Patient Education and Counseling 97 (2014) 16–22

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.elsevier.com/locate/pateducou

Review

# Video-assisted patient education to modify behavior: A systematic review

Manar Abu Abed [a], Wolfgang Himmel [b], Stefan Vormfelde [a], Janka Koschack [b,*]

[a] Department of Clinical Pharmacology, University Medical Center, Göttingen, Germany
[b] Department of General Practice, University Medical Center, Göttingen, Germany

ARTICLE INFO

*Article history:*
Received 3 February 2014
Received in revised form 17 June 2014
Accepted 25 June 2014

*Keywords:*
Videotape recording
Audio–visual aid
Teaching material
Health behavior
Patient education
Systematic review

ABSTRACT

*Objective:* To evaluate the efficacy of video-assisted patient education to modify behavior.
*Methods:* Fourteen databases were searched for articles published between January 1980 and October 2013, written in English or German. Behavioral change as main outcome had to be assessed by direct measurement, objective rating, or laboratory data.
*Results:* Ten of the 20 reviewed studies reported successful behavioral modification in the treatment group. We discerned three different formats to present the information: didactic presentation (objective information given as verbal instruction with or without figures), practice presentation (real people filmed while engaged in a specific practice), narrative presentation (real people filmed while enacting scenes). Seven of the ten studies reporting a behavioral change applied a practice presentation or narrative presentation format.
*Conclusion:* The effectiveness of video-assisted patient education is a matter of presentation format. Videos that only provide spoken or graphically presented health information are inappropriate tools to modify patient behavior. Videos showing real people doing something are more effective.
*Practice implications:* If researchers wish to improve a skill, a model patient enacting the behavior seems to be the best-suited presentation format. If researchers aim to modify a more complex behavior a narrative presentation format seems to be most promising.


**Contents**



* Corresponding author at: Department of General Practice, University Medical Center Göttingen, Humboldtallee 38, 37073 Göttingen, Germany. Tel.: +49 551 3914225; fax: +49 551 399530.
E-mail address: jkoscha@gwdg.de (J. Koschack).

http://dx.doi.org/10.1016/j.pec.2014.06.015
0738-3991/

## 1. Introduction

Making informed choices and taking an active role in their health care is more challenging for patients today than it used to be: first, the biomedical progress leads to more choices that need to be made because a greater variety of diagnostic and therapeutic options are available. Second, the self-care of patients who suffer from a chronic illness becomes important [1]. For both reasons, health literacy is essential [2]. Clinical research has revealed that poor health literacy is consistently associated with poorer outcome, e.g. with more hospitalizations, greater use of emergency care, poorer medication adherence, poorer ability to interpret labels and health messages [3]. These developments and study results are a call for the enhancement of health literacy – and patient education may be the way to attain this goal.

There are many strategies of how to educate patients. They can be broadly divided into three categories according to the presentation mode: (1) verbal instruction, (2) written material, and (3) multimedia-based tools, including audio–visual interventions presented on a data carrier (videotape, CD-ROM, DVD) or on the internet. The multimedia-based or 'video-assisted' patient education is held to have some advantages compared with written or verbally presented education: Videos can be designed as a takeaway tool that allows more independent application, away from the hospital clinic, at the patient's own pace and in the presence of friends or relatives [4]. Audio–visual material can be entertaining, the medium is familiar and can also be used by those who have limited literacy. Moreover, information stored on data carriers has the advantage of being repeatable [5].

Patient education is typically applied for at least three purposes: (1) enhancing knowledge to make informed choices, i.e. providing patient decision-aids, (2) helping to cope with negative feelings that can be developed in the forefront of diagnostic or therapeutic procedures, (3) improving health behavior, e.g. in the case of self-care activities such as regular medication intake, lifestyle changes, or home-based disease monitoring. While video-assisted patient education can be and is used in all three areas, research shows ambiguous results as to whether it is really effective. Videos designed to reduce pre-procedural anxiety and improve coping skills seem to be effective [6]. There are also promising results that videos are effective in enhancing knowledge, especially in assisting decision-making for treatment options and informed consent [7]. In contrast, evidence for the efficacy of videos designed to improve health behavior remains anecdotic, and a systematic evaluation is still lacking.

In this paper we report the results of a systematic review that evaluates the efficacy of video-assisted patient education in modifying patient behavior. The 'active ingredients' of well-designed studies are identified – studies that do not only modify health-related patient behavior, but also demonstrate this effect with a high level of evidence.

## 2. Methods

We performed a systematic review of the impact of audio–visual material on modifying patient behavior. Audio–visual material included the use of a videotape, a CD-ROM/DVD, or an interactive website.

