

Original Article

Information sources for patients undergoing corneal refractive surgery: results from a cross-sectional patient survey from a single private center in Poland

Piotr Kanclerz, MD, PhD,^{a,b} and Katarzyna Przewiócka, BSc^a

Author affiliations: ^aHygeia Clinic, Gdańsk, Poland;

^bArtLife Ophthalmological Center, Gdańsk, Poland

Abstract

Purpose—To identify the information sources for patients undergoing laser vision correction.

Methods—Individuals who underwent corneal refractive surgery at a private practice from December 2017 to August 2018 and agreed to complete an anonymous questionnaire were included. The manifest refraction and surgical method was recorded and correlated with the questionnaire results.

Results—Data collected from 126 patients (mean age, 32.8 ± 8.6 years; 55.6% women) were analyzed. Of 121 patients, 120 (99.2%) identified the Internet as a source for information on refractive surgery, and 71 of 119 (59.7%) noted that the clinic's website influenced their choice of clinic. Patients with high myopia more commonly used contact lenses and had considered undergoing refractive surgery for a longer time compared with patients with other refractive errors ($P < 0.01$ and $P < 0.01$, resp.). Patients with hyperopia were less likely to know their own refractive error ($P = 0.02$).

Conclusions—In this patient cohort, the Internet was the main source of information for those undergoing refractive surgery.

In 2016, it was estimated that almost half of the world's population was using the Internet; coverage is over 80% in developed countries and just less than 40% in developing countries.¹ An increasing number of people use it for information about health issues.² However, very few studies have analyzed the effect of widespread Internet use on the information sources and decision making of patients undergoing elective ophthalmic surgery. The aim of the current study was to identify the information sources used by patients undergoing corneal refractive surgery and to investigate the role the Internet-based information played in patients' decision making.

Materials and Methods

Patients who underwent corneal refractive surgery at a private practice in Poland (ArtLife Ophthalmological Center, Gdańsk, Poland) from December 2017 to August 2018 were included. This practice focuses solely on refractive surgery (superficial ablations and manual

microkeratome LASIK), and the preferred surgical method is thin-flap LASIK. The study adhered to the tenets of the Declaration of Helsinki, and the study protocol was approved by the bioethics committee (Komisja Bioetyczna przy Okręgowej Izbie Lekarskiej w Gdańsku; KB-31/17). Informed consent was obtained from all participants.

Consecutive patients were asked to complete an anonymous questionnaire, which included free-text and multiple-choice questions on demographics, refractive status, and their decision to undergo surgery (Appendix 1). The questions, written in Polish, were developed by the authors using published methods.³ In all cases, the questionnaire was filled out after arriving at the center but before any medical consultation. A questionnaire was excluded from the analysis if the patient did not enter age and sex or did not answer at least half of the questions. Along with the questionnaire, the manifest refraction and surgical method were recorded for each patient.

Published March 19, 2021.

Copyright ©2021. All rights reserved. Reproduction in whole or in part in any form or medium without expressed written permission of the Digital Journal of Ophthalmology is prohibited.

doi:10.5693/djo.01.2021.01.001

Correspondence: Piotr Kanclerz, MD, PhD, Hygeia Clinic, ul. Jaśkowa Dolina 57, 80-286 Gdańsk, Poland (email: p.kanclerz@gumed.edu.pl). Dr. Kanclerz receives nonfinancial support from Visim and Optopol Technology.

