MEDICAL SCIENCE MONITOR

CLINICAL RESEARCH

e-ISSN 1643-3750
© Med Sci Monit, 2024; 30: e944175
DOI: 10.12659/MSM.944175

Received: 2024.02.19
Accepted: 2024.03.15
Available online: 2024.03.27
Published: 2024.XX.XX

Impact of Patient Education Formats on Treatment Adherence and Denture Hygiene in Edentulous Patients: A Comparative Study

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Financial support: None declared
Conflict of interest: None declared

Background: Effective communication and patient education are important in geriatric dental care. Memory decline complicates patient adherence. This study aimed to compare verbal, audio, and video patient education material (PEM) and adherence to dental prosthetic management in edentulous patients.

Material/Methods: 90 completely/partially edentulous patients (aged 40 to 70 years), were divided (simple random) into three groups (Gp) of 30 each. A total of 68 instructions were organized into 9 learning categories. For GpVi, a 20 minute video was shot using a Sony camera (PD170), with two actors depicting related PEM information. Patients were recalled after 1 day and 7days, to recall the PEM instructions. A Denture plaque Index (DPI) determined the efficiency of the instructions at both time intervals. Frequencies, means and standard deviations were derived for each group and then compared using Chi square, paired and unpaired t test and a Neuman-Keul post hoc pairwise test. All significant differences were kept at probability t value of ≤0.05.

Results: PEM instructions related to patient individuality, proper tongue position and miscellaneous showed poor patient recall. At 1 day interval, audio was found to have better recall than video and verbal in 5 PEM instruction categories. At 7 day interval, video showed better recall than other two groups ($P \leq 0.05$). Despite improvements in patients recall, DPI revealed better denture hygiene maintenance in patients receiving instructions through video format ($P \leq 0.05$).

Conclusions: For all categories, no single media was considered to be sufficient, audio produced early better recall while video influenced long term recall and better denture hygiene maintenance.

Keywords: Geriatric Dentistry • Geriatric Psychiatry • Multimedia • Patient Compliance • Prosthodontics

Full-text PDF: https://www.medscimonit.com/abstract/index/idArt/944175

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Introduction

As humans age, their understanding and memory decline, while their cognitive skills, such as active listening, problem-solving, and management skills, also decline. Active geriatric healthcare services accordingly require effective and competent doctor–patient communication, one of the principles of which is efficient patient education and motivation (PEM). The process of patient education involves continually refining patients' knowledge and skills, which affect their attitudes and behaviors needed to maintain health. Patient education is effective only if and when patients are motivated to a level at which they consider maintaining health as their primary responsibility rather than depending on someone else. Effective PEM can revolutionize the successful delivery of geriatric care in dentistry's field of prosthodontics, which includes complete dentures (CD), removable partial dentures (RPD), implant-supported fixed dentures, and removable dentures. The patients' right to treatment-related information (before, during, and after), patient empowerment, and patient engagement form a core in implementing patient-centered care, which received renewed global attention after 2001, with publication of an article titled Crossing the Quality Chasm [1]. In geriatric prosthodontic services and care (GPSC), clinician skill and quality of dental prosthesis and patient-related factors (eg, personality, attitude toward dentures, prior denture experience and motivation for wearing and maintaining a denture) are considered to be important for treatment satisfaction [2]. Pre-treatment PEM in GPSC should start at the first visit [3] and should continue every time during subsequent treatment visits [4]. Innovators have reiterated that the PEM-related information should be reinforced and substantiated at each succeeding clinical steps [3], which has evolved as a novel concept called vigilance in healthcare [5], which yet has not been recognized in various fields of medicine and dentistry. The purposes of PEM in GPSC include: (a) informing the patient in advance about what to expect of a prosthesis, and special problems associated with wearing of prosthesis [6]; (b) improving mental attitude of the patient; (c) ensuring patient expectations are reasonable and realistic [6]; (d) encouraging patients to practice preventive prosthodontics by abstaining from wearing dentures continuously; (e) maintaining prosthesis and tissue hygiene; (f) seeking regular maintenance care; (g) dispelling patient fear and anxiety, thus saving clinicians from having many unnecessary interruptions [7]; and (h) making GPSC understandable and acceptable for older people. Making patients and/or caretakers aware of their roles in home care, nutrition, and tissue maintenance is one of the greatest challenges in GPSC [3,7]. It is a responsibility rather than an obligation for clinical prosthodontists to ensure patients are following the prosthodontists' instructions.

Patient treatment satisfaction in GPSC is dependent on factors like age, sex, education, vocation, social status, upbringing, home environment, vocational environment, general state of the patients' health, level of education, patients' ability to perform oral functional activities, and post-insertion care [2,3]. Dental prostheses are more likely to be physiologically and structurally correct if more emphasis is placed on PEM [3,8], and prosthodontic treatment failures are directly associated with poorly delivered or completely ignored PEM. This aspect of patient care has been identified as a neglected area in medicine/dentistry and in GPSC [2,3,8]. In medical treatments, patient adherence is interpreted as taking the drug at the right time and following instructions related to it [2], while in orthopedics it is defined as a patient following instructions to perform a particular exercise during or after rehabilitation. Non-existent (absence) or inappropriate PEM contributes to patient non-adherence/non-compliance with medical treatments, especially when diseases are chronic in nature. While individual studies have that medical treatments fail in 40-50% of non-adherent patients [9], a study on patients wearing an oral appliance for sleep apnea showed 57% non-adherence to the recommended wearing protocol [10]. Meanwhile, most prosthodontic treatment options involved in GPSC require a preventive approach that is complex and requires an obligatory change in lifestyle that involves a change or adjustment of prevailing habits (eg, eating, speaking, disclosing prosthesis publicly). Medical studies report non-adherence to be as high as 70% in such situations [11].

A substantial barrier in such complex treatments is patient failure to follow the physician's/surgeon's recommendations through either a misunderstanding, forgetfulness, incorrect performance, forgetting, or completely ignoring [12]. In GPSC, PEM-associated patient non-compliance has been reported due to lack of reinforcement and patient follow-up [13], patient's recollection of instructions, high numbers of post-insertion instructions [3], lack of the patient's active involvement during and after prosthesis fabrication, and lack of effective communication [3]. In addition, geriatric cognitive decline, hearing and vision impairment, barriers to understanding, poor patient memory, inconsistent information, barriers to the physician's delivery of PEM instructions, and the patient's inability to return for follow-up visits does not facilitate absolute GPSC service. At times, simple instructions like maintaining hygiene and removing denture plaque have not been adhered by the patients, which is why the use of denture cleansers is advised to all patients. Patients' memory of medical-related information tends to be poor and inaccurate, especially among older and/or anxious patients [14].

