Effect of a Multidisciplinary Educational Course on Health Literacy and Satisfaction of Patients Undergoing Keratoplasty

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Abstract

Background: Keratoplasty is a surgical procedure in which part or all of a damaged or diseased cornea is replaced by healthy corneal tissue from a donor. **The study aimed** to evaluate the effect of a multidisciplinary education course on the health literacy and satisfaction of patients undergoing keratoplasty. **This study was carried out** at the Ophthalmology department and outpatient clinics at Assiut University hospital. **The sample of the study** was a purposive sample of 60 adult and elderly patients (30 study group and 30 for the control group) undergoing corneal transplantation surgery. **Tools of data collection** included four tools, (1) patient's interview questionnaire sheet, (2) patient's knowledge assessment & observation checklist, (3) health literacy questionnaire, (4) patient satisfaction with nursing care quality questionnaire. **The main results of this study** revealed the majority of patients in the two groups were diagnosed with keratoconus, performed Full-thickness (penetrating) keratoplasty for optical reasons. There was a highly statistically significant difference between both the study and control of patients regarding health literacy score. Half of the patients in the control group have poor satisfaction level while the majority of the study group patients (83.3%) have a very good satisfaction level post educational course application. There was a positive correlation between patients' knowledge & health literacy and patient satisfaction (P. <0.001). **The main recommendation** is to establish a patient education center in the ophthalmology department to provide patients with the needed information before performing the keratoplasty.

Keywords: Educational course, Health Literacy, Keratoplasty, Multidisciplinary, and Satisfaction.

Introduction

Organ transplantation is considered to be one of the most successful medical care technologies of the twentieth century that has developed in recent decades alongside scientific advances in medical technology ***(Bezinover, and Saner, 2019).*** Corneal transplantation, also known as corneal grafting or keratoplasty, is a process in which dysfunctional cornea is removed from a patient's eye and replaced with a healthy clear cornea from a donor. After Dr. Eduard Zirm's first successful human corneal graft in 1905, awareness, practice, and research on corneal transplantation have progressed rapidly. Today, the most widely done and effective transplant operation is with the establishment of eye banks ***(Lee and Chen, 2019).***

Currently, an estimated 12.7 million corneal transplants are required worldwide, with just one cornea available for every 70 people. ***(Martin et al, 2020).*** U.S. eye banks reported 136,130 total tissue recoveries from 68,759 donors in 2019. Although these numbers increased slightly from 2018, the transplant rate decreased from 69.4% in 2018 to 68.7% in 2019 (-1.3%). For the sixth year in a row, more cornea donors (59%) were listed on a donor registry than not ***(Eye Bank Association of America, 2021)*** and 3,000 cases are carried out in Iran ***(Ali et al, 2020).***

Indications of keratoplasty include optical; to improve visual acuity by replacing the opaque or distorted host tissue with clear healthy donor tissue. The most common indication in this category is pseudophakic bullous keratopathy, followed by keratoconus, corneal degeneration, keratoglobus, and dystrophy, as well as scarring due to keratitis and trauma ***(Jemberu et al, 2019).***Tectonic/reconstructive; to preserve corneal anatomy and integrity in patients with stromal thinning and descemetoceles, or to reconstruct the anatomy of the eye, e.g. after corneal perforation. Therapeutic; to remove inflamed corneal tissue unresponsive to treatment by antibiotics or antiviral and cosmetic; to improve the appearance of patients with corneal scars that have given a whitish or

opaque hue to the cornea ***(American Academy of Ophthalmology, 2021).***

A corneal transplant is recommended for elderly people who have vision problems caused by thinning of the cornea, most often due to keratoconus. A transplant may be considered when less invasive treatments are not an option ***(Arian, 2018).***

An eye pad and shield are applied overnight, and the next morning, the eye is checked. No further bandaging is required for the eye; however, the patient is instructed to wear dark glasses while outdoors. For complex cases, eye drops are given in the form of antibiotics and steroids for the first 3-6 months or longer ***(Lee and Chen, 2019).*** Heavy lifting (>20kg) or bending over should be avoided in the first 2 weeks. Hair washing with closed eyes is permitted. Most patients require 1-2 weeks off work. In anterior lamellar keratoplasty (ALK), the stitches remain in situ until the graft-host junction has healed which is usually 9-12 months after the operation and in some cases, are left in long term, dependent on the corneal shape and healing. The sutures are buried and do not usually cause foreign body sensations. The visual recovery after traditional PK is over 12-18 months ***(Padrón-Pérez et al, 2017).***

The main goal of the first 3 months is to ensure that the graft heals well and to avoid rejection. Glasses or contact lenses can be prescribed after the initial duration to help enhance vision, but the final vision may not be established until the sutures are removed within 12-18 months. Residual astigmatism may also be fixed by soothing incisions / re suturing or laser excimer ***(Alghamdi, 2016).***

Multidisciplinary care (MDC) is an integrated team approach to health care. The evaluation of treatment options and treatment planning are collaborative processes involving medical and allied healthcare practitioners in collaboration with the patient and the families of the patient. Individual, patient-specific treatment plans are being built and care delivery is a shared responsibility **(*Deb, and Blackwood, 2021).***

Evidence shows that MDC is capable of minimizing mortality and enhancing patient quality of life and that treatment decisions made by multidisciplinary teams are more aligned with evidence-based recommendations than those taken by independent health care practitioners. A multidisciplinary approach to care often increases patient satisfaction with the treatment, improves financial performance, decreases the mean duration of hospitalization, and substantially reduces the number of unplanned hospital readmissions ***(Tee et al, 2018).***

Everybody finds themselves in situations where they require special knowledge and skills to meet their basic needs and sustain their lives. One such situation relates to loss of health and hospitalization. All patients have the right to be educated on maintaining their health, disease prevention, and health promotion. In recent years, the role of nurses as the most pivotal member of the healthcare team has undergone a historic transformation ***(Arian, 2018).***

Nurses make up more than 70% of the healthcare staff. They have greater access to the patient and his / her families and spend a lot of time delivering patient care; thus, nurses give patients daily training opportunities and can evaluate the quality of education. Patient education is effective as part of nursing because it decreases costs, duration of hospitalization, and patient distress and improves patient satisfaction with the healthcare services given ***(Molina-Mula, and Gallo-Estrada, 2020).***

Health literacy can be described as an individual's capacity to access and use health-related information effectively, to promote and sustain good health. While literacy can allow people to understand and communicate health information and concerns, it is called health literacy when these are applied to a health context. An individual can be educated and still have limited literacy on health. Examples of actions that require health literacy skills include properly reading and adhering to a care or prevention program as well as being able to use the available healthcare services rationally and ponder individual behavioral change. Increasing health literacy rates is a means to empower patients and contribute to downgrading inequalities towards a healthier, safer, more demanding society ***(Hepburn, 2021).***

Patient satisfaction is a highly desired result of hospital clinical treatment, and can even be an aspect of the state of health itself. Expression of satisfaction or disappointment by a patient is a decision on the quality of hospital care in all its aspects. Whatever its strengths and limitations, patient satisfaction is an indicator that should be indispensable to the assessment of the quality of care in hospitals ***(Services et al, 2021)***

Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims. It affects the timely, efficient, and patient-centered delivery of quality health care. Patient satisfaction is only a proxy but a very strong predictor for assessing doctor and hospital success. Successful education improves patient satisfaction and contributes to increased care adherence and ultimately to a better result. Different methods, such as verbal education, written information (handouts, popular magazine posts, etc.), group-based learning, audiotapes, videotapes, computer-assisted education, and the internet can be used to educate the patient about the disease ***(Park, 2018).***

Significance of the study:

Some advanced countries in Europe and America have special documents like driver's licenses for donating organs after death, but we, unfortunately, have not reached this sophisticated level of thought or culture ***(WHO, 2021).***

Organ transplantation is considered as a difficult and long, unresolved religious and cultural debate in Egypt as we are Muslims and believe that our bodies belong to god, our dead bodies should be laid to rest as soon as possible and we haven't the right to donate any part during our life or even after death. Even after the permissions that were be given from Dar al - Ifta and religious scholar as Shaykh Tantawi who said that" God created illnesses and cures and that as long as the doctors say this is a cure, it is not forbidden to take from dead"**,** there is a great unchangeable perception of refusing the idea ***(Hamdy, 2021).***

The United States and Sri Lanka, the only countries where exporting corneas is an objective in itself, account for 94% of all exported corneas worldwide. In Egypt, most corneal transplants are done with corneas imported from the United States ***(Wong et al, 2017).*** At Assiut University Hospitals, Around 150 corneal transplants were performed from August 2017 to April 2019 ***(Assiut University Hospital Records, 2019).***

As we consider every cornea is a precious one, patients should be provided with sufficient information and skills to increase their literacy level about their operation and increase their satisfaction and these are our aims of this study.

Aim of the study

To evaluate the effect of a multidisciplinary education course on health literacy and satisfaction of patients undergoing keratoplasty.

Research hypotheses:

Patients who receive multidisciplinary education course will have a high level of health literacy and satisfaction regarding keratoplasty than who don't.

Subjects and Method

Research design:

A quasi-experimental research design was utilized to conduct this study.

Research Setting:

The study was conducted in the Ophthalmology department and outpatient clinics at Assiut University hospital.

Subjects:

A purposive sample of 60 adult and elderly patients (30 study group and 30 for the control group) undergoing corneal transplantation surgery.

The sample was calculated by using power analysis according to the patient's flow with precision levels 5% at confidence level 95% and $p < 0.05$ ***(Thompson,1992).***

Inclusion criteria:

Adults and elderly patients who their ages 20 years and more, both sexes male and females' patients.

Exclusion criteria:

Unconscious patients and who refuse participating in the study.

Tools of Data Collection:

The following four tools were used for data collection:

(1) Patients Interview Questionnaire Sheet:

It was developed by the researchers based on the literature review. It consisted of two parts:

Part I: Socio-demographic patient variables:

It includes the code number, age, gender, marital status, occupation, and level of education.

Part II: Medical assessment:

It includes medical diagnosis, indication for keratoplasty, and type of operation, chronic disease assessment, and previous family member history of the disease.

(2) Patient's Knowledge and Observation Checklist:

It was developed by the researchers after a relevant national and international literature review. It consisted of two parts:

Part I: Patient's knowledge about keratoplasty.

It included fifteen questions about the definition of keratoplasty, indications, and procedure of corneal transplantation, postoperative complications, preoperative, intraoperative preparations, post-operative care, and pre-discharge instructions after corneal transplantation.

Scoring System:

Each right answer was given one score. The total score was 15. Those who obtained less than 60% (less than 9 degrees) were considered to have an unsatisfactory level. While those who obtained 60% or more (9 degrees or more) were considered to have a satisfactory level of knowledge.

Part II: Patient's observation checklist:

This tool was used after the implementation of the educational course. It consists of the following items:

- Performing hand washing which includes 11 steps.
- Administering eye drops which include 10 steps.
- Administering eye ointments which include 9 steps.

Scoring System:

The total score of the observation checklist was 30 degrees, each item in the checklist was scored as follows: - one degree for each step those done correct, and zero for the step that was not done. This system translated into results into adequate and inadequately done, adequately done includes steps that are done correctly, and inadequately done include steps that done incorrectly. Scores more than or equal to 60 % (more than or equal to 18 degrees) were graded as a satisfactory level of practice. Scores less than 60% (less than 18) were graded as an unsatisfactory level of practice.

(3) Health Literacy Questionnaire (HLQ):

It was developed by ***(Osborne et al, 2013).*** It is a multi-dimensional tool that has been designed to provide practitioners, organizations, and governments with data describing the health literacy strengths and limitations of individuals and populations. These data allow the development and selection of fit-for-purpose response strategies that optimize opportunities to improve equity in health outcomes and access ***(Hawkins et al, 2017).***

The HLQ consists of 44 items over nine separate scales, each representing a different element of the general construct of health literacy which includes the following: feeling understood and supported by healthcare providers, having sufficient information to manage my health, actively managing my health, social health support, appraisal of health information, ability to actively engage with healthcare providers, navigating the healthcare system, ability to find good health information, and understanding health information well enough to know what to do ***(Morris et al, 2021).***

Each scale contains four to six items. The complete instrument or selected scales can be used, depending on the intent of the inquiry. The first five scales contain items asking respondents to show their degree of agreement on one of four reaction choices (strongly disagree to strong agreement). The remaining scales (6–9) reflect self-reported capability scales, and items within these scales are rated

on one of five (can not do; very difficult; very difficult; very easy; quite easy) answer choices. The full HLQ offers nine individual scores within each of the nine scales, based on an average of the items. There is no overall total score for the HLQ as that could potentially mask individual needs in specific health literacy domains ***(Batterham et al, 2016).***

Scoring System of the HLQ:

The HLQ provides scores on nine scales. - Score offers insight into the respondent's strengths and shortcomings but when presented together, the scores are most effective in displaying the respondent's 'health literacy profile.' Average scale scores for respondent groups provide valuable insights into the strengths and limitations of populations in health literacy. Use of cluster analysis or latent class analysis to classify clusters of individuals with specific health literacy profiles is recommended. This approach to analyzing HLQ data unmasks sub-groups of people with unique strengths that can be built on, or sub-groups with limitations that may provide support to improve ***(Leslie et al, 2020).***

(4): The Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ):

