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REVIEW ARTICLE

Watch this space: a systematic review of the use of video-based media as a patient education tool in ophthalmology

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Abstract

Effective clinician-patient communication is particularly important in ophthalmology where long-term adherence to treatment is often required. However, in the context of increasingly pressurised clinics, there is a tendency to resort to written information leaflets not suited to patients with visual impairment, non-English speakers or those with low levels of literacy. Video-based media could be harnessed to enhance clinician-patient communication. This systematic review aimed to assess the efficacy of using video-based media for patient education in ophthalmology. A pre-defined search strategy was used by two independent researchers to systematically review the PubMed, MEDLINE, EMBASE and PsycINFO databases. Eligible articles included peer-reviewed studies involving ophthalmology patients, who received a solely video-based educational intervention to assess for improvement in patient knowledge, behaviour and overall health-related outcomes. The search yielded 481 studies of which 31 passed initial screening. Following full-text analysis, 12 studies met the inclusion criteria, of which seven studies (58.3%) were randomised controlled trials. The majority of studies (58.3%) reported outcomes on patient comprehension with 5/7 (71%) showing statistically significant improvement after video intervention. Four studies (33.3%) reported on patient performance in a task (e.g. drop application method) or overall health-related outcome with 2/4 (50%) showing statistically significant improvement after intervention. Though more evidence is needed, the use of video-based media appears to be effective in improving patient understanding and in certain cases may ameliorate overall outcome. There is a paucity of well-designed studies and future research is required to fully examine the role of video-based media in patient education.

Introduction

Educating patients with long-term ophthalmic conditions, such as glaucoma, and empowering them to take a leading role in their own management is linked to higher rates of treatment adherence [1] and has been associated with an overall more favourable clinical outcome [2, 3]. Clinicians therefore have a unique opportunity to ameliorate ophthalmic health simply by effective education of their patients. Furthermore, clear and effective education has been found to be imperative in reducing preoperative anxiety in patients about to undergo surgical procedures [4]. However, this can be a challenge in the context of increasingly overburdened outpatient clinics, with the nine million appointments currently made in ophthalmology each year set to continue to rise [5]. Clinicians currently rely heavily on verbal information, of which as much as 40–80% is forgotten by patients after a traditional consultation; moreover, almost 50% of the information patients do recall is incorrect [6, 7]. Written patient education media are a helpful adjunct; however, these are not

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ideal for those who are sight impaired, non-English speakers or those with low levels of literacy.

Video-based media are one of the most ubiquitous forms of communication in the modern age and have recently become a prominent platform for education with hours of informative content shared on online websites every day, generating millions of views between them [8]. There has been some work to suggest that video-based media can also be harnessed as an effective method of patient education [9]. This has potentially numerous advantages when compared with existing forms of education. In particular, short videos using visual representation and audio components could overcome hurdles related to limited literacy and hearing impairment, respectively. More recently, we have reported on the potential of 'video blogging' or 'vlogging' as a possible patient education tool; the use of popular social media figures to convey information in the form of a video blog could help to draw a wider audience and help to raise greater awareness of ophthalmic conditions in patients and the wider population [10].

This systematic review of the existing literature aimed to assess the efficacy of using video-based media for patient education in ophthalmology.

Methods

An electronic database search was conducted using the EMBASE, PubMed, MEDLINE® and PsycINFO databases from their inception to July 2019. This systematic review was conducted in line with the Cochrane Handbook for Systematic Reviews and Interventions [11] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [12].

The primary objective of this systematic review was to assess the impact, if any, of video-based patient education in the ophthalmic population. Secondary objectives included to identify the extent to which video-based media influences health behaviour; whether video-based patient education has an impact on overall clinical outcome in the ophthalmic population; and to describe currently reported methods of video-based patient education in ophthalmology.

Inclusion criteria included peer-reviewed published studies including primary and secondary research. Studies were included in this systematic review if they involved the use of video-based media as a sole intervention for patient education in ophthalmology with endpoints focussed on its impact on patient knowledge, health behaviour or overall clinical outcome. Publications that did not fulfil the inclusion criteria and duplicates were excluded from the search.

The following keywords were searched using Boolean logical operators: (patient education) AND (ophthalmology) AND ((video) OR (video blog) OR (vlog) OR (vlogger) OR (vlogging)). Initial screening was conducted by two independent authors. Article titles and abstracts were read and assessed for suitability against the inclusion criteria and any duplicate studies were removed. Studies which passed the initial screening criteria were put forward to full-text screening to yield the final articles that were included in the data extraction stage. Any discrepancies in study selection were discussed to reach a consensus and if this was unsuccessful, a third author was contacted to review and decide on whether to include the study or exclude it.

Following screening, data from selected studies were extracted independently by two authors. All yielded studies were collated onto a spreadsheet using Microsoft Excel (Microsoft Office 365 ProPlus version 1909, Microsoft Corporation, Redmond, USA).

Results

The search strategy yielded 481 studies. Following screening, 12 studies were deemed eligible to proceed to data extraction. Study selection is shown in the PRISMA flow diagram below (Fig. 1).

Overall, 58.3% of studies included in this systematic review were randomised controlled trials. The remainder were prospective non-randomised controlled trials (25%) and pre- and post-intervention studies (16.6%) (Fig. 2). Overall, a total of 1650 participants were included in this systematic review (range 13–244).

The majority of included studies were from researchers based in the USA (Fig. 3). Eleven out of twelve studies were single centre studies.

Four out of twelve studies assessed changes to health behaviour, of which 50% yielded statistically significant studies which specifically measured improvements in eye drop proficiency [13, 14].

Furthermore, 7 out of 12 studies (58.3%) measured improvements in patients' knowledge of a condition or procedure, of which five studies (71.4%) yielded statistically significant results for the intervention. Specifically, this assessed comprehension of cataract surgery [15, 16], glaucoma [17, 18], intravenous fluorescein angiography process [19] and parental understanding of retinopathy of prematurity [20]. More comprehensive data on the outcomes they measured and the scores are outlined in Table 1.

Discussion

In this systematic review, we looked at 11 studies, of which seven (63.6%) were randomised control trials, two (18.2%) were pre- and post- intervention studies and two (18.2%) were prospective non-randomised control trials. The outcomes

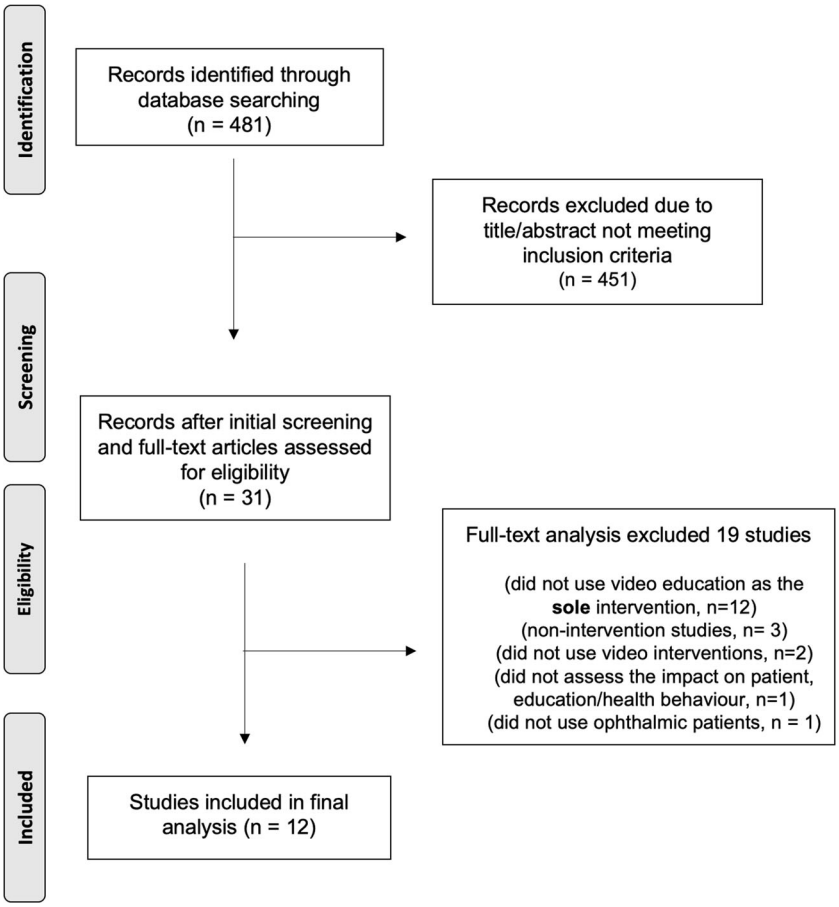

Fig. 1 PRISMA flow diagram highlighting the process of study selection. A total of 12 studies were included in the systematic review.

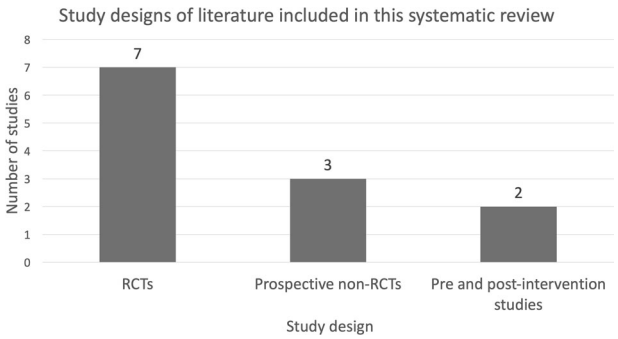

Fig. 2 Study designs of the papers included in the systematic review.

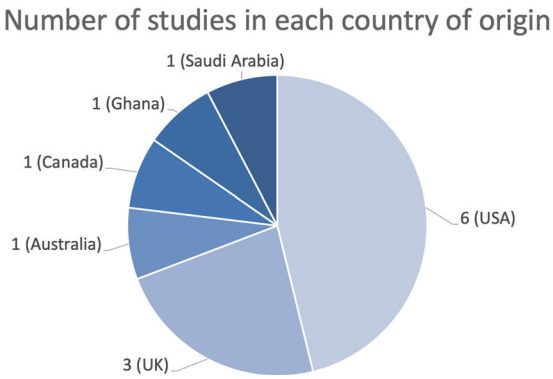

Fig. 3 Countries of origin on the studies included. Eleven out of twelve studies were single centre; Note that one multicentre study assessed cohorts in the USA and UK.

varied greatly across the studies, making it challenging to evaluate the evidence base for video-based media as a patient education tool. This review however establishes the current evidence base and could help guide future research.

We aimed to study the extent of use of video-based media in influencing patient knowledge, health behaviour and overall clinical outcome. The studies presented, though small in number, did assess these areas but with mixed results. Rosenthal et al.'s [18] intervention involved a 6-min videotape on primary open-angle glaucoma showed improved patient knowledge on the condition which was sustained even 6 months after the intervention ($p < 0.01$) [18]. Similarly, Mednick et al. [19] demonstrated better patient understanding of fundus fluorescein angiography with their narrated white board animation ($p < 0.05$).

Vo et al. [15] found that video-based description of cataract surgery offered no benefit in terms of comprehension or satisfaction amongst patients due to undergo

Table 1 The results of the outcomes measured in each study, including study demographics and methodology.

