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ORIGINAL RESEARCH

Efficacy study of multimedia rheumatoid arthritis patient education program

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Abstract

Purpose: The research goal of improving patient adherence was assessed in this randomized controlled trial of the outcomes of a 15-min multimedia educational program when compared to educational literature for rheumatoid arthritis (RA) patients.

Data sources: One hundred eight RA patients from a Midwestern rheumatology outpatient clinic completed the self-reported Medication Adherence Questionnaire (MAQ), the Brief Illness Perception Questionnaire (BIPQ), and Health Assessment Questionnaire (HAQ) at baseline and 1 month after education. A paired samples *t*-test was use for data analyses to determine if there was a significant difference in the change between the groups at preintervention and 1-month postintervention.

Conclusions: There were no significant differences in the scores between the two groups from pretest to posttest. Results from this study showed that medication adherence, illness perception, and disability were not improved by use of multimedia or the literature within 1 month.

Implications for practice: Findings from this research study showed that a short multimedia educational program is as effective as printed materials to educate patients with RA about their disease and treatment. However, neither multimedia nor literature affects medication adherence, illness perception, or disability as self-reported by patients with RA.

Introduction

Rheumatoid arthritis (RA) is a painful inflammatory arthritis which leads to joint damage, deformities, loss of function, systemic complications including lung disease and coronary artery disease, and permanent disability often within the first 2 years of disease onset (Klippel, 2008). RA affects all ethnicities worldwide and all ages with peak onset between ages 40 and 50 (Klippel, 2008). RA affects 1.3 million people in the United States with a 3.6% lifetime risk of development for adult women and 1.7% for men (Crowson et al., 2011). In 2005, the annual healthcare costs for RA patients in the United States was $8.4 billion, and total societal costs were $39.2 billion, including direct, indirect, and intangible costs (Birnbaum et al., 2010).

Limited health literacy is problematic for some RA patients who may not understand simple written instructions or directions printed on prescription labels (Buchbinder, Hall, & Youd, 2006). Studies have shown that a number of patients with RA do not adhere to their prescribed treatment plan of disease modifying antirheumatic drugs (DMARDs), biologic and nonbiologic (van den Bemt et al., 2009). Treatment of RA is complex, and a considerable amount of time is required during clinic appointments to discuss with the patient and family the diagnosis, coexisting conditions, treatment options, and adherence to a mutually agreeable plan of care. Most RA patients receive little instruction about their disease from staff in the rheumatology office (Makelainen, Vehvilainen-Julkunen, & Pietila, 2009a), and communication from healthcare providers frequently contains unclear medical jargon that patients may not understand (Castro, Wilson, Wang, & Schillinger, 2007). According to the Centers for Disease Control (2009), the provision of patient education should occur in an accurate, timely, concise, and cost-effective manner using educational materials that are comprehensible based on the individual's level of health literacy.

In the United States, healthcare literacy is a problem for one of three adults, and patients who are unable to read materials provided in the clinic or pharmacy may be unable to understand and act on the information (Kountz, 2009). The Centers for Disease Control and Prevention (CDC) reported nearly 90% of adults have difficulty following medical advice, including omission of necessary tests or failure to take medications as instructed by healthcare providers (Centers for Disease Control, 2009). The CDC called for treatment plans based on the principles that patients have the right to have access to health information that helps them make informed decisions and health information be presented in an understandable format, which is beneficial to their health and quality of life (Centers for Disease Control, 2010).

Educational formats used in the clinic setting are usually patient educational brochures or literature from national organizations, which are written at a high school or college readability level (Cronin, O'Hanlon, & O'Connor, 2011). Health education websites may be useful for some RA patients; however, other patients may lack access to a computer with Internet connection or may not be properly directed during an Internet search to reliable sources of accurate RA information. The Internet has multiple web sites containing healthcare patient education specific to RA education. The Agency for Healthcare Research and Quality (AHRQ, 2008) has an audio guide for treating RA, and Medline has an audio PowerPoint presentation on RA available to the public (Medline Plus, 2011). The pharmaceutical industry uses television ads, promotional DVDs, and websites to review specific treatments and sell their products. Patients often recall these resources and discuss them with healthcare providers in the clinic. The purpose of this study was to use a multimedia modality to improve medication adherence of patients with RA. Through adherence to medications, patients have less physical disability (Stockl et al., 2010) and may have a more positive illness perception (Dalbeth et al., 2011).

Literature review

Studies have shown medication adherence is problematic for some RA patients and have suggested RA education programs impact the outcome of adherence. A study of RA patients demonstrated that 32%–40% did not adhere to RA medications for multiple reasons, including access to medications and potential for side effects (van den Bemt et al., 2009). There were no associations among patients with specific demographic, clinical characteristics, coping styles, satisfaction about medication information, or concerns.

Systemic reviews on RA educational programs in the Cochran database in 2008 revealed most educational interventions did not lead to long-term improvement in adherence and treatment outcomes (Haynes, Ackloo, Sahota, McDonald, & Yao, 2008). The implementation of an arthritis self-help course resulted in reductions of pain by 20% and physician visits for arthritis by 40%, which was a significant cost savings (Kruger, Helmick, Callahan, & Haddix, 1998). Comprehensive evaluations of RA patient education programs showed small improvements in short-term disability, joint counts, global assessment, psychological status, and depression (Riemsma, Taal, Kirwan, & Rasker, 2002). A review of trials evaluating educational programs showed improvements in knowledge and compliance without improvement in health status (Niedermann, Fransen, Knols, & Uebelhart, 2004). Effective educational programs that result in adherence to DMARDs and improved long-term outcomes for RA patients remain a challenge.

Online video and podcasts are available to educate patients and the public on a variety of medical conditions, and positive outcome studies of multimedia education for hospitalized patients have been published. A falls prevention DVD was superior to a workbook in older hospitalized patients on outcomes of perceived risk of falling and motivation to engage in self-protective strategies (Hill et al., 2009). Preoperative instructional DVD for postoperative activity increased patient knowledge and preparedness, and postoperative nurses reported higher knowledge levels among patients and families (Ong, Miller, Appleby, Allegretto, & Gawlinski, 2009). Postoperative hip replacement patients, who viewed a multimedia DVD with nursing instructions plus printed nursing guides, had higher self-efficacy and decreased hospitalization than controls (Yeh, Chen, & Liu, 2005). In order to improve self-efficacy in caring for self, a post-surgical procedure video was used to provide patient instructions, and the findings showed superiority over standard printed instructional material in a hospital setting (Yeh, et al., 2005). Informative and educational videos, including preparation for surgical procedures, postoperative care, and postnatal care, are used to educate patients in many hospitals through closed circuit in room television.

Multimedia presentations including video/DVD and computer programs also have proven efficacious in outpatient settings. Healthcare education through use of multimedia has proven beneficial in motivating patients positively to follow recommendations of healthcare providers. Use of online video education has led to improved knowledge and skin scores of patients with skin disease (Armstrong, Kim, Idriss, Larsen, & Lio, 2011). Portable video media demonstrated superiority in knowledge scores over oral education as a means to presenting informed consent for wound care instructions and skin biopsies (Armstrong et al., 2010). A study showed efficacy of teaching the importance of mammography by improvement in attitudes about screening (Kreuter et al., 2010). Video education increased rates of vaccination among younger age groups specifically Hispanics, African Americans, and lower income families (Chapman et al., 2010). The feasibility of media to educate melanoma patients showed that use of combined in-clinic and at-home computer and DVD were preferred among patients over in-clinic use alone (Marble, Loescher, Lim, & Hiscox, 2010). A video-based program reduced barriers to screening and improved awareness and compliance with colorectal cancer screening (Gimeno-Garcia, Quintero, Nicolas-Perez, Parra-Blanco, & Jimenez-Sosa, 2009). Video education improved chemotherapy patients understanding of treatment and retention of information regarding management of side effects and reporting symptoms (Kinnane & Thompson, 2008). Interactive CD-ROM was valuable in communicating interesting, clear, and useful information to patients about stem cell transplantation (Mank & Molenaar, 2008). Among cancer patients preparing for radiation therapy, 90% of patients who watched a video on preparing for therapy reported some or all of the video information was new to them (Dunn, Steginga, Rose, Scott, & Allison, 2004). Lastly, a study of a video about dementia and end-of-life care showed that health literacy, not race, predicted end-of-life care preferences (Volandes et al., 2008).

This current study addressed the Institute of Medicine's Six Aims For Improving Healthcare (Institute of Medicine [U.S.], Committee on Quality of Health Care in America, 2001). The study was patient-centered, timely, efficient, equitable, and evaluated for efficacy. The educational program was designed to assist in improving education of RA patients by providing them with knowledge about disease, rational treatment options, and self-care. The educational RA multimedia program developed for and presented to patients during a clinic appointment was used to facilitate improvement in patient–clinician communication concerning disease understanding, treatments including medication adherence, and self-help strategies aimed to limit disability.

Theoretical framework

The cognitive theory of multimedia learning process was used. This theory suggested that the selection, organization, and integration of words and images into the multimedia program may enhance the ability of patients to build connections (Mayer, 2005). Audio and visual components can enhance the comprehension of written material through the use of the sight and hearing senses. In this application, the RA patient as learner was provided with both visual and auditory material that would theoretically improve his or her understanding of the need for adherence to long-term treatment plans in order to reduce physical disability.

When a nurse educates an RA patient one on one, the visual and auditory senses of the patient are used. Improvement in patients RA self-care efficacy is seen when they learn disease etiology, effective treatment, and self-care options, and how to access and work with healthcare providers (Makelainen, Vehvilainen-Julkunen, & Pietil, 2009b). Through a short course that used interpersonal communications, RA patients learned to manage their disease and strengthen their confidence (Primdahl, Wagner, & Hørslev-Petersen, 2010). In this study, patients were provided with information to improve self-efficacy. Effects were measured by assessing medication adherence, illness perception, and physical disability.

Methods

In this randomized controlled study, we collected data at baseline and 1-month postintervention. The intervention group (experimental) received an audio PowerPoint program designed by the author and reviewed for content validity by rheumatologists. The 15-min program contained five main topics, including information about the causes of RA disease, how it affects the body, treatments, healthy self-care, and resources the patient may access for more information. The comparison group (control) received literature about RA from a national rheumatology organization containing similar information.

Participants and setting

A convenience sample of 108 RA patients was recruited from the rheumatology clinic of a Midwestern University healthcare center over a 3-month period. With 50 patients per group at 1 month, the 1-tailed test was calculated to have 80% power to detect a difference in proportions of 0.20 (0.71 vs. 0.91). Inclusion criteria consisted of patients who were age 18 or older and English speaking with a diagnosis of RA. Excluded were patients who were unable to complete the questionnaires. The selected patients were provided with an explanation of the study by the primary investigator and signed an informed consent approved by the Institutional Review Boards.

Instruments

Baseline sociodemographic characteristics included gender, age, ethnicity, income, marital status, highest educational level, and estimated time in number of years of RA diagnosis by the participant. The outcome variables were medication adherence, illness perception, and disability. Medication adherence was assessed by the six-item Medication Self-Assessment Questionnaire (MAQ). The MAQ is part of a 43-item questionnaire representing eight behavioral domains used to evaluate illness self-management of adults living with vasculitis (Thorpe et al., 2007). Permission to use the instrument was given by its author. The self-administered questionnaire consists of six items that patients score based on a Likert scale of 1–5 to represent medication adherence during the previous 4 weeks. A score of 1 = *always adherent* and 5 = *never adherent*.

