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Retinopathy: Reducing the Risk for Patients with Type II Diabetes Mellitus

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NURS 4500: Nursing Research and Senior Thesis

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Abstract

Background

In our modern environment, diabetes has become a significant public health issue. It is estimated that there are currently 537 million diabetics living in the world. According to those predictions, there will be about 783 million diabetics worldwide by 2045. With the effects of rapid lifestyle changes and urbanization, there is a rising tendency in the prevalence of diabetes and its consequences, such as retinopathy. Moreover, diabetic retinopathy is an important cause of avoidable blindness.

Objective

The purpose of this study is to evaluate whether there is a relationship between early education and health outcomes in regards to retinopathy. This study will also explore the use of interventions necessary to raise awareness and compliance rates among individuals with type II diabetes mellitus.

Methods

A literature review was compiled of primary studies that investigates awareness of diabetes management and its complications on diabetics. A proposal for a study is included as well which can serve to bridge the gap of reducing the risk of retinopathy.

Keywords:

Type II Diabetes, Early Education, Diabetic Retinopathy, Risk Reduction

Acknowledgement

I would first like to thank my parents for encouraging me on this path that has challenged my capabilities as a person and as a student. Next, I want to acknowledge my research professor, Dr. Hamidi, for providing me with abundant resources to make this research proposal possible. I would also like to recognize the support that I have been given by all of my friends and classmates that I have met at Dominican University of California. Finally, I would like to thank the staff at Pacific Eye Associates in San Francisco for providing me with the opportunity to work as a diagnostic technician and to learn under fellow technicians and ophthalmologists. Working at Pacific Eye Associates has allowed me to first hand see that retinopathy is a very common acquired complication of diabetes. This research is written in hopes to reduce those diabetes complications with the help of early education and appropriate access to resources.

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Introduction

Type II Diabetes Melitus is a chronic condition that affects the body's ability to control and regulate sugar which can cause the bloodstream to circulate with an excessive amount of sugar. In our rapidly growing economy, the number of adults diagnosed with diabetes has more than doubled over the past 20 years. Without proper awareness and management, diabetes remains the leading cause of kidney failure, lower-limb amputations, and adult blindness known as diabetic retinopathy (Centers for Disease Control and Prevention, 2022).

Despite having a diagnosis of type II diabetes mellitus, it has become evident that many diabetics are not fully educated of their condition nor aware of the potential complications that may come with their chronic condition. The objective of this paper involves a review of literature revolving around studies that assesses diabetics' knowledge on complications such as the development of retinopathy. Additionally, it is revealed that other factors such as financial and transportation issues play a role in an individual's lack of awareness and lack of compliance. Moving forward, this paper includes a further study that proposes the use of interventions to see if there is a present correlation between early education and health outcomes for individuals with type 2 diabetes mellitus.

Problem Statement

Diabetic retinopathy is known as the most serious eye complication caused by diabetes. Early symptoms and signs of diabetic retinopathy may include floaters, blurriness, dark areas of vision, and difficulty perceiving colors (Fong et al., 2004). Moreover, diabetic retinopathy is the most common cause of blindness in adults aged 20-74 years. It has been concluded that nearly all patients with type 1 diabetes and >60% of patients with type 2 diabetes have retinopathy which is caused by damage to the blood vessels in the retina (Fong et al., 2004). Almost any individual

with diabetes is prone to diabetic retinopathy, however, preventative measures can be practiced earlier specifically in individuals with type 2 diabetes. Preventing the development of diabetic retinopathy heavily rely on early education such as managing blood sugar levels, staying physically active, maintaining a healthy diet, being compliant to medications and diabetic diet, and receiving an annual comprehensive dilated eye exam. Exploring these educational measures will allow a better understanding on how people with type 2 diabetes can reduce the risk of retinