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# A study to compare the efficacy of integrated instructions for fixed orthodontic treatment through various methods

**Neha Agarwal**
Professor, Department of Orthodontics and Dentofacial Orthopaedics, Rama Dental College Hospital and Research Centre, Kanpur, India
Corresponding author email: neha23975@gmail.com

**Prachi Doneria**
Post Graduate Student, Department of Orthodontics and Dentofacial Orthopaedics, Rama Dental College, Kanpur, India
Email: prachidoneria@gmail.com

**Karuna Singh Shawney**
Professor, Department of Orthodontics and Dentofacial Orthopaedics, Rama Dental College, Hospital and Research Centre, Kanpur, India
Email: drkarunachib@yahoo.co.in

**Umang Agarwal**
Reader, Department of oral maxillofacial surgery, Career Dental College, Lucknow, India
Email: drumang@rediffmail.com

**Shahid Ahmed Khan**
Senior Lecturer, Department of orthodontics and dentofacial orthopedics, Sharavathi dental college and hospital, Shimoga, Karnataka

**Amit Kumar**
Department of dentistry, Senior Resident, Department of Dentistry, All India institute of medical Sciences, Patna, Bihar
Email: dramit9956@aiimspatna.org

***Abstract*---**Objective- The purpose of this research was to determine the efficacy of verbal, written, and video communication in promoting oral hygiene, dietary changes, and care of the appliance among fixed orthodontic patients in the orthodontics department at Rama Dental College. Material and Methods- The department conducted an eye-tracking investigation with blind participants. The sample included 90 patients; 30 were assigned to each group. Randomly the patients were

allotted into verbal, written, and video groups. After three months of the given instructions, bleeding on probing, dental knowledge, cleanliness of the appliance, and mouth ulcers were evaluated to investigate the result. There was a comparison made between the three groups using a one-way analysis of variance. Result- Mean score based on oral hygiene instructions, the video method was significantly increased, while based on dietary changes, the verbal method was significantly increased, and based on the care of the appliance instructions, the verbal method was significantly increased. Conclusion- Within the constraints of the present research, it is argued that the video method is more successful in giving optimum oral hygiene instructions to patients, while verbal training is more effective in providing both diet modification and care of the appliance.

***Keywords*---**oral hygiene instructions, verbal, fixed orthodontic appliance.

## Introduction

Plaque accumulation occurs when fixed orthodontic equipment impedes access to the tooth surfaces using oral hygiene devices [1,2]. Tooth plaque surrounding orthodontic brackets has been linked to the development of white spot lesions [3,4]. Patients' dental health will improve significantly, which will have a profound impact on their quality of life [5,6]. This is why hygienists often provide advice and care for such patients before putting them on a waiting list for permanent orthodontics. Maintaining good oral hygiene practices is essential for preserving periodontal health by reducing the amount of microbial plaque on the teeth and gingiva [7,8]. Brushing and flossing regularly may help patients from developing the periodontal disease [9,10]. There are several proven psychological models of behavior control for actions like brushing one's teeth [11-18]. Professional oral health advice on oral hygiene has significantly affected patients' adherence to good oral hygiene practices [19,20]. Computers have become an increasingly integral part of people's lives as technology has advanced. The accuracy, reproducibility, and transparency of video-based instruction are three important benefits. This is the method that has been most strongly recommended by studies on how to best teach people to practice good dental hygiene. [21]. Oral hygiene training for patients with fixed orthodontics was also the subject of another study, which examined the efficacy of written, spoken, and videotaped forms of instruction. Results from the various approaches were found to be consistent and it was concluded that there was a discernible difference between them [22-25]. The modified Bass technique and computer-based oral hygiene instructions were both tested and compared. It was suggested that the video approach for oral hygiene training would be the most conventional strategy for showing the brushing style. We were unable to find any studies that compared the efficacy of computer-based oral hygiene education for fixed orthodontic patients to that of other approaches, such as written or vocal instructions. However, we also know that cultural variations may influence the outcomes of any given technique of training. This research aimed to evaluate the effectiveness of video education

against in-person verbal tactics versus brochures for fixed orthodontic patients who sought care at the Orthodontics clinic at Rama Dental College, Kanpur.