Traditionally, different modes/methods of patient communication and PEM have been used to comprehend and/or retain treatment-related information. These include printed messages (pamphlets, pictures) [8], verbal conversations (with or without rehearsal), visual aids (eg, resin models, casts) [15], group-based patient education [16], and audiovisual aids [17]. Other patient-teaching strategies investigated recently include simulated games

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and role playing [18]. Even with the current boom in multimedia communication, giving rise to the use of computer-assisted strategies, health application programs, social websites, using mobile phones, free internet, and satellite outreach [19], there still seem to be wide gaps in the literature on GPSC-related PEM due to the scarcity of research in this field. Furthermore, the current generation of elderly people were not exposed to computers, social networks, multimedia, and mobile applications while they were younger and better able to learn to use such tools. Studies related to computer use have found elderly people make the most computer errors and require considerably more time and assistance when using software and applications [20]. Recent studies on the adoption of ICT (information communication technology) for health care of the elderly with chronic diseases found barriers to their use, including knowledge gaps, unwillingness to learn new skills, altered cognition, visual/hearing impairments, and privacy concerns [21]. It is also noteworthy the although the elderly population in more developed countries may have access to a wide array of multimedia-related healthcare information, patients in the underdeveloped and developing nations generally still rely on traditional methods of doctor–patient communication. Such disparities of communication preferences are therefore ominous in the research interests conducted in the application of ICT in PEM between these nations.

With evidence of both gaps in the field of GPSC (post-insertion care) and differences among ICT-based PEM in developed and developing nations, the present study aimed to compare verbal, audio, and video patient education material (PEM) and adherence to dental prosthetic management in 90 completely or partially edentulous patients aged 40-70 years. Our main objective was to find a most effective multimedia mode of delivering PEM instructions to prosthodontic patients. We also comprehensively reviewed the relevant literature and outline necessary PEM material (instructions) regarding GPSC. Based on the results, the study would then recommend developing learnable categories for PEM in GPSC, and determine the degree of difficulty in their learning and practice. Finally, the study we sought to provide an effective method for each category of instruction for short-term and long-term use. The study was based on the hypothesis that multimedia communication improves patient recall and treatment compliance and, depending upon each form, there will be differences between media. Alternately, the null hypothesis states that there will be no difference between the media formats.

Material and Methods

Ethics

The present clinical study was conducted at the Department of Prosthetic Dental Sciences in a recognized postgraduate medical/dental institute in northern India. The study proposal was submitted to, evaluated, and approved by the college/university ethics committee (SVSUSDC-E0000212-D18), which adheres strictly to ethical principles and standards according to the Helsinki Declaration. All eligible participants at different stages of the study were briefed about study benefits, and once confidentiality was assured, signed written informed consent was acquired.

Study Design

This study was conducted in 2 different parts (auxiliary and core) on a northern Indian population sample. The auxiliary study explored the knowledge status of PEM-related post-insertion instructions (associated with different types of CD and RPD prostheses) given by prosthodontic postgraduate dental students in various northern Indian institutes through a survey. The second (core) study was a prospective, interventional, cross-sectional study on 90 partially/completely edentulous patients attending outpatient clinics.

Operational Definitions

The term GPSC was operationally defined as the delivery of prosthodontic care to elderly completely or partially edentulous patients involving prevention, diagnosis, and treatment/management of age-related problems. GPSC in this study was limited to oral prostheses (complete or partial, removable, or fixed, which included various types of CDs, immediate denture/overdenture, implant-supported removable CDs). The PEM was defined as the process of influencing the behavior of the patient to improve patient knowledge, skills, and mental attitude that needed to either improve or maintain health [22]. We also designed an interactive learning process to support and enable patients to manage/adapt to their dental prosthesis. Prosthesis adherence (PA) was defined as the degree to which the patients' behavior corresponds with the approved recommendations (for self-caring, device use, medication/drugs, self-reliant exercises, therapy sessions), and compliance was defined as the degree to which a patient's behavior matched the prescriber's advice [23]. Successful adaptation to the prosthesis is based on the patient's ability to adhere to the recommendations provided; therefore, these 2 terms are used interchangeably throughout this text.

Sample Size Estimation

The sample size for this study was determined in accordance with previous studies of the same nature [3], and through power analysis (95% confidence interval, 80% power) using software (Epi-Info V 7, Atlanta, Georgia, USA). The total sample size estimated for the auxiliary study was 350 subjects and that for the core study was calculated as 90 subjects with an additional 10% to adjust for subject loss.

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Sample Preparation, Selection, and Grouping

An auxiliary study using an exploratory, descriptive, small-scale survey established the need for the study. Using a combination of closed- and open-ended questions (multiple choice), a survey questionnaire was distributed among 366 prosthodontic postgraduate students studying in different postgraduate institutes of northern India. The questionnaire was first validated through a pilot study (n=20, age 20-30 years, Cronbach alpha 0.782) at 2 different times to explore the different categories of post-denture insertion instructions given to denture patients. The questionnaire required listing the number of PEM-related instructions to patients with complete or partial dentures.

For the core study, routine prosthodontic OPD patients were screened for presence/absence of dementia (memory loss) using the Mini-Mental State Examination (MMSE) [24] and cognitive impairment using the Elderly Cognitive Assessment Questionnaire (ECAQ) [25]. The final sample (purposive) contained 90 edentulous (completely edentulous 49, mandibular partially edentulous 41) patients (61 males, 29 females) with an age range of 60-70 years. The inclusion criteria were first-time denture wearer, cooperative, good denture foundation, able to read/write local/non-local language, owned or had access to a multimedia player (audio player, compact disc player, digital versatile disc (DVD) player, computer, laptop, mobile phone), no systemic or mental disorder, no hearing or vision loss, no history of depression or dementia, no full-time caregiving tasks, non-alcoholic, and not regularly taking any prescription medicine. Exclusion criteria were patient apathy, no healthcare provider, subjects suffering from self- or elder neglect, childless, and patient with previous bad experiences with dentists. For implant-supported prostheses, subjects who had previously received implant fixtures and were fit to receive an overdenture prosthesis were selected. For all partial dentures, only those who would receive mandibular partial denture were included, in line with study objectives. Subsample of 30 subjects each were divided by simple random distribution into 3 different groups: Group Ve (Gp Ve) (verbal/written), Group A (Gp A) (audio), and Group Vi (Gp Vi) (video) based on the mode of receiving PEM instructions. Patients in each group were then allotted to postgraduate students (second- and third-year postgraduates) who were responsible for carrying out the prosthodontic treatment under supervision of experienced academic staff. All postgraduate students were calibrated and trained to maximize patient adherence to GPSC instructions. These included the right time, right way, and the right conditions to teach PEM instructions, empathic communication, and answering patients' questions whenever approached. Demographic characteristics of all subjects were recorded while taking a case history of each subject. It also included assessment of health literacy by using a word recognition test using Rapid Estimate of Adult Literacy in Medicine (REALM) with scores from 0 to 7: 0=below third grade, 1-3=4th to 6th grade, 4-6=7th to 8th grade, 7=high school [26]. A standard prosthodontic treatment protocol was followed for all prostheses in terms of treatment options, number of appointments (12-15 appointments), laboratory and clinical procedures, and prosthesis designs. Prostheses delivered to the test subjects were evaluated by a separate team of experienced academicians who were blinded to patients and treatment outcome. Any prosthesis deemed to be unfit was replaced. All patients received PEM instructions according to their designated group and were provided a denture maintenance kit (Archtek, Pennsylvania, Dental LLC, USA) containing a denture brush and denture cleansing powder on the day of prosthesis delivery. In the final period of the study, patients were followed up at 2 timepoints (1 day and 7 days), at which all the PEM instructions were reviewed through recall and recorded. The first day was considered to be at least 24 h after receiving a prosthesis.