### 2.1. Database and search terms

We searched for clinical studies in 14 medical and psychological databases accessed through the German Institute of Medical Documentation and Information (DIMDI): Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Review, Database of Abstract of Reviews of Effects, EMBASE, EMBASE Alert, gms, Health Technology Assessment Database, MEDIKAT, Medline, PsychInfo, PSYNDEX, SciSearch, Social SciSearch, SOMED. We limited our search to articles published between January 1980 and October 2013, written in English or German. We defined four categories of search terms: (1) 'education' OR 'teaching' AND (2) 'patient' AND (3) 'video' OR 'video assisted' OR 'audio–visual' AND (4) 'randomised' OR 'randomized' OR 'controlled'. The articles were checked electronically for duplicates.

### 2.2. Selection criteria and procedure

The studies retrieved from the databases were selected for the final review in several steps (Fig. 1). First, article *titles* were checked according to the categories described above. Three researchers (MAA; JK; WH) tested whether they would include or exclude the same articles from reading the title. *Abstract reading* and *article reading* were the next two steps of the process (MAA; JK). The selection criteria were the following:

(1) *Topic*. Only studies were included that analyzed the efficacy of patient education programs to improve the handling of health problems or diseases, such as dietary restrictions, medication intake, exercise programs, and use of devices. We excluded trials of decision-aids or information material that was designed to improve informed consent as well as trials of videos aiming to reduce pre-operative anxiety or concerns.
(2) *Study population*. We included only studies with adult patients who suffered from a health-related problem.
(3) *Medium*. We selected studies that evaluated the implementation of an audio–visual educational component.
(4) *Intervention and study design*. To properly assess the effect of the audio–visual component, the selected study needed to satisfy two criteria: a control condition was implemented and the audio–visual component was applied separately from other interventions, such as talking with nurse or doctor after watching the video. We only included studies without randomization when an experimental design had implemented a control condition.
(5) *Outcome measurement*: Included studies assessed the main outcome by direct measurement, objective rating, or laboratory

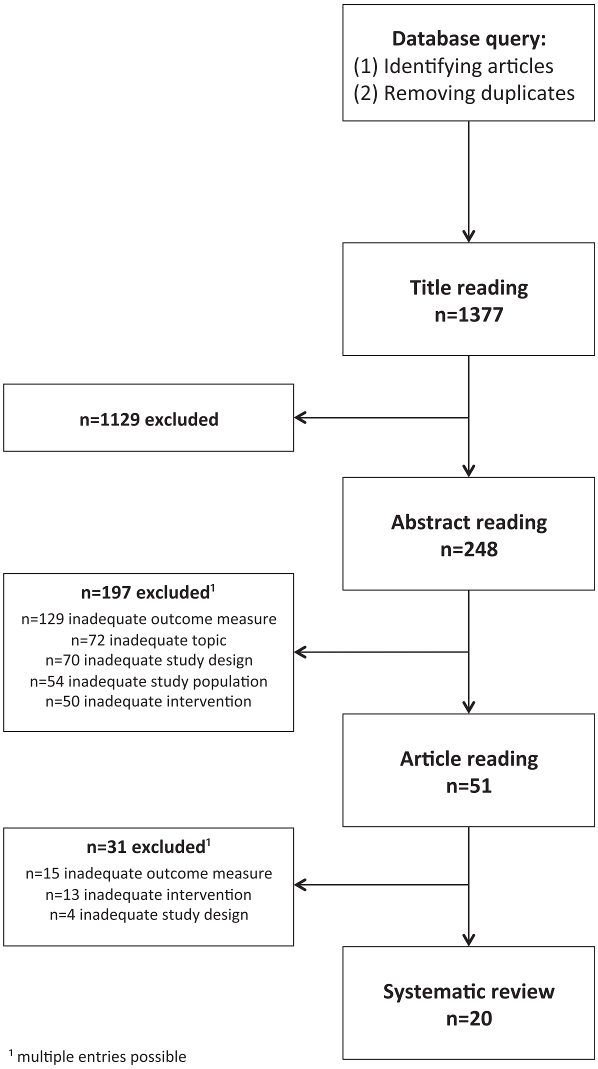


**Fig. 1.** Flowchart of inclusion procedure.

data. Studies were excluded when the main outcome was assessed by self-report or questionnaire data alone.

During the last step of article selection, cited references were cross-checked to identify studies not found in the electronic search.