## Materials and Methods

### Study design and setting

From January through March of 2022, the orthodontics department of Rama Dental School conducted a blinded clinical study. Everyone got their regular orthodontic care. There was no change in their orthodontic treatment as a result of this research. Patients were randomly assigned to one of three groups, each of which received different instructions for oral hygiene, dietary changes, and appliance maintenance.

### Subjects, sample size, and randomization

95 Patients in need of fixed orthodontics from Rama Dental College who were chosen using a simple sampling approach had no history of prior orthodontic treatment. Participants could not be younger than 15 or older than 25, had to be literate, have at least 20 permanent teeth, have 10 or more teeth bleed during the study, not have severe crowding, not use electric toothbrushes, not smoke, not have had any dental work that would have affected their gingival health or oral hygiene, and could not be pregnant or nursing. Poor restorations, calculus, and abnormal dental crown morphology were all ruled out as potential local risk factors for plaque accumulation, as were those with a history of smoking or diabetes. After discussing the study with a statistician, we decided on 90 patients, 30 in each group. Patients were given a self-designed questionnaire that included questions about their demographics, their primary complaint, and 10 multiple-choice questions on oral health at the first session of lower arch banding and bonding. This questionnaire served as the intervention test score. A pilot study was conducted to test the validity and reliability of the questionnaire. We started by having a single expert in the Orthodontics department review each question and the whole survey. Expert feedback informed the changes made to better accomplish the study's stated aims. A professional designer was engaged to assess the questionnaire's superficial reliability. Twenty patients receiving orthodontic treatment were randomly selected to receive the final survey. Cronbach's alpha was used to determine the reliability of the survey ( = 0.73). After waiting four weeks, these 20 individuals were invited to complete the survey once again. With the use of the kappa agreement test, we were able to determine that the questionnaire was reliable both initially and after being retested. Questions on appliance maintenance, diet, and routine oral hygiene were asked during fixed orthodontic treatment. A score of 1 was awarded for each right answer and a score of 0 was given for each erroneous response. As a result, each patient's final score fell between 0 and 10. After the intervention was completed, the pre-intervention oral hygiene status was documented by filling out a simple outline form. Patient demographics and bleeding during the probing index were included in the form's original layout. The patient’s upper and lower arches were banded and bonded to straighten them out. Each patient's teeth were straightened using the same materials: 0.022 in. metal brackets and bands (MBT treatment, Small Expert SeriesTM American OrthodonticsTM metal brackets, and

bands), Nickel Titanium (NiTi) (3M) curve wire, combination bond 5 (groundwork), and light fix (glue) (OrthofixTM) (occlusogingival and mesiodistal bits of the focal point of the tooth, sections, and band primary cylinders situated in a similar spot). Each tooth had any excess adhesive examined and cleaned off. Following completion of the intervention form, patients were randomly assigned to receive either verbal, written, or video instructions on dental hygiene, food, and appliance maintenance. A computer-based random number generator was used for the selection process, and the results were secreted away in sealed, opaque envelopes containing a sequence of numbers. This straightforward random number generator was developed separately. After the random assignment, each group was compared to the others to ensure that they were similar in age.

**Instructions**

Upper and lower teeth were banded and bonded as instructed after the session. Orthodontic patient oral hygiene tools All of the test participants were given an ortho brush and an interdental brush during the admissions session. The impression session required patients to bring their tools. The patients were not supposed to have a banding and bonding session until the equipment was examined. All participants in the study were given oral hygiene education covering the same five topics: brushing, flossing (with an interdental brush), rinsing, caring for fixed appliances, and eating well. Patients were taught how to clean around their braces and their third molars using a modified Bass brushing method. The use of super floss, which was shown, was recommended, and the recommended frequency was set at once per day. Daily use of a fluoride-containing mouth rinse is now an option. Patients were also advised on how to maintain their devices and what kinds of foods they should avoid, such as anything too hard or sticky. Both groups (3 min brushing, 1 min rinse, and 2 min each flossing, interdental brushing, appliance care, and diet) received instructions for a total of 10 min. Pamphlets were used to disseminate the written guidelines. The majority of the prepared training was based on content originally published on the websites of the Indian Orthodontic Society [24], the American Association of Orthodontists [25], the British Dental Health Foundation [26], and Carranza's Clinical Periodontology [27]. Participants in the verbal group were given verbal instructions on how to practice good oral hygiene. Patients assigned to the written method received pamphlets outlining proper oral hygiene practices. In the group that watched the videos, patients learned how to properly care for their teeth and gums. The verbal group saw each stage of the procedure demonstrated on a dental model wearing braces. Patients were instructed not to interrupt the presentation with inquiries unrelated to proper dental hygiene. This was taken into account to lessen the potential for discrepancies in the information the verbal group would receive versus the video group and the written group. The same material was presented in video format to the video group. The video's creator is a professor of orthodontics at Rama Dental College in Kanpur. It was the subject's WhatsApp number that received the video. The training video segment that concluded each chapter included textual and visual demonstrations. In both of the videos, Hindi and English were used by the narrator. The intervention's efficacy was measured by assessing the participants' oral hygiene practices every three weeks for up to three months. Patients refilled out the dental knowledge questionnaire, with the highest score representing the quality of the intervention.