Table 1. Patient characteristics

Study parameter	High myopia (n = 21)	Moderate myopia (n = 44)	Low myopia (n = 38)	Hyperopia (n = 23)	Total (n = 126)	P value
Age, years, mean \pm SD (range)	33.5 \pm 8.7 (21.0-52.0)	30.9 \pm 6.6 (21.0-45.0)	31.7 \pm 8.7 (20.0-56.0)	37.6 \pm 10.4 (19.0-58.0)	32.8 \pm 8.6 (19.0-58.0)	0.04
Refractive error, mean \pm SD	-8.09 \pm 1.6	-4.39 \pm 0.84	-1.9 \pm 0.72	3.87 \pm 1.56	-2.72 \pm 3.93	<0.01
Astigmatism, mean \pm SD	-0.9 \pm 1.07	-0.58 \pm 0.69	-1.03 \pm 1.03	-1.08 \pm 1.05	-0.45 \pm 3.16	0.25
Sex, no. (%)						0.49
Female	13 (61.9)	27 (61.4)	20 (52.6)	10 (43.5)	70 (55.6)	
Male	8 (38.1)	17 (38.6)	18 (47.4)	13 (56.5)	56 (44.4)	
Education, no. (%)						0.05
Primary	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.3)	1 (0.8)	
Gymnasium (grades 1-9)	1 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.8)	
Vocational	2 (9.5)	2 (4.5)	3 (7.9)	2 (8.7)	9 (7.1)	
Secondary	6 (28.6)	14 (31.8)	19 (50.0)	13 (56.5)	52 (41.3)	
Higher	12 (57.1)	28 (63.6)	16 (42.1)	7 (30.4)	63 (50.0)	
Performed surgery, no. (%)						0.09
EBK	2 (9.5)	6 (13.6)	11 (28.9)	1 (4.3)	20 (15.9)	
LASIK	17 (81.0)	35 (79.5)	26 (68.4)	22 (95.7)	100 (79.4)	
TransPRK	1 (4.8)	3 (6.8)	1 (2.6)	0 (0.0)	5 (4.0)	
EBK RE, SBK LE	1 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.8)	

EBK, Epi-Bowman keratectomy; LASIK, laser in situ keratomileusis; TransPRK, transepithelial photorefractive keratectomy.

Patients were classified based on spherical equivalent of the manifest refractive error in the most ametropic eye as low myopia (from -0.25 D to -3.0 D), moderate myopia (from -3.25 to -6.0 D), high myopia (over -6.0 D), and hyperopia ($+0.25$ D and over). Astigmatism was defined as a cylinder power ≥ 0.75 D. The results from the questionnaire were tallied with the manifest refractive error.

Open Source Statistics for Public Health application⁴ and Statistica 12.0 (Dell Software, Round Rock, TX) were used for statistical analysis. The Shapiro-Wilk test for normality was applied to assess the distribution of continuous parameters. Differences among categorical data were analyzed using the χ^2 test; for continuous data the Kruskal-Wallis test was applied. A *P* value of <0.05 was considered statistically significant. Approximately 280 patients undergo surgery in the center annually; assuming that the response distribution is 70%, for a 5% margin of error and a confidence level of 90% the representative sample size was estimated at 125 participants.

Results

A total of 160 complete questionnaires were collected from individuals undergoing preoperative evaluation. Nobody declined to complete the form, and all acquired forms were considered valid. As 34 patients were not considered eligible to undergo surgery, the results of 126 completed questionnaires were analyzed. The mean age of patients (with standard deviation) was 32.8 ± 8.6 years. Women represented 55.6% of the patients in this study. Characteristics of the patients are presented in Table 1. Bilateral surgery was performed in 119 patients

(94.4%), whereas a unilateral procedure was performed in 7 eyes (3 right and 4 left).

Results of questionnaires are summarized in Table 2. Of the respondents, 96% believed that the Internet was their main source of information before the consultation. The vast majority of patients (96.7%) knew their own spherical refractive error. Of the 160 patients, 56 had astigmatism in their manifest refraction; only 18 individuals knew that they had astigmatism, and 8 knew their cylinder power. With regard to when patients decided to pursue the idea of undergoing refractive surgery, for 34.1% of patients it was after talking to a friend; for 29.4%, after talking with another person who underwent such a surgery; and for 43.7% and 8.7%, respectively, it was after finding information on the Internet or consulting with an ophthalmologist. Almost all patients (99.2%) used the Internet for information on refractive surgery before the consultation, and 79.8% of participants believed that the amount of information they found online was satisfactory. In most cases, knowledge from the Internet was very (37.2%) or moderately (57.9%) helpful in understanding the health problem and in making the decision to pursue surgery.

