

An implementation pathway for matching education material with the literacy level of dialysis patients

Julie E. Owen, Jacinda Kohne, Lee Douglas, Tim D. Hewitson and Rachael Baldwin,

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Abstract

Comprehension of pre-dialysis education material is essential for the successful transition of patients to any dialysis programme. Our own observations suggested that the reading ability of many patients is below that required for comprehending printed healthcare material, highlighting that patient literacy levels (LL) should be considered when developing education materials. In this paper we describe implementation of a pathway that can be used to ensure that patient education material is appropriately matched to the LL of patients.

The sequential steps in this pathway are: Collection of written material, Testing the LL of patients with the 'Rapid Estimate of Adult Literacy in Medicine' (REALM), determining the readability of patient brochures using the Gunning FOG Index & Fry Graph (FG), evaluating the level of comprehension required using the Suitability Assessment of Materials (SAM), and finally, modifying brochures to match.

Testing of our patient population with REALM indicated that the LL of our patients corresponded to 7-8 years of schooling. Conversely, the two readability tests showed that year 10 (FOG) and year 10 (FG) was required for comprehension of our written material. SAM indicated that 4 brochures were superior (year 4 LL required) and 3 were adequate (year 6-7 LL required). To address these deficiencies, brochures were modified to improve readability. After brochure modification, FOG decreased to Year 8, FG decreased to year 8 LL and all 7 brochures achieved superior (Year 4).

By modifying our education brochures we have ensured that they meet the LL of our patients. This more effectively delivers information required by patients to understand the treatment and lifestyle regime required for their disease treatment. On-going use of this pathway is recommended.

Key Words

Dialysis, Literacy, Nephrology, Patient Education

access. The decision on dialysis modality is made during the pre-dialysis education program, after clinical assessment and consultation. Those patients commencing dialysis visit the dialysis units to meet the staff. Most patients attend the introductory session and first interview on a single day, likewise the lifestyle session and second review sessions are held on the same day, a fortnight later. As part of this programme, patients are provided with written education material on the first day. This material explains many of the details about dialysis, and serves as a basis for the final sessions (Owen *et al.*, 2006).

Comprehension of pre-dialysis education material is therefore essential for the successful understanding of patients with regard to their choice for transition from end-stage kidney disease to dialysis. However, we increasingly recognise that the literacy level of dialysis patients may be an obstacle to their receiving proper pre-dialysis education (Kleinpeter, 2003). Patients with limited literacy skills may struggle to understand health information, such as consent forms, treatment regimens, and written instructions (Aldridge, 2004). The average adult in the United States is unable to read a book above the eight grade level (Doak, 1996). A large percentage of dialysis patients are older than 65 years

Introduction

An important part of any dialysis service is the provision of pre-dialysis education programmes. In this service, pre-dialysis education for metropolitan areas consists of two education sessions, two review sessions and one or more visits to dialysis units. The introductory

education session provides an overview of renal failure and treatment regimes. At the first review, recorded details are checked and individual questions answered. The second education session provides an insight into dialysis lifestyle and support, with the second medical review planning dialysis education and

Author Details:

Julie E. Owen M.Sc., was the Project Officer, Jacinda Kohne, B.Sc., is the Business Activity Co-ordinator, Lee Douglas R.N., Grad. Dip. Adult Ed., is Dialysis Co-ordinator, Tim D. Hewitson, Ph.D., is Senior Scientist, and Rachael Baldwin, B.Appl. Sc., is a Dialysis Technician for the North West Dialysis Service, Melbourne Health, Victoria

Correspondence to:

Julie Owen North West Dialysis Service, Melbourne Health, Melbourne, Vic 3050 Australia. Email: mjstrachan@bigpond.com

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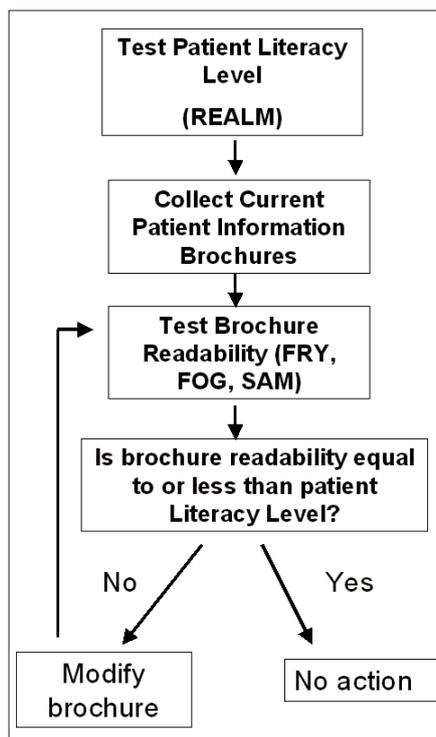
and are particularly at risk as 10% of people above 65 years read below grade 4 (Doak 1996). A study by the Australian Bureau of Statistics show that only half of the Australian population have the literacy skills to deal with the demands of everyday life and work (Perrin 1998). This is often at conflict with written patient information. For example, over the counter medication instructions have been assessed at requiring Year 10 reading level (Aldridge 2004).

