored at level 5 compared with 5% of white people. Webb also emphasized that 38% of African Americans surveyed scored at the two lowest levels for prose literacy, 43% performed at the lowest level for document literacy and 46% of African Americans scored at the lowest level for quantitative literacy.

In addition to age-associated cognitive deficits, poor education and high levels of poverty were considered to be major contributors to poor performance on the literacy proficiency tests. Older adults, aged 55 years and above, had fewer years of schooling compared with younger adults. In fact, the difference in education paralleled that in literacy levels (Kirsch *et al.*, 1993). There was a significant disparity between the educational attainments of white people compared with other minority groups, which was reflected in the literacy proficiency scores. Because of the poor literacy levels among older Americans and even greater low literacy among older African Americans, the teaching tools used for this population, particularly those receiving warfarin treatment, should be examined.

WRITTEN PATIENT EDUCATION MATERIALS ABOUT ANTICOAGULATION THERAPY

There is a wealth of information in the literature regarding the management and education of patients on anticoagulation therapy, but only one article was found that addressed the readability of written patient education materials on anticoagulation therapy (Estrada *et al.*, 2000). These investigators analysed the readability of 50 brochures commonly used as teaching tools in the management of anticoagulation therapy. Their study showed a mean readability level of eleventh grade (95% CI 10–11.2); the brochures required reading skills at the sixth grade level or above. In addition, the researcher found that information on the Internet had a higher mean

readability level of twelfth grade ($SD = 1.3$). These findings are in contrast to those of the National Literacy Work Group on Literacy and Health (1998) which recommended that written patient education materials be written at or below sixth grade level. Other literacy experts suggest that the appropriate level for health care materials is fifth grade level (Doak *et al.*, 1996a,b), and third and fifth grade levels for materials targeting patients in urban areas (Doak *et al.*, 1996a,b). Estrada *et al.* (2000) concluded that the anticoagulation brochures were written above the comprehension level of most patients.

Studies have shown that misuse of medication and poor compliance have been associated with lack of understanding. In fact, poor compliance with anticoagulation treatment occurs in 10–26% of cases, especially among the elders (Arnsten *et al.* 1997). When new or unfamiliar information is presented to patients with low literacy, a significant amount of it may not be processed or retained (Bernier, 1993; Guidry *et al.*, 1998). Older patients are at greater risk of not complying because of poor comprehension, multiple prescribed medications and impaired cognition (Estrada *et al.*, 2000). Therefore, a variety of strategies, including the use of easy-to-read patient education materials, should be employed to ensure comprehension (e.g. video, illustrations, cassette recordings).

Older patients receiving oral anticoagulants must become active participants in their care. Such participation dictates that they and their families read and comprehend written instructions on clinic appointment schedules for blood tests, medication labels, discharge instruction forms and other written information on their treatments. Patients with poor literacy are less likely to comply with recommended medication regimens and have an average health care cost that is approximately six times greater than the general public (Weiss *et al.*, 1992; Estrada *et al.*, 2000).

RESEARCH QUESTIONS

The following questions guided the study:

- 1 What is the readability of written anticoagulation patient education materials used in an anticoagulation management clinic and is there a discrepancy between the patient's actual skills and the reading requirements of the education materials?
- 2 Are there differences in literacy based on the age and gender of patients seen in the clinic?
- 3 Are the anticoagulation patient education materials used to teach older African Americans culturally sensitive?
- 4 What is the patient knowledge level about the warfarin and vitamin K diet, as measured by the Information Knowledge Profile?

Method

RESEARCH DESIGN AND SETTING

This descriptive study was conducted at an urban, hospital-based anticoagulation managed clinic in the Midwest of the USA. The clinic served a significant number of older African Americans on an outpatient basis, and clinic staff noticed that many older patients were having difficulty understanding and following the recommended regimen and felt that further exploration was needed.

