



Video discharge instructions for pediatric gastroenteritis in an emergency department: a randomized, controlled trial

A. Jové-Blanco¹ · G. Solís-García¹ · L. Torres-Soblechero¹ · M. Escobar-Castellanos¹ · A. Mora-Capín¹ · A. Rivas-García¹ · C. Castro-Rodríguez¹ · R. Marañón¹

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Abstract

The aim was to evaluate if the addition of video discharge instructions (VDIs) to usual verbal information improved the comprehension of information provided to caregivers of patients who consult for acute gastroenteritis (AGE). We conducted an open-label, parallel, randomized trial, enrolling patients who consulted for AGE at a tertiary hospital. First, caregivers answered a written test concerning AGE characteristics and management. They were randomly allocated to a control group, which received the usual verbal instructions, or to an intervention group, which additionally received VDI. After discharge, caregivers were contacted by telephone and answered the same test, satisfaction questions, and follow-up information. From September 2019 to March 2020, 139 patients were randomized, 118 completed follow-up. The mean score was 3.13 (SD 1.07) over 5 points in the initial test and 3.96 (SD 0.96) in the follow-up test. Patients in the intervention group had a greater improvement (1.17 points, SD 1.11) than those in the control group (0.47 points, SD 0.94, $p < 0.001$). In the follow-up test, 49.1% in the intervention group and 18.6% in the control group answered all questions correctly ($p < 0.001$). There were no significant differences in return visits. Caregivers gave high satisfaction scores regardless of the allocation group.

Conclusion: Video instructions improve caregivers' understanding of discharge information.

Trial registration: [NCT04463355, retrospectively registered July 9, 2020].

What is Known:

- Poor comprehension of discharge instructions leads to incorrect treatment after discharge, increased readmissions and a reduction of caregivers' satisfaction.
- Video discharge instructions are useful providing concise information independently of the patients' health literacy level or communication skills of the health care provider

What is New:

- The addition of video discharge instructions to verbal instructions improves caregivers' knowledge about AGE improved with respect to those who only receive verbal instructions
- Video instructions do not add extra time to the emergency department visits

Keywords Clinical trial · Discharge information · Video instructions · Caregivers' satisfaction, caregivers' knowledge · Acute gastroenteritis

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✉ G. Solís-García
gonzalo.solis@salud.madrid.org; gonsolisg92@gmail.com

Abbreviations

AGE	Acute gastroenteritis
IQR	Interquartile range
PED	Pediatric emergency department
SD	Standard deviation
VDI	Video discharge instructions

Extended author information available on the last page of the article

Introduction

Acute gastroenteritis (AGE) is a frequent cause of consultation in the pediatric emergency department (PED) with a subsequent high healthcare spending [1]. AGE has usually a self-limited and favorable course; therefore, it is essential to provide adequate discharge instructions in order to improve treatment adherence and avoid unnecessary return visits. However, providing effective discharge information in the PED can be a challenging task due to the hurried environment [2].

Discharge instructions are a key element in patients' PED aftercare management. Both patients and caregivers must understand the diagnosis, the treatment received, and when and why they should be reevaluated in order to diminish unnecessary return visits and improve caregivers' satisfaction [3]. Poor comprehension of discharge instructions leads to incorrect treatment after discharge, increased PED readmissions, and a reduction of caregivers' satisfaction.

Patient-centered care is based on effective communication, which is often overestimated by healthcare providers [2]. Comprehension of discharge instructions depends on caregivers' health literacy level, complexity of the instructions given, time constraints in PED or the communication skills of the healthcare provider [4, 5]. Improving the comprehension of discharge information has been the subject of multiple studies, concluding that simple, straightforward, short, and standardized instructions improve caregivers' comprehension [6–8]. Different strategies have been used to ameliorate discharge instructions. The most common formats are verbal, written, and video instructions. One of the disadvantages of verbal instructions is that information can be incomplete and that in this case comprehension depends mostly on the healthcare provider communication skills [9, 10]. Instead, written instructions are frequently left unread by caregivers [9] and mostly overestimate the caregivers' health literacy level [10].