Several studies have highlighted the disparity between the readability of patient material and patient literacy levels (Hearth-Holmes *et al.*, 1997; Powers, 1988; Davis *et al.*, 1990) and that comprehension of information is a prerequisite for patient compliance (Doak 1996). Indeed, Baker (1998) has shown that illiteracy is associated with poor health outcomes, which can lead to a greater use of health care resources, more frequent outpatients attendances and hospital admissions. Anecdotally, our own observations suggested that the reading ability of many patients is below that required for comprehending printed healthcare material, highlighting that patient literacy levels should be considered when developing education materials. In this paper we describe implementation of a pathway and process to ensure that our patient education material is appropriately matched to the literacy levels of patients.

Methods

A schema for matching patient education material to the literacy of a patient population is summarised in Fig 1. The sequential steps in this pathway are: (1) Collection of written material, (2) Testing the literacy level of the patient population, (3) Determining the readability of patient brochures, and finally, (4) Modifying brochures to match

Fig 1. Schematic representation of the steps involved in matching healthcare education material to patient literacy.



the literacy level. The following tools were used to complete this process.

Testing the literacy level of our patients

Reading is a complex process that involves the combination of language and thinking skills. A patient's ability to 'decode' information and their basic level of literacy can be measured by using The Rapid Estimate of Adult Literacy in Medicine (REALM) a test devised and validated by Davis *et al.*, 1993. The REALM test is the tool most often used to measure literacy (US Department of Health and Human Services, 2009). It has been used extensively to assess literacy levels in health, most recently in rheumatoid arthritis patients (Gordon *et al.*, 2002), coronary patients (Ibrahim *et al.*, 2008) and kidney transplant patients

(Gordon 2009). The REALM test is a screening instrument of a list of 66 health and medical related words arranged in 3 columns, each containing a list of words ranging from basic to complex medical terminology. Words are arranged in order of increasing difficulty and number of syllables ranging from flu, fat, pill through to anaemia, jaundice, medication and inflammatory. The patient is required to read all three lists of words out aloud, with the examiner checking for correct pronunciation of each word. If the patient is unable to complete the list they are asked to recognize any other words they are able to say aloud. The maximum score is therefore 66, with the raw score being directly proportional to the number of years of schooling. We applied this test to a group of 254 dialysis patients to determine the underlying literacy level of our patient population. Ethics approval was deemed not required by the Melbourne Health Human Research Ethics Committee (HREC) as it was seen as a quality improvement project.

Determining readability of patient brochures

A number of different tools are available to assess the readability and complexity of written material. However, those that appear to best fit health related matter and used in our implementation project are the *Gunning FOG index* (Gunning, 1952), the *Fry Graph* (Fry, 1977) and *Suitability Assessment of Materials* (SAM) (Doak *et al.*, 1996).

In 1952 Robert Gunning designed a tool to assess the literacy levels required to read texts written for wide audiences. The *Gunning FOG Index* (FOG) is a tool for analysing the complexity of any piece of writing. To do this FOG uses a mathematical formula that takes into account the average sentence length and the number of polysyllabic words in the passage of text. The calculated figure is

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an indication of the number of years of formal education required in order for the reader to understand the passage of text tested.

Edward Fry in 1968 designed the FRY readability formula to assess the readability of texts. This was modified in 1977. The FRY readability formula has been used extensively in healthcare (Jaffrey 2004, Berland et al 2001, Cutill 2006). *The Fry Graph* (FG) takes a similar approach, estimating readability by counting the number of sentences and the number of syllables in three one hundred word passages of text. Results are expressed as the number of sentences and syllables per one hundred words. These are then plotted on the fry graph (FG), with the intersection being defined as the reading level. Again, the final number is an approximation of the number of years of education needed to understand the written material.

Tests such as FOG and FG assess only the capacity to decode but not understand. A patient's ability to understand a word does not necessarily mean that they fully comprehend its meaning; reading and comprehension rely on different skills. The complexity of health education materials can be evaluated using *Suitability Assessment of Materials* (SAM) (Doak 1996). The SAM test has also been extensively used in health care and can pinpoint specific deficiencies in literature

that reduces its suitability for use. (Rudd RE 2005, Smeltzer 2003). SAM rates actors such as content, literacy demand, graphics, layout and topology, learning stimulation and motivation, and cultural appropriateness. For each factor SAM assigns a numerical score, the weighting of which leads to a rating of superior, adequate or not suitable.