### 2.3. Quality assessment

At first, we had aimed to use an established protocol to assess the quality of the included articles, e.g. the WIDER recommendations [8]. However, given the heterogeneous nature of the included studies as well as the specifics of the intervention, i.e. videos, we developed a rationale that allowed us (a) to describe the intervention in a standardized manner, e.g. mode of the video application and (b) to include established quality criteria, e.g. appropriateness of the biometric analysis. We assessed the quality of the included articles on five dimensions. Scores were accorded as follows:

(1) *Study design*. Randomized-controlled trials (RCTs) with an elaborate control condition, i.e. not merely standard care, received 3 points, followed by RCTs with a standard control condition (2 points). Experimental designs defined as studies with a control condition but without reliable randomization received 1 point.
(2) *Video design*. Videos designed to modify complex behavior were accorded a higher quality when they were based on a theoretical background or when their design was carefully considered (1 point). Videos designed to optimize single maneuvers do not necessarily need a theoretical framework; they were considered non-written instruction manuals and were also accorded 1 point. Studies without any scientific rationale and description of the video development received 0 points.
(3) *Video application*. Studies were considered more valuable when the watching of the video was monitored (2 points). Studies describing the application without control or monitoring were judged as second-best (1 point). When information about how often and where patients watched the video was missing, 0 points were given.
(4) *Reported statistical analysis*. Studies that examine the effect of an intervention have to compare at least two groups at two or more points of times. Moreover, they often regard multiple outcomes, such as rating scores or questionnaires. Therefore, we required that a study had at least an adjustment of the alpha error for multiple testing to consider the statistical analysis as sufficient (1 point). Statistical analyses without adjustment received 0 points, while 2 points indicated a sophisticated multifactorial design with random and fixed effects.

In summary, 8 points represent the top score, 1 point indicates the lowest quality.

### 2.4. Subgroup analysis

*Presentation format*. In the course of the review process, a study characteristic evolved that we did not define a priori: the presentation format of the information. We identified three presentation formats:

(1) Didactic presentation, i.e. objective information is given as verbal instruction with or without figures, e.g. a doctor or scientist presenting information and showing figures on a blackboard.
(2) Practice presentation, i.e. real people are filmed while engaged in a specific practice, e.g. a patient with asthma is filmed by using the inhaler, first in an incorrect, after instruction in a correct manner.
(3) Narrative presentation, i.e. real people are filmed while acting out scenes, e.g. while sitting in the staff canteen, a young mechanic told his colleague about his feelings, expectations and experiences about visiting a public STD clinic for gonorrhea treatment.

In a subgroup analysis, we compared the outcome of trials that directly assessed behavior according to these three presentation formats.

*Condition-related analysis*. In the course of the analysis, it became apparent that the efficacy of video-assisted patient education totally differed in two health conditions, namely asthma/COPD and diabetes mellitus. This is important because these are very similar diseases, i.e. both are chronic conditions that require effective self-management regarding drug intake, self-monitoring etc. Therefore, we performed a subgroup-analysis of trials that addressed one of these two conditions.

### 2.5. Statistical analysis

Regarding the small number of included studies and the nominal or ordinal level of the assessed variables, we applied non-parametric tests: a Mann–Whitney-*U*-Test to analyze differences between studies that did or did not report a behavioral change, and a Spearman rank correlation test to analyze relations between variables. All tests were two-tailed with $\alpha = 0.05$, unless otherwise declared. The statistical analyses of the review were explorative rather than inferential; thus, we did not test against a hypothesis, so that power calculations were not necessary.

## 3. Results

### 3.1. Article selection

Fig. 1 shows the results of the selection process. After reading the titles of 1377 articles that were the result of the electronic database search, the abstracts of the remaining 248 articles were read. We excluded another 197 articles; the most common reason for exclusion was 'inadequate outcome measure', especially in cases where knowledge or attitudes was the only outcome measure. A total of 51 articles were read in detail. The main reasons for exclusion on this level of the selection process were either 'inadequate outcome measure', i.e. the main outcome was assessed by self-ratings or questionnaires, or 'inadequate intervention', i.e. the effect of the video-assisted education could not be separated from other interventions. A total of 20 articles were included in the final analysis.

### 3.2. Quality of selected studies

#### 3.2.1. General description

The 20 articles covered the period of time from 1983 to 2011. While in the period 1983–2000 long intervals up to the point of years between publications existed, from the year 2000 onward, there was at least one article per year. The articles addressed 12 different diseases or health-related problems. Five articles dealt with diabetes mellitus type 2 [9–13] and four with asthma/chronic obstructive pulmonary disease (COPD) [14–17]. Sexually transmitted diseases were addressed in two articles [18,19]. Nine conditions were only addressed in one article, including ankle sprain [20], anticoagulation [21], cancer [22], hypertension [23], medication adherence (different drugs/diseases) [24], sleep apnea [25], and surgery [26].