Study no.	Title, Author	Study design Country Single or multicentre	Participants	Intervention	Control	Outcomes (how it was measured)	Improvement post intervention	*p* values
1	A randomised controlled trial of an online educational video intervention to improve glaucoma eye drop technique, Davis et al. [13]	RCT USA Single centre	92 POAG patients above 18, prescribed at least 1 eye drop medication, self-administered and performed at least 1 of the 5 steps incorrectly	4 min 'Meducation' eye drop technique video	3 min nutrition video (attentional control) called 'How to Cook with Budget Friendly Whole Grains'	Eye drop technique—videotaped at baseline, before and after watching intervention/control video and assessed by masked research assistant	✓	$p < 0.001$
						Eye drop technique at 1 month follow up, measured with a test	✓	
						Eye drop technique self-efficacy assessed by 'Eye Drop Technique Self-Efficacy Scale' recorded at all time points	✓	
						Outcome expectations measured with the 4-item scale by Sleath et al.	✓	$p < 0.001$
						Gender, glaucoma severity, visual acuity, previous education	✓	$p < 0.001$
2	Proficiency of eye drop instillation in postoperative cataract patients in Ghana, Liu et al. [14]	Prospective non-randomised controlled trial Ghana Single centre	218 post-cataract patients	Educational session that consisted of verbal instructions and an educational video.	No educational session involving the educational video was offered. They only received the standard clinic postoperative instructions	Measured: eye drop instillation proficiency on postoperative day #30	✓	$p < 0.05$
						Reported: percentage of subjects who do not have trouble applying eye drops	✓	$p > 0.05$
						Reported: percentage of subjects who do not miss their eye when applying eye drops	✗	$p > 0.05$
						Reported: percentage of subjects who do not touch the eye with the bottle tip	✗	$p > 0.05$
3	Randomised controlled trial of preoperative information to improve satisfaction with cataract surgery, Pager [16]	RCT Australia Single centre	141 patients undergoing day-stay cataract surgery	Patients were shown a 9-min video explaining what to expect from the cataract surgery.	9-min Placebo video which contained no information about expectations from cataract surgery but was exclusively concerned with the anatomy of the crystalline lens.	Likelihood of feeling uncomfortable	✓	$p < 0.05$
						Effect on patient anxiety, satisfaction with current vision, expected post-operate visual function	✗	$p > 0.05$
						Patients' understanding of what was happening to them	✓	$p < 0.01$
						Satisfaction with the overall experience	✓	$p < 0.01$
						Report feeling nervous or uneasy during the surgery	✓	$p < 0.01$
4	The effect of a short animated educational video on knowledge among glaucoma patients, Al Owaifeer et al. [17]	Pre and post-intervention study Saudi Arabia Single centre	196 patients with a confirmed diagnosis of glaucoma for 6 months or more	3 min animated, motion graphics glaucoma educational video	N/A	Change in Knowledge Score—using validated 11-item questionnaire, max score of 17	✓	$p < 0.001$
5	Educating the glaucoma patient, Rosenthal et al. [18]	Prospective non-randomised controlled trial USA, UK Multicentre	98 patients with POAG (49 in UK, 49 in USA)	A 6-min videotape about chronic open-angle glaucoma was given to English and American glaucoma patients.	A 6 min videotape about chronic open-angle glaucoma was given to control patients with no history of ocular disease (except refractive errors), no diabetes, no family history of glaucoma.	Mean test score as a percentage of questions asked corrected from a 12-point questionnaire the intervention and control group received	✓	$p < 0.01$

Table 1 (continued)

