CLINICAL BRIEF

Designing Dietary Education Materials for People With Chronic Kidney Disease: Recommendations for Improving the Quality of Resources

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Objective: The aim of this study is to quantify the readability, actionability, understandability, and overall quality of dietary education resources designed for patients and published in the *Journal of Renal Nutrition*.

Design and Methods: All patient education materials published in the "Patient Education" section of the journal from 2011 to 2021 were included. The readability, health literacy demand, and quality were evaluated using the Hemingway editor, Patient Education Materials Assessment Tool, and the Centers for Disease Control and Prevention Clear Communication Index (CDC CCI) respectively. Good quality materials were those with a reading grade level of ≤8; a Patient Education Materials Assessment Tool score of >70% (indicating materials were understandable and actionable), and a CDC CCI score >90%.

Results: A total of 42 resources were evaluated. Most materials (92%) were written at an appropriate level of readability (median grade 5, interquartile range [IQR: 5-7). The median understandability score was 71% (IQR: 60-81); however, only half (52%) of the materials met the 70% benchmark. Materials published performed poorly for actionability with the median actionability score of 37% (IQR: 20-83), and only 29% met the benchmark score. Overall quality was scored as low, with a median CDC CCI score of 65%, and only 10% of materials met the benchmark score. Areas for improvement were identified including providing a clear purpose, and summary of important points, explaining numbers and how to perform calculations, and including at least one action to take. Future efforts to improve actionability need to use the active voice, directly address readers, explain how to act, and describe the steps required.

Conclusion: Patient education materials that are attentive to health literacy principles beyond readability may enhance patient engagement, confidence, and empowerment, and improve adherence to the kidney diet.

Keywords: health literacy; patient education material; understandability; actionability; PEMAT; readability

Introduction

THE YEAR 2022 has been declared the year of "Kidney Health for All," with a specific focus on efforts to improve education and awareness about kidney health.[1] This call-to-action advocates for increased provision of practical advice on diet and lifestyle to empower patients. A key part of nutrition education for people with kidney disease is the provision of dietary handouts to supplement the oral advice provided.

However, people with chronic kidney disease (CKD) find dietary advice confusing, overwhelming, and burdensome.[2] Patients have also described adapting kidney diet handouts to better suit their needs.[3] Given the evidence that inadequate health literacy is also present in one in 4 patients with CKD,[4] and that patients have great difficulty finding appropriate self-management information to support their needs,[5] it is important to evaluate the quality of publicly available materials used for dietary education.

Only one study to date has formally evaluated the quality of written kidney diet information.[6] This study found that readability levels exceeded the skills of the average American. However, this research was conducted more than 3 decades ago. More recent research found that online kidney diet information frequently omitted details that supported behavior change.[7] Given the prominent role of the International Society of Renal Nutrition and Metabolism in the World Kidney Day campaign, it appears timely to review the quality of patient education materials (PEMs) published previously in the *Journal of Renal Nutrition*. This information can be used by members and readers to identify areas for improvement in the design of future dietary education materials. The following were the specific aims of the project: (1) describe the readability level, (2) evaluate the