The used videos were very different in length, content, and structure. Some were best described as interactive patient textbooks, structured by chapters that could be chosen. Others were more like instruction videos to improve certain movements known from other areas like sports. Some video resembled short film sequences, following a story board and showing real people acting and talking.

#### 3.2.2. Evaluation

Table 1 shows the characteristics of the 20 studies in detail.

(1) *Study design*. All studies were RCTs, but only 12 had tested against an elaborated control condition, i.e. more than merely standard care.
(2) *Video-design*. We found no information about the development of the video in six articles. In six articles, the researcher used the video to optimize a single maneuver [14–17,22,27], such as the correct use of an inhaler in asthma therapy. Their videos were judged as non-written instruction manuals that do not have to be well-founded. In eight articles, we found detailed information about the development of the video, with a mix of theoretical and empirical rationales [10,18–21,23,26,28].
(3) *Video application*. Two articles provided no information about the application of the video, more than half (12/20) described the application, but did not monitor the video use – because the video was intended to be watched at home. This meant that it was impossible to control whether it was used properly. Studies monitoring the video use ($n = 6$) were mainly those that included video-watching at the study site. One study with video-watching at home evaluated the intervention engagement through computer-assisted log-file analysis [23].
(4) *Reported statistical analysis*. We rated the reported statistical analyses as insufficient in 9 of the 20 articles, all with multiple testing of within-group and between-group differences. Eight studies with adequate statistics tested the effect of the video by analysis of variance (ANOVA) for repeated measurements with time × group-interaction. Three study groups discussed the ANOVA for repeated measurement as inferior compared with general estimation equation models (GEE) for dealing with longitudinal data [21,23,27]. The GEE approach accounts for missing data without list-wise deletion of data. However, in one study using ANOVA to test group differences at follow-up, the problem of missing data was discussed and an intention-to-treat analysis with last observation carried forward was additionally conducted [14].

### 3.3. Efficacy of video-assisted patient education

Of the 20 studies included in the systematic review, 13 reported a difference between experimental/treatment condition versus control condition (cp. Table 1). However, only 10 of these 20 studies showed a difference in the outcome of interest, i.e. an outcome that directly assessed the addressed behavior or the consequences of its modification by objective ratings or surrogate parameters. There was no statistically significant difference in the overall score ($5.8 \pm 1.1$ versus $5.1 \pm 1.9$; Mann–Whitney-*U*-Test: $p = 0.631$) between the two groups, i.e. studies that did report a behavioral change compared with studies that did not report a change. We also compared the studies by the years elapsed since publication. The mean of years elapsed since publication of the 10 studies reporting a behavioral change was $10.4 \pm 10.0$ and of the 10 studies not reporting any behavioral change the mean was $12.7 \pm 10.1$. This difference was statistically not significant (Mann–Whitney-*U*-Test: $p = 0.353$). To consider possible modifying effects of recent developments in design and statistical analysis, we correlated the years elapsed since publication and the study quality (sum score) over all 20 studies. The correlation was nearly zero (Spearman rank correlation: $r = -0.090$; $p = 0.707$).

However, analyzing all variables presented in Table 1 in a more qualitative way, we found some remarkable differences: authors of studies with a positive study result based their video-design on a scientific background or described the maneuvers that should be optimized by the video more often and more detailed than did authors of studies with a negative result (9/10 versus 5/10). Half of the positive studies monitored the application of the video, but none of the negative studies did.

### 3.4. Subgroup analyses

#### 3.4.1. Comparison of asthma/COPD and diabetes mellitus

In the 20 studies included, two conditions, diabetes mellitus and asthma/COPD, were most prominent (five and four studies, respectively). Three of the four asthma/COPD studies dealt with optimizing the inhaler technique [15–17]. These three studies used a video-design that was manual-based, i.e. characteristics of the correct inhaler technique were described and realized in the video with a model patient showing the correct use. They measured the behavioral change directly by comparing the correct inhaler use at baseline and after education, and all of them showed improvement (objective ratings by an experienced medical professional not privy to the treatment allocation).