Differences in the responses to the questions according to refractive error groups are presented in Table 3. Individuals with hyperopia were less likely to know their refractive error ($P = 0.02$; $\chi^2 = 10.15$; $dF = 3$) and were more likely to know different glasses for distance and reading ($P < 0.01$; $\chi^2 = 19.93$; $dF = 3$). Patients with high myopia were more likely to have used contact lenses compared to those with moderate myopia, low myopia, and hyperopia ($P < 0.01$). High myopia patients also more commonly considered undergoing refractive sur-

Table 2. Information sources for laser refractive surgery

Question	Answer choices	No. of responses (%)
How did you learn about the possibility of having surgery? ^a	Internet	55 (43.7)
	Person after similar surgery	37 (29.4)
	Friend	43 (34.1)
	Ophthalmologist	11 (8.7)
	Press	6 (4.8)
Did you ask your or any ophthalmologist about their opinion about laser refractive surgery?	No, I didn't	70 (56)
	Yes, I did some time ago	35 (28)
	Yes, I did recently	20 (16)
Did you receive any negative opinion about laser refractive surgery from your or any other ophthalmologist?	No, I didn't	113 (92.6)
	Yes, I received a negative opinion from my ophthalmologist	3 (2.5)
	Yes, I received a negative opinion from other ophthalmologist	6 (4.9)
How long have you considered undergoing surgery?	More than 3 years	24 (19.8)
	From 1 to 3 years	40 (33.1)
	From 6 to 12 months	17 (14)
	From 1 to 6 months	30 (24.8)
	Just recently	10 (8.3)
Did you use the Internet for information prior to surgery?	Yes	120 (99.2)
	No	1 (0.8)
If yes, was the information obtained on the Internet helpful in understanding the health problem and in making decision about treatment? ^a	I didn't check	1 (0.8)
	Not at all	5 (4.1)
	Moderately	70 (57.9)
	Very	45 (37.2)
Do you think the amount of information found in the internet is satisfactory?	Yes	95 (79.8)
	No	24 (20.2)
Did the information on the clinic's website have an impact on the choice of clinic?	Yes	71 (59.7)
	No	48 (40.3)
What kind of information on websites do you think is the most important? ^a	Other patients' opinions	70 (55.6)
	Description of operation	65 (51.6)
	Description of perioperative management	49 (38.9)
Did you send an inquiry, eg, an email about the surgery?	Yes	37 (30.8)
	No	83 (69.2)
Did you participate in an online forum?	Yes	44 (36.4)
	No	77 (63.6)
Did the information on the Internet help you to be better prepared for interview with the doctor?	Yes	93 (79.5)
	No	24 (20.5)

^aMultiple answers allowed.

gery for a longer time than other refractive groups ($P < 0.01$).

Discussion

Traditionally, the most important means for patients to obtain knowledge about health was by direct contact with a specialist.⁵ In our study, 44% of patients had asked an ophthalmologist for advice on corneal refractive surgery before the consultation, and only 4.8% felt that contact with a doctor was the main source of their information before coming for the consultation. Our results indicate that the Internet was perceived as the main source of information for current patients undergoing laser vision correction. This is in contrast to other studies, which have reported significantly lower importance of the Internet; in one study, the Internet was the informal source of information in 23% of parents of children with ophthalmic diseases⁶ and for 36.2%–58.1% in plastic surgery patients.^{7,8} The relative importance of the Internet for the patients in our study could partially be explained by the relatively young patient age in our study (32.8 ± 8.6 years) as well as to the high Internet penetration in Poland.

Almost 80% of patients indicated that the information they found on the Internet helped them prepare for the surgical consultation. Our study also suggests that there is a high demand for authoritative online health information that can help patients to be more critical about information obtained directly from consultation with their ophthalmologists. An increasing number of government and medical institutions as well as business corporations have established health knowledge information portals to provide public health information.⁹ The reliability of information on these websites could potentially be influenced by several factors. One investigation reported that medical information found on Wikipedia is more complete and accurate compared to other freely available Internet information sources, including clinic Web pages.² Another study has shown that the quality of refractive surgery YouTube.com videos is generally poor and might contain fragmentary information.¹⁰ Moreover, Desai et al reported that videos with better educational content did not engage users more than low-quality videos.¹¹ Several instruments were developed to rate health information found on the Internet; however, their ratings cannot be considered unbiased.¹² Based on our findings, we recommend that information for patient education