CLINIC ADMISSION PROCEDURES

During hospitalization, patients were usually given intravenous anticoagulant; however, prior to discharge this was changed to oral anticoagulants. Physicians made referrals to the clinic for outpatient treatment and follow-up. Patients were usually seen in the clinic within 1 week of discharge. The INRs were carefully monitored at each visit and, if necessary, adjustment in medication dosages were also made. Frequency of patient visits was determined by blood INR levels and educational needs; however, 1 day per week was the average visits to the clinic. During clinic visits, the pharmacist instructed patients about their medication, including side-effects, signs and symptoms to report, and information about their diet with respect to the possible food–drug interaction. In addition, patients were given a pack of written patient education materials to take home as supplemental teaching tools. They spend an average of 10–15 minutes receiving instructions from the pharmacist. Follow-up and additional patient teaching was done in the primary clinics run by advance practice nurses and physicians.

SAMPLE

A convenience sample ($n = 65$) of patients receiving anticoagulation therapy participated in the study. Eligibility criteria included African American patients, 50 years of age or older, English speaking, and physically and mentally able to participate in the study. Their mean age was 67 years. Thirty-four per cent ($n = 22$) were men and 66% ($n = 43$) were women. In terms of income, 59% had an annual income of \$15 000, which is considered to be a low income.

INSTRUMENTS

The Rapid Estimate of Adult Literacy in Medicine (REALM) (Murphy *et al.*, 1993) is a word recognition test designed to assess adults in health care settings. The

test consists of 66 words related to the anatomy or health care that increases in difficulty as the reader advances through the list. The test takes 5–10 minutes to administer. The REALM has been correlated with other standardized tests, namely the Wide Range Achievement Test (Jastak-Wide Range *et al.*, 1993) ($r = 0.87$) and Peabody Individual Achievement Test (Markwardt, 1989) ($r = 0.97$).

The Knowledge Information Profile (unpublished), developed by one of the authors (Wilson) in 1998, was used to evaluate the knowledge level of patients on warfarin. The test contains 20 items derived from the literature and a set of objectives. It focuses on the actions and side-effects of warfarin, the food–drug effects of vitamin K on anticoagulation and sources of vitamin K foods. The questions are scored as correct (1 point), incorrect (0 point) or I don't know (0). The number of correct answers is divided by the total number of items and multiplied by 100 to obtain percentage score. A score of 80% or above is deemed a satisfactory level of knowledge about their medication. Content validity was verified by a panel of six experts in anticoagulation therapy and gerontology. For this study, the correlation coefficient for reliability was 0.80.

The SMOG (McLaughlin, 1969) is a test that measures the readability of written patient education materials. Calculating the number of multisyllabic words in a 30-sentence passage scores the test. The procedure is as follows: choose a total of 30 sentences from a passage, 10 consecutive sentences at the beginning, middle and end. Count all the words with three or more syllables in those sentences, take the square root of the total and add a constant of 3 to obtain a grade level equivalency.

STUDY PROCEDURE

The first phase of the study involved the readability analysis of the written patient education materials used in the clinic. Next, the pharmacist identified patients who were eligible for the study. A member of the research team obtained consent and conducted the interview. During this time, the patients were also administered the REALM, the Knowledge Information Profile and a demographical questionnaire developed by the authors.

CULTURAL SENSITIVITY ASSESSMENT

We were unable to find a standardized instrument to measure the cultural sensitivity of written anticoagulation therapy patient education materials. There was, however, a cultural assessment tool for cancer materials for African Americans (Guidry *et al.*, 1998) which was not appropriate for this content. To evaluate the cultural sensitivity of

the written materials in this study, Bloch's Ethnic/Cultural Assessment Guide (1994) was used. No psychometric studies have been conducted with this instrument, but it has been used in nursing since the 1970s, is considered a recognized assessment tool, and can be found in many nursing education textbooks. The following questions were derived from the assessment guide:

- 1 Did the written information identify or target particular groups?
- 2 Did the written information contain statements about the target groups' beliefs and attitudes towards life, health or illness?
- 3 Was the written information presented in the language of the target group?
- 4 Did the written information address cultural healing systems or healing practices adhered to by the target group?
- 5 Were food preferences and restrictions addressed in the written materials?

The questions were scored yes or no. Three raters with expertise in urban older African American health care and culturally sensitive care evaluated each item of the educational material for culturally appropriate content and reached 95% agreement.