Study no.	Title, Author	Study design Country Single or multicentre	Participants	Intervention	Control	Outcomes (how it was measured)	Improvement post intervention	*p* values
6	The influence of health literacy level on an educational intervention to improve glaucoma medication adherence, Muir et al. [21]	RCT USA Single centre	127 veterans with glaucoma	20-min session and showing of informational video. The language varied depending on literacy level	Standard care by ophthalmologist including any education they may provide	Number of days without medication (DWM) in 6 months	✗	$p > 0.05$
						Medication possession ratio	✗	$p > 0.05$
						Effect size for patients with inadequate health literacy	✗	$p > 0.05$
						Effect size for patients with marginal health literacy	✗	$p > 0.05$
						Effect size for patients with adequate health literacy	✗	$p > 0.05$
7	A randomised trial of multimedia-facilitated informed consent for cataract surgery, Vo et al. [15]	RCT USA Single centre	63 patients undergoing first time counselling for phacoemulsification cataract surgery	4 min cataract surgery education video (obtained AAO) before counselling	Face-to-face counselling with the surgeon	Length of time required by surgeon to complete consent process	✓	$p < 0.01$
						Satisfaction	✓	$p > 0.05$
						Comprehension	✗	$p > 0.05$
8	Assessing a narrated white board animation as part of the consent process for intravenous fluorescein angiography: a randomised educational study, Mednick et al. [19]	RCT Canada Single centre	78 IVFA-naive patients	Narrated white board animated video	Standard physician-patient interaction	6-question knowledge quiz	✓	$p < 0.05$
						Likert scale: agreed that they enjoyed the use of video	96.2%	
						Likert scale: should videos be incorporated into consent process	100%	
9	A video educational and consenting system for ROP, Arnold [20]	Pre- and post-intervention study USA Single centre	13 parents (also 29 NICU staff)	brief (5:51 min) overview of ROP pathophysiology with sequential retinal image videos from Dr Anna Ells and an additional 4:43 min segment on ROP treatment.	None	A survey was constructed with four levels of understanding ranked from 0 (no understanding) to 3 (sufficient understanding)	✓	$p < 0.05$
10	The impact of a video intervention on the use of low vision assistive devices, Goldstein et al. [22]	RCT USA Single centre	151 adults with low vision	Animated 3D video incorporating cognitive restructuring and simulation of vision with AMD—assessed two weeks after mailing video	No video was mailed before 2 week interview	Improvement in knowledge scores	✓	$p < 0.05$
						Change in behaviour	✓	$p > 0.05$
						Self-efficacy measured by survey at 2 weeks	✓	$p > 0.05$
						Emotional response using 4-point scale		$p > 0.05$
11	Effect of a patient training video on visual field test reliability, Sherafat et al. [27]	RCT UK Single centre	244 new glaucoma patients	4.5 min audio-visual presentation + normal routine visual field test and consultation with clinician	Routine visual field test and consultation with clinician	Reliability of visual fields in both eyes	✓	$p < 0.05$
						Reliability of visual field in left eye	✓	$p < 0.05$
						Reliability of visual field in right eye		$p > 0.05$
12	Effect of a patient-information video on the preoperative anxiety levels of cataract surgery patients, Ahmed et al. [28]	Prospective non-randomised controlled trial UK Single centre	200 patients scheduled for routine, elective phacoemulsification cataract surgery	Video explaining the process of routine phacoemulsification cataract surgery, featuring individual patients describing their cataract surgery experience	No video shown prior to elective cataract surgery	Mean VAS anxiety score marked between 0 mm (not at all anxious) and 80 mm (extremely anxious)	✓	$p < 0.001$
						Likert scale response to APAIS Statement 'I am worried about the procedure'	✓	$p < 0.001$

RCT randomised controlled trial, *POAG* primary open-angle glaucoma, *IVFA* intravenous fundus angiography, *ROP* retinopathy of prematurity, *NICU* neonatal intensive care unit, *AMD* age-related macular degeneration, *VAS* visual analogue scale, *APAIS* Amsterdam Preoperative Anxiety and Information Score Questionnaire.

phacoemulsification when compared with a face-to-face consultation (both $p > 0.05$).

However, by contrast Mednick et al. [19] did report that the majority of patients enjoyed the video-based intervention and all were keen to see video-based media become a regular part of the consenting process for fundus fluorescein angiography. Likewise, Pager [16] found that there was significantly lower likelihood of patients feeling uncomfortable or feeling nervous and uneasy before cataract surgery in a group shown a video on what to expect from cataract surgery compared with the control group shown a video of the anatomy of the lens. There was also a significantly higher satisfaction rate in the intervention group [16].

Muir et al. [21] found that there was no significant improvement after video intervention to improve glaucoma medication adherence in war veterans when compared with standard level of care and education. However, Davis et al. [13] and Liu et al. [14] both found that eye drops instillation technique improved significantly in the groups which were shown an informative video compared with a group shown a control video and no video, respectively.