The use of video discharge instructions (VDIs) has proved to be a useful strategy to provide clear, simple, and concise information independently of the patients' health literacy level or communication skills of the healthcare provider [3, 11, 12]. Demonstrations and illustrations can be included, being effective tools in patient education [2]. VDI must provide key points which tackle diagnosis, management, and follow-up information. In order to keep caregivers' and patients' focus and attention, the video's length must be short (less than 3 min) [3]. Previous studies [2, 10] suggest that the use of visual aid could be incorporated to clinical practice as a communication and educational element.

This study was designed to evaluate if the addition of VDI to usual verbal information improved the comprehension of the information provided to caregivers of patients who consult in PED for acute gastroenteritis. As secondary objectives, we aimed to evaluate if video instructions improved satisfaction with the information received and decreased return visits.

Methods

Design and setting

The study was an open-label, parallel, randomized trial which took place between June 2019 and March 2020 in the PED of a third-level Spanish hospital which receives 58,000 emergencies annually. Up to 3 eligible patients were enrolled every shift when one of the main investigators was present. Simple, 1:1 randomization was performed using R software [13]. Patients were randomly assigned to a group by opening sequentially numbered paper envelopes which contained the group in which the patient would be allocated, ensuring thus allocation concealment.

Patients

We enrolled patients from 1 month to 16 years who met ESPGHAN criteria for AGE: decreased stool consistency and/or increased evacuation frequency during a period < 7 days, associated or not to fever or vomiting [14]. Patients were eligible if they were accompanied by a usual caregiver; if two caregivers were present, they could decide who would participate. We excluded patients with severe dehydration, chronic comorbidities needing special instructions (i.e., neurologic, respiratory, or cardiologic), those whose caregivers were not able to communicate in Spanish, and those who were admitted for hospitalization. Written informed consent was provided before trial enrollment.

Interventions

The trial was developed in three steps: an initial written test, an information phase, and a second follow-up test after discharge.

1. First step. After enrollment, all patients filled-in a written test before discharge, which consisted of 5 questions about AGE: etiology, treatment, dehydration signs, after-care diet, and reasons to reconsult (Appendix 1). Each correct answer scored 1 point. In addition, demographic and clinical characteristics of the AGE episode were collected: gender and age of the patient, siblings, previous AGE episodes, AGE symptoms (fever, diarrhea, and vomiting), Gorelick score [15], caregiver filling in the questionnaire and academic level, as well as length of stay in the PED. Academic level was categorized as primary education, secondary education, technical qualification, and university studies. Length of stay in the PED included both waiting time and time consumed by the verbal and video instructions.
2. Second step. Enrolled subjects were randomly assigned to the control or intervention group. In the first group of

subjects (control group), caregivers received, after completing the test and prior to discharge, the usual verbal information and recommendations about AGE following the guidelines of the Spanish Society of Pediatric Emergencies [16]. In the second group (intervention group), patients were shown a short 2-min video providing the same information about AGE, in addition to verbal instructions. In both groups, instructions were given by one of the main investigators in order to provide homogeneous and consistent information. Both sets of instructions explicitly included the information that had been previously asked in the test. All patients additionally received a discharge report which included instructions concerning aftercare treatment.

3. Third step. After discharge, all caregivers were contacted by telephone and were asked the same 5 questions from the initial test. The questionnaire had to be completed by the same caregiver as in Step 1. This test also included questions about subsequent visits to either emergency units or outpatient pediatric clinics, satisfaction with the information (caregivers were asked to evaluate information in a score 0–10) and a question about whether they perceived video instructions as potentially useful tool or not. All questions were asked to all patients independently of the group they had been allocated to. The first telephonic contact was established 72 h after discharge. If investigators were not able to contact them at first, telephonic contact would be repeated every 1–2 days up to a total of 5 days before excluding them and considering them as lost in follow-up.

Main outcome measures

The primary efficacy endpoint was the difference between the score obtained in the initial test and the follow-up test. Secondary efficacy assessments included the number of caregivers who got a 100% score in the follow-up test, the rate of return visits and caregivers' satisfaction. No post hoc analysis were made.