Patients who did not show up by the specified date were not included, so supplementary samples have already been collected.

**Outcome measures**

The dental information poll's mediation score, the cleanliness of the equipment, the prevalence of mouth ulcers, and the evidence of draining during testing all contributed to a general shift in how oral hygiene practices are conceived and implemented. Drainage on testing (BOP) data was used to assess a change in periodontal health, which was predicted. Aside from the first and second premolars, which are more vulnerable to section breakages and extraction, all 20 permanent maxillary and mandibular teeth (focal incisors, parallel incisors, canines, first molars, and second molars) were included for evaluation of draining on testing. The BOP file was tested on both the buccal and lingual sides of the selected teeth. The BOP was assessed in three distinct regions of the free gingiva: the proximal, central, and distal regions. After doing minimal periodontal testing in all areas, if draining continued for more than 30 seconds, a point would be awarded (Williams periodontal test; Hu-Friedy, Chicago, USA). A single score was assigned to each of the BOP's selected teeth based on the total number of focal points. The final score on the curve was determined by the total number of these concentrations. The BOP file included all teeth and the complete curve, and the ranges for each were a firm 0–3 and 0–9, respectively.

**Ethical consideration**

The subcommittee was constituted by the Institutional ethics committee. RDCHRC has reviewed and discussed your protocol to conduct the Research study. Participants were assured anonymity and the confidentiality of their data. All parental agreement to use their children's data in this research was obtained in writing.

**Statistical analysis**

To do this, we averaged the scores for the upper and lower arches on the BOP index across the three groups (verbal, visual, and written). Mean intervention ratings across the three groups were also calculated. To analyze the data, we employed one-way ANOVA. We utilized paired t-tests to compare how the groups fared after the interventions. When comparing the BOP index before and after the intervention, the same statistical test was employed for each group.

Table 1: Inter-group comparison of Scores based on oral hygiene instructions among Group 1, Group 2, and Group 3

| Groups | N | Min | Max | Mean | SD | P value |
|---|---|---|---|---|---|---|
| Group 1 | 30 | 4 | 9 | 6.63 | 1.22 | 0.003 S |
| Group 2 | 30 | 3 | 9 | 6.53 | 1.68 | |
| Group 3 | 30 | 5 | 9 | 7.60 | 0.93 | |

Statistical Analysis: ANOVA one-way test. S: statistically significant if P≤0.05; NS: Not significant.

Table 2: Inter-group comparison of Scores based on oral hygiene instructions between Group 1, Group 2, and Group 3

| Groups | Mean | SD | Mean difference | P value |
|---|---|---|---|---|
| Group 1 | 6.63 | 1.22 | 0.10 | 0.792 NS |
| Group 2 | 6.53 | 1.68 | | |
| | | | | |
| Group 1 | 6.63 | 1.22 | 0.97 | 0.001 S |
| Group 3 | 7.60 | 0.93 | | |
| | | | | |
| Group 2 | 6.53 | 1.68 | 1.07 | 0.003 S |
| Group 3 | 7.60 | 0.93 | | |

Statistical Analysis: Independent sample t-test. S: statistically significant if P≤0.05; NS: Not significant.