**Table 1**

Detailed evaluation of the articles included in the systematic review ($n$ = 34) (in alphabetic order).

| # | First author | Publication year | Health issue | Outcomes and their assessment[a] | Study design | Video design | Video application | Statistical analysis | Overall score[b] | Difference between groups[c] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bassett SF [20] | 2010 | Ankle sprain | Adherence to physiotherapy by attendance rates ankle function by objective ratings | RCT+ | Manual/well-founded | Described | Multifactorial | 7 | In other outcomes |
| 2 | Doering S [26] | 2001 | Surgery | Post-OP mobility by objective ratings | RCT | Manual/well-founded | Monitored | Insufficient | 5 | In main outcomes |
| 3 | Dyson PA [9] | 2010 | Diabetes | Medication adherence by HbA1c level physical activity by pedometer | RCT | Not specified | Described | Insufficient | 3 | No difference |
| 4 | Gerber BS [10] | 2005 | Diabetes | Diabetes self-management skills by HbA1c level, BMI, blood pressure level and by questionnaire data | RCT+ | Manual/well-founded | Monitored | Multifactorial | 8 | No difference |
| 5 | Hagan LD [28] | 1983 | Psychiatric disorders | Therapy persistence by attendance rates | RCT+ | Manual/well-founded | Monitored | Insufficient | 6 | In main outcomes |
| 6 | Haines TP [27] | 2009 | High risk of falls | Mobility after discharge by fall rates, objective ratings, self-reports | RCT | Manual/well-founded | Described | Multifactorial | 6 | No difference |
| 7 | Houston TK [23] | 2011 | Hypertension | Hypertension control by blood pressure level | RCT+ | Manual/well-founded | Monitored | Multifactorial | 8 | In main outcomes |
| 8 | Huang JP [11] | 2009 | Diabetes | Diabetes self-management skills by HbA1c level, self-reports | RCT | Not specified | Described | Insufficient | 3 | No difference |
| 9 | Kinnane N [22] | 2008 | Cancer | Self-management of chemotherapy side effects by objective rating of symptom awareness | RCT | Manual/well-founded | Monitored | Insufficient | 5 | In main outcomes |
| 10 | Mazor KM [21] | 2006 | Anti-coagulation | Adherence to laboratory monitoring by attendance rates knowledge and beliefs by questionnaire data | RCT | Manual/well-founded | Described | Multifactorial | 6 | In other outcomes |
| 11 | McCulloch DK [12] | 1983 | Diabetes | Glycemic control by HbA1c level knowledge of and adherence to dietary restrictions by questionnaire and self-report | RCT | Not specified | Described | Insufficient | 3 | No difference |
| 12 | Mulrow C [13] | 1986 | Diabetes | Sustained glycemic control by HbA1c level sustained weight control by weight measurement | RCT+ | Not specified | Described | Multifactorial | 5 | No difference |
| 13 | O'Donnell CR [18] | 1997 | STD | Condom use by infection rates | RCT | Manual/well-founded | Not specified | Insufficient | 3 | In main outcomes |
| 14 | Opat AJ [14] | 2000 | Asthma/COPD | Asthma control by peak expiratory flow and by self-reports of inhaled reliever medication intake, symptoms | RCT+ | Manual/well-founded | Described | Multifactorial | 7 | In other outcomes |
| 15 | Powell KM [24] | 1995 | Medication adherence | Medication intake by medication possession rates | RCT | Not specified | Described | Insufficient | 3 | No difference |
| 16 | Savage I [15] | 2003 | Asthma/COPD | Quality of inhaler technique by objective ratings | RCT | Manual/well-founded | Monitored | Insufficient | 5 | In main outcomes |
| 17 | Self TH [16] | 1983 | Asthma/COPD | Quality of inhaler technique by objective ratings | RCT+ | Manual/well-founded | Described | Multifactorial | 7 | In main outcomes |
| 18 | Solomon MZ [19] | 1988 | STD | Adherence to follow-up examination by attendance rates informing sexual contacts by attendance rates knowledge by questionnaire | RCT | Manual/well-founded | Not specified | Multifactorial | 5 | In main outcome |
| 19 | van der Palen J [17] | 1997 | Asthma/COPD | Quality of inhaler technique by objective ratings | RCT+ | Manual/well-founded | Described | Multifactorial | 7 | In main outcome |
| 20 | Wiese HJ [25] | 2005 | Sleep apnoea | Adherence to CHAP by attendance rates knowledge by questionnaires | RCT | Not specified | Described | Multifactorial | 5 | In main outcome |

RCT randomized controlled trial; +with elaborated control condition

[a] Outcome measures of primary interest are underlined.

[b] Maximum score is 8 with study design [RCT = 2, RCT+ = 3], video design [not specified = 0, manual/well-founded = 1], video application [not specified = 0, described = 1, monitored = 2], statistical analysis [insufficient = 0, adjusted = 1, multifactorial = 2].