The trial was approved by the hospital's Institutional Review Board and registered at clinicaltrials.gov database as NCT04463355. No financial aid was involved in the study. No changes were made in the protocol after the start of the study. All authors are responsible for adherence to the protocol and veracity of the data.

Statistical analysis

The sample size was calculated to provide a statistical power of 80% at an alpha level of 5% to detect a two-tailed difference of 0.5 points between the two groups. We calculated that with an estimated loss rate of 15% of patients between

randomization and follow-up test, assuming a 1-point variance in test results based on previous studies [3], this statistical power would be reached by enrolling 75 patients in each group.

All randomized patients who completed both tests were included in the primary endpoint analysis as part of the group in which they were randomized, following intention-to-treat principle. Patients lost before completion of the second test were not included as it was not possible to calculate the primary endpoints. The differences in test points and satisfaction between groups were analyzed using Student's *t* test, and the differences in proportions were analyzed using chi-square test. Statistical significance was set at $p < 0.05$. Analysis was performed using Rv3.6.1 and SPSS.25 statistical software.

Results

Patients

From September 2019 to March 2020, 159 patients with AGE were assessed for eligibility. Of the 139 patients included in the study, 69 patients were randomized to the standard verbal information group (control group) and 70 patients to the video instructions group (intervention group) (Fig. 1). After discharge, 59 patients (85%) in the control group and 59 patients (84%) in the intervention group were contacted by telephone and were included in the follow-up analysis.

The baseline characteristics of each group are provided in Table 1. Median age was 2 years (IQR 1–5) and 65 patients were male (60.2%). Only 15 patients (12.7%) presented with dehydration. Of these dehydrations, 11 (9.3%) were mild (Gorelick < 2) and 6 (5%) were moderate (Gorelick 3–6). The median global score in the pre-allocation written test was 3.13 over the 5-total score (SD 1.07). The mean time elapse from discharge to step 3 was 6.58 days (SD 2.28) without differences between groups ($p = 0.67$).

Primary outcome

Analyzing the difference in scores obtained in step 1 and step 3, patients in the intervention group had a greater improvement (1.2 points, SD 1.11) than those in the control group (0.5 points, SD 0.94, $p < 0.001$). Scores for both groups in each test are summarized in Fig. 2. In step 3, there was a difference of 0.3 points between allocation groups in favor of the intervention group, which was not statistically significant.

Secondary outcomes

The mean score for all patients was 3.13 (SD 1.07) over a total score of 5 points in step 1 and 3.96 (SD 0.96) in step 3. Globally, only 2 caregivers (1.7%, one of each group)