There are several limitations which were uncovered during this systematic review. Firstly, the impact of video-based patient education in the ophthalmic population is difficult to assess due to the limited literature and validated tools. Outcome measures used across the studies included change in a knowledge score [22], or simple pre- and post-test questionnaires [18, 20]. It can be difficult to measure outcomes objectively even with questionnaires due to the limitations they pose. Although they are commonly used and demonstrate good results, they also hold several biases, with researcher, recall and social desirability bias all playing a role in the outcome [23]. One way in which to overcome this is by agreeing on validated questionnaire tools with a core outcome set that is universal. This will allow comparisons to be drawn between studies and improvements to then be made over time.

Furthermore, the majority of studies included in this review were small, single-centre trials and almost all were based in the USA and the western world. For a more representative and externally valid data set, future work will need to focus on expanding to larger multicentre randomised control trials with a wide demographic base. Wide demographic bases will also help to identify specific patient groups which can be targeted for more specialised educational intervention. This is important as patient characteristics may be just as important as the video intervention in determining outcome behaviour [24]. Moorfields Eye Hospital NHS Foundation Trust has been using patient education videos in their waiting rooms, as outlined in the *Annual Reports and Accounts 2018/19* (Annual Report 2019) [25]. However, in this digital age there could be benefit of moving towards posting videos on trust websites or on YouTube and monitor their usage by patients. Furthermore, there needs to be sustainable change moving forward, which would require regular updated content by ophthalmologists. Specialists in the field would best be able to judge patient education videos to maintain accuracy and quality of content. This would of course demand more cost, however can be implemented over the coming years [26].

Due to the low number of the studies and heterogeneity of the interventions used and outcomes reported, it is challenging to reach any firm conclusions on the validity of the use of video-based media as a patient education tool in ophthalmology. There appears to be potential, in particular in areas around patient understanding, satisfaction and drop technique; however, these are likely to be best suited as an adjunct and not as a replacement for the clinician. Face-to-face consultations are invaluable, however due to time constraints in the NHS, it is not always possible to satisfy every patient. Videos could therefore help to bridge that gap.

Future work requires national and international focus on developing standardised, high-quality video interventions and validated scoring systems to evaluate their impact. This could be best approached by contacting the appropriate Colleges and Boards internationally for their support. Access for patients to these interventions will also require some thought; in particular those who are elderly or from low-income households, where electronic devices and internet access may not always be readily available. Finally, any change must be sustainable. Pilot studies trialling video-based media as an educational tool should start as early as possible, so that results can guide regular developments and updates as the field of medical innovation and technology grows and lessens the time and cost needed to generate video content. Whilst this systematic review has found limited available evidence, video-based media has shown some promise as an educational tool in ophthalmology and offers an exciting and innovative way in which patients can feel more empowered and involved in their care in a digital age.

Compliance with ethical standards

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

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References

1. Sleath B, Blalock SJ, Carpenter DM, Sayner R, Muir KW, Slota C, et al. Ophthalmologist-patient communication, self-efficacy, and glaucoma medication adherence. Ophthalmology. 2015;122:748–54.