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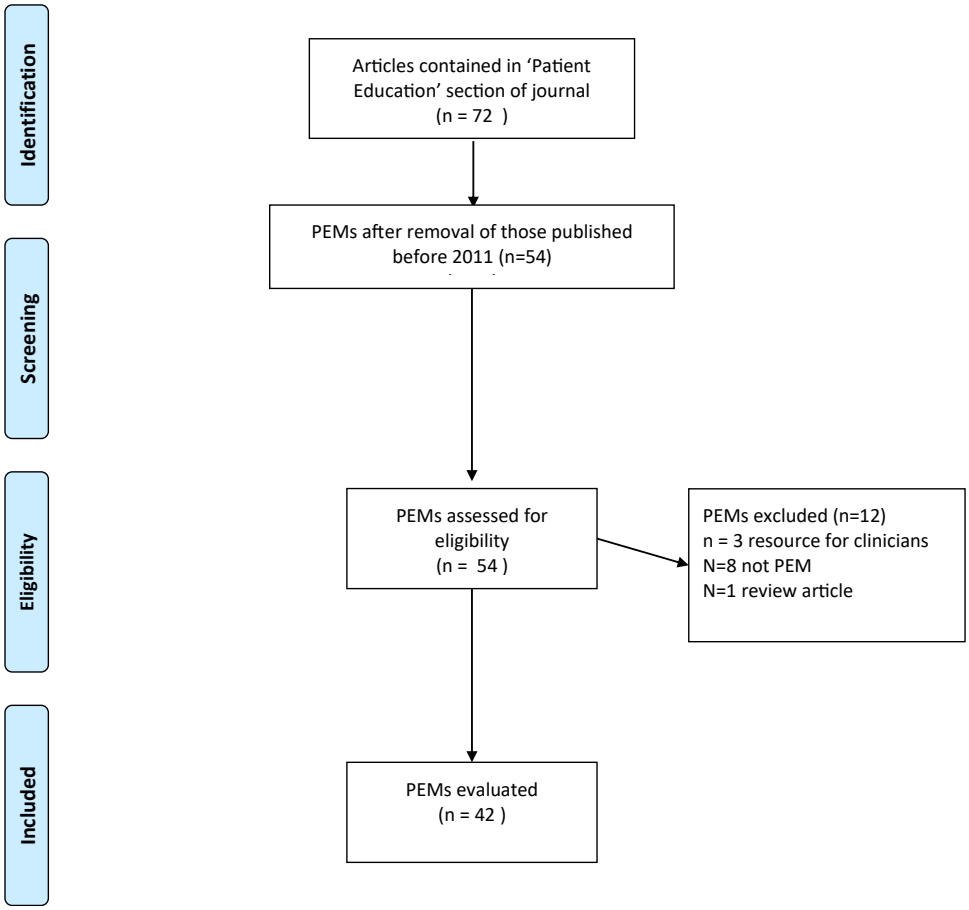

Figure 1. Flowchart of selection of PEMs. PEM, patient education material.From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097.

understandability and actionability, and (3) overall quality of PEMs published in the *Journal of Renal Nutrition* in the period 2011-2021.

Methods

Materials published in the journal in the "Patient Education" section were downloaded from the journal website. Materials not eligible for evaluation were those materials not in English, published prior to 2011, <100 words, or not designed for patient education (i.e., were resources for clinicians).

This desk-based content analysis used 3 tools. Readability was evaluated by pasting text from the materials into the Hemingway editor (https://hemingwayapp.com/). This online tool uses the Flesch-Kincaid readability formula[8] to calculate the reading grade level. The average American reads at 7th-8th grade level,[9] so the goal for PEMs is for them to be written at an 8th grade level at most. Materials with a lower level are more desirable[10] as the average Medicare beneficiary in the United States reads at a 5th grade level.[11]

The Patient Education Materials Assessment Tool (PEMAT) for written materials was used to determine the understandability and actionability[12] (referred to as health literacy demand). "Understandability" refers to health information that can be understood by health consumers from diverse backgrounds and varying health literacy levels.[13] "Actionability" refers to content that enables the viewer to identify what they need to do.[13] The PEMAT scores materials on a scale of 0-100, with a score of 100% indicating higher "understandability" and "actionability," respectively. A score of >70% has been set by the authors of the tool as indicative of material that has low health literacy demand and is considered understandable and actionable.[13] The written material version of the PEMAT includes 17 criteria for assessing understandability and 7 criteria assessing actionability.

Finally, the CDC Clear Communication Index[14] was used to evaluate the quality of the material. This 20-item index includes assessment of the main message, language, information design, and behavioral recommendations. A score of ≥90% is ideal. The materials were evaluated by an experienced renal dietitian (K.L.). Basic descriptive statistics are used to describe the readability, health literacy demand, and quality. All analyses were conducted in SPSS (version 25; SPSS Inc, Chicago, IL).