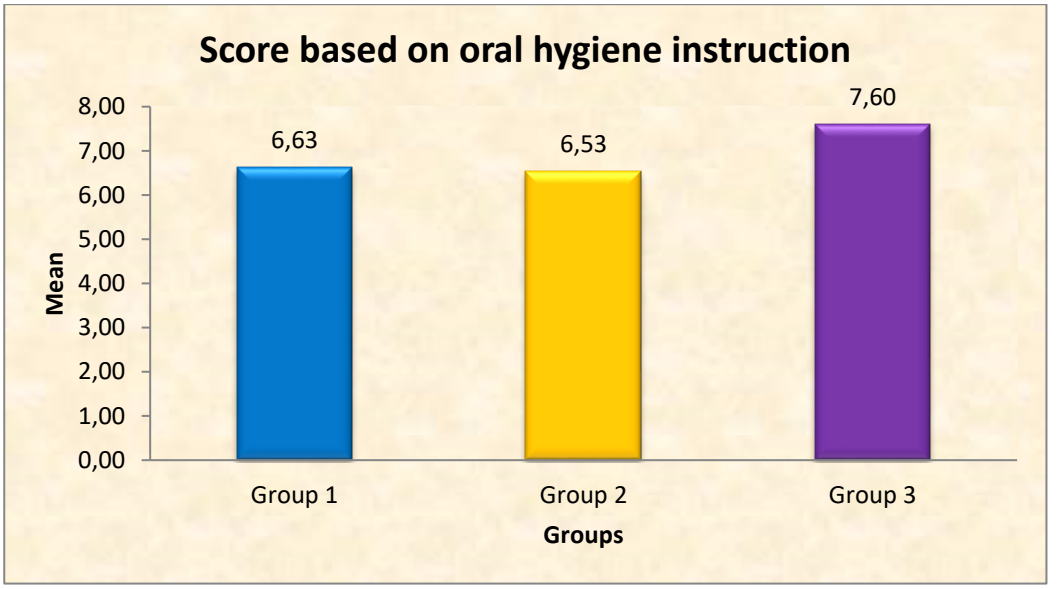



Table 3: Inter-group comparison of Scores based on dietary modification instructions among Group 1, Group 2, and Group 3

| Groups | N | Min | Max | Mean | SD | P value |
|---|---|---|---|---|---|---|
| Group 1 | 30 | 1 | 8 | 4.97 | 2.04 | 0.000 S |
| Group 2 | 30 | 1 | 7 | 3.00 | 1.53 | |
| Group 3 | 30 | 1 | 6 | 2.83 | 1.37 | |

Statistical Analysis: ANOVA one-way test. S: statistically significant if P≤0.05; NS: Not significant.

Table 4: Inter-group comparison of Score based on dietary modification instructions between Group 1, Group 2, and Group 3

| Groups | Mean | SD | Mean difference | P value |
|---|---|---|---|---|
| Group 1 | 4.97 | 2.04 | 1.97 | 0.000 S |
| Group 2 | 3.00 | 1.53 | | |
| | | | | |
| Group 1 | 4.97 | 2.04 | 2.14 | 0.000 S |
| Group 3 | 2.83 | 1.37 | | |
| | | | | |
| Group 2 | 3.00 | 1.53 | 0.17 | 0.658 NS |
| Group 3 | 2.83 | 1.37 | | |

Statistical Analysis: Independent sample t-test. S: statistically significant if P≤0.05; NS: Not significant.