Illness perception was measured by the Brief Illness Perception Questionnaire (BIPQ) that was developed as a predictor value to assess the cognitive and emotional representations of illness rapidly (Broadbent, Petrie, Main, & Weinman, 2006). Permission to use the instrument was granted by its author. The self-administered questionnaire has nine items: consequences, timeline, personal control, treatment control, identity, concern, understanding, emotional response, and narrative cause of disease. The BIPQ demonstrated usefulness in studies with repeated measures of research design. Validity of the BIPQ was assessed by comparison to the Illness Perception Questionnaire-Revised (IPQ-R). The validity correlations were tested on patients with renal disease, diabetes, asthma, and minor illnesses, including allergies, colds, headaches, and prediagnosis stress exercise testing. The eight-item questionnaire was easy to understand by patients and could be applicable in a variety of research setting (Broadbent et al., 2006). The first eight items are scored based on a Likert scale of 1–10 and responses are reported individually for each question based on the patients' interpretation of their illness perception. The questions are not related to each other in a way that a single composite score could be given. Each question must be analyzed individually. High or low scores cannot be generalized to a single meaning of the patient's illness perception.

Disability was measured by the Health Assessment Questionnaire (HAQ), which is a valid measure of arthritis "severity" (Fries, Spitz, Kraines, & Holman, 1980). The HAQ has been used in clinical trials assessing outcomes data of interventions for RA patients. The tool is used for patients to self-assess their physical function abilities based on the degree of difficulty the patient has with activity. The HAQ contains 18 questions divided into eight domains of daily living activity, including dressing and grooming, arising, eating, walking, hygiene, reach, grip, and activity. Patient scores range from 0 = *without difficulty* to 3 = *unable to do*. The highest score from each of the eight domains are summed and then divided by eight for a disability index score. Zero represents *not disabled* and 3 represents *highly disabled*. Reliability and validity data were obtained by direct observation of patients compared to self-recorded responses in the Stanford Outcome in RA study (Fries et al., 1980).

Procedures

During June 2011 to September 2011, patients were recruited. At the conclusion of a patient's regularly scheduled clinic appointment, he or she was invited to participate in the study by the primary investigator. Study procedures were explained by the primary investigator and informed consent signed. Patients completed baseline measurements of sociodemographic, MAQ, BIPQ, and HAQ. Then, the participants were randomized 1:1 to Group 1 (experimental) or Group 2 (control). Participants in Group 1 viewed the multimedia in the clinic exam room on a designated laptop computer and were given a printed copy of the slides and a CD copy of the program to review on their home computer. Participants in Group 2 were sent home with published literature about RA. All patients were asked to mail follow-up MAQ, BIPQ, and HAQ questionnaires at 1 month after participation in the intervention and control activities; included with the questionnaires was a preaddressed stamped envelope. A note with return date was given at baseline and a reminder call was made at 1 month.

Data analysis

Data analysis was completed with SPSS (Version 19.0) statistical software. Descriptive statistics were used to report demographic variables. Pre- and postdata were calculated for each group and comparisons were conducted between the groups using paired samples *t*-test. Mean scores were reported for MAQ, BIPQ, and HAQ. In addition, the six MAQ items were calculated for mean scores across all study patients and for a single mean composite score of all items for all patients. The eight BIPQ items were calculated for mean scores across all study patients. The HAQ was calculated for mean composite score of all patients.

Results

The study sample included 108 RA patients with equal distribution between both groups. The 1-month follow-up questionnaires were returned by 98 (91%). Five patients in each group failed to return the study

Table 1 Sociodemographic data

Variable	Group 1 *N* = 54 Mean	*SD*	Group 2 *N* = 54 Mean	*SD*	Total Mean	Total *SD*
Age	50.1	12.9	50.5	11.3	50.3	12.1
Years diagnosis	7.3	8.7	8.0	10.2	7.6	9.5
	Group 1 *n*	%	Group 2 *n*	%	Total *n*	Total %
Gender						
Male	8	14.8	14	24.9	22	20.2
Female	46	85.2	40	74.1	86	78.9
Ethnicity						
Black	16	29.6	17	31.5	33	30.3
White	38	70.4	37	68.5	75	68.6
Income						
None	4	7.4	4	7.4	8	7.3
<$5000	9	16.7	7	13.0	16	14.7
$5000–$14,999	13	24.1	14	25.9	27	24.8
$15,000–$24,999	6	11.1	6	11.1	12	11.1
$25,000–$49,999	10	18.5	9	16.7	19	17.4
>$50,000	11	20.4	13	24.1	24	22.0
Marital status						
Married	26	48.1	25	46.3	51	46.8
Living with someone	5	9.3	10	18.5	15	13.8
Divorced	13	24.1	8	14.8	21	19.3
Never married	7	13.0	10	18.5	17	15.6
Widowed	2	3.7	1	1.9	3	2.8
Highest education						
<High school	4	7.4	8	14.8	12	11.0
High school graduate	15	27.8	14	25.9	29	26.6
Some college/trade	30	55.6	28	51.9	58	53.2
Graduate school	5	9.3	3	5.6	8	7.3
Other	-	-	1	1.9	1	.9

