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Assessment of Readability Levels of Educational Video Scripts on Kidney Transplantation

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Abstract

Background: Successful cases of kidney transplants have produced improved health outcomes compared to dialysis. However, limited health literacy can impact access to living kidney donation. Investigators of this study evaluated educational video scripts to address health literacy and readability in the education of living donation among patients and potential donors, which can potentially increase access to healthy kidneys and alleviate associated healthcare burdens.

Objective: Assess the readability level of scripts used to narrate the educational videos.

Methods: A descriptive design was used to assess the reading levels for the 12 video scripts using Text Readability Consensus Calculator formulas with metrics such as text-scale scores for text difficulties and grade levels.

Results: The 12 video scripts assessed had a mean reading level of 7th-grade, which meets recommendations by the Center for Disease Control and Prevention for communication aids.

Conclusion: The educational video scripts met the recommended readability level. However, further research to assess the implication of the materials on improving learning and health outcomes can be explored.

Keywords: Health literacy; readability level; kidney transplant; living organ donation; public health; health education

Introduction

End-stage renal disease

Kidney disease is the ninth leading cause of preventable death in the United States.[1] Chronic kidney disease is a condition of progressive loss in the kidney function to filter waste in the blood. End-stage renal disease can result in various life-threatening complications and premature death.[1] Those who progress to end-stage renal disease may require dialysis or a kidney transplant. Medicare estimated health expenditure per beneficiaries with chronic kidney diseases up to 49.2 billion US dollars per year.[1–3]

Kidney transplant education

Kidney transplants can improve a patient's quality of life at a reduced cost compared to dialysis. However, organ shortage in the United States still poses major challenges as the demand for transplants increases. As of July 2019, over 113,000 men, women, and children are listed on the national transplant waiting list. On average, 20 people die each day waiting for a transplant.[2]

In 2018, 6,831 donations came from live donors; while 10,722 came from deceased donors.[2] The number of kidney donations from deceased donors has stagnated over the past years. With the increased demand for transplants, increasing donations from living donors can be a solution to increase supplies of healthy kidneys. Evidence suggests that patients who receive donations from live donors achieve greater success and require fewer resources compared to those who received donations from deceased donors.[2] However, poor health literacy and lack of kidney transplant education are barriers that have prevented many potential living donations.

Patient education can impact patients' and donors' knowledge of the risks and benefits of transplants, which can help overcome stigmas and misconceptions about living donation.[4–6] Improved education can result in patients reaching out to potential donors, transplant candidates, and others in their social network for support in accessing donations. Limited knowledge on living kidney is one of the social determinants of health that limits living donations. In addition, donors need to be educated on the benefits, alternatives, and risks of donation surgery to make informed decisions. Education for potential live donors, patients, and their respective social

support networks is essential to ensure access to live donations and successful transplants.[7]

Kidney transplant education video scripts

To promote patient education, researchers have developed scripted kidney transplant videos that can be used as portable educational tools for recipients and potential live donors. New patient education tools are useful to increase patient's knowledge and intervention and can positively affect patients' attitudes and behaviors toward a kidney transplant.[7,8] The effectiveness of the educational materials depends on the education level, readability level, and health literacy of the donors and patients themselves.[4] Readability in the setting of health literacy refers to the level of ease with which a health educational text can be read. In the context of the videos that scripts will be transcribed, the readability level of the scripts will correlate with how well the information from the videos will be delivered. The readability level of the scripts is a major contributing factor in how to educate and disseminate educational materials regarding kidney transplantation. The script was created in correspondence with the average readability levels of the US population. As the scripts are designed to be later transcribed into educational videos, adequate readability of the scripts will ensure delivery of the educational material at the average population health literacy level.[9] Adequate assessment of the readability level of the educational scripts can support delivery of education contents and can potentially increase access to living kidney donations.[9]

Health literacy and readability

Health literacy is an integral aspect of patient care that involves patients' ability to understand and interpret health information presented to them and subsequently utilize such information to make informed decisions on their health.[9] According to the United States Department of Health and Human Services, only 12% of the population has proficient health literacy, with 77 million individuals having below basic health literacy.[9] Low health literacy limits the ability to understand health information, negatively impacts medication adherence, and can contribute to poor health outcomes.[9,10] Limited health literacy may impact a patient's ability to adhere to specific medical regimens, ultimately leading to negative health consequences.[11] In a single-center study on the health literacy of kidney transplant recipients, the health literacy level among those that received deceased donor kidneys is lower than among those that received living donor recipients, suggesting that patients with greater health literacy levels are more likely to receive living donations.[12] This evidence demonstrates the need for all educational materials to be assessed for the readability level to ensure understanding of the content conveyed.

Health literacy can greatly impact access to live donor kidneys as well as self-management of recipients' health post transplantation, which directly correlates with the prognosis of transplants. Self-management refers to a patient's ability to complete the required steps to maintain their health post-transplant, such as taking medications, having follow-up appointments, and maintaining a healthy lifestyle. Furthermore, patients with reported lower health literacy are also less likely to adhere to immunosuppressive regimens after transplants, resulting in adverse outcomes.[13] The Joint Commission recommends that in order for an individual to maintain good health, they have to be able to locate and evaluate health information for risks and benefits.[14] One study that assessed adverse outcomes of kidney transplant candidates due to limited health literacy found that patients with limited health literacy were less likely to be on the transplant waitlist when measured against those who had more proficient health literacy at 3-months, 6-months, and 1-year observation periods (21.7%, 36.7%, and 47.1% vs. 44.5%, 57.9%, and 64.8%).[15] Limited health literacy is also independently associated with a 2.42-fold greater waitlist mortality.[15] To improve health outcomes, the health literacy of kidney donors and recipients should be evaluated before procedures. Evaluation of health literacy can help medical professionals identify the type of education that may be needed to promote more accessible donations and to ensure a healthy prognosis after the donation. Educational materials, such as brochure, flyers, and videos, are often utilized to inform patients. However, to be effective, educational tools must be comprehensible to the target population. Literature on readability level of published educational materials is limited. This study assessed the readability of video transcripts as a means to evaluate accessibility of educational materials, a potential barrier to living kidney donation.

Methodology

Study design

A descriptive study design was used to analyze the readability level of 12 kidney transplant educational video scripts (created in April 2018). The scripts were created by investigators at Erie County Medical Center, with the primary goal to develop educational videos for living kidney donors. The scripts were analyzed one time using a web-based Text Readability Consensus Calculator.[12]

Readability formulas

The Text Readability Consensus Calculator is an online literacy assessment tool that uses provided text materials and seven of the more prominently used readability assessment formulas to compute the text difficulty and reading grade levels of the provided materials.[16] The readability formulas were designed to use preliminary information given by the corresponding text, such as vocabulary, sentence structures, and wording, to approximate the average health literacy or US grade reading level needed to understand the materials presented fully. The seven formulas compute readability levels of text provided into text scales and correlated grade school reading levels. The Flesch Reading Ease Formula is a readability formula used to compute the grade level of the materials, especially school text materials.[17] The formula dictates that readability increases with shorter text and words, with a standard readability score between 60 and 69, indicating an average of 8th to 9th-grade reading level.[18] The Gunning's Fog Index Readability Formula is a readability formula used to compute the estimated years of formal reading and writing education required to comprehend the provided text material.[19] The formula does have flaws, such as it discounts that not all

multisyllabic words are difficult.[19] The Flesch-Kincaid Grade Level Formula is a readability formula modified from the Flesch Reading Ease Formula that computes the readability level as US grade levels.[20] The Coleman-Liau Index is a readability formula that computes the readability of materials based on characters per word.[21] The Simplified Measure of Gobbledygook Readability Formula (SMOG Index) computes the estimated health literacy based on the number of years of formal education required.[22] Finally, the Linear White Formula is a readability formula designed to compute the difficulty of reading technical manuals based on sentence length and the number of words with three or more syllables.[23]

Video script analysis

Readability of 12 kidney transplant educational video scripts created in 2018 by investigators at Erie County Medical Center was assessed. The Text Readability Consensus Calculator was used to assess text difficulty and grade school reading levels of the video scripts.[12] For this study, only the video scripts were evaluated for their readability level. The analysis was complete from September 2018 to December 2019. After the readability levels of the 12 kidney transplant educational scripts were assessed, the results were compared to the 6th grade recommended reading level for health materials by the American Medical Association (AMA), National Institute of Health (NIH), and the 8th grade reading level by the Centers for Disease Control and Prevention (CDC).

Results

The readability levels for each of the 12 kidney transplant video scripts were assessed using the Text Readability Consensus Calculator Formulas in Table 1.[16] The results of each script's grade level are referenced in Table 2. The Flesch Reading Ease formula produced a score of 7.149, which indicates the readability of the scripts is at around the 8th-grade level. The Gunning's Fog Index produced a scoring average of 8.95, which makes the scripts of medium difficult to comprehend. The Flesch-Kincaid Grade Level Formula produced 6.20. The average grade level required to understand the health information on kidney transplants from the scripts ranges from 6th to 7th grade. The Coleman-Liau Index produced a score of 8.25, indicating the education scripts have a grade reading level of about 8th grade. The Simplified Measure of Gobbledygook Readability Formula produced a score of 6.94, indicating an average grade reading level of 7th graders. The Automated Readability Index produced a score of 5.29, which means that the scripts are understandable by those of 5th-grade reading level. Finally, the Linear Write Formula produced a score of 6.28, which indicates an average grade of the reading level of those of a 6th grader. The average readability level for the educational scripts on kidney transplants across all the formulas calculated using Text Readability Consensus Calculator is about 7.13, which is a readability level understandable by a 7th grader—higher than the recommended reading level by both the AMA and the NIH (no higher than 6th grade level). However, this meets the CDC's recommended reading level for health communication aids (no higher than 8th grade level).[10]

Discussion

Principal findings

The purpose of this study was to assess the readability level of kidney transplant educational video scripts to create educational tools in

Table 1. Text-scale scores of reading level assessment of kidney transplant videos.

Scoring Formula	Vid 1	Vid 2	Vid 3	Vid 4	Vid 5	Vid 6	Vid 7	Vid 8	Vid 9	Vid 10	Vid 11	Vid 12
Flesch Reading Ease Formula	67.1	73.9	71.1	77.8	72.8	76.4	69.3	68.2	72.1	70.1	67.8	71.3
Gunning Fog Index	9.3	8.1	9.7	9.0	8.7	7.5	9.5	10.1	9.0	8.5	8.5	9.5
Flesch-Kincaid Grade Level Formula	6.9	5.9	6.6	5.7	5.9	4.6	6.9	6.9	5.5	6.5	6.6	6.5
Coleman-Liau Index	9.0	8.0	7.0	6.0	8.0	8.0	10.0	9.0	9.0	9.0	9.0	7.0
SMOG Index	7.1	6.3	7.3	6.8	6.7	5.9	7.5	7.8	7.0	6.7	7.0	7.2
Automated Readability Index	6.1	4.7	5.2	4.5	4.5	3.5	7.3	6.1	4.7	6.3	5.5	5.1
Linear Write Formula	6.5	5.9	7.1	7.0	5.9	4.0	7.4	7.2	5.1	6.4	6.0	6.9

Vid, Video; SMOG, Simple Measure of Gobbledygook; Vid 1, Script 1.

Table 2. Grade reading level assessment of kidney transplant videos (in US grade level).