Table 1. Evaluation of Patient Education Materials Published From 2011 to 2021 in the Patient Education Section of the Journal of Renal Nutrition

	Total (n = 42)
Readability	
Reading grade level, median (IQR)	5 (5-7)
Proportion meeting grade level 6-8 (%)	92.3
Health literacy demand	
Understandability	
Understandability total score, median % (IQR)	71 (60-81)
Understandability proportion exceeding benchmark 70%	52.4
Proportion meeting understandability criteria (%)	
Clear purpose	50
Avoids distractions	81
Uses plain language	62
Explains terms	67
Uses active voice	57
Easy to understand numbers	52
Not expected to perform calculations	64
Chunks information	83
Informative headings	79
Logical sequence	86
Summary provided	10
Visual cues used to highlight key points	81
Uses visual aids to help understanding	62
Visual aids reinforce content	48
Clear titles for visual aids	45
Clear images	43
Tables have row and column headings	43
Actionability	
Actionability total score, median (IQR)	37 (20-83)
Actionability proportion exceeding benchmark 70%	28.6
Proportion meeting actionability criteria (%)	
Describes one action to take	74
Directly addresses reader	38
Breaks down actions to steps	26
Provides tangible tool to help take action	71
Explains how to use visuals to take action	17
Uses visual aids to assist action	57
Quality	
CDC CCI total score, median (IQR)	65 (53-82)
CDC CCI proportion exceeding benchmark 90%	9.5

CDC CCI, Centers for Disease Control and Prevention Clear Communication Index; IQR, interquartile range.

Results

Figure 1 shows that a total of 72 articles were retrieved. After exclusion of ineligible PEMs, a total of 42 PEMs were assessed (see Table S1 for details of PEMs). The median readability of the written PEMs was grade 5 (interquartile range [IQR]: 5-7, range 2-12; Table 1). Most PEMs (92%) were written at grade 8 or lower. The health literacy demand of PEMs was suboptimal. Although the median understandability score was 71% (IQR: 57-81), only half (52%) exceeded the benchmark score. Actionability scores were substantially lower, with the median actionability score of 37% (IQR: 20-83). Only one-quarter (29%) exceeded the benchmark score of 70%. Table 1 shows areas where PEMs performed poorly. This included failing to explain the purpose of the PEM, not using the active voice, failing to use numbers in an easily understandable manner, and failing to provide a summary of the main message. Regarding actionability, most materials failed to directly address the reader, break down advice into simple steps, and importantly failed to explain how to use the information. Overall quality was scored as low, with a median CDC Clear Communication Index score of 65%, and only 10% of materials met the benchmark score.

Discussion

Many barriers to learning about the kidney diet exist for patients with CKD. These include the high prevalence of cognitive impairment,[15] low health literacy, a complex diet that changes over time, and limited staffing and time for education. Although no clear guidance exists specifically for the development of diet-related PEMs, we have evaluated the quality of kidney diet materials against best practice standards. The results suggest that there are several areas where improvements can occur. A summary of recommendations for the design of future PEMs are outlined in Table 2.

The art and science of designing PEMs is rapidly expanding. It is clear that PEMs are effective[16] and should be included as part of interactive educational sessions rather than provided as stand-alone passive dissemination strategies.[17] New strategies such as gaining feedback directly from patients in a standardized approach should be incorporated as this is associated with improvements in health literacy demand.[18] Although no formal cultural sensitivity assessment tool for dietary PEMs exists, dietitians should expand the types of food examples provided to enhance the cultural suitability of PEMs. This has been previously identified as a limitation by both dietitians[19] and patients.[3] PEMs should also proactively focus on diet quality and not just nutrients as outlined in the new KDOQI nutrition guidelines.[20]

In this study, most materials met the required level of readability. This is in contrast to the sole previous study.[6] However, it is now known that attention to the layout and design of PEMs is required because these factors affect comprehension, even in materials considered "readable."[21] Other factors such as understanding how reader eye tracking changes in PEMs with single versus multiple columns is important (readers passively scan material on a

Table 2. Recommendations for Improving Kidney Diet Patient Education Materials

Readability
- Cut and paste text into an online readability calculator such as the Hemingway editor (https://hemingwayapp.com/) or Readability calculator (https://readabilityformulas.com/free-readability-formula-tests.php)
- Use simple shorter words, e.g., eat rather than consume
- Define any complex, vague, or not well understood dietetic words, e.g., portion (about the size of a deck of cards), enriched milk (milk with added milk powder), plenty, moderate, energy, serve, intake, balanced
- Use short sentences, approximately 25 words in length
- Chunk information into sections and use subheadings in the form of a sentence or question, e.g., "Why do I need a special diet?". This allows readers to skim and better absorb information by including meaningful "signposts"[21]