Table 3. Differences between refractive error groups

Questions ^a	High myopia (n = 21)	Moderate myopia (n = 44)	Low myopia (n = 38)	Hyperopia (n = 23)	Total (n = 126)	P value
<i>What is your refractive error?</i>						0.02
I don't know	1 (4.8%)	0 (0.0%)	0 (0.0%)	3 (14.3%)	4 (3.3%)	
<i>Do you have different glasses for reading and for distance?</i>						<0.01
Yes	0 (0.0%)	0 (0.0%)	1 (2.7%)	5 (23.8%)	6 (4.9%)	
<i>How often do you use contact lenses?</i>						<0.01
Never	7 (33.3%)	13 (29.5%)	21 (56.8%)	18 (78.3%)	59 (47.2%)	
Occasionally	4 (19.0%)	8 (18.2%)	5 (13.5%)	3 (13.0%)	20 (16.0%)	
A few times a week	0 (0.0%)	3 (6.8%)	1 (2.7%)	1 (4.3%)	5 (4.0%)	
Every day, a few hours daily	0 (0.0%)	3 (6.8%)	2 (5.4%)	0 (0.0%)	5 (4.0%)	
Every day, just remove for sleeping	10 (47.6%)	17 (38.6%)	8 (21.6%)	1 (4.3%)	36 (28.8%)	
<i>For how long have you considered undergoing surgery?</i>						<0.01
>3 years	10 (50.0%)	5 (11.9%)	6 (16.2%)	3 (13.6%)	24 (19.8%)	
1-3 years	7 (35.0%)	12 (28.6%)	13 (35.1%)	8 (36.4%)	40 (33.1%)	
6-12 months	1 (5.0%)	11 (26.2%)	3 (8.1%)	2 (9.1%)	17 (14.0%)	
1-6 months	2 (10.0%)	10 (23.8%)	10 (27.0%)	8 (36.4%)	30 (24.8%)	
Just recently	0 (0.0%)	4 (9.5%)	5 (13.5%)	1 (4.5%)	10 (8.3%)	

^aResults are number (%)

presented on websites should be scrupulously prepared, show evidence-based data, and undergo critical review. That is, patient educational texts should undergo peer review, and the fact of the text's having undergone a process of unbiased expert review should be attested for healthcare consumers. Furthermore, high-quality sources with greater educational content should be favored by search engines over popular videos. Attention must also be paid to health literacy level, because high-quality educational materials are commonly written at a level too high for many patients to understand.¹³

There are several limitations of this study. First, it was performed at a single center and is likely representative of our particular clinic population, but it may not reflect patient populations at other refractive surgery centers in Poland and worldwide. Patients presenting at different clinics may have different information sources, for example, depending on the marketing strategy of the clinic. In developing countries with more limited Internet access, the information sources may be different. Second, we did not ask for detailed information regarding specific Internet content patients consulted preoperatively. At the time of this study, our center had a website and Facebook profile, but it did not have a YouTube channel. Another limitation is that, because only patients who underwent surgery were included, the effect of Internet-based information on the decision to undergo surgery was not directly determined. Lastly, the questionnaire was not validated. The questionnaires were completed before the preoperative consultation, so the adequacy of the information found on the Internet could not be compared with information obtained at the surgical consultation.

Acknowledgments

The authors thank Dr. Jullia Rosdahl for the Department of Ophthalmology, Duke University School of Medicine, Durham, NC, USA, for a critical discussion of the current work and language edits.