It was developed by ***(Laschinger et al., 2005),*** it was used to measure the patients' satisfaction in the research setting based on the quality of nursing care they received on a 5-point Likert scale using the 19 questions derived from the Patient Judgment of Hospital Quality **survey** ***(Karaca, and Durna, 2019).***

Each item of the PSNCQQ consists of a phrase to designate the content of the question or "sign-post," followed by a more detailed question or "descriptor." For example, in the first item of the instrument, "information you were given" is used as a signpost for the descriptor that follows, "How clear and completes the nurses' explanations were about tests, treatments, and what to expect." Items 7, 9 to 13 pertains to nursing and daily care; Items 14 to 16 for ancillary staff and the hospital environment; Item 8 for medical care; Items 3 to 6 for information; Item 1and 2 for admissions; Items 17 to 18 for discharge; and four questions (Item 19.1 to 19.4) measure satisfaction with the overall quality of care ***(Laschinger, 2021).***

Scoring System of the PSNCQQ:

For each PSNCQQ item, a 5-point Likert scale ranging from poor to excellent is used. The scores for all items can be summed up and combined to provide a single value for each patient for general outcomes. Standard deviations can be measured for accurate feedback and more "actionable" results, item means and standard deviations can be calculated ***(Laschinger, 202).***

The Multidisciplinary Educational Course:

This educational course was prepared by the researchers (Ophthalmologist, lecturer of Medical-surgical nursing, and assistant professor of Gerontological nursing). The educational course contained theoretical and practical parts.

(1) The theoretical part: It included

- Brief anatomy of the eye.
- Definition of corneal transplantation.
- Indications of corneal transplantation.
- A brief explanation of the corneal transplantation procedure.
- Postoperative complications.
- Preoperative preparations.
- Intraoperative and postoperative care.
- Pre-discharge instructions after corneal transplantation included nursing instructions about pain management, instructions about operated eye care, additionally, the proper position of praying after the operation for Muslims, and the importance of follow-up with the ophthalmologist for a year after surgery were cleared.

(2) The Practical part included

- Routine hand washing (with soap and water).
- Administering eye drops.
- Administering eye ointment.

Tools validity:

Validity of tools was through three juries in Medical-surgical nursing from the Faculty of Nursing/ Assiut University and Ophthalmology expert from faculty of Medicine, Assiut University who are experts in the related field and selected to test the content validity of the instruments and to judge its clarity, comprehensiveness, relevance, simplicity, and accuracy. All of their comments were taken into consideration; some items were re-phrased to reach the final version of the tools.

Reliability assessment:

The developed and validated tools for Patient's knowledge and observation checklist, Health literacy questionnaire, and Patient satisfaction with nursing care quality questionnaire were tested for reliability. Test-re-test results using Cronbach's alpha coefficient cleared that all items were significantly different with a correlation above the threshold of significance (r=0.95, 0.87& 0.94) respectively.

Administrative and Ethical consideration:

All research ethics principles were fulfilled according to ***the World Medical Association Declaration of Helsinki (1997).*** Before the conduction of the pilot study as well as the actual study, official permission and consent were obtained from the dean of the Faculty of Nursing, as well as the director of the ophthalmology department and outpatients' clinic after explaining the nature and purpose of the study. The subject of the study is entitled to refuse to participate and/or withdraw from the study at any time without any reason. During data collection, the research topic of privacy was not considered to pose any health hazards. Participants were assured of being highly confidential with all their data.

Pilot Study:

A pilot study was conducted on 10% of the sample (6 patients) in a selected setting to evaluate the applicability & clarity of the tools. According to this pilot study, the required modifications were made. Those patients who were involved in the pilot study were not included in the study sample.

Field of work:

The process of data collection was carried out from the beginning of November 2018 to the end of January 2020, during morning and afternoon shifts. The researchers attended the ophthalmology department and outpatient clinic.

Assessment phase:

- Preparation and revision of all study tools.
- Formulation of the theoretical and practical part of the education course. The theoretical content of the education course was concerned with keratoplasty, as the definition of keratoplasty, indications, and procedure of corneal transplantation, Postoperative complications Preoperative, Intraoperative preparations, Postoperative care, and pre-discharge instructions after corneal transplantation. The practical part included how to wash hands properly, how to administer eye drops or ointment properly.
- Moreover, teaching materials were prepared such as an education booklet, discussion, demonstration, pictures, real objects that helped in covering theoretical and practical information.
- At the beginning of the interview, the researchers introduced themselves to the patient and explained the purpose of the study.
- Oral consent was obtained for participation. Then the researchers start to fill the interview questionnaire to assess the patient's socio-demographic characteristics, and medical data by using the tool I.

Implementation phase

- The first group of patients (30 patients) was the control group who received routine care. On admission, patients are interviewed and the patient's socio-demographic characteristics & medical data by using the tool I.
- At the duration of patient preparation for the surgery patients are assessed for their knowledge and skills about keratoplasty and

assessed for their health literacy by using tools II, and III.

- At the ophthalmology clinic after two weeks of discharge, patients were assessed for their satisfaction with nursing care quality.
- The second group (30 patients) was the study group that received the routine group in addition to the educational course. On admission, patients are interviewed and the patient's socio-demographic characteristics and medical data by using the tool I.
- At the duration of patient preparation for the surgery, patients have received the educational course. Each patient received the education in two sessions two days before the operation.
- The first session, begun with explaining the theoretical part of the educational course that includes brief anatomy of the eye, definition, indications, procedure of keratoplasty, postoperative complications, preoperative preparations, and intraoperative care.
- The second session, completing the theoretical part of the educational course that included post-operative care and pre-discharge instructions after corneal transplantation. In addition to the practical part of the educational course that included hand washing procedure, administering eye drops and ointment properly.
- Each session takes 30 - 40 minutes. After each session, there were 5-10 minutes for discussion and gave feedback. The reinforcement of teaching was performed according to the patient's needs to ensure their understanding. Each patient in the group obtained a copy of the teaching booklet; the researchers used pictures and, diagrams to educate the patient.
- Study group patients were assessed for their knowledge and skills about keratoplasty and assessed for their health literacy by using tools II, III, and IV.
- At the ophthalmology clinic after two weeks of discharge, patients were assessed for their satisfaction with nursing care quality.

Evaluation phase:

Impact of applying the multidisciplinary education course was done by comparing the change in their literacy level and satisfaction before the study, after finishing the study by two weeks using the previous mentioned interviewing questionnaire sheet

III. Administrative Design:

Official permission was obtained from the head of the Ophthalmology department and Outpatient clinic at Assiut university hospital to conduct the study.