Congregation and Review of PEM Instructions

PEM instructions (n=63) regarding post-prosthesis insertion were divided into 9 different categories (nature of prosthesis, first oral feeling, sialorrhea control, mastication, patient individuality, tissue/denture hygiene, tongue position, miscellaneous) based on the literature [4,5,27] (**Table 1**). All PEM content was translated from English to the 2 local languages (Hindi and Urdu) by senior educators in the local language. The same translated version was then back-translated into English by a different senior educator in English language. The original version of the instructions and translated version was then compared for consistency. Difficult medical and dental terminologies were put into simple, understandable words without changing their context or meaning. All the instructions were labeled with numbers to eliminate errors.

PEM Information Conversion to Multimedia

All the PEM instructions were analyzed by academic experts before planning use of 3 different modes of delivering the instructions. For Gp Ve (verbal/written), the instructions were first given verbally and included a patient instruction sheet. For delivering instructions to patients in Gp A (audio), all instructions were audio recorded on the recorder device (National Panasonic) in a professional studio in a loud and clear voice. For patients belonging to Gp Vi (video), a movie was made that depicted instructions. The movie had 2 actors (1 male and 1 female) portraying completely edentulous patients who were successful and experienced prosthesis wearers. The movie was directed after consensus between 2 experienced movie directors. The particular way of depicting a particular instruction was based on consensus among at least 3 experienced prosthodontists.

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Table 1. Concise patient education and motivation (PEM) post-insertion prosthesis instructions.

Category	PEM Instructions
I (Nature of prosthesis)	Prosthesis is a single unit and cannot replace natural teeth. The prosthesis has limitation (eg, taste, wear, shrinkage, water sorption). Problems can be overcome only with patience, determination, and skill. Minute variations in the movement of food particles cannot be detected. The prosthesis cannot detect variation in size and location or texture differences. Biting force with prosthesis is 1/5th that of natural teeth, and force applied on one side affects the other side
II (First oral feeling)	Strained face feeling with the new denture. Muscles take time to assume different positions. Bulkiness initially develops nausea or gagging, which is temporary and purely psychological. Lips feel protuberant initially. Prosthesis should not be shortened as it will affect seal and function
III (Sialorrhea)	Initially for 1-2 days salivary flow will increase, but it will reduce slowly over time. The saliva should not be allowed to collect in the mouth and should be swallowed repeatedly. Unnecessary rinsing or spitting should be avoided
IV (Speech)	Altered speech initially, which is overcome by adjusting tongue. Avoid rapid conversation for adjusting speech fluency. Read loudly in front of a mirror for practice. Alteration in your speech will be more obvious when making certain sounds (eg, /s/,/z/,/f/). Do not repeat same words
V (Mastication)	Prosthetic mastication is a new skill to be learned. Eat soft/crispy foods, avoid sticky food, take small bites and chew thoroughly. Food should be halved and placed bilaterally on posterior teeth. Chewing strokes should be vertical. Avoid hard food and eating in gatherings until the learning period is over. Chewed food to be placed towards corner of the mouth, and be aware that taste may be altered initially
VI (Patient individuality)	Prosthesis must not be compared with other patients' prosthesis, nor the experience of other wearers. One must not exhibit prosthesis to curious socialites. Problems related to prosthesis will be resolved by learning which takes time. Do not overexpose yourself after wearing a new prosthesis. Your adaptation ability gets compromised with age; therefore, patience and persistence are the key
VII (Hygiene)	Do not wear the prosthesis continuously. Gradually increase number of wearing hours to maximum of 8 hours. Remove prosthesis before sleep. Oral tissues should be given rest. Oral physiotherapy, which includes finger massaging and warm saline gargling, is a must. Tongue is to be cleaned with brush to increase taste perception. Take a regular and balanced diet added with supplement nutrients and avoid alcohol. Clean prosthesis with soft brush under running water, avoid stiff brush. Clean prosthesis after every meal, soak prosthesis once in a day in cleanser for 30 minutes. Brush the prosthesis in a basin filled with water. Sit down and wash it; do not wash it standing. Avoid toothpaste to clean denture. Irritated mucosa should be given rest. When out of mouth, the prosthesis should be placed in clean water, which should be changed daily. A prosthesis in a container should be covered with a lid. Calculus accumulation should be avoided by regular cleaning, and if present should be removed with mild white vinegar solution
VIII (Tongue position)	New assumed tongue position must be learned to improve prosthesis stability, mandible foundation is weaker than maxillary; therefore, certain functions should be avoided. Prosthesis stability depends on correct tongue and surrounding muscles. Practice opening and closing as demonstrated. Relationship between prosthesis contours and muscles should be learned, and improper tongue position cannot be a solution to solve prosthesis problems
IX (Miscellaneous)	No household remedy or repairs are to be performed, prosthesis is made of plastic which changes; therefore, follow-up correction is essential. The dentist and patient have responsibilities to be fulfilled to make prosthesis adaptation quick, must keep the prosthesis away from children and pets

The instructions listed under various categories are concise and summarised without detailed description that was demonstrated to the patients during clinical stages. Category types: I – Nature of prosthesis; II – First oral feeling; III – Sialorrhea-Excess saliva; IV – Speech; V – Mastication; VI – Individuality of patient; VII – Tissue and prosthesis hygiene; VIII – Tongue position; IX – Miscellaneous.