Results

Testing the literacy level of our patient population

Of the 254 patients that attempted REALM, 152 patients completed the testing, the remaining 102 patients being excluded due to insufficient English or low vision. Median score was 52 out of a maximum of 66 (range 4-66), which indicates a literacy level of year 7-8 schooling.

Testing readability and complexity of brochures

The 7 principal brochures used in pre-dialysis education were assessed for readability using three different tools: FOG, FG and SAM. Results are summarised in Table 1.

The median FOG index was 10 (range 8 - 12) indicating patients required a literacy level of year 10. Likewise, the Fry Graph, itself based on a similar criteria, indicated that 10 years of education (range 7-12) were required.

Table 2: Guideline principles used for improving readability and comprehension of our patient education brochures.

Content limited
Leave plenty of white space
Limit the number of ideas in each brochure
Brochures made easier to read
Short sentences
Use examples to explain concepts
Engage reader
More visual presentation
Include diagrams
Bold headings
Minimum 12 pt font size

Of the 7 brochures tested, SAM indicated that 4 brochures were superior (a literacy level of year 4 required) and 3 were adequate (literacy level of year 6-7 required).

Brochure modification

It is typically suggested that health education materials should be written at 3 levels below the educational level of the patient population. We therefore modified our education brochures in an attempt to achieve this target. The following general principles (D'Alessandro et al., 2001; Aldridge 2004)) were used to redesign brochures: content was limited, brochures were made easier to read, and information was presented in a more visual manner. General principles of brochure modification are shown in Table 2. For example, *excretes body wastes was changed to get rid of body wastes; producing hormones was changed to make hormones*. In addition, cartoon drawings were assessed for cultural appropriateness; font size and colour of paper was considered.

Table 1: Readability of the seven pre-dialysis education brochures as assessed by FOG, FG and SAM (year of education).

	Initial	Post-modification
FOG	10 (8-12)	8 (7-9)
FG	10 (7-12)	8 (7-10)
SAM	4 superior 3 adequate	7 superior

Key: FOG and FG represented as median (range). Sam represented as superior, adequate and not suitable.

Assessment after brochure modification

Reassessment of the modified brochures indicated that changes undertaken had consistently improved their readability. FOG decreased to Year 8 (range 7-9), FG decreased to year 8 (range 7-10) literacy level and all 7 brochures achieved superior (Year 4) by SAM.

Discussion

The health care community increasingly relies on written material to convey and gather information. However, written materials are often given to patients with little regard for their ability to read them, there frequently being a clear gap between the average person's reading ability and the reading level of many instructions and documents in our society. In this paper we have described the steps we have undertaken to maximise the effective transmission of health care information to our pre-dialysis patients.

Comprehension is a complex process that requires a match in logic, language, and experience. Clearly, although written brochures in themselves are not sufficient to communicate complex medical and health care concepts, more attention must be given to the use of unexplained and unfamiliar words, the level at which the material is written and presented, and the experience of the patient, if we are to better educate our patients and their carers.

An evaluation of our commonly used written educational brochures on dialysis services found that they fell short in providing for the needs of many patients with low literacy levels. Indeed, the results of our brochure assessment strategies suggested that our patient education tools would be inappropriate for the estimated 40% of the population with limited functional literacy skills (Australian Bureau of Statistics, 2006).

These findings have important implications. A patients' literacy level can adversely affect participation in their medical care and compliance with treatment, and severely impact efforts to provide health education.

Patients and the public in general need to be given written materials or instruction containing words they understand. Well-designed and appropriately written patient education materials can augment other educational efforts and ultimately improve patient care. Improving the readability of our brochures does not guarantee that patients will understand or use education materials. However, these simple strategies increase the likelihood that the materials will be useable.

Written education material is not in itself only part of the solution to health care communication. A multidisciplinary and multi-sensory approach is required with written material used to supplement and reinforce verbal and visual messages. However, by modifying our education brochures we have ensured that they meet the literacy level of our patients. This more effectively delivers information required by patients to understand the treatment and lifestyle regime required for their disease treatment.

It was assumed that matching written material to patients reading level would be advantageous; this study did not specifically measure the effect of this brochure modification on patient comprehension. Future studies may wish to measure this effect. We contend that on going evaluation of these factors is an important part of the management of all patients with end-stage kidney disease.

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