Table 2 Pre- and posttest comparisons[a]

Measure	Group 1: Pre	Group 1: Post	Group 2: Pre	Group 2: Post
Medical adherence	1.60	1.73	1.68	1.70
BIPQ 1	6.40	6.60	6.30	6.76
BIPQ 2	9.68	9.71	9.56	9.71
BIPQ 3	4.13	4.98	4.74	4.35
BIPQ 4	7.91	7.69	8.13	7.29
BIPQ 5	6.57	6.88	6.44	7.02
BIPQ 6	8.17	8.91	8.78	8.60
BIPQ 7	7.41	8.33	7.93	8.42
BIPQ 8	6.72	6.24	6.43	6.29
HAQ	1.10	1.15	1.12	1.14

[a] All comparisons significant, $p < .05$.

Table 3 Posttest only comparisons: Group 1 versus Group 2

Measure	Group 1 mean	Group 2 mean	*t*	df	*p*
Medical adherence	1.73	1.70	.207	95	.836
BIPQ 1	6.59	6.76	−.282	96	.779
BIPQ 2	9.71	9.71	−.035	95	.972
BIPQ 3	4.98	4.35	1.059	96	.292
BIPQ 4	7.69	7.29	.913	96	.364
BIPQ 5	6.88	7.02	−.273	95	.785
BIPQ 6	8.91	8.60	.473	96	.638
BIPQ 7	8.33	8.42	−.221	95	.825
BIPQ 8	6.25	6.29	−.076	95	.940
HAQ	1.15	1.14	.093	96	.926

questionnaires that resulted in 49 patients in each group for postevaluation. The mean age was 50.3, and the mean years of having RA was 8, range less than 1–47 years. The majority of patients were women (78%), married (51%), and some college education (66%). Ethnicities represented were 33% Black and 67% White, and income levels were diverse. There were no statistically significant differences in sociodemographic characteristic between the groups with comparable age, disease duration, gender, ethnicity, income, marital status, and education level (Table 1). Results of questionnaires including the MAQ, BIPQ, and HAQ are reported for comparisons to show significance. Table 2 shows pre- and posttest comparisons. Table 3 shows results of posttest-only comparisons: Group 1 versus Group 2.

Medication adherence

MAQ composite mean score at baseline was 1.60 for the multimedia group and 1.68 for the literature group. Postintervention mean scores were 1.74 for multimedia and 1.65 for literature. Adherence rate for both groups, pre- and postinterventions, averaged 66.5%. Range of adherence among all individual was 23% to 100%.

Illness perception

BIPQ scores were similar between groups at baseline and follow-up. Possible scores ranged from 1 to 10 and meaning of response varied according to question. Ranges of mean scores were consequences 6.40–6.76, timeline 9.56–9.71, personal control 4.13–4.98, treatment control 7.29–8.13, identity 6.44–7.02, concern 8.17–8.91, understanding 7.41–8.42, and emotional response 6.29–6.72. The BIPQ was modified mid study because of transcription error made by repeating question number 3 about personal control and elimination of number 6 about concern. The corrected form was used by 47 patients. Patients' narrations of reasons, which may have contributed to their disease development, included primarily genetics and stress of work or family. Environmental factors, which were cited by participants, included food, water, tobacco smoke, chemical exposure, bacteria, poor diet, allergies, and lifestyle.