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The shooting of the video was done by the professional cameraman with a Sony camera (PD170), in clinical, at-home, and public settings. Editing of the video was done at the studio using Canopus EDIUS – 5 Pro version software. The background sound editing, describing each instruction was then incorporated within the video and the final edited version was then converted to various compatible formats (DVD, VCD [video compact disc], MP4 [moving pictures]). The edited version of the video was made available in 2 local languages, and the total duration of the video was approximately 20 minutes. All the copies in various media were examined for any errors in copying before distributing to the patients of Gp Vi. No restrictions were imposed as to how many times a particular subject would listen to or watch the mode of instructions given to them.

Measures, Data Evaluation, Collection, and Analysis

PEM Instructions Recall: The patient's ability to remember the PEM instructions was verified by a 2-step follow-up recall procedure based on the literature [28]. At the first (day 1) and second (day 7) follow-up visits, patients were asked to recall the PEM instructions. The instructions that the patients recalled in subsequent visits were noted in the case sheet against the numbers designated in the table and the final total was counted. Each instruction was considered correct if the patient performed the act or verbally mentioned the instruction. Correct recall of an instruction was scored as 1 and incorrect/unable to recall a particular instruction was scored as 0. Partially correctly recalled instructions, if contextually appropriate, were considered as correct and vice versa. Each category had a maximum score that was designated by the number of instructions (eg, category I had 10 instructions; therefore, the maximum score was 10). Thus, for each patient the maximum score for 9 different categories was 68 (category I=10, II=5, III=3, IV=5, V=10, VI=5, VII=20, VIII=6, IX=4) (**Table 1**) and the patient could score anywhere from 0 to 68 as a total score. This would evaluate the overall effectiveness of the intervention method.

At both recall appointments the patient's denture was also assessed for denture hygiene maintenance using a denture plaque/hygiene index (DPI/DHI) [28]. The denture plaque index objectively measures the patient's motivation and compliance with PEM instructions. Denture plaque levels were examined by using the disclosing agent (Erythrosin B; FD & C Red No. 3). Dentures were removed from the mouth and soaked in a bowl of water for 1 minute to remove food debris. Erythrosine (red 3) dye was diluted with water and dentures were dipped in the solution and left for 1 minute. The dentures were rinsed under running tap water to remove the unbound dye. The disclosed denture plaque on the denture was scored. The denture hygiene scores were categorized from zero to 4: 0 – no denture plaque, 1 – light plaque (25% present), 2 – moderate plaque (26-50% covered), 3 – heavy plaque (51-75% covered), and 4 – very heavy plaque (76% or more covered).

Statistical Analysis

The number of instructions recalled under each category at follow-up appointments were reviewed and coded for analysis using SPSS (IBM Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). Mean values (measure of central tendency) and standard deviation (a measure of dispersion of data) for continuous variables and frequencies (relative and absolute) for qualitative variables were calculated. The means for each category were calculated by dividing the number of instructions recalled from the total number of instructions in that category. Distribution of data for normality was assessed through the Shapiro-Wilk test. Differences in frequency distribution for categorical variables including uniform distribution of the subjects were assessed using chi-square test. Differences in means between studied groups were calculated using the paired *t* test (compare means of the same group at 2 different recalls) and unpaired *t* test (compare means of independent or unrelated groups). We used the post hoc Newman-Keul pairwise comparison test to assess differences within groups, while at the same time allowing to reject/accept the null hypothesis. To consider the value statistically significant, $P \leq 0.05$ was kept as a baseline.

Results

Auxiliary Survey

The results obtained from the auxiliary survey included 366 (215 males, 151 females) postgraduate students pursuing higher education in the specialty of prosthodontics (**Table 2**). The PEM instructions were divided into 2 categories – complete denture (CD) (n=68) and partial denture (PD) (n=34) – and were analyzed in 3 population groups (first-, second-, and third-year students). For CD prosthesis, the mean score of third-year postgraduate students (31.53±6.98) was higher than for the first-year (16.25) and second-year (16.55) students. The mean score of PEM instructions for CD reported by all students averaged 21.44 (31.53%; n=68). For PEM instructions related to PD, mean scores for third-year students were higher than for first- and second-year students. Poor recall by postgraduate students was found to be due to the large number of instructions, difficulty in remembering, interpreting, understanding and explaining to patients, long time required, patients' lack of attention, forgetting to implement the PEM from the beginning, lack of patient demonstration facilities, supervising staff believing that PEM was not important, and language barriers.

Demographic Characteristics

The demographic characteristics of the intervention study on 90 geriatric patients are presented in **Table 3**. There were

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Table 2. Demographics associated with prosthodontics postgraduate students auxiliary survey.

Variable		Total (N/%)	Year of study (N/%)		
			First year	Second year	Third year
	Categorical	366 (100.00)	N=112 (30.60)	N=174 (47.54)	N=80 (21.86)
Gender	Male	215 (58.74)	63 (56.26%)	95 (54.59%)	58 (72.5%)
	Female	151 (41.26)	49 (43.74%)	79 (45.40%)	22 (27.5%)
	Continuous	102	**Mean±SD**	**Mean±SD**	**Mean±SD**
PEM Instructions	CD	68	16.25±5.39	16.55±6.58	31.53±6.98
	PD	34	21.37±6.88	28.24±5.73	31.34±6.99

N – number; % – percentage; PEM – patient education and motivation; SD – standard deviation; CD – complete denture; PD – partial denture.

more male patients than female patients (3: 1), with average age of all participants being 56.55 (4.87) years. According to the International Standard Classification of Education (ISCED), 77.7% of all patients had low levels of education. Most patients required prosthodontic treatment for either conventional complete denture or implant-supported overdentures. Most patients (73%) had been edentulous for at least the last 2 years. The leading reason for seeking prosthodontic care was inability to masticate (37.7%), followed by social compulsion/motivation (30%), and problems speaking (5.5%). Clinical interaction between the patient and their healthcare provider, as well as their interaction with clinicians during treatment procedures were utilized to establish a patient's mental attitude. Regarding patients' mental attitude, 33.3% were exacting, 30% were philosophical, and 24.4% were critical. Assessment of patient literacy revealed that 61.1% scored 4-6 on the REALM-SF scale, which corresponds to a 7th or 8th grade health literacy. For all demographic variables, there were no differences (chi-square test) observed that could confound the study outcome, indicating that patients in all groups had similar characteristics.