IV. Statistical Design:

Using the Anderson-Darling test, the data were checked for normality and variances inhomogeneity before further statistical analysis. Categorical variables were defined by number and percentage (N & percent), where the mean and standard deviation (Mean, SD) were described as continuous variables. Chi-square test and Fisher exact test used to compare categorical variables, t-test, Pearson, and Spearman correlation coefficients were applied to continuous variables, a two-tailed $p < 0.05$ was deemed statistically significant. All analyses were performed with the IBM SPSS 20.0 software.

Result

Table (1): shows that; more than half (53.3%) of patients in the study group and (50.0%) of them in the control group were males, their age ranged between 20: 60 years with a mean (58.70 ± 7.10 and 59.60 ± 6.52) years for study and control groups respectively. Also, (40.0% and 46.7%) of patients in the study and control group respectively their age was ranging between more than 60 years to 74 years. Regarding marital status; (56.7 %) of the control group patients and (46.7 %) of patients in the study group were married. The highest percent in both the study and control group of patients were illiterates and either farmers or housewives. Finally, there was no statistically significant difference between the two groups of patients.

Table (2): demonstrates that; all patients in the control group and the majority of them in the study group were diagnosed with keratoconus, performed Full-thickness (penetrating) keratoplasty for optical reasons. (23.3%) of study group patients complain from diabetes and the same percentage of them in the control group complains from hypertension. More than half (56.7%) of the control group patients have a previous family history of the disease while (60.0 %) of patients in the study group have not no previous history. The majority of patients in the two groups went

directly to the unit and reported the previous hospitalization twice or three times. Finally, there was no statistically significant difference between the two groups of patients regarding the medical data.

Table (3) clarifies that; More than two thirds (83.3) of patients in the control group have unsatisfactory knowledge levels while the majority of the study group patients (96.7%) after completing the educational course had a satisfactory knowledge level with a mean score (13.87 ± 1.68 and 6.40 ± 2.81) for study and control groups consequently. There was a highly statistically significant difference between both two groups regarding knowledge.

Table (4) illustrates that; there was a highly statistically significant difference between study and control groups of patients regarding the three practical procedures with a mean (29.07 ± 3.52 and 13.47 ± 7.29) for study and control group consequently.

Fig. (1): shows that; More than two-thirds (80 %) of patients in the control group have unsatisfactory practice level while patients majority of the study group (93.3%) had a satisfactory practice level after implementing the educational course.

Table (5): demonstrates that there was a highly statistically significant difference between both study and control of patients regarding health literacy score with an obvious high score for navigating the healthcare system, ability to actively engage with healthcare providers, and understanding health information well enough to know what to do in study group patients.

Table (6): shows that; there was a highly statistically significant difference between both study and control of patients regarding the patients' satisfaction score with a mean (83.37 ± 7.81 and 42.73 ± 12.9) for the study and control groups respectively. Also, obvious high scores were observed for nursing and daily care, the information provided, and satisfaction with the overall quality of care in study group patients.

Fig. (2): shows that; half (50%) of patients in the control group have poor satisfaction levels while the majority of the study group patients (83.3%) have a very good satisfaction level.

Fig. (3): illustrates that; there was a positive correlation between patients' total knowledge and practice of the study group of patients which means that as patients' knowledge increased, their practice increased also.

Fig. (4): shows that; there was a positive correlation between patients' knowledge and patient satisfaction with nursing care quality which means that as patients' knowledge increased their satisfaction level increased also.

Table (1): Distribution of demographic characteristics of patients in both study and control groups.

Socio-demographic variables	Study (N.=30)		Control (N.=30)		P. value
	No	%	No	%	
Age group					
• from 45: 60 years	18	60.0	16	53.3	0.602
• > 60 - 74 years	12	40.0	14	46.7	
Mean ± SD	58.70 ± 7.10		59.60 ± 6.52		0.611
Gender					
• Male	16	53.3	15	50.0	0.796
• Female	14	46.7	15	50.0	
Marital status					
• Married	14	46.7	17	56.7	0.678
• Divorced	2	6.6	1	3.3	
• Widowed	14	46.7	12	40.0	
Education					
• Illiterate	16	53.3	13	43.3	0.715
• Reading and writing	11	36.7	11	36.7	
• Primary school	1	3.3	1	3.3	
• Preparatory school	1	3.3	4	13.3	
• Secondary school	1	3.3	1	3.3	
• University	-	-	-	-	
Occupation					
• Farmer	17	56.7	13	43.4	0.468
• Handcraft	0	0.0	1	3.3	
• Housewife	13	43.3	16	53.3	

Table (2): Distribution of Medical assessment data accords to study and control groups.

Medical data	Study (N.=30)		Control (N.=30)		P. value
	No	%	No	%	
Diagnosis					
• Keratoconus	27	90.0	30	100.0	0.076
• Corneal opacity	3	10.0	0	0.0	
Indication for keratoplasty:					
• Optical	29	96.7	30	100.0	0.313
• Tectonic/ reconstructive	1	3.3	0	0.0	
Operation type					
• Full-thickness (penetrating) keratoplasty	30	100.0	30	100.0	-
Chronic disease assessment					
• Diabetes	7	23.3	5	16.7	0.519
• Hypertension	6	20.0	7	23.3	0.754
• Renal disease	2	6.7	5	16.7	0.228
• Heart disease	2	6.7	4	13.3	0.389
Previous Family history of the disease					
• No	18	60.0	13	43.3	0.196
• Yes	12	40.0	17	56.7	
Previous hospitalization					
• Once	2	6.7	6	20.0	0.195
• Twice'	15	50.0	9	30.0	
• 3 times	10	33.3	8	26.7	
• 4 times±	3	10.0	6	20.0	
Means of admission					
• Emergency	5	16.7	3	10.0	0.056
• Direct to unit	24	80	22	73.3	
• Referred from another facility	1	3.3	5	16.7	

Table (3): Distribution of patient's knowledge level accords to study and control groups.

Knowledge level	Study (N.=30)		Control (N.=30)		P.value
	No	%	No	%	
Unsatisfactory	1	3.3	25	83.3	<0.001**
Satisfactory	29	96.7	5	16.7	
Mean score ± SD	**13.87 ± 1.68**		**6.40 ± 2.81**		**<0.001****

**** (High statistical significant differences P value <0.001)**

Table (4): Distribution of patient's observation checklist accords to study and control groups.

Observation checklist	Max Score	Study (N.=30)	Control (N.=30)	P.value
		Mean ± SD	Mean ± SD	
Performing hand washing	11	11.37±1.65	5.13±3.04	<0.001**
Administering eye drops	10	9.3±1.09	4.53±2.43	<0.001**
Administering eye ointment	9	8.4±0.89	3.8±2.11	<0.001**
Total score	**30**	**29.07± 1.52**	**13.47±7.29**	**<0.001****

**** (High statistical significant differences P value <0.001)**

Fig. (1): Distribution of patient's practice level according to study and control groups.