[c] Differences in all studies favored the treatment group.

All five diabetes studies dealt with improving the glycemic control assessed by HbA1c levels [9–13]. Better HbA1c levels were interpreted as being the consequences of behavioral modifications regarding lifestyle changes such as food intake and physical activity or better medication adherence. In four of the five studies, the video in the treatment condition aimed at improving knowledge by giving dietary advice and information about physical activity [9,11–13]. None of the five studies showed a difference between treatment group and control group.

*3.4.2. Presentation format of the information*

In the course of the analysis, we became aware that mainly three different presentation formats were used to relay the information. Videos that provided objective information by verbal or graphical presentation were used in nine studies [9,11–13,18,20,22,24,28]. Five studies used a video that showed real people engaged in a specific practice [14,15–17,27]. Real people acting and talking in scenes were used in six studies [10,19,21,23,25,26]. Seven of the ten studies reporting a behavioral change seemed to favor the practice presentation or narrative presentation format [15–17,19,23,25,26], whereas only four of the ten studies with a negative result used these formats [10,14,21,27].

## 4. Discussion and conclusion

In this systematic review, we found no clear evidence for the efficacy of video-assisted patient education in modifying behavior. Of the 20 articles included in the review, 10 reported a difference between experimental/treatment condition versus control condition in the expected direction. That is neither a clear demonstration of, nor a trend towards, efficacy. However, we became aware of two important cues and their interplay, which may be crucial for the efficacy of video-assisted patient education: the format in which the educational information is presented and the complexity of the addressed behavior.

### 4.1. Discussion

*4.1.1. A lid for every pot: didactic, practice or narrative presentation*

In the course of the analysis of the 20 studies, three different presentation formats for the educational information proved to be important: (1) providing objective information verbally or graphically ('didactic presentation'), (2) real people engaged in a specific practice ('practice presentation'), and (3) real people enacting scenes ('narrative presentation'). Seven of the ten studies that reported a significant behavioral change seemed to favor the practice or narrative presentation, while only four of the ten studies with a negative result used these formats.

Consideration of common psychological concepts and models may elucidate why the presentation format has an impact on the efficacy of video-assisted patient education. It is known that knowledge alters attitude, but there is no straightforward clear association between attitude and behavior, as has been shown previously [29]. Thus, enhancing the knowledge of patients by verbally or graphically presented didactic information is definitely not the most effective way to modify patient behavior. The negative results of the five studies that aimed to improve glycemic control in patients with diabetes mellitus seem to support this assumption: glycemic control is easy to assess by the HbA1c level, but is the result of a very complex behavioral construct, i.e. adherence to lifestyle changes and medication regime. Four of the five diabetes studies preferred a didactic presentation.

Obviously, knowledge improvement is not sufficient to modify adherence to lifestyle changes and medication regime. The results of the three other studies that aimed to modify complex behavior indirectly confirmed this interpretation: Solomon and Dejon [19] and O'Donnell et al. [18] showed increased attendance rates in patients with sexually transmitted diseases, Houston et al. [23] revealed better blood pressure control in hypertensive patients. All three studies used highly sophisticated videos with a screenplay that presented actors or even real patients discussing their decisions, their problems and their coping strategies.

However, the narrative presentation of educational information is possibly not always the best choice. Video-assisted patient education can also be effective when a model patient demonstrates the best practice. This assumption is supported by Bandura's 'Social Cognitive Theory', which places observational learning at the center of behavioral modelling [30]. The findings of effective patient education in asthma/COPD that aims to optimize the inhaler technique are in line with this idea. This means that the practice presentation is a good choice to optimize a specific technique or a single maneuver.

*4.1.2. Importance of adequate outcome parameters*

A main strength of our review is the selective and clear focus on the impact of video-assisted patient education on health-related behavior, which is an outcome that really matters in healthcare. While reviews have shown that videos can effectively enhance knowledge, especially in assisting decision-making for treatment options [5] and in the context of informed consent [7] or in reducing pre-procedural anxiety and improving coping [6], it was vital to investigate the efficacy of video-assisted patient education to improve health-related behavior. Many educational programs have been designed and conducted in this context, but systematic evidence was still lacking.