Health literacy demand

Understandability
- Outline what the patient education material is for, e.g., "This handout is for people who need to follow a low potassium diet"
- Limit the number of key messages to about three
- Use the active voice, e.g., "You can continue to eat two pieces of fruit every day" rather than "Eat 2 serves of fruit everyday" or "Here are some tips you can use to help you gain weight" rather than "Tips to enrich your intake"
- Include information in a logical order. Think about what the reader needs to know first, then second and third, e.g., Why do I need a special diet? What nutrients (and therefore foods) do I need to alter?
- Arrange food lists in a logical order, e.g., "bananas, tomato, mango, chocolate" can be arranged into "fruit: banana, mango; vegetables: sweet potato; confectionary: chocolate"

Use bullet points with no more than 7 points in the list
- Explain numbers (and how to perform calculations if necessary), e.g., "each serving of X has 200 mg and you can eat 3 of these each day"

Actionability
- Clearly state the action you want the reader to take, e.g., "Drain all liquid from canned fruit to help lower potassium"
- Explain why the behavior or action is needed, e.g., "Reducing how much salt you eat can help you lower your blood pressure"
- Explicitly outline the steps the reader needs to take, e.g., "You can reduce how much salt you eat by looking at the nutrition information panel on packaged foods. Buy foods with no more than 120 mg of sodium per 100 g"

Cultural sensitivity
- Refer to cultural practices in the patient education material if appropriate, e.g., how to manage blood glucose levels during Ramadan
- Choose images and meal/foods that represent the cultural profile of your target reader
- Develop customized resources for common cultural groups with their input on important cuisine-related elements
- Use qualified interpreters to translate materials to other languages and help ensure an accurate message is conveyed
- When developing patient education materials, research the major and emerging language groups in your area
- Consider including reference to common beliefs about food/eating/healing/illness that may be important to cultural groups in your care
- Consider completing a cultural sensitivity dietetic assessment, e.g., https://metrosouth.health.qld.gov.au/sites/default/files/content/heau-clinician-assess-tool.pdf. This will help improve your awareness of ways to provide culturally responsive services

Design and layout
- Use wide margins and leave white space between sections
- Use font size 12-14 and sans serif fonts such as Arial, Helvetica, Futura, Calibri to enhance readability
- Simple line drawings with a lower level of detail may be more effective at conveying the main message and less distracting than infographics or multiple complex images[26]
- Label visuals with a caption to explain the message being conveyed
- Consider use of color but be aware of combinations that are not differentiated for people who are color blind[27]

Other recommendations
- Test your materials with your target patient group. What do they think are the key messages? Is this what you want to convey? Are there things they think are missing or should be included? Are there terms that need to be explained/clarified? Foods that they want included? Is the information in a logical order to them?
- Use positive messaging in your summary of the main messages. Tell the audience what they will gain from using the material, e.g., "This diet sheet has shown you three ways you can reduce the amount of salt you eat. By making these changes, you can reduce your blood pressure, and help slow down progression of your kidney disease"
- People with poor cooking skills may not understand common household measures or weights. Try and use alternative sizes instead, e.g., matchbox-sized piece, palm-sized portion, etc.
- Always include a weblink and/or contact details to contact the clinician for more information
- Dichotomous thinking is a barrier to behavior change.[28] Rather than using terms like "Foods to avoid" try alternative phrases, e.g., "Limit" or "Eat only occasionally"

page in an F-shaped pattern, using signposts to guide their reading and columns disrupt this pattern).[22] Clinicians should carefully consider which images are included in PEMs. Visual aids such as line drawings or photographs should be clear and not fuzzy, include captions, be representative of the target audience (age, gender, ethnicity), and importantly be closely linked to the concept being described. This has been shown to improve attention and comprehension and recall of information[23]

Readers are encouraged to refer to Table 2 and Figure 2 as well as the other resources including the following:

- The CDC writing patient materials guide "Simply Put"[21]