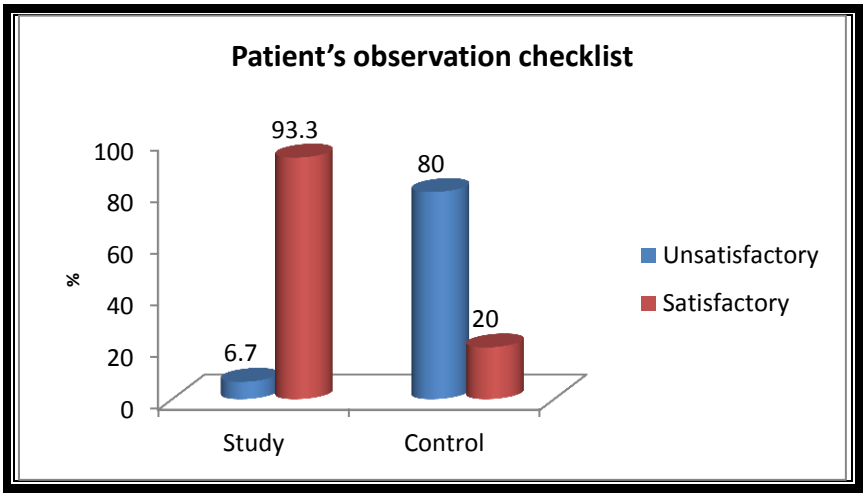


Table (5):- Distribution of health literacy scores regarding study and control groups.

Health literacy	Study (n=30)	Control (n=30)	P.value
	Mean ± SD	Mean ± SD	
• Feeling understood and supported by healthcare providers.	14.03±1	5.97±1.69	<0.001**
• Having sufficient information to manage my health.	13.47±1.48	5.43±1.19	<0.001**
• Actively managing my health.	16.37±1.79	7±1.62	<0.001**
• Social health support.	16.5±1.5	6.33±1.18	<0.001**
• Appraisal of health information.	16.07±2.1	6.73±1.39	<0.001**
• Ability to actively engage with healthcare providers.	**22.4±1.13**	7.47±1.93	<0.001**
• Navigating the healthcare system.	**24.5±3.08**	8.47±1.7	<0.001**
• Ability to find good health information.	19.93±2.29	7±1.88	<0.001**
• Understanding health information well enough to know what to do.	**20.17±2.56**	6.83±1.29	<0.001**

**** (High statistical significant differences P value <0.001)**

Table (6): Distribution of patients' satisfaction scores regarding study and control groups.

Patients Satisfaction	Max Score	Study (N.=30)	Control (N.=30)	P.value
		Mean ± SD	Mean ± SD	
• Nursing and daily care	30	**22.8±0.92**	10.6±4.01	<0.001**
• Ancillary staff and hospital environment	15	11.97±0.18	6.27±2.08	<0.001**
• Medical care	5	3.83±0.7	2.17±0.53	<0.001**
• Information	20	**17.07±0.69**	8.0±2.9	<0.001**
• Admission	10	6.9±0.4	3.97±1.47	<0.001**
• Discharge	10	7.7±0.88	2.97±1.1	<0.001**
• Satisfaction with the overall quality of care	20	**15.7±0.92**	8.77±3.43	<0.001**
Total	110	**83.37±7.81**	**42.73±12.9**	<0.001**

**** (High statistical significant differences P value <0.001)**

Fig. (2): Distribution of patient satisfaction with nursing care quality regarding study and control groups.

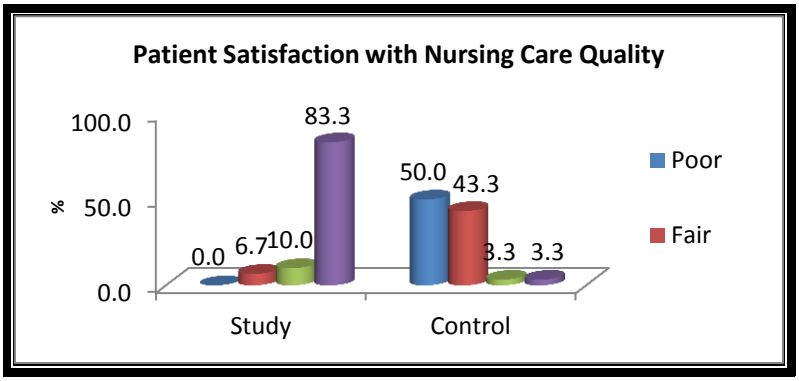


Fig. (3): Correlation between patients' total knowledge and practice of study group of patients.

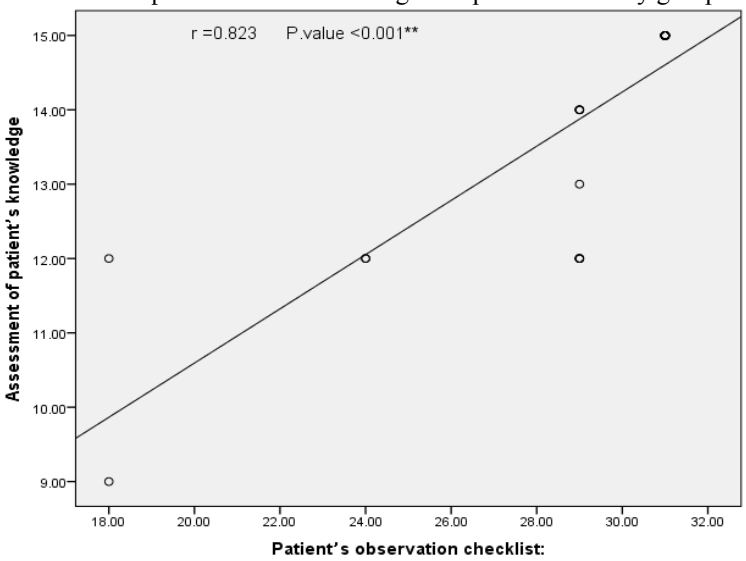
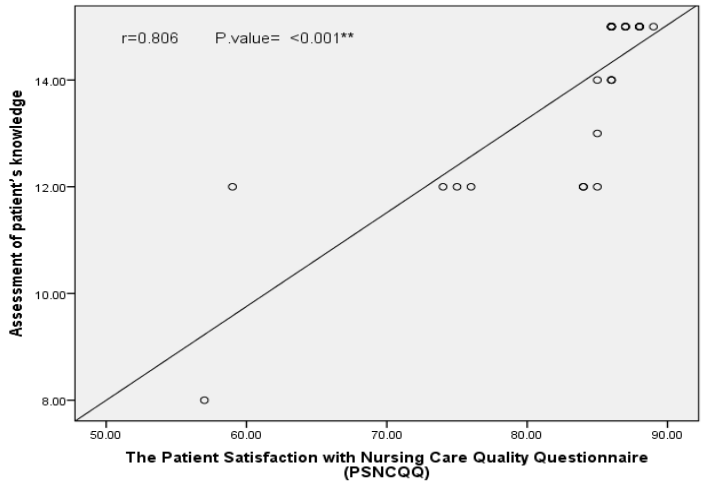


Fig. (4): Correlation between patients' total knowledge and patient satisfaction with nursing care quality regarding study groups.