PEM Instruction Recall

The results obtained according to the average number of instructions given in 9 different categories to subjects using 3 different modes at 2 timepoints are presented in **Table 4**. Three categories – category VI (individuality of each patient) (n=5), VIII (tongue position) (n=6), and IX (miscellaneous) (n=3) – showed mean values of less than 1 at both the appointments in all 3 intervention groups, except for category 6 in Gp A (audio), thus making these groups one of the lowest recalled. Although there was an increase in the number of recalled instructions at the second follow-up in these categories, category IX in verbal group showed a decline in recall of instructions at the second appointment. The highest increase between the 2 follow-up visits was observed in category VII (n=20) (tissue, hygiene) (Gp Ve from 4.6 to 7.4, Gp A from 11.5 to 13.5, Gp Vi from 11.6 to 14.3) despite having a very high number of PEM instructions. Differences in recalling the PEM instructions between the 2 follow-ups were significant in 6 categories (I, II, III, IV, V, VII) for Gp Ve, 6 categories (I, III, V, VII, VIII, IX) for Gp A, and 7 categories (I, II, III, IV, V, VII, VIII) for Gp Vi. The categories whose values were not significantly different between the 2 follow-up appointments were 3 categories in Gp Ve (VI, VIII, IX), 3 categories in Gp A (II, IV, VI), and 2 categories in Gp Vi (VI, IX). The overall results show that subjects in Gp A and Gp Vi had better recall than the subjects in Gp Ve. Gp Vi showed a poor response at the first follow-up for category 6 and category 8 (**Table 4**). Results of stepwise comparisons (multiple) using the Newman-Keul post hoc test are presented in **Table 5**, which identifies individual category means that significantly differed from each other between various groups at the 2 follow-up appointments. Individual differences between the 3 groups in terms of their respective categories are presented for 2 different time intervals (1 day/7 days) in each category.

DPI (Denture Plaque Index) Scores

The effectiveness of denture hygiene maintenance was evaluated at both follow-up appointments to objectively measure the effectiveness of PEM instructions. The results of the DPI scores between subjects of the 3 groups are presented in **Table 6**. Results show that although patients in Gp V had better recall in PEM instruction category VII (hygiene), the total score on DPI for this group scored heavy plaque (51-75%) at both follow-ups [(1D=3.73±0.702); (7D=3.63±0.621)] and did not show any significant differences upon analysis. The other 2 groups, Gp A and Gp Vi, showed significantly lower DPI scores of moderate-to-light and light-to-no plaque, respectively. Gp Vi showed better DPI scores from the first day after denture insertion.

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Table 3. Sociodemographic characteristics of the completely/partially edentulous patients participating in the interventional study.

Variables	Parameters	Total (N)	Group distribution			Statistical test
			Gp Ve N=30	Gp A N=30	Gp Vi N=30	
Continuous		**90**	**M±SD**	**M±SD**	**M±SD**	**Average**
Average age	Male	61 (67.78)	56.8	56.4	56.4	56.5±4.36
	Female	29 (32.22)	53.5	56.7	59.7	56.6±5.33
Categorical		**N (%)**	**N (%)**	**N (%)**	**N (%)**	**Chi-square**
Gender	Male	61 (67.78)	21 (70)	21 (70)	19 (63.3)	χ^2=0.407 *P*=0.815
	Female	29 (32.22)	9 (30)	9 (30)	11 (36.6)	
Education*	ISCED 1	27 (30)	8 (26.6)	11	8 (26.6)	χ^2=1.501 *P*=0.826
	ISCED 2	23 (25.56)	7 (23.3)	7 (23.3)	9 (30)	
	ISCED 3	20 (22.22)	7 (23.3)	5 (16.6)	8 (26.6)	
	ISCED 4	12 (13.33)	5 (16.6)	4 (13.3)	3 (10)	
	ISCED 5	8 (8.89)	3 (10)	3 (10)	2 (6.67)	
Socioeconomic status	Low	19 (21.1)	4 (13.3)	8 (26.6)	7 (23.3)	χ^2=2.551 *P*=0.635
	Moderate	50 (55.5)	17 (56.6)	17 (56.6)	16 (53.3)	
	High	21 (23.3)	9 (30)	5 (16.6)	7 (23.3)	
Type of prosthodontic care	Partial denture	17 (18.8)	5 (16.6)	8 (26.6)	4 (13.3)	χ^2=2.802 *P*=0.591
	Conventional denture	26 (28.8)	10 (33.3)	6 (20)	10 (33.3)	
	Immediate denture	19 (21.1)	7 (23.3)	6 (20)	6 (20)	
	Immediate overdenture	5 (5.5)	2 (6.67)	0 (0)	3 (10)	
	Implant overdenture	23 (25.55)	6 (20)	10 (33.3)	7 (23.3)	
Duration of edentulism	≤0-12 months	33 (36.6)	12 (40)	8 (26.6)	13 (43.3)	χ^2=2.409 *P*=0.878
	≤13-24 months	32 (35.5)	10 (33.3)	13 (43.3)	9 (30)	
	≤25-36 months	14 (15.5)	4 (13.3)	5 (16.6)	5 (16.6)	
	>36 months	11 (12.2)	4 (13.3)	4 (13.3)	3 (10)	
Reasons for seeking treatment	Esthetics	24 (26.6)	4 (13.3)	10 (33.3)	10 (33.3)	χ^2=8.772 *P*=0.186
	Mastication	34 (37.7)	17 (56.6)	7 (23.3)	10 (33.3)	
	Phonetics	5 (5.5)	0 (0)	3 (10)	2 (6.67)	
	Social	27 (30)	9 (30)	10 (33.3)	8 (26.6)	
Mental attitude	Critical	22 (24.4)	7 (23.3)	8 (26.6)	7 (23.3)	χ^2=1.241 *P*=0.974
	Exacting	30 (33.3)	10 (33.3)	9 (30)	11 (36.6)	
	Hysterical	11 (12.2)	5 (16.6)	3 (10)	3 (10)	
	Philosophical	27 (30)	8 (26.6)	10 (33.3)	9 (30)	
REALM-SF Scores	0 (third grade below)	0 (0)	0 (0)	0 (0)	0 (0)	NA
	1-3 (4th to 6th grade)	9 (10)	4 (13.3)	3 (10)	2 (6.67)	
	4-6 (7th to 8th grade)	55 (61.1)	16 (53.3)	21 (70)	18 (60)	
	7 (high school)	26 (28.8)	10 (33.3)	6 (20)	10 (33.3)	

Gp – group; Ve – verbal/written; A – audio; Vi – video; N – number; % – percentage; M – mean; SD – standard deviation; REALM-SF – Rapid Estimate Adult Literacy Medicine. * Education: ISCED – International Standard Classification of Education; ISCED 1 – Primary; ISCED 2 – Lower secondary; ISCED 3 – Upper secondary; ISCED 4 – Post-secondary non-tertiary; ISCED 5 – Short-cycle tertiary.

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Table 4. Comparative evaluation of average number of instructions of different study groups for 9 different categories of PEM instructions at 2 different post prosthetic rehabilitation time intervals (1 day and 7 days).

Category	Timing	Gp Ve (Verbal) (n=30)		Gp A (Audio) (n=30)		Gp Vi (Video) (n=30)	
		Mean±SD	*P* value	Mean±SD	*P* value	Mean±SD	*P* value
I (n=10)	1 D	0.433±0.504	0.040*	3.233±0.817	0.0168*	2.367±0.927	0.0022*
	7 D	0.867±0.507		4.100±1.093		3.667±1.124	
II (n=5)	1 D	1.00±0.455	0.000*	2.633±0.490	0.0996	2.300±0.46	0.0037*
	7 D	1.966±0.668		3.100±0.876		3.200±0.664	
III (n=3)	1 D	1.266±0.639	0.004*	2.333±0.66	0.0100*	2.267±0.449	0.0045*
	7 D	1.967±0.490		2.867±0.345		2.833±0.379	
IV (n=5)	1 D	0.600±0.563	0.007*	2.533±0.628	0.1608	2.400±0.621	0.0123*
	7 D	1.200±0.550		2.800±0.484		3.033±0.614	
V (n=10)	1 D	2.533±0.681	0.000*	5.433±1.072	0.0110*	5.767±0.678	0.0003*
	7 D	3.700±0.876		6.567±1.104		7.600±0.563	
VI (n=5)	1 D	0.167±0.379	0.374	1.100±0.803	0.7078	0.500±0.572	0.0951
	7 D	0.267±0.449		1.200±0.484		0.800±0.406	
VII(n=20)	1 D	4.633±1.321	0.000*	11.500±3.048	0.0072*	11.600±2.094	0.0001*
	7 D	7.467±1.591		13.533±1.525		14.370±1.245	
VIII (n=6)	1 D	0.200±0.406	0.586	0.500±0.508	0.0226*	0.433±0.504	0.0209*
	7 D	0.300±0.46		0.667±0.479		0.867±0.571	
IX (n=4)	1 D	0.067±0.25	0.325	0.700±0.466	0.0169*	0.333±0.479	0.4762
	7 D	0.033±0.182		0.933±0.253		0.4333±0.504	

Gp – group; Ve – verbal/written; A – audio; Vi – video; N – number; % – percentage; M – mean; SD – standard deviation; D – day/days. Category types: I – Nature of prosthesis; II – First oral feeling; III – Sialorrhea-Excess saliva; IV – Speech; V – Mastication; VI – Individuality of patient; VII – Tissue and prosthesis hygiene; VIII – Tongue position; IX – Miscellaneous. Statistical significance: * P<0.05; * marks for comparison between first and second appointment.

Discussion

This study was conducted to determine the efficacy of multimedia interventions for PEM to enhance denture adaptation in completely and partially edentulous patients. The main findings of the study are that undertraining prosthodontic postgraduate students learning GPSC recollected very low percentage of PEM information for either CD or partial denture (PD), PEM information should be arranged in learnable categories for better patient adherence, different formats of delivering PEM yield different results, suggesting that no single media is best for delivering all PEM information, and PEM information when presented in video improves both short- and long-term learning (at follow-up 1 and 7 days later) as compared to other formats. The study also shows that the most difficult PEM instructions for GPSC are those related to individuality of the patient and tongue position.

Patient failure to follow treatment recommendations is a significant barrier in delivering effective medical treatment. The phrase "patient non-adherence/non-compliance with treatment" can refer to misunderstanding, forgetting, ignoring, and/or incorrect performance [12,19,22]. Similar explanations have also been reported in completely edentulous patients who have experienced a difficult denture adaptation [8]. An overview of the entire results from this study supports these facts, as the results suggest that despite using different media, the overall ability of patients to recall information is poor when given verbally (less than 25%) and average with use of multimedia (50%), which improved over time (from 1 day to 7 days). In medicine,

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Table 5. Newman-Keul post hoc pairwise comparison of 3 groups with respect to each individual category.

Category	N	Group	Gp Ve (Verbal)		Gp A (Audio)		Gp Vi (Video)	
		TI	1 D	7 D	1 D	7 D	1 D	7 D
I	**30**	**M**	0.4333	0.8667	3.2333	4.1000	2.3667	3.6667
		Verbal	–	–	–	–	–	–
		Audio	0.0001*	0.0001*	–	–	–	–
		Video	0.0009*	0.0001*	0.1211	0.4641	–	–
II	**30**	**M**	1.0000	1.9667	2.6333	3.1000	2.3000	3.2000
		Verbal	–	–	–	–	–	–
		Audio	0.0001*	0.0002*	–	–	–	–
		Video	0.0004*	0.0001*	0.3304	0.7082	–	–
III	**30**	**M**	1.2667	1.9667	2.3333	2.8667	2.2667	2.8333
		Verbal	–	–	–	–	–	–
		Audio	0.0003*	0.0001*	–	–	–	–
		Video	0.0002*	0.0001*	0.7915	0.7535	–	–
IV	**30**	**M**	0.6000	1.2000	2.5333	2.8000	2.4000	3.0333
		Verbal	–	–	–	–	–	–
		Audio	0.0001*	0.0001*	–	–	–	–
		Video	0.0001*	0.0001*	0.6585	0.3984	–	–
V	**30**	**M**	2.5333	3.7000	5.4333	6.5667	5.7667	7.6000
		Verbal	–	–	–	–	–	–
		Audio	0.0001*	0.0001*	–	–	–	–
		Video	0.0001*	0.0001*	0.5519	0.0218	–	–
VI	**30**	**M**	0.1667	0.2667	1.1000	1.2000	0.5000	0.8000
		Verbal	–	–	–	–	–	–
		Audio	0.0006*	0.0018*	–	–	–	–
		Video	0.1663	0.0448*	0.0139*	0.1303	–	–
VII	**30**	**M**	4.6333	7.4667	11.5000	13.5330	11.6000	14.3670
		Verbal	–	–	–	–	–	–
		Audio	0.0001*	0.0001*	–	–	–	–
		Video	0.0001*	0.0001*	0.9236	0.2027	–	–
VIII	30	M	0.2000	0.3000	0.5000	0.6667	0.4333	0.8667
		Verbal	–	–	–	–	–	–
		Audio	0.3439	0.1026	–	–	–	–
		Video	0.2783	0.0333*	0.7561	0.3707	–	–

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Table 5 continued. Newman-Keul post hoc pairwise comparison of 3 groups with respect to each individual category.