Scoring Formula	Vid 1	Vid 2	Vid 3	Vid 4	Vid 5	Vid 6	Vid 7	Vid 8	Vid 9	Vid 10	Vid 11	Vid 12
Flesch Reading Ease Formula	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gunning Fog Index	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flesch-Kincaid Grade Level Formula	7	6	7	6	6	5	7	7	6	7	7	7
Coleman-Liau Index	9	8	7	6	8	8	10	9	9	9	9	7
SMOG Index	7	6	7	7	7	6	8	8	7	7	7	7
Automated Readability Index	5.5	4.5	4.5	4.5	4.5	4.5	6.5	5.5	4.5	5.5	5.5	4.5
Linear Write Formula	7	6	7	7	6	4	7	7	5	6	6	7

Vid, Video; N/A, Not Applicable.

the format of videos. To accomplish this, the current study employed a descriptive study design to assess the readability level of kidney transplant educational video scripts. After using the Text Readability Consensus Calculator Formulas, it was determined that the 12 educational video scripts analyzed had an average grade reading level corresponding to that of a 7th grader.[16] The result of the assessment indicates that the readability level of the scripts was above the recommended level of 6th grade according to the AMA and the NIH.[24] However, the scripts' readability level was within the recommended parameters established by the CDC, which was no higher than an 8th grade level.[24] Another similar descriptive study was conducted to assess educational mobile information apps used for congestive heart failure disease and demonstrated that the mean readability of 6th-graders (range 5th to 8th-graders) would be suitable for the American public.[9,25,26] Since most Americans in the general population have a health literacy level of 8th graders, the assessed kidney transplant educational video scripts are considered acceptable readability for the general population.[9,25,26]

Study limitations

One limitation of this study is that this is a descriptive study design due to the fact that videos script had already been created and evaluated for readability retrospectively. Therefore, further longitudinal studies with a pre-post study design to evaluate the knowledge of the target population before and after watching educational videos on kidney transplants may be warranted to test for video education effectiveness. Another limitation is that this study did not assess the video aspect of the materials. The educational scripts being evaluated intend to be transcribed into a video format that allows better access. However, the effect of changing the presentation format cannot be directly evaluated by the Text Readability Consensus Calculator. Although the readability assessment used in the study does measure the video script reading levels and text scale difficulties, it does not account for a range of other factors that can contribute to reduced readability, such as cultural barriers, cultural appropriateness, religious constraints, learning barriers, personal motivations, and interpersonal differences.[4]

Implications

Clinicians should support the need to assess readability of kidney transplant educational materials before implementing or disseminating. Readability level of materials above thresholds given by AMA and NIH would likely not be suitable for certain populations such as children, those with special needs, and those with limited language proficiency. Educational video scripts with readability level that meets AMA/NIH threshold can be feasibly used in a multi-institutional setting.[26] In the case that a specific patient of the affected transplant population does not possess adequate personal health literacy level to comprehend the educational materials, it is suggested that alternative measures should be employed. For example, those who possess a reading grade level below that of 7th grade might be provided with supplemental assistance. Tools meant to improve health literacy levels could be implemented before the scripts are turned into videos to mediate the problem. It is recommended that these patients should be counseled by clinical staff members, while other communication aids are given as needed. Videos of the reading level of 6th grade or below should be adapted or the original sets of videos should be modified. Readability formulas can be useful in assessing the readability levels of education material to ensure that developed materials are at the readability level of the targeted population. Effective utilization of accessible and appropriate educational materials can help educate the targeted population at all levels of health literacy and potentially lead to positive patient health outcomes and overall improvements to the healthcare system.

Conclusion and Future Implications

A kidney transplant can improve a recipients' quality of life and reduce cost compared to dialysis, yet limited health literacy remains a barrier to understanding and accessing needed organ donations and achieving desirable health outcomes for a large proportion of the affected population. Therefore, tools that aim to educate the population should be presented at recommended readability levels in correspondence to the population's health literacy level. The study has found that the readability level for 12 educational scripts at an average reading level for 7th graders; this level is above the threshold recommended by the AMA and NIH, but below the reading level recommended by the CDC. Institutions can utilize this approach to assess and modify educational tools to ensure they are at a readability level of their population to improve dissemination of information. A future longitudinal study looking into the effectiveness modified educational materials on rates of kidney transplants and acceptability of the educational materials of and approach is warranted.

Conflicts of Interest

None declared

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