However, focusing on behavioral modification as the primary outcome revealed a decisional conflict: while studies that only aimed to improve knowledge or alter attitudes and beliefs were easily identified and rigorously excluded, the direct measurement of behavioral modification as the primary outcome was a very strict criterion to include a study. An example of a direct assessment of the addressed behavior would be measuring attendance rates after education about the importance of follow-up consultation in sexually transmitted diseases. However, direct measurement of behavior is not always possible; studies using meaningful and well-founded surrogate markers and objective ratings of the addressed behavior were also included. An example of this is the improvement of self-management skills in diabetes as the behavioral outcome, with HbA1c levels as a surrogate marker.

*4.1.3. The persuasive power of narrative information*

Since most patient education programs aim to modify/optimize complex behavior and not only specific techniques and maneuvers, we now discuss the narrative presentation format in more detail, referring to the overview on narrative information in health communication of Matthew Kreuter and colleagues [31]. Although they focused on communication about cancer, their definitions, taxonomic framework and conclusions can be generalized for our purpose. They defined narrative information as "a representation of connected events and characters that has an identifiable structure, is bounded in space and time, and contains implicit or explicit messages about the topic being addressed" (p. 222). They described four different capabilities of narratives: (1) overcoming resistance, (2) facilitating information processing, (3) providing surrogate social connections, and (4) addressing emotional and existential issues. Thus, educational videos that focus on the modification of complex behavior, such as adherence to lifestyle changes, should be designed in a narrative instead of in a didactic format.

### 4.2. Conclusion

The main conclusion we draw is that the effectiveness of video-assisted patient education is a matter of presentation format. Using didactic information may increase health literacy, but is not sufficient to modify health-related behavior. Videos that only provide spoken or graphically presented health information are inappropriate tools to modify patient behavior. Instead, videos with a narrative format seem to be a powerful education tool. However, regarding the persuasive character and the problem of subjectivity of personal experience against the objectivity of epidemiological data, future research will have to consider the ethical challenges for patient education [32,33].

### 4.3. Practice implication

In addition to the carefully chosen behavioral outcome parameter, researchers need to consider the behavior they wish to modify. If they wish to improve a skill, a model patient enacting the behavior seems to be the best-suited presentation format. If they aim to modify a more complex behavior such as coping strategies or lifestyle changes, a narrative presentation format seems to be most promising.

## Authorship statement

All authors of this paper fulfill the criteria of authorship. In addition, we assert that there is no one else who fulfils the criteria but has not been included as author.

## Ethical approval

Ethical approval was not required.


## Funding

The study was not funded.


## Conflict of interest statement

No financial disclosures.