References

- Individuals using the Internet (% of population) | Data. Accessed October 24, 2018. <https://data.worldbank.org/indicator/IT.NET.USER.ZS>.
- Ivastinovic D, Wackernagel W, Wedrich A. Accuracy of freely available information about rhegmatogenous retinal detachment on the Internet. *JAMA Ophthalmol* 2019;137:113-14.
- Johnson, RL.; Morgan, GB. Item types, response formats, and consequences for statistical investigations. In: Schweizer, K.; DiStefano, C., editors. *Principles and Methods of Test Construction: Standards and Recent Advances* Hogrefe Publishing; 2016. p. 83-104.
- Open Source Statistics for Public Health. <http://openepi.com>. Accessed October 24, 2018
- Kassirer JP. Patients, physicians, and the Internet. *Health Aff* 2000;19:115-23.
- Rahi JS, Manaras I, Barr K. Information sources and their use by parents of children with ophthalmic disorders. *Invest Ophthalmol Vis Sci* 2003;44:2457-60.
- Parmeshwar N, Reid CM, Park AJ, Brandel MG, Dobke MK, Gosman AA. Evaluation of information sources in plastic surgery decision-making. *Cureus* 2018;10:e2773.
- Szychta P, Zieliński T, Rykała J, Kruk-Jeromin J. The Internet as a Source of Information for Patients Prior to Rhinoplasty. *Clin Exp Otorhinolaryngol* 2011;4:131.
- Lu X, Zhang R, Wu W, Shang X, Liu M. Relationship between Internet health information and patient compliance based on trust: empirical study. *J Med Internet Res* 2018;20:e253.
- Kuçuk B, Sirakaya E. An Analysis of YouTube Videos as Educa-

- tional Resources for Patients About Refractive Surgery. *Cornea* 2020;39:491-4.
11. Desai T, Shariff A, Dhingra V, Minhas D, Eure M, Kats M. Is content really king? An objective analysis of the public's response to medical videos on YouTube. *PLoS One* 2013;8:e82469.
 12. Jadad AR, Gagliardi A. Rating Health Information on the Internet. *JAMA* 1998;279:611.
 13. Williams AM, Muir KW, Rosdahl JA. Readability of patient education materials in ophthalmology: a single-institution study and systematic review. *BMC Ophthalmol* 2016;16:133.

Appendix 1. Questionnaire

No.	Question	Possible answers
1	Indicate gender, please.	Female Male
2	How old are you, years?	...
3	Indicate your place of residence.	Village City below 50,000 City 50,000-100,000 City 100,000-500,000 City above 500,000
4	What is your educational background?	Primary Gymnasium Secondary Vocational Higher
5	What is your marital status?	Singe In a relationship Married Separated Divorced Widowed
6	What refractive error do you have?	Myopia Myopia with astigmatism Hyperopia Hyperopia with astigmatism Mixed astigmatism
6a	What is your approximate refractive error?	Don't know Right eye . . . Left eye . . .
6b	What surgical technique would you prefer?	LASIK SBK-LASIK EpiLASIK EBK PRK TransPRK SMILE
7	How often do you wear glasses?	Don't know Every day, just take of for sleeping Every day, a few hours daily Every day, up to 1-2 hours a day Once a while Seldom Never
8	Do you have different glasses for reading and for distance?	Yes No
9	Do you use contact lenses?	Yes No
10	How did you learn about the possibility of performing the surgery? (multiple answers allowed)	Family doctor Ophthalmologist Friend Television Person after similar operation Press Internet Not previously learned

Appendix 1. Questionnaire

10a	Did you ask your or any ophthalmologist about his opinion about laser refractive surgery?	Yes, I did recently Yes, I did some time ago No, I didn't
10b	Did you receive any negative opinion about laser refractive surgery from your or any ophthalmologist?	Yes, I did No, I didn't
11	How long have you considered undergoing surgery?	Immediately Below 1 month From 1 to 6 months From 6 to 12 months Over 1-3 years More than 3 years
12	Do you have the Internet at home?	Yes No
13	Did you use the Internet, searching for information prior to surgery?	Yes No
14	If yes, was the information obtained on the Internet helpful in understanding the health problem and in making decisions about treatment? (multiple answers allowed)	Very Moderately Slightly Not at all
15	Do you think the knowledge on the Internet is satisfactory?	Yes No
16	Did the information on the website have an impact on the choice of clinic?	Yes No
17	What kind of information on the websites you think is the most important? (multiple answers allowed)	Description of operation Description of perioperative management Contact with other patients Other patients' opinions Contact with doctor
18	Did you consult the doctor on the Internet?	Yes No
19	Did you send an inquiry, eg, an email about the surgery?	Yes No
20	Did you participate in an online forum?	Yes No
21	What was your main source of information?	Interview with a doctor Another ophthalmologist Friend Television Person after similar operation Press Internet Other . . .
22	Did the information on the Internet help you to be better prepared for the interview with the doctor?	Yes No