Discussion

Keratoplasty is the most common type of transplant surgery currently being performed, and it has the highest success rate. Several different methods of corneal transplantation are available to help restore vision in patients with corneal problems, all of which are normally done under local anesthesia ***(Cincinnati Eye Institute, 2021).***

Regarding patients' Socio-demographic data, our study revealed that more than half of patients in both control and study groups were males, their ages ranged between forty-five to less than sixty years old with a mean (58.7 ± 7.1) years. Also, nearly half of patients in both control and study groups were aged between sixty to seventy-four years. ***Cruz et al, (2017)*** were agreeing with our study results as they reported that "more than half of them were males, and more than one-third of patients their ages were over sixty years. The mean age of the patients was 49.33 years, with a standard deviation of 22.60, while half of the patients were aged up to 52.50 years. Also, ***Cruz et al, (2016)*** were agreeing regarding gender but disagree regarding the age of patients as they reported that "The average age of patients was 38 ±17.61 years, ranging from 13 to 87 years, the male prevalence was 57.6%".

Fulya Duman et al, (2013) were agreeing with the study findings as they revealed that "nearly half of studied sample aged from 60 - 74 years old and endothelial abnormalities were more common indications for surgery in the elderly. This may be due to the age-related changes that occur to elderly people during the aging process that lead to eye disease and keratoplasty.

More than half of the patients in the control group and more than one-third of the study group were married. Regarding the educational level, more than half of patients in the study group and more than one-third of the control group patients were illiterates, more than one-third of patients in both two groups are reading and writes**.** More than half of the patients in the control group were housewives and more than one-third of the study group was not working and housewives also.

Al-Arfai et al, (2015) were agreeing with our study results as they mentioned that "Sex distribution showed a male predominance as more than half of the study sample was males and more than one-third of them was females, but disagreeing with the mean age of patients as they reported that "the mean age of all patients was 28.8 years (range 14-72 years)".

Additionally, ***Lee and Chen, (2019)*** were observed that about fifty-five percent of the participants were unable to read and write and were farmers. ***Sarezky et al, (2017)*** were reported that "out of eighty patients; nearly two-thirds of patients were illiterates, one-quarter of them were educated only till primary class and only ten percent were educated till secondary school or beyond.

Regarding medical data, the study results revealed that the majority of patients in the study group and all patients of the control group performed penetrating keratoplasty because of keratoconus**.** ***Tilahun and Shimelash, (2016)*** were agreeing with these results as they reported "Keratoconus was the leading indication for PK in the Middle East, with 32.8%. It ranked first in the majority of studies".

Also, ***Mario et al, (2017)*** reported that "Penetrating keratoplasty (PK) ranks among the oldest and most common kinds of human tissue transplantation" and ***Cruz et al, (2016)*** clarified that "the indications for keratoplasty were keratoconus in more than half of patients' eyes. Of the hundred keratoplasties performed, ninety-eight were penetrating". Additionally, ***Abdelkader, (2019)*** reported that "the main indicator for cornea transplant in the hospital was keratoconus. Patients underwent corneal transplantation, three-quarters of them had penetrating keratoplasty performed for optical purposes and the remaining quarter underwent penetrating keratoplasty for therapeutic reasons.

The current study clarified that more than two-thirds of patients in the control group have unsatisfactory knowledge level while the majority of the study group patients after completing the educational course had a satisfactory knowledge level with a mean score (13.87 ± 1.68 and 6.40 ± 2.81) for study and control groups consequently, From the researchers' point of view, it was an acceptable

result as the multidisciplinary education course has a great effect in raising the patients' knowledge level. This agrees with ***Tilahun, (2016)*** who reported that most of the study group patients achieved satisfactory knowledge levels versus the control group.

Health literacy has been described in several ways, basically "health literacy represents the cognitive and social skills that decide individuals' motivation and ability to gain access to understand and use knowledge in ways that promote and maintain good health" ***Crondahl and Eklund, (2016).*** Health literacy is also increasingly recognized as a multidimensional construct, based on a combination of functional, interactive, and essential levels of literacy. All of these are important because they ultimately affect how people communicate with their healthcare and make decisions about it ***Nutbeam et al, (2019).***

Our results demonstrate that there was a highly statistically significant difference between both study and control of patients regarding health literacy score with an obvious high score for navigating the healthcare system, ability to actively engage with healthcare providers, and understanding health information well enough to know what to do in study group patients. From the researchers' point of view, it is an anticipated result as the study group patients have received a multidisciplinary educational course that increases their knowledge and practice level that reflects on their health literacy level.

Schillinger et al, (2017) was agreeing with the study results as they revealed that" Patients with low health literacy have less knowledge about how to manage their illness compared with patients who have adequate health literacy". ***Razazi et al, (2018)*** were in the same line as they mentioned "there was a relationship between the mean of health literacy and the mean of knowledge that is; people with higher knowledge levels had higher levels of health literacy and higher awareness. Since nurses and health care professionals play a major role in the care and treatment of patients, they can enhance their health awareness by correctly informing them, which can rectify many issues, such as drug errors, repeated physician referrals, and re-admission to the hospital and, in general, affect the quality of health care services.

The present study revealed that there was a positive correlation between patients' knowledge and health literacy which means that as patients' knowledge increased their literacy level increased also. Additionally, there was a positive correlation between patients' health literacy and their satisfaction with nursing care quality. ***Keifi et al, (2016)*** was agreeing with the study results as they mentioned that "The patient education course increased substantially the mean quality scores of health care and patient satisfaction in the experimental group relative to the control group.

Also, the present study showed a positive correlation between patients' knowledge and patient satisfaction with nursing care quality, this may be due to when patients' knowledge increased their satisfaction level increased also. This agrees with ***Keifi et al, (2016)*** who reported that patient satisfaction with nursing care quality is related to their knowledge.

In the same line ***Abd Elgaphar, (2015)*** reported that patient satisfaction increased after providing patients with an educational protocol. Moreover, ***Keifi et al., (2016)*** mentioned that patient education is one core part of the nursing role when its implementation leads to low costs, length of hospital stay, and patient worry and raises patients' satisfaction with the provided healthcare services. ***Abdelmowla et al, (2017)*** added that the effect of the nursing instructions brochure showed significant differences regarding patients` satisfaction with nursing care pre, during, and post-intervention. The study group patients were more satisfied with the nursing care provided than the control group.

Also, the present study showed that there was a positive correlation between patients' total knowledge and practice of the study group patients, this is because when the knowledge level of patients increase their practical level enhanced means that as patients' knowledge increased, their practice increased also. This agrees with ***Abdelmowla et al, (2017)*** who founded a positive relationship between knowledge and practice of the study group of patients

Finally, education is a simple way that multidisciplinary team members can provide patients with the needed information, increase their literacy level about their conditions, increase their ability to manage their problems, and increase their satisfaction with the care provided.

Conclusion

Based on the current study results, it was concluded that:

- The majority of patients in the two groups were diagnosed with keratoconus, performed Full-thickness (penetrating) keratoplasty for optical reasons.
- There was a highly statistically significant difference between both the study and control of patients regarding health literacy score.
- Half of the patients in the control group have poor satisfaction level while the majority of the study group patients have a very good satisfaction level post educational course application.
- There was a positive correlation between patients' knowledge & health literacy and patient satisfaction.
- The multidisciplinary educational course and providing patients with an educational handout resulted in a significant improvement in patient health literacy level and satisfaction concerning keratoplasty.

Recommendations

Because of the findings of the present study, it was recommended that:

- Nurses and other healthcare staff members should consider patient education as one of their critical duties and improve their awareness of the importance of this education about keratoplasty.
- Establishing a patient education center in the ophthalmology department to provide information to such a group of patients before performing the keratoplasty.
- Further research studies should be done on the effect of patients' education on the keratoplasty rejection rate.

References

Abd Elgaphar S M (2015): The Effect of Protocol of Nursing Intervention on Quality of Care in Minor Injuries Unit IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959.pISSN: 2320–1940 Volume 4, Issue 6 Ver. V (Nov. - Dec.), PP 12-18 www.iosrjournals.org.

Abdelkader, A., (2019): Changes in Corneal Wound Healing and Graft Biomechanics after Primary Penetrating Keratoplasty versus Repeat Penetrating Keratoplasty. Cornea, 38(8), pp.1006 - 1010.

Abdelmowla R A, Sayed SY and Abo Elmagd NS (2017): Lumbar Puncture: Nurses` Knowledge, Performance, and Patients' Satisfaction with Nursing Care. American Journal of Nursing Science. Vol. 6, No. 5, pp. 433-439. https://doi.org/10.11648/j.ajns.20170605. 18.

Al-Arfai, K., Yassin, S., Al-Beshri, A., Al-Jindan, M. and Al-Tamimi, E., (2015): Indications and techniques employed for keratoplasty in the Eastern province of Saudi Arabia: 6 years of experience. Annals of Saudi Medicine, 35(5), pp.387-393.

Alghamdi H F. (2016). Causes of Irreversible Unilateral Or Bilateral Blindness In The Al Baha Region Of The Kingdom Of Saudi Arabia. Saudi Journal of Ophthalmology Volume 30, Issue 3, July–September 2016, Pages 189-193 https:// doi. org/ 10. 1016/ j. sjopt. 2016. 06. 001

Ali J, M., Rezaei K M. and Safi, S., (2020): A 27-Year Report from the Central Eye Bank of Iran. Journal of Ophthalmic and Vision Research, Volume 15, Issue 2 / Pages 149–159. DOI: 10.18502/jovr.v15i2.6731

American Academy of Ophthalmology (2021): Corneal Perforations. [online] Available at: <https:// www. aao. org/ eyenet/ article/ corneal- perforations> [Accessed 16 January 2021].

Arian, M., Memarian, R., Oghazian, M., Vakilian, F. and Badiee, Z., (2018): The Effect of a Holistic Care Program on the Reduction of Iron Overload in Patients

with Beta-Thalassemia Major: A Randomized Clinical Trial. Iranian Red Crescent Medical Journal, 20(4).

Assiut University Hospital Records, (2019): Ophthalmology department records. No 7, pp. 254-297.

Batterham, R., Hawkins, M., Collins, P., Buchbinder, R. and Osborne, R., (2016): Health literacy: applying current concepts to improve health services and reduce health inequalities, Public Health, 132, pp.3-12.

Bezinover, D., Saner, F. (2019): Organ transplantation in the modern era. BMC Anesthesiology 19, 32. https:// doi. org/ 10. 1186/ s12871-019-0704-z.

Cincinnati Eye Institute (2021): Corneal Transplantation Cincinnati | Keratoplasty Northern Kentucky. [online] https:// www. cincinnatieye. com/ corneal-diseases/ corneal-transplants/

Crondahl, K. and Eklund Karlsson, L., (2016): The Nexus between Health Literacy and Empowerment. SAGE Open, 6(2), p.215824401664641.

Cruz, G., Azevedo, I., Carvalho, D., Vitor, A., Santos, V. and Ferreira Júnior, M., (2017): Clinical and epidemiological aspects of cornea transplant patients of a reference hospital. Revista Latino-Americana de Enfermagem, 25(0).

Cruz, G., da Silva, S., de Azevedo, I., Carvalho, D., Meireles, P., Júnior, M. and Vitor, A., (2016): Epidemiological Profile of Patients Undergoing Urgent Corneal Transplant in a Referral Center in Northeastern Brazil. Transplantation Proceedings, 48(7), pp.2366-2370.

Deb, R. and Blackwood, O., (2021): Multidisciplinary Team Approach in Breast Cancer Care: Benefits and Challenges. Volume 63 (5), PP. 105-112. https:// www. ijpmonline. org/ article. asp? issn= 03774929; year= 2020; volume= 63;issue= 5;spage= 105; epage= 112; aulast= Blackwood

Eye Bank Association of America (2021): Statistical Report - Eye Bank Association of America. [online] Available at: <https:// restoresight. org/ what- we- do/ publications/ statistical-report/> [Accessed 16 January 2021].

Fulya D, Mustafa K, Kunal S, Jagadesh C R, Jenny F M (2013): Indications and outcomes of corneal transplantation in geriatric patients. Am J Ophthalmol. 2013 Sep; 156(3):600-607.e2. doi: 10. 1016/ j. ajo. 2013. 04. 034. Epub 2013 Jun.

Hamdy, S., (2021): The Organ Transplant Debate In Egypt: A Social Anthropological Analysis. [online] Journals. openedition.org. Available at: <https:// journals. openedition. org/ droitcultures/ 2184?lang=en> [Accessed 16 January 2021].

Hawkins, M., Gill, S., Batterham, R., Elsworth, G. and Osborne, R., (2017): The Health Literacy Questionnaire (HLQ) at the patient-clinician interface: a qualitative study of what patients and clinicians mean by their HLQ scores. BMC Health Services Research, 17(1).

Hepburn, M., (2021): Health Literacy, Conceptual Analysis For Disease Prevention. [online] Internalmedicine. imedpub. com. Available at: <https:// internalmedicine.imedpub.com/health-literacy-conceptual-analysis-for-disease-prevention.php?aid=6075> [Accessed 16 January 2021].

Jemberu, Y., Woldie, Y., Mulugeta, W., Shiferaw Alemu, D., and Bantie, G., (2019). Are Corneal Patients Accepting the Transplantation? The Cases of the University of Gondar, Tertiary Eye Care and Training Center, Ethiopia. Journal of Ophthalmology, pp.1-6.

Karaca, A. and Durna, Z., (2019): Patient Satisfaction with the Quality of Nursing Care. Nursing Open;6: 535–545. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6419107/pdf/NOP2-6-535.pdf

Keifi S, Shahriari M, Baghersad Z, Sheibani-Tehrani D and Rejalian F (2016): Effects of Patient Education Program on the Quality of Nursing Care and Inpatient Satisfaction in Surgical Wards of Selected Hospitals in Isfahan, Iran http://www.jhpr.ir Hosp Pract Res. 1(4):129-134.

Laschinger H K (2021): PSNCQQ - Patient Satisfaction with Nursing Care Quality Questionnaire - Research Measurement Tools - Western University. [online] Available at: <https:// www. uwo. ca/ fhs/ hkl/ psncqq. html> [Accessed 16 January 2021].

Laschinger, H. S., Hall, L. M., Pedersen, C. & Almost, J. (2005): A psychometric analysis of the patient satisfaction with nursing care quality questionnaire: an actionable approach to measuring patient satisfaction. Journal of nursing care quality, 20, 220-230.

Lee G H and Chen K (2019): Corneal transplantation, indications and current techniques, Queensland government, http://www.cityeye.com.au/wp-content/uploads/2013/06/Corneal-Transplantation-booklet.pdf.

Leslie, C., Hawkins, M. and Smith, D., (2020): Using the Health Literacy Questionnaire (HLQ) with Providers in the Early Intervention Setting: A Qualitative Validity Testing Study. International Journal of Environmental Research and Public Health, 17(7), p.2603.

Mario M; Heike S; Martin H, Werner A; Albert S., Claus C and Ludwig H.(2017): Changing Indications in Penetrating Keratoplasty, A Systematic Review of 34 Years of Global Reporting, Transplantation: June 2017 - Volume 101 - Issue 6 - p 1387–1399.

Martin, C., Tschernig, T., Loic, H., Daas, L. and Seitz, B., (2020): Cornea from body donors in anatomy department: valuable use for clinical transplantation and experimental research. BMC Ophthalmology, 20(1).

Molina-Mula, J. and Gallo-Estrada, J., (2020): Impact of Nurse-Patient Relationship on Quality of Care and Patient Autonomy in Decision-Making. International Journal of Environmental Research and Public Health, 17(3), p.835.

Morris, R., Soh, S., Hill, K., Buchbinder, R., Lowthian, J., Redfern, J., Etherton-Beer, C., Hill, A., Osborne, R., Arendts, G., and Barker, A., (2021): Measurement Properties Of The Health Literacy Questionnaire (HLQ) Among Older Adults Who Present To The Emergency Department After A Fall: A Rasch Analysis. BMC Health Services Research 17(1). DOI: 10.1186/s12913-017-2520-9.

Nutbeam D, Levin-Zamir D, and Rowlands G (2019): Health Literacy in Context Settings, Media, and Populations, 1st ed., pp. 99-110. ISBN 978-3-03897-472-7 (PDF). file:// F:/ Health_ Literacy_ in_ ContextSettings Media and Populations. pdf

Osborne, R.H., Batterham, R.W., Elsworth, G.R., Hawkins, M., & Buchbinder, R. (2013). The grounded psychometric development and initial validation of the Health Literacy Questionnaire (HLQ). BMC Public Health, 13:658.

Padrón-Pérez, N., Filloy, A., & Martí-Huguet, T. (2017): Complete dehiscence of a DALK graft after early suture removal. Eye (London, England), 28(7), 909–911. doi:10.1038/eye.2017.59

Park, J., (2018): The influences of client-centered therapy on the level of performance, the level of satisfaction of activity of daily living, and the quality of life of the chronic stroke patients. Journal of Physical Therapy Science, 30(2), pp.347-350.

Razazi R, Aliha J M, Amin A, Taghavi S, Ghadrdoost B and Naderi N. (2018): The relationship between health literacy and knowledge about heart failure with recurrent admission of heart failure patients, Res Cardiovasc Med;7:123-9.

Sarezky, D., Orlin, S., Pan, W. and VanderBeek, B., (2017): Trends in Corneal Transplantation in Keratoconus. Cornea, 36(2), pp.131-137.

Schillinger D, Grumbach K, and Piette J, (2017): Association of health literacy with diabetes outcomes. JAMA. ;288 (4): 475– 482. DOI: 10. 1001/ JAMA. 288. 4. 475.

Services, C., Tool, C., Data, &., University™, H., Sciences, L., Response, C., Stories, S., Relations, I., Tam, O., Directors, B. and Bureau, S., (2021): Top 5 Essentials For Patient Satisfaction And Outcomes. [online] Health Catalyst. Available at: <https:// www. healthcatalyst.com/insights/patient-satisfaction-and-outcomes-five-recommendations> [Accessed 16 January 2021].

Tee, J., Bekker, S., Collins, R., Klingbiel, J., van Rooyen, I., van Wyk, D., Till, K. and Jones, B., (2018): The Efficacy of An Iterative "Sequence Of Prevention" Approach To Injury Prevention By A Multidisciplinary Team In Professional Rugby Union. 2018 Sep; 21(9):899-904. Doi: 10.1016/j.jsams.2018.02.003. Epub 2018 Feb 14.

Tilahun Y and Shimelash D. (2016): The outcome of corneal transplantation versus indications in a tertiary eye care center in Ethiopia. Ethiop Med J.; 48:35–39.

Thompson S. K. (1992). The use of statistical significance tests in research: Source criticisms and alternatives. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

WHO (2021): The State of the International Organ Trade: A Provisional Picture Based On Integration of Available Information. [online] Available at: <https:// www. who. int/ bulletin/ volumes/ 85/12/06-039370/en/> [Accessed 16 January 2021].

Wong, K. H., Kam, K. W., Chen, L. J., & Young, A. L. (2017). Corneal blindness and current major treatment concern-graft scarcity, International journal of ophthalmology, 10 (7), 1154–1162. https://doi.org/10.18240/ijo.2017.07.21

World Medical Association Declaration of Helsinki. (1997): Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, *277*(11), 925–926.