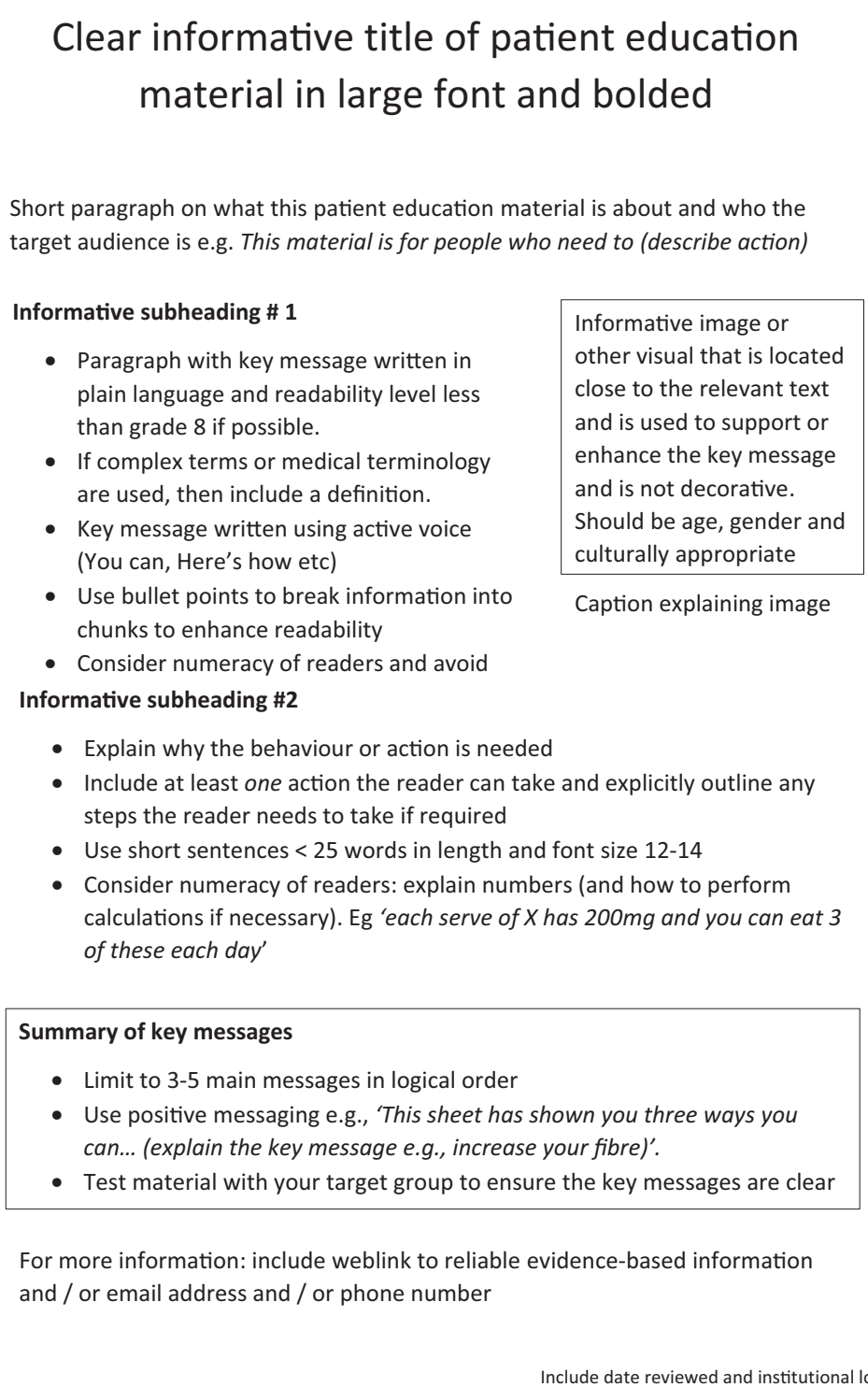

Figure 2. Example template of patient education materials using best practice health literacy and design principles.

- The Toolkit for Making Written Material Clear and Effective (especially the section on Writing Actionable Content)[24]
- The CDC guidance on how to write in plain language including the document list of everyday words[25]

Practical Application

Future PEMs should be attentive to readability, health literacy demand, be culturally sensitive, and follow appropriate design principles. This may enhance patient empowerment which is essential for patients to make adequate sense of and adhere to the kidney diet.

CRediT Authorship Contribution Statement

Kelly Lambert: Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Final version of the manuscript.

Supplementary Data

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1053/j.jrn.2022.06.005.

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