Results

The mean self-report of highest grade completed in school ranged from a low of third grade to a high of college grade, with an average of eleventh grade ($SD = 3.4$). Sixty-two per cent ($n = 40$) of the patients reported completing twelfth grade or higher, while 23% ($n = 15$) reported completing grades ninth through eleventh and 15% ($n = 10$) reported completing eighth grade and below. However, actual mean reading levels were between the seventh and eighth grade levels as measured by the REALM; this is three to four grades below the self-reported educational achievement levels.

Pearson correlation coefficients were used to study the relationships among literacy, education and age. There was a significant relationship between literacy and education ($P < 0.01$) and an inverse relationship between literacy and age ($P < 0.01$). That is, as age increased, literacy levels decreased.

To test for gender differences in literacy and education, *t*-tests for independent samples were conducted. Although women ($M =$ twelfth grade, $SD = 2.8$) reported higher levels of educational achievement than did men ($M =$ eleventh grade, $SD = 4.5$), the differences between the two groups were not statistically significant ($P > 0.05$). There was, however, a significant difference between the actual literacy between men and women as measured by the

REALM ($P < 0.05$). The average reading ability of men was 46 (SD = 26.2) and 58 (SD = 11) for women. The REALM raw scores of 45–60 are equivalent to seventh to eighth grade levels. Literacy scores for the men were on the low end of the scale, while the women's literacy levels were at the high end of the scale.

The level of patients' knowledge about warfarin and a vitamin K diet was evaluated. The overall mean score on the knowledge test was 70% (SD = 7.0) out of a possible score of 100%. Ninety per cent of the patients knew that warfarin was a 'blood thinner', yet only 50% knew its side-effects. In addition, a significant relationship was found between literacy level and knowledge ($P < 0.01$), such that as literacy increased so did knowledge. Twenty-eight per cent of the variance in knowledge is accounted for by literacy. The strength of the relationship between knowledge and age was also examined. A negative relationship was found ($P < 0.01$), that is, as age increased, knowledge about medication and food–drug interaction decreased.

EVALUATION OF READABILITY AND CULTURAL SENSITIVITY OF WRITTEN ANTICOAGULATION THERAPY PATIENT EDUCATION MATERIALS

Nine brochures and pamphlets on warfarin, cardiovascular diseases and dietary instructions and information were routinely used as education materials for patients in the anticoagulation management clinic. For that reason, these

documents were analysed in the study using the SMOG readability formula. DuPont Pharmaceutical Company developed the majority ($n = 7$) of the brochures and pamphlets. The pharmacy staff in clinic developed the remaining two leaflets. The mean readability scores of the materials were equivalent to grade eleven, and ranged from a low of ninth grade to a high of thirteenth grade level. Table 1 shows the readability scores for the patient education materials as measured by the SMOG.

To explain the discrepancy between reading skills of the patients and the readability of the materials, a mid-point on the REALM scale was determined for each reading skill level. Table 2 shows the discrepancy between patients' actual reading ability and the reading requirements of the anticoagulation education materials.

Using the previously discussed questions, we analysed the nine anticoagulation education documents for cultural sensitivity. No information in the materials mentioned beliefs or attitudes of African Americans towards health behaviours or illness. The materials did not contain any information that recognized the healing systems, practices and food preferences or diet restrictions unique to this minority group. All documents, however, were written in English.

Discussion

More than half the patients were unable to read the information given to them to teach them about their

Brochures and pamphlets	Source	Grade reading levels measured by SMOG*
A patient's guide to using coumadin†	DuPont Pharmaceutical Company	10th
Coumadin-maintaining the delicate balance	DuPont Pharmaceutical Company	13th
Atrial fibrilwhat? understanding and managing atrial fibrillation	DuPont Pharmaceutical Company	11th
If it doesn't say coumadin, it isn't	DuPont Pharmaceutical Company	12th
Deep vein thrombosis and pulmonary embolism	DuPont Pharmaceutical Company	9th
Valvular heart disease	DuPont Pharmaceutical Company	11th
Brief patient guide to coumadin	DuPont Pharmaceutical Company	12th
Anticoagulation clinic	Anticoagulation Clinic	10th
Vitamin K controlled diet	Anticoagulation Clinic	12th

Table 1 Readability of written patient education materials on anticoagulation treatment

*SMOG = A formula for assessing readability.

†Coumadin® = warfarin.