## References


[1] Wilson PM, Mayor V. Long-term conditions. 2: supporting and enabling self-care. Brit J Community Nurs 2006;11:6–10.
[2] Schulz PJ, Nakamoto K. Health literacy and patient empowerment in health communication: the importance of separating conjoined twins. Patient Educ Couns 2013;90:4–11.
[3] Berkman ND. Low health literacy and health outcomes: an updated systematic review. Ann Intern Med 2011;155:97.
[4] Gysels M, Higginson IJ. Interactive technologies and videotapes for patient education in cancer care: systematic review and meta-analysis of randomised trials. Support Care Cancer 2007;15:7–20.
[5] Green MJ. Effect of a computer-based decision aid on knowledge, perceptions, and intentions about genetic testing for breast cancer susceptibility: a randomized controlled trial. J Amer Med Assoc 2004;292:442–52.
[6] Schofield P, Jefford M, Carey M, Thomson K, Evans M, Baravelli C, et al. Preparing patients for threatening medical treatments: effects of a chemotherapy educational DVD on anxiety, unmet needs, and self-efficacy. Support Care Cancer 2008;16:37–45.
[7] Ryan RE, Prictor MJ, McLaughlin KJ, Hill SJ. Audio–visual presentation of information for informed consent for participation in clinical trials. Cochrane Database Syst Rev 2008;CD003717.
[8] Albrecht L, Archibald M, Arseneau D, Scott SD. Development of a checklist to assess the quality of reporting of knowledge translation interventions using the Workgroup for Intervention Development and Evaluation Research (WIDER) recommendations. Implement Sci 2013;8:52.
[9] Dyson PA, Beatty S, Matthews DR. An assessment of lifestyle video education for people newly diagnosed with type 2 diabetes. J Hum Nutr Dietet 2010;23:353–9.
[10] Gerber BS, Brodsky IG, Lawless KA, Smolin LI, Arozullah AM, Smith EV, et al. Implementation and evaluation of a low-literacy diabetes education computer multimedia application. Diabetes Care 2005;28:1574–80.
[11] Huang J, Chen H, Yeh M. A comparison of diabetes learning with and without interactive multimedia to improve knowledge, control, and self-care among people with diabetes in Taiwan. Public Health Nurs 2009;26:317–28.
[12] McCulloch DK, Mitchell RD, Ambler J, Tattersal RB. Influence of imaginative teaching of diet on compliance and metabolic control in insulin dependent diabetes. Brit Med J 1983;287:1858–61.
[13] Mulrow C, Bailey S, Sönksen PH, Slavin B. Evaluation of an audiovisual diabetes education program: negative results of a randomized trial of patients with non-insulin-dependent diabetes mellitus. J Gen Intern Med 1987;2:215–9.
[14] Opat AJ, Cohen MM, Bailey MJ, Abramson MJ. A clinical trial of the Buteyko Breathing Technique in asthma as taught by a video. J Asthma 2000;37:557–64.
[15] Savage I, Goodyer L. Providing information on metered dose inhaler technique: is multimedia as effective as print? Fam Pract 2003;20:552–7.
[16] Self TH, Brooks JB, Lieberman P, Ryan MR. The value of demonstration and role of the pharmacist in teaching the correct use of pressurized bronchodilators. Can Med Assoc J 1983;128:129–31.
[17] van der Palen J, Klein JJ, Kerkhoff AHM, van Herwaarden CLA, Seydel ER. Evaluation of the long-term effectiveness of three instruction modes for inhaling medicines. Patient Educ Couns 1997;32:S87.
[18] O'Donnell CR, O'Donnell L, San Doval A, Duran R, Labes K. Reduction in STD infections subsequent to an STD clinic visit. Using video-based patient education to supplement provider interactions. Sex Transm Dis 1998;25:161–8.
[19] Solomon MZ, Dejon W. The impact of a clinic-based educational videotape on knowledge and treatment behavior of men with gonorrhea. Sex Transm Dis 1988;15:127–32.
[20] Bassett SF, Prapavessis H. A test of an adherence-enhancing adjunct to physiotherapy steeped in the protection motivation theory. Physiother Theory Pract 2011;27:360–72.
[21] Mazor KM, Baril J, Dugan E, Spencer F, Burgwinkle P, Gurwitz JH. Patient education about anticoagulant medication. Is narrative evidence or statistical evidence more effective? Patient Educ Couns 2007;69:145–57.
[22] Kinnane N, Stuart E, Thompson L, Evans K, Schneider-Kolsky M. Evaluation of the addition of video-based education for patients receiving standard pre-chemotherapy education. Eur J Cancer Care 2008;17:328–39.
[23] Houston TK, Allison JJ, Sussman M, Horn W, Holt CL, Trobaugh J, et al. Culturally appropriate storytelling to improve blood pressure. A randomized trial. Ann Intern Med 2011;154:77–84.
[24] Powell KM, Edgren B. Failure of educational videotapes to improve medication compliance in a health maintenance organization. Amer J Health Syst Pharm 1995;52:2195–9.
[25] Wiese HJ, Boehtel C, Phillips B, Wilson JF, Peters J, Viggiano T. CPAP compliance: video education may help! Sleep Med 2005;6:171–4.
[26] Doering S, Behensky H, Rumpold G, Schatz DS, Rössler S, Hofstötter B, et al. Video-Vorbereitung bei Hüftgelenksersatz-Operation verbessert die Mobilität nach drei Monaten. Z Psychosom Med Psychother 2001;47:140–52.
[27] Haines TP, Russell T, Brauer SG, Erwin S, Lane P, Urry S, et al. Effectiveness of a video-based exercise programme to reduce falls and improve health-related quality of life among older adults discharged from hospital: a pilot randomized controlled trial. Clin Rehabil 2009;23:973–85.
[28] Hagan LD, Beck NC, Kunce JT, Heisler GH. Facilitating psychiatric patient follow-up: a study of transfer attrition. J Clin Psychol 1983;39:494–9.
[29] Fishbein M, Ajzen I. Belief, attitude, intention, and behavior: an introduction to theory and research. Reading, MA: Addison-Wesley Pub. Co.; 1975.
[30] Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev 1977;84:191–215.
[31] Kreuter MW, Green MC, Cappella JN, Slater MD, Wise ME, Storey D, et al. Narrative communication in cancer prevention and control: a framework to guide research and application. Ann Behav Med 2007;33:221–35.
[32] Hinyard LJ, Kreuter MW. Using narrative communication as a tool for health behavior change: a conceptual, theoretical, and empirical overview. Health Educ Behav 2007;34:777–92.
[33] Myers KR, Green MJ. Storytelling: a novel intervention for hypertension. Ann Intern Med 2011;154:129–30.