Category	N	Group	Gp Ve (Verbal)		Gp A (Audio)		Gp Vi (Video)	
		TI	1 D	7 D	1 D	7 D	1 D	7 D
IX	30	M	0.0667	0.0333	0.7000	0.9333	0.3333	0.4333
		Verbal	–	–	–	–	–	–
		Audio	0.0005*	0.0001*	–	–	–	–
		Video	0.0964	0.0044*	0.0233*	0.0005*	–	–

Gp – group; Ve – verbal/written; A – audio; Vi – video; M – mean; D – day/days; TI – time intervals. Category types: I – Nature of prosthesis; II – First oral feeling; III – Sialorrhea-Excess saliva; IV – Speech; V – Mastication; VI – Individuality of patient; VII – Tissue and prosthesis hygiene; VIII – Tongue position; IX – Miscellaneous. * Signifies that differences between various groups at 2 different intervals of time with the value of $P<0.05$ were significant.

Table 6. Comparative differences in the denture plaque index scores at 2 timepoints between 3 groups based on the mode of PEM instructions given for post-insertion denture maintenance and care.

	N	Gp Ve		Gp A		Gp Vi	
		1D	7D	1D	7D	1D	7D
DPI Score	30	3.73±0.702	3.63±0.621	2.83±1.019	1.76±0.727	1.56±0.568	0.73±0.639
't' test	T value	0.3912		4.662		5.334	
	P value	0.697		0.0001*		0.00001*	

Gp – group; Ve – verbal/written; A – audio; Vi – video; M – mean; D – day/days; TI – time intervals. DPI Score criteria: 0 – no denture plaque; 1 – light plaque (25% present); 2 – moderate plaque (26-50% covered); 3 – heavy plaque (51-75% covered); 4 – very heavy plaque (76% or more covered). * Significant – Level of the degree of significance was determined on the value of $P<0.05$.

treatment non-adherence is costly ($13.35 billion US dollars in the USA alone) [29], as well as a risk factor for increased mortality (more than 100 000 deaths each year). While adherence in medicine is generally refers to medication compliance (see Wikipedia - Adherence [medicine]), it also applies in situations like medical device use, self-care, self-directed exercises, and lifestyle change. Complete denture prosthesis requires major changes by patients, which is evident in the PEM instructions given to patients, but there have been few clinical studies in general dentistry addressing the connection among dentist/patient characteristics, patient communication (PEM), and treatment outcomes [30]. Similarly, there are few studies on this issue related to GPSC [8], even though patient motivation has been considered an essential element of GPSC before, during, and especially after treatment. Evidence shows that achieving accurate and effective communication is difficult, especially in elderly patients whose motivation is variable [31]. Improving skills in effective communication requires understanding of both patient- and dentist-related factors [32]. Instructing patients and assuming that they will follow the instructions only qualifies as a one-way communication. Martin et al [12] rightly stated that the first step for improving patient adherence is to assess whether they have followed the recommendations associated with their treatments. The sociodemographic variables investigated in this study were found to be closely associated with patient non-adherence to treatment recommendations and patient treatment satisfaction [8]. While patient involvement in self-care varies across cultures, evidence shows that doctor–patient similarity in preferences about patient involvement in care are more important than their congruence on demographic and ethnic variables. Demographic findings associated with the results of this study support earlier findings that elderly patients (age), inability to read/understand written instructions (education), and patient health literacy and health beliefs [33] are associated with treatment non-adherence. Patient non-compliance has also been explained according to various cognitive and behavioral models (eg, reasoned action theory, planned behavior theory) [12]. A patient's intentions to listen to treatment instructions have been shown to be significantly associated with their beliefs/thoughts, social influence, and mental attitude [12,33].

Congregation and Categorization of PEM Information

The literature on PEM associated with GPSC has evolved over time and is extensive and widely dispersed. With the advent

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of new and multiple prosthetic options in implants, the first step is to divide all the instructions into categories, the importance of which has been mentioned by Kessels et al [14]. The results of the present study show that certain PEM categories (category VI, VII, IX) were difficult to recall by the patients across all groups at both follow-ups (except category VIII for Gp Vi at the second follow-up). Instructions may be difficult to remember because they are complicated or difficult for clinicians to clearly explain and rehearse, such as proper positioning of the tongue. Ihm et al found that time restrictions are a major reason why treatment recommendations are not thoroughly explained to and rehearsed with patients [34]. Our study results support this view. Since no attempts were made by clinicians to rehearse instructions, it was difficult to determine which instruction the patient would consider to be difficult. Other studies have stressed the need to explain, review, and encourage the patient to ask questions about their treatment recommendations [12]. Categorization of instructions can enhance patients' ability to remember instructions [3].

Multimedia Communication and its Role in Enhancing PEM

Multimedia encompasses a wide range of media types (narrative, interactive, communicative, adaptive, and productive media), with basic elements (captured media, synthesized media, discrete media, and continuous media) presented in the form of different applications (text, graphics, images, sound/audio, animation and/or video) [35]. Most of these have been found to influence education at different levels, with many scientific studies done on audio and video [3,4,18,30,31] to enhance effective patient communication, especially for patients with poor literacy skills. Conveying (by clinician) and following (by the patient) PEM information in any type of GPSC is key to quick, effective, and durable prosthesis adaptation, besides being significant to long-term maintenance for preservation of biological tissues and prosthesis. The choice of the timing of 2 follow-ups (at 1 day and 7 days) for this study allowed us to determine whether patients remember/follow/adhere to the PEM information before starting to use the prosthesis (1 day) and whether they continue to do so to ensure competent prosthesis adaptation (7 days to 30 days). The results of this study show that subjects who received PEM information through audio had a higher individual recall (all 9 categories) when compared to those who received PEM in the verbal/written form at day 1 (short-term recall). When compared to those who received PEM information using a video, 2 individual categories – V and VII – showed a better recall than audio. These results suggest that video yields better recall when information is extensive and complex. At the second follow-up, the recall of instructions was found to be higher in Gp Vi that in other groups. Five individual categories (II, IV, V, VII, and VIII) showed better recall in Gp Vi than GpA. These results suggest that delivering PEM information using a video may be better if quick patient adherence to PEM instructions is desired. The results agree with a study done using podcasts in seeking patient adherence to a weight loss intervention [36]. Our overall results also agree with the results obtained by Wilson et al, who showed video to be more effective than printed format, but after 1 week there were no differences between the 2 formats [37]. However, their study was related to demonstrations on how to use an inhaler, which is much easier than wearing a prosthesis. In another study that concluded video to be more effective than text alone for cancer-related PEM information, the better results using video were attributed to the cognitive theory of multimedia learning [38]. Video has also been shown to be very effective in those who have limited literacy skills, which adds to its advantage of being independent of the literacy level of an individual. Use of videotapes (animated cartoons) have also been shown to improve knowledge among healthcare providers about prevention of polio [39]. Increased adherence to medication recommendations has also been found among patients with asthma (infographic and video) [40], trauma (mobile discharge video and glyph pictographs) [41], cancer patients undergoing radiotherapy (video) [42], mallet finger injury (online videos) [43], and orthodontic patients (audiovisual) [44]. Elderly people have been observed to take more time with the texts that are associated with illustrations [45]. Although verbal information lays the foundation of patient education, audiotapes or videotapes provide information that gives patients the ability to review information repeatedly if necessary [17]. This could be one of the reasons for higher recall of instructions in GpA at the first follow-up (1 day), since playing an audio file is easier than using a video player. Use of text along with pictures (video) has been shown to overcome challenges associated with different literacy levels of individuals [46]. Use of complex language within a video should be avoided, although a video has an added benefit of depicting complex behavioral material. Multimedia communication is also effective because it alleviates anxiety as a confounding factor and allows for unlimited repetition, both of which have been found to affect the recall of instructions [14]. The use of pictographs resulted in over 80% accuracy in recalling information when verbally delivering medical instructions, but only 14% of it was correctly remembered [14].