Table 2 Discrepancy between patient literacy and anticoagulation patient education material readability

Patient literacy level by school grade	Midpoint for literacy level of anticoagulation patient education materials	Average readability of anticoagulation patient education materials	Discrepancy between literacy and readability by discrepancy	Number of subjects affected	%
Grades 1–3	Grade 2	11	Nine grades	5	7.9
Grades 4–6	Grade 3	11	Eight grades	8	12
Grades 7–8	Grade 6	11	Five grades	15	24.8

anticoagulation medication and food–drug interaction with vitamin K foods. The patients' average reading ability was at the seventh to eighth grade levels. Yet, the average reading levels of the brochures used to teach them was eleventh grade, exceeding the recommended sixth grade level for patient education materials. Written patient education materials and information that is written three to four grades higher than patients' ability to read can be viewed as another barrier to care.

Consistent with the findings of the NALS (Kirsch *et al.*, 1993), we found that as age increased, reading skills decreased. Age also had a significant correlation with knowledge. That is, as age increased, knowledge level about medication and diet decreased. Earlier exploratory studies have identified a strong correlation between knowledge and literacy (Gazmararian *et al.*, 1999; Baker *et al.*, 2000). Limited knowledge about side-effects of the drug can place patients in potentially harmful situations.

According to the NALS report, older men had slightly higher literacy proficiency scores than older women. However, the women in our study had higher levels of literacy level than did their male counterparts. Changes such as an increase in the number of women in the workforce have contributed to the increase in education attainment for this population group (Ntiri, 2000). Although in the USA minorities remain disproportionately poorly educated compared with white people, African American women outnumber their male counterparts in the increase in educational achievement (Ntiri, 2000).

In terms of knowledge levels, the scores showed that patients had only a moderate level of understanding about their medications and two-thirds did not understand the side-effects of the medication and food–drug interaction.

Conclusion

The purpose of written patient education materials is to provide information about health promotion, diagnostic procedures, treatments and medications. Patients need information they can understand in order to undertake self-care behaviour. The potential for serious adverse effects of anticoagulation therapy requires that written

patient informational materials is at a reading level that patients can understand. In this instance, they must understand the reason for taking the medication and its side-effects (Gibbar-Clements *et al.*, 2000). Older patients with poor reading abilities are at greater risk of not following instructions because of the difficulty they have in formulating questions to ask their health care provider, further hampered by the burden of shame and embarrassment associated with illiteracy.

In addition, education materials used in urban settings with diverse populations should reflect the cultural values, beliefs and language of the target group. Studies have indicated that patient education materials can positively affect knowledge, attitude and behaviour (Guidry & Fagan, 1999). Further, researchers, educators and nursing clinicians should recognize that having culturally sensitive information is one step towards addressing health care disparities in minority groups.

When education materials do not meet the needs of patients, health professionals should develop their own. For example, the creation of easy-to-read material that specifically addresses the dietary patterns and dietary desires of African Americans with respect to vitamin K foods would provide patients with information that promotes self-care and decision making. For the development of anticoagulation therapy information, an interdisciplinary approach with nurses, pharmacists, physicians and nutritionists is recommended. Each professional can contribute to the accuracy and depth of information in the materials. Using focus groups consisting of the target groups can add another dimension in the development of the materials. Patients can identify items that are unclear, highlight areas they like and make suggestion about cultural appropriateness.

Health care providers have a responsibility to use education materials that will meet the unique learning needs of patients with low literacy levels. While increased knowledge through access to readable information may not lead to changes in behaviour, having understandable information available is a first step towards reducing health care barriers to patient education and improved patient outcomes. Warfarin is becoming the drug of choice for patients with thromboembolic diseases, and therefore

appropriate strategies that meet the needs of patients not in the mainstream must be considered.

The management of anticoagulation therapy on an outpatient basis requires a team approach among nurses, physicians, pharmacists and nutritionists. Successful education of patients taking anticoagulants can result in the reduction of health cost by reducing hospital readmissions, improved medication compliance and better patient outcomes. Although several complications can develop, misuse of medication can be averted when patients have a greater understanding of the medication actions and food–drug interactions, and when to report complications to a nurse, physician or pharmacist.

Acknowledgement

This study was supported by the National Institute on Aging, Michigan Center for Urban African American Research (MCUAAR).

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