Disability

Mean HAQ disability index scores were similar for groups' pre- and postinterventions. Baseline HAQ scores for the multimedia group was 1.10 and the literature group was 1.12, which represents some difficulty with activities of daily living. Postintervention scores were similar with multimedia group mean of 1.15 and literature group mean of 1.14. The HAQ scores ranged from 0 to 2.875.

Discussion

The findings of this study showed that the educational modality did not significantly impact self-reported medication adherence, illness perception, or disability within a 1-month time period. None of the results could be attributed to sociodemographic variables. There were no measurable or meaningful differences between the two groups based on the educational intervention. Comparison of posttest scores for all three measures showed similarity between groups. Medication adherence was not improved with education by multimedia or literature at 1 month. Therefore, patients who are offered education by multimedia or literature are unlikely to have changes in medication adherence in the short term. Patients who reported adherence to medications at baseline continued to adhere at follow-up, and patients who were nonadherent at baseline remained nonadherent at follow-up. Worsening of mean MAQ scores at follow-up for the multimedia group indicated a slight decline in medication adherence over time. This difference may represent patients taking more time to consider their answer at the repeated measure. Some patients reported scores ranging from 1 to 5 for the individual questions that indicated that the patients either did not clearly understand the question or the six questions teased out an accurate mean score. The MAQ items were all stated negatively, which may have been a factor in the test measurements. There were some patients who had difficulty understating some of the MAQ questions and asked for clarification.

Illness perception, as measured by the BIPQ, was essentially unchanged with interventions between and among the two groups. Patients felt RA affected their lives to a moderate degree of severity. Patients generally thought RA would continue forever and perceived little control of their disease. Overall, patients thought their treatment could help RA. Patients had concerns about RA and did not think they understood it well enough and it affected them emotionally. There were minor pretest to posttest changes, but these variations occurred in both directions and there were no differences in gain scores between the two groups. Illness perception was not affected by education as measured in this study.

Changes in HAQ scores are expected with disease activity (2009). Disability index scores were only minimally changed for both study groups at 1 month. The mean HAQ score of 1 reported in this study represents patients who have some difficulty with activities of daily living. The educational intervention did not statistically change the scores over 1 month. Some patients commented that they found the information useful and learned new information.

Limitations

The study was limited to patients who attended a rheumatology clinic in one institution, thus, limiting the ability to generalize results to larger populations. All measures were self-reported; therefore, confirmation of patient medication adherence or nonadherence was not measured objectively. Reliability of self-reported MAQs has been challenged because of relying on subjective patient reports. Results may vary if reassessed at longer intervals than 1 month. Assessment of patients' perception of RA disease knowledge pre- and poststudy would have been useful in evaluating change in their disease understanding.

Patients who declined study participation gave reasons, including not having enough time to complete the study procedures due to transportation, parking cost, other appointments to attend, or employment. Some patients were unable to read the consent and study questions. Data was not collected on nonstudy patients. At phone call follow-up some study patients reported they lost the forms, left them in the car, or simply forgot about the study. These findings reflect the difficulty with establishing RA educational programs outside of scheduled appointment times.

Implications for practice

Multimedia can be used to address health literacy and improve patient clinician-communication efficiency in rheumatology clinics. The audio feature of the program helped overcome health literacy barriers because it did not rely solely on a patient's reading comprehension ability. Viewing the program in clinic ensured patients were provided RA educational information that may be review or new to patients. Although this study did not affect medication adherence scores at 1 month, multimedia may be useful to educate patients in the clinic, particularly those persons with early RA. The negative findings could be reflective of the short evaluation period, or the baseline understanding of disease because selection of early RA patients was not a study requirement. Future studies could include formal evaluation by participants of their perceived value of the information presented, level disease understanding, and longer evaluation intervals.

Healthcare providers have the responsibility to ensure patients receive useful information that is comprehensible to them about disease and treatments. Multimedia may enhance patient clinician-communication about disease and treatment efficiently with incorporation of education during clinic appointments. Multimedia used for disease specific education addresses the Institutes of Medicine recommendation to provide effective healthcare to patients with low health literacy.

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