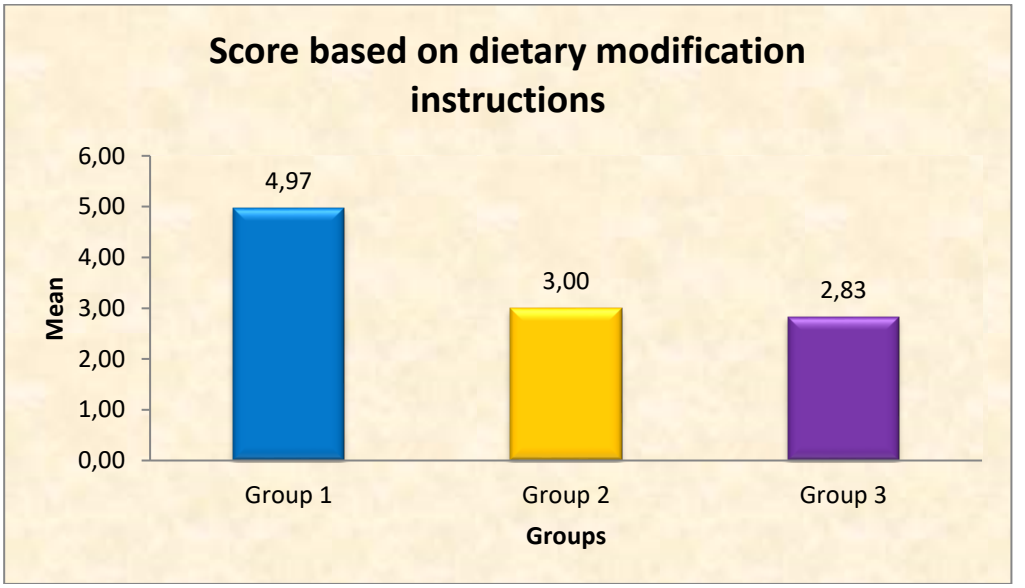



Table 5: Inter-group comparison of Score based on the care of appliance instructions among Group 1, Group 2 and Group 3

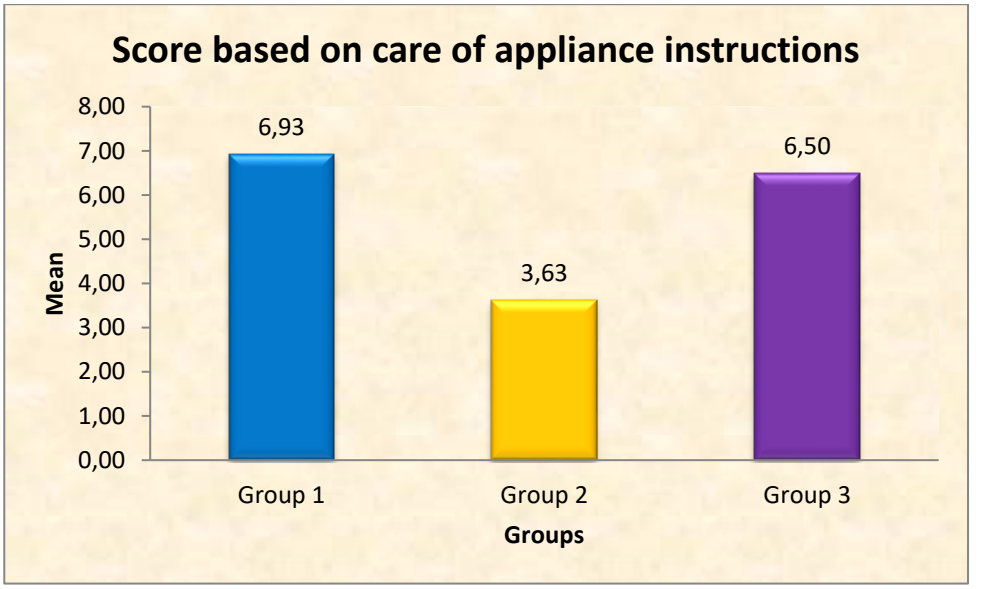
| Groups | N | Min | Max | Mean | SD | P value |
|---|---|---|---|---|---|---|
| Group 1 | 30 | 3 | 9 | 6.93 | 1.20 | 0.000 S |
| Group 2 | 30 | 2 | 6 | 3.63 | 1.07 | |
| Group 3 | 30 | 5 | 8 | 6.50 | 0.94 | |

Statistical Analysis: ANOVA one-way test. S: statistically significant if P≤0.05; NS: Not significant.

Table 6: Inter-group comparison of Score based on the care of appliance instructions between Group 1, Group 2 and Group 3

| Groups | Mean | SD | Mean difference | P value |
|---|---|---|---|---|
| Group 1 | 6.93 | 1.20 | 3.30 | 0.000 S |
| Group 2 | 3.63 | 1.07 | | |
| | | | | |
| Group 1 | 6.93 | 1.20 | 0.43 | 0.125 NS |
| Group 3 | 6.50 | 0.94 | | |
| | | | | |
| Group 2 | 3.63 | 1.07 | 2.87 | 0.000 S |
| Group 3 | 6.50 | 0.94 | | |

Statistical Analysis: Independent sample t-test. S: statistically significant if P≤0.05; NS: Not significant."