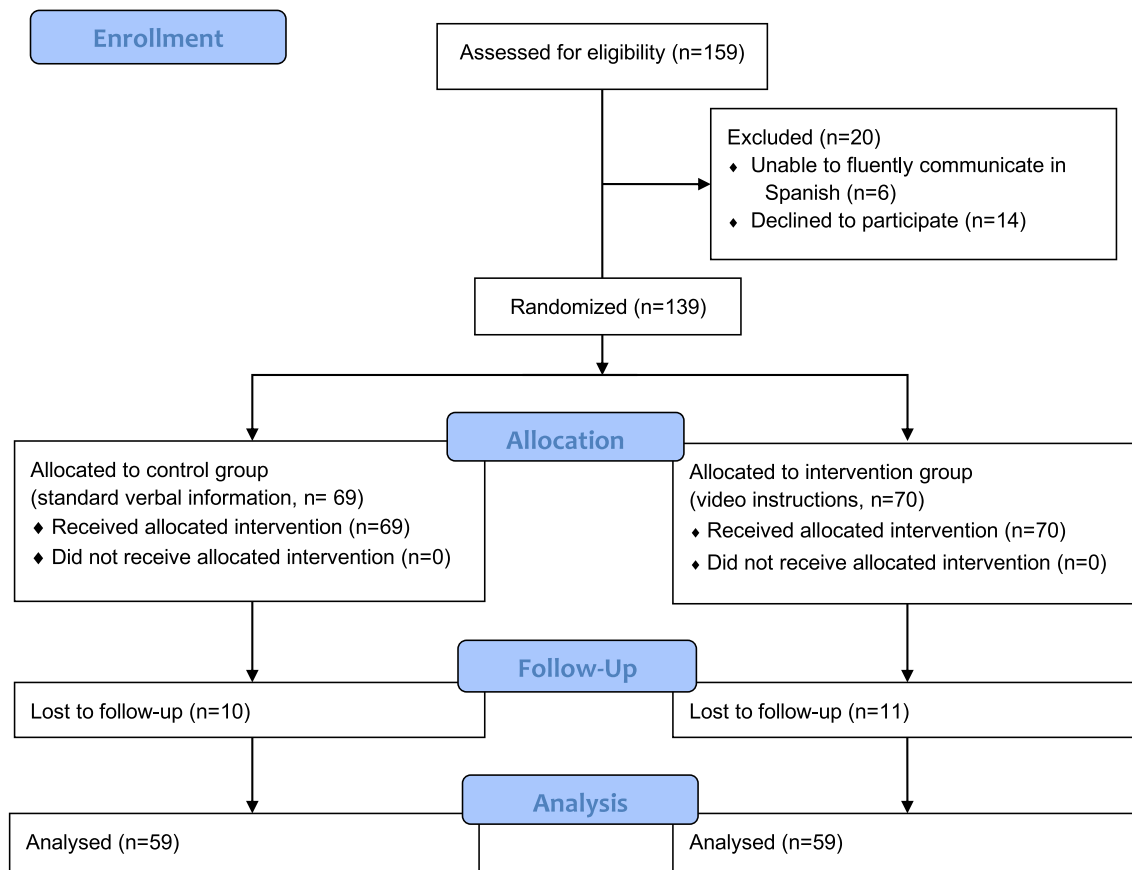


Fig. 1 Flow diagram

answered 5 over 5 questions correctly in step 1. In the follow-up test, up to 40 caregivers (37.0%) answered all questions correctly: 29 caregivers (49.1%) belonged to the intervention group and 11 caregivers (18.6%) to the control group ($p < 0.001$).

There were no differences in the test scores in relation to previous AGE episodes ($p = 0.33$), patients' sex ($p = 0.94$) or age ($p = 0.67$), caregivers' educational level ($p = 0.96$), or to whether the mother, father, or grandparent was participating in the study ($p = 0.72$). The question that most caregivers failed to get right, in both moments of the study and both allocation groups, was "What kind of diet should children with AGE receive?"

The frequency of return visits was 25.4% (15) in the control group. Of these 15 patients, 3 revisited PED and 12 were attended in a primary healthcare center. The frequency of return visits in the intervention group was 28.8% (17): six patients were attended in PED and 11 patients in a primary healthcare center. Of them, 2 patients (one in each group) needed intravenous fluid rehydration and 1 (in the control group) needed oral rehydration treatment. Only one patient (in the intervention group) needed subsequent admission, but the cause was not AGE but an accidental intake of a caustic agent. There was no significant difference in the

frequency of return visits, globally ($p = 0.68$) nor specifically emergency visits ($p = 0.49$).

Regarding caregivers' perceived satisfaction level with information, caregivers gave high scores regardless of the allocation group (control group 9.64, SD 0.66, vs intervention group 9.74, SD 0.58, $p = 0.50$). More caregivers thought that video instructions could be useful in the video instructions group than in the standard verbal information group: 57 caregivers (96.6%) in the intervention group considered that videos could be useful while only 53 caregivers in the control group considered so (89.8%, $p = 0.043$).

Discussion

The present study analyzes the effect of the addition of discharge video instructions to verbal information in PED. We observed that when caregivers received VDI in addition to verbal instructions, their performance in a test that measured AGE knowledge improved with respect to those who only received verbal instructions.