2. Sleath B, Blalock S, Covert D, Stone JL, Skinner AC, Muir K, et al. The relationship between glaucoma medication adherence, eye drop technique, and visual field defect severity. Ophthalmology. 2011;118:2398–402.
3. Friedman DS, Hahn SR, Gelb L, Tan J, Shah SN, Kim EE, et al. Doctor-patient communication, health-related beliefs, and adherence in glaucoma. results from the glaucoma adherence and persistency study. Ophthalmology. 2008;115:1320–7.
4. Ayyadhah Alanazi A. Reducing anxiety in preoperative patients: a systematic review. Br J Nurs. 2014;23:387–93.
5. Royal College of Ophthalmologists, UK. Workforce Census; 2018. https://www.rcophth.ac.uk/wp-content/uploads/2019/02/RCOphth-Workforce-Census-2018.pdf. Accessed 28 Nov 2019.
6. Anderson JL, Dodman S, Kopelman M, Fleming A. Patient information recall in a rheumatology clinic. Rheumatology. 1979;18:18–22.
7. Kessels RP. Patients' memory for medical information. J R Soc Med. 2003;96:219–22.
8. Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of Social Media. Bus Horiz. 2010;53:59–68.
9. Abu Abed M, Himmel W, Vormfelde S, Koschack J. Video-assisted patient education to modify behavior: a systematic review. Patient Educ Couns. 2014;97:16–22.
10. Sheriff IHN, Farwana M, Ahmed F, Sheriff AHJ. Vlogging on: could video blogging enhance medical education? Med Teach. 2018;40:758.
11. Higgins JP, Green S . Cochrane handbook for systematic reviews of interventions (Vol. 4). John Wiley & Sons; 2011.
12. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med. 2009;151:264–9.
13. Davis SA, Carpenter DM, Blalock SJ, Budenz DL, Lee C, Muir KW, et al. A randomized controlled tial of an online educational video intervention to improve glaucoma eye drop technique. Patient Educ Couns. 2018;102:937–43.
14. Liu Y, Murdoch A, Bassett K, Dharmsi S. Proficiency of eye drop instillation in postoperative cataract patients in Ghana. Clin Ophthalmol. 2013;7:2099–105.
15. Vo TA, Ngai P, Tao JP. A randomized trial of multimedia-facilitated informed consent for cataract surgery. Clin Ophthalmol. 2018;12:1427–32.
16. Pager CK. Randomised controlled trial of preoperative information to improve satisfaction with cataract surgery. Br J Ophthalmol. 2005;89:10–13.
17. Al Owaifeer AM, Alrefaie SM, Alsawah ZM, Al Taisan AA, Mousa A, Ahmad SI. The effect of a short animated educational video on knowledge among glaucoma patients. Clin Ophthalmol. 2018;12:805–210.
18. Rosenthal AR, Zimmerman JF, Tanner J. Educating the glaucoma patient. Br J Ophthalmol. 1983;67:814–7.
19. Mednick Z, Irrcher I, Hopman WM, Sharma S. Assessing a narrated white board animation as part of the consent process for intravenous fluorescein angiography: a randomized educational study. Can Ophthalmological Soc. 2016;51:471–5.
20. Arnold RW. A video educational and consenting system for ROP. J Pediatr Ophthalmol Strabismus. 2012;49:382–382.
21. Muir KW, Ventura A, Stinnett SS, Enfiedjian A, Allingham RR, Lee PP. The influence of health literacy level on an educational intervention to improve glaucoma medication adherence. Patient Educ Couns. 2012;87:160–4.
22. Goldstein RB, Dugan E, Trachtenberg F, Peli E. The impact of a video intervention on the use of low vision assistive devices. Optom Vis Sci. 2007;84:208–17.
23. Gibson J, Kim B. Non-classical measurement error in long-term retrospective recall surveys. Oxf Bull Econ Stat. 2010;72:687–95.
24. Cleary PD. The increasing importance of patient surveys: now that sound methods exist, patient surveys can facilitate improvement. BMJ. 1999;319:720–1.
25. Moorfields Eye Hospital NHS Foundation Trust Annual Report and Accounts 2018/19. 2019. https://www.moorfields.nhs.uk/sites/default/files/Moorfields%20Eye%20Hospital%20annual%20report%202018-19.pdf.
26. MacEwen C. Increasing demand on hospital eye services risks patients losing vision. UK: Royal College of Ophthalmologists; 2016. https://www.rcophth.ac.uk/2016/03/increasing-demand-on-hospital-eye-services-risks-patients-losing-vision/. Accessed 23 Sep 2019.
27. Sherafat H, Spry PGD, Waldock A, Sparrow JM, Diamond JP. Effect of a patient training video on visual field test reliability. Br J Ophtalmol. 2003;87:153–6.
28. Ahmed KJ, Pilling JD, Ahmed J, Buchan J. Effect of a patient-information video on the preoperative anxiety levels of cataract surgery patients. J Cataract Refract Surg. 2019;45:475–9.