**Results**

They choose 90 people to participate. Thirty people were randomly assigned to each of the three groups (verbal, written, and video). There was a 100% recruiting rate across all groups, with no subjects cancelling their second appointment or deboning their braces. In all three groups, there was a p0.05 correlation between age and gender. Table 1 through Table 6 displays subject descriptive data for the spoken, written, and video groups, respectively. Significant differences were seen between the verbal, written, and video groups regarding the mean BOP file score, oral health awareness, and machine care. After arranging all of the data, we observe that the video group has a much higher mean score than other groups for oral cleanliness instruction, while the verbal group has a significantly higher mean score than other groups for food swaps and machine maintenance.

**Discussion**

This review aimed to assess the effectiveness of verbal, written, and video oral hygiene guidance, dietary change, and care of the apparatus among patients undergoing fixed orthodontic treatment by utilizing the draining on the testing list, the dental information score, the tidiness of the machine, and the prevalence of mouth ulcers. Patients may benefit from better oral health by learning good oral hygiene practices, which can be achieved via oral hygiene teaching. There are several proven psychological models for behavior control in the area of oral hygiene-related actions [14–18]. Many uncontrollable socio-psychological variables of oral hygiene behavior were presented when analysing these models. The process of altering one's behavior has been shown to include three types of learning: cognitive, emotional, and behavioral [29]. To measure the mental impact of dietary changes, researchers filled up a custom questionnaire testing participants' awareness of oral health. Periodontal health, seen as the result of behavioral modification, was evaluated using the BOP index. It was revealed that there were significant differences between the three groups in terms of dental knowledge, oral hygiene condition, and appliance maintenance. We also accounted for lifestyle and occupational characteristics that may influence dental hygiene practices [30]. Three weeks following a session of banding and bonding the upper and lower arches during which oral hygiene instruction was orally delivered, there was no significant change in knowledge of dental health, as well as the state of oral hygiene and periodontal health. It is evident from the index that the OHI via video was effective since low scores indicate that poor oral hygiene and periodontal health are to be expected in the absence of specific oral hygiene treatments. In addition, if there were larger sample size, the findings would likely be statistically significant (as suggested by the p values of the three parameters). The OHI group that received written materials saw considerable improvements in their ability to alter their diet and maintain their device. Considering the comparable subject numbers in the verbal, written, and video groups, it is reasonable to conclude that the video group may be more helpful in teaching patients aged 15 to 25 who had fixed orthodontics about proper dental hygiene. Only two-thirds of the teeth that are below the gum line were assessed since the orthodontic brackets and wire would interfere with regular cleanings. The findings of this research were consistent with those of the BOP index. In contrast to our research, which explicitly highlighted potential confounding variables as inclusion/exclusion criteria during sample selection and randomization, this one did not. Respondents were given copies of the leaflet to read at their leisure. The trial's controls may be compromised and inferences drawn from it rendered unreliable if the pamphlet and its contents influenced behavior in any of the three study groups. Participants were neither limited in their exposure to the booklets and films, nor in their ability to switch to the verbal group. In research evaluating the effectiveness of written, verbal, and videotape methods of oral hygiene training for patients with fixed orthodontics, the results indicated no statistically significant difference between the modalities. That went against what we found. There may have been a distinction since the patients in the trial had been banded and bonded for some time before to the investigation, often between one and three months. It is unclear when precisely the patients were trained on how to clean around their braces and teeth. Because of this, the results of the research may have been skewed. It would be unethical if the

participants were not briefed at the initial banding and bonding session. Models adjusted bass playing after receiving oral hygiene training through written text or video. The orthodontics department's professors reached a consensus that video oral hygiene training is the best tool for demonstrating proper brushing, flossing, and rinsing techniques. Participants in our research ranged in age from teenagers to early adulthood (15-25 years). The scope of our investigation was not exhaustive. Furthermore, following follow-ups did not examine the maintenance of the habit, and the condition of oral hygiene was only assessed every three weeks for three months. It is suggested that future studies recruit more people and do more follow-ups.

**Conclusions**

Video education may be more helpful than verbal and written techniques in fixed orthodontic patients in achieving optimal oral health status, within the limits of the present research. In fixed orthodontic treatment, it has been proposed that spoken education is more successful than written or video approaches in offering dietary adjustment and maintenance of the appliance.

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