The poor early recall (short-term recall) by patients in this study agrees with results from a systematic review of 63 studies, which found poor adherence to treatment instructions when extensive information was presented [47]. Other reasons for patient non-adherence to treatment instructions include the natural tendency of forgetfulness by patients after leaving the clinics (56%) [48], use of technical terms and medical jargon [12], if and when dissatisfied with their treatment [49], and non-empathic doctor–patient communication [50]. Instructions that are easily memorized by the patient include those which

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are experienced and belong/relate to the treatment needs of the patient [51]. Understandably, instructions that patients feel are attached to their chief problem are better adhered to. The high recall in category 7 (tissue health and hygiene), which in fact contained the maximum number of instructions among all groups, substantiates these conclusions. Our results show that for GPSC, overall recall was poor when PEM information was given verbally/written at 1 day [16.8%] and 7 days [26.02%], although there was an improvement in recall between the 2 appointments. These results disagree with a study by Byrne et al [52], who reported that written format was associated with the highest recall, stating that audio and audio/video were more distracting to the participants than text. The differences could be attributed to different education levels of study participants and their ability to read, which has been found to be significantly associated [4,48]. Our results in category VI, which are related to individuality of the patient, show that certain instructions are difficult to depict in any form (audio or video). Patients' ability to remember and follow a particular instruction for a long time is also related to the level of motivation resulting from interaction with the doctor [9,30]. Studies have shown that informed and effective patient motivation, [52] degree of patient involvement, cohesive/true physician–patient partnership without fear of criticism, and doctors' ability to understand various aspects (patient beliefs, mental attitude, cultural contexts, emotional integrity, social support, or lack of them) enhance patients' ability to learning medical information. Poor compliance to verbal instructions has been studied and it has been concluded that verbal education of both patient or his family members requires a multidisciplinary approach that must consider literacy and culture as well [53]. It has also been reiterated that special skills for providers are necessary to deliver highly efficient verbal instructions. For written instructions, Sun et al [54] investigated an easy-to-read (EZ) method and found that oral health education delivered by this method significantly improved oral health literacy scores.

Multimedia and Patient Care

The PEM information for GPSC in this study requires long clinical working hours to effectively communicate and rehearse each instruction, which is very demanding to both patient and clinician. Most prosthodontic treatments are inpatient, while application of PEM information is outpatient, where the patient does not have any guidance. Many patients return only when they develop a complication, while some tend to adapt with time, although with proper understanding, the prosthesis adaptation time can be shortened. Therefore, the significance of patient-centered communication becomes more important at the time of prosthesis delivery. Multimedia (computer-mediated) communication, along with other electronic health records at the disposal of the patient, is an important tool to deliver patient-centered care (communication) in GPSC [55]. Moreover, in patient-centered care, mere delivery of instructions and follow-up by the patient may not bring desired treatment results. This is evidenced by the results of our study, as indicated by the DPI score variations in different groups. Despite patients increase of recalling information in verbal group, the DPI score was still high at the 7-day follow-up, which suggests that patients may remember the information but their application of it may be poor. This was not observed in groups which used multimedia, as both groups had a significant reduction in denture plaque between the 2 follow-up visits, suggesting that their application of instructions was better than in patients in Gp Ve. These findings agree with previous studies on effect of multimedia on patient learning and instruction [56]. Multimedia, especially with video, allows a clinician to place patients at the center of their own care [57], as the patients can understand their role at various stages. Multimedia overcomes social, cultural, linguistic, physical, and psychological (anxiety) barriers, addresses various levels of learning according to the individual's ability and intelligence, presents PEM information in different formats and with different perspectives, and can be customized according to individual needs of the patient. Healthcare workers are working in time-pressured environments, where the healthcare providers expect the healthcare workers to process patients quickly without compromising patient communication.

Strength/Limitations

This study and its auxiliary survey highlight the present-day scenario of poor recollection and understanding of PEM information by postgraduate students involved in GPSC. The study also congregates the widely dispersed PEM information involved in various aspects of different prosthodontic options in GPSC. This study compared the traditional methods of delivering PEM, which has not been previously done in GPSC. The positive outcome of the study was the making of a movie that has been widely appreciated and circulated by academicians and practitioners among their patients across northern India. The main limitation of the study is that it was not able to monitor the quality of dentist–patient interaction during various stages of prosthesis fabrication. Another limitation is that it cannot be generalized for other fields since PEM information for prosthesis is not same as that of other treatments. Limitations of study design (cross-sectional), specific age group (40-70 years only) and different treatment periods among various options of GPSC also are limitations.

Conclusions

Within the scope and limitations of this study, one can conclude that PEM related to GPSC is extensive, complex, and

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difficult for patients to understand. Categories VI, VIII, and IX for prosthodontics patients were more difficult to understand and remember by all patients in both groups. Category V and VII instructions were easily remembered and followed by patients who were educated through audio or video. Academicians involved in teaching GPSC must reiterate the importance of PEM information to their undergraduate and postgraduate students and take measures to ensure a patient-centered care is delivered by them. No single mode of conveying PEM information can actually be considered satisfactory or comprehensive in patient education, largely because of multiple factors influencing both patient and clinician. At present, a combination method (verbal, audio, and video) may be a better choice rather than just 1 specific method. Further studies in this regard are needed to enhance patient communication and adherence in prosthodontic practice.

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Acknowledgements

The authors would like to acknowledge the Department of Computer Science, Mass Media and Communications at Subharti University for their kind assistance while filming and preparing various multimedia formats for this study. The authors would also like to thank Mr. Kamlesh Singh and Mrs. Janki Rani for their pivotal roles as actors in the video made for the study. All postgraduate students who participated in the survey and were involved in the study intervention need a special vote of thanks from all the authors.

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