These results are consistent to those obtained by Bloch [3], where the addition of video instructions about AGE, fever, and asthma symptoms improved caregivers' knowledge after

Table 1 Baseline characteristics of patients who completed both questionnaires

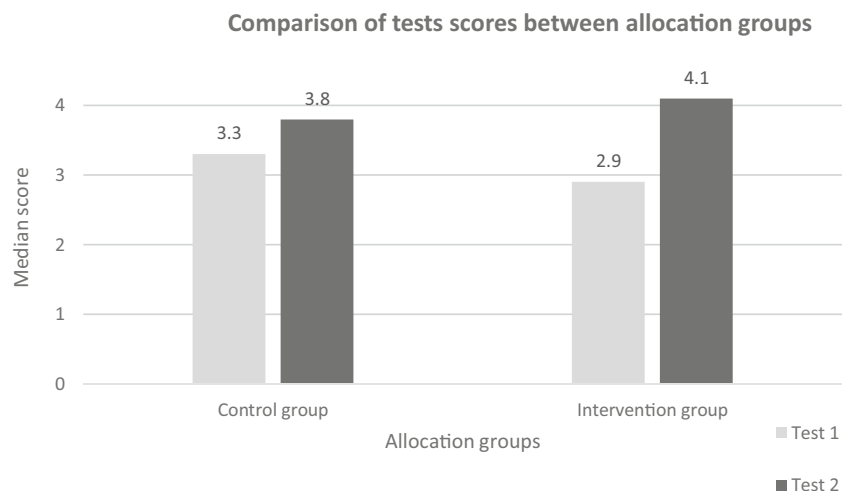
	Control group (n = 59)	Intervention group (n = 59)
Gender (% male)	32 (54.3%)	33 (55.9%)
Age, median years (IQR)	2 (0–6)	2 (1–4)
Sibling (%)	38 (64.4%)	33 (55.9%)
Previous episodes (%)	34 (57.6%)	33 (55.9%)
Symptoms (%):		
Diarrhea	59 (100%)	59 (100%)
Vomiting	44 (74.6%)	38 (64.4%)
Fever	34 (57.6%)	27 (45.8%)
Score Gorelick, mean (SD)	0 (0–0)	0 (0–0)
Caregiver enrolled (%)		
Mother	51 (86.4%)	50 (84.7%)
Father	6 (10.2%)	9 (15.3%)
Grandparents	2 (3.4%)	0
Academic level (%)		
Unknown	0	1 (1.7%)
None	1 (1.7%)	0
Elementary school	6 (10.2%)	7 (11.9%)
High school	20 (33.9%)	21 (35.6%)
Technical qualification	9 (15.2%)	12 (20.3%)
University degree	23 (39.0%)	18 (30.5%)
Caregiver’s age, mean years (SD)	36.8 (8.2)	33.6 (7.8)
Pre-allocation test score, mean (SD)	3.3 (0.9)	2.9 (1.2)
Length of stay, median minutes (IQR)	30 (15–90)	30 (15–90)

Qualitative variables are shown in absolute frequencies and percentages. Quantitative variables are shown in means and standard deviations (SDs) or in medians and interquartile ranges (IQRs)

discharge. The use VDI has been extended to other aspects such as providing information about appropriate antibiotic use [12], fever and head injuries [17], or sprains and lacerations [11], improving the comprehension of discharge information in the short and long term as well as caregivers’ satisfaction with the information. Alternatively, Wood [10] pointed out

that the benefit of VDI depends on the disease, observing a greater improvement in caregivers’ knowledge when they received VDI for gastroenteritis than for fever/bronchiolitis. Although a single clinical trial regarding acute media otitis found no differences between paper and video instructions [18], most studies [3, 10–12] agree that VDI minimize factors

Fig. 2 Comparison of tests scores between allocation groups. Patients in the intervention group had a greater improvement than those in the control group (Student *t* test, *p* < 0.001)



which affect the comprehension of the instructions such as the communication skills of healthcare providers. Our results prove that video instructions do not add extra time to the emergency department visits, as already suggested by previous articles [3]. Therefore, the use of short VDI seems a useful strategy to provide clear and standardized discharge instructions in PED, which has been highlighted as a key path to improve quality of care for children and caregivers [19].

Interestingly, Ismail et al. observed that families with lower educational level (less than high school education) could be most benefitted by the addition of VDI to standardized verbal instructions [17]. We did not find such differences, probably due to having a small percentage of caregivers with low educational level. A previous systematic review also found no differences in PED outcomes and costs depending on health literacy [20].

As a secondary endpoint, we aimed to compare the frequency of return visits between groups. We did not find differences, probably due to the sample size not being calculated for this outcome: in order to find a difference between 25 and 15% rates of return visits, we would have needed to randomize 464 patients, more than three times more the sample size we used for our primary outcome. A previous before-and-after study [21] found that implementing a set of clinical practices which included standardized (but not video) instructions would reduce subsequent visits to PED. However, this study included more measures such as identification of risk factors, management plans, feedback systems, and planned visits to clinics. Alternatively, a similar before-and-after study found no differences in return visits in the period after computer-generated discharge instructions were implemented [22] so the direct effect of these instructions cannot be inferred.

We also aimed to measure caregivers perceived satisfaction with the information received. Previous studies comparing video instructions to usual information show that VDI may be perceived as more helpful [3]. In our study, we did not find significant satisfaction differences, with very high satisfaction in both groups. However, we found that caregivers who received video instructions were more likely to think that VDI could be helpful in the understanding of their children's disease. This may be a sign of lack of familiarity with video instructions from the parents allocated to the control group. Given the high satisfaction with video instructions in the intervention group, as a future quality improvement project they will be available in the hospital's Web page for all caregivers to watch at home.

Our study has some limitations. It is a single-center design, and we only enrolled patients who consulted during working shifts of one of the investigators; although this included patients in different morning, evening and night shifts as well as those who attended PED in working days and holidays, it may have led to selection bias. When both caregivers were present, it is probable that the most qualified of them was the one who

decided to participate. Due to coronavirus pandemic situation and the reorganization of patient care [23], we were forced to stop patients' recruitment, hence the smaller sample analyzed. Even though the allocation was random, there was a difference of 0.4 point between the scores obtained in step 1 in favor of the control group. In step 3, we did not find differences between the scores obtained by each group, probably due to these differences found in step 1. Finally, we did not enroll any patients with severe dehydration, which could be the one of the populations whose caregivers are most benefited by detailed information.

As a conclusion, we have found that in our population of pediatric patients with acute gastroenteritis, short video instructions improve caregiver understanding of the information given. Satisfaction with the information provided is high and return visits are not frequent.

Author contributions AJB, GSG, and RM were responsible for the trial design and wrote the trial protocol. AJB, GSG, LTS, and MEC enrolled the patients and collected the data. GSG analyzed the data. AJB, GSG, LTS, and CCR wrote the draft of the manuscript, which was critically revised by RM, MEC, ARG, and AMC.

Compliance with ethical statements

The manuscript has not been published nor is under consideration for publication in any other journal.

Conflict of interest The authors declare that they have no conflict of interest.

Informed consent Informed consent was obtained from all individual participants included in the study.

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Affiliations

A. Jové-Blanco¹ · G. Solís-García¹ · L. Torres-Soblechero¹ · M. Escobar-Castellanos¹ · A. Mora-Capín¹ · A. Rivas-García¹ · C. Castro-Rodríguez¹ · R. Marañón¹

A. Jové-Blanco
ajoveblanco22@gmail.com

L. Torres-Soblechero
ltsoblechero@outlook.com

M. Escobar-Castellanos
mariaescobarcastellanos121091@gmail.com

A. Mora-Capín
andreamc4@hotmail.com

A. Rivas-García
arisrivas@hotmail.com

C. Castro-Rodríguez
cristinacastror@gmail.com

R. Marañón
rafamaranonpar@gmail.com

¹ Pediatric Emergency Department, Hospital General Universitario Gregorio Marañón, C/O’Donell 48, 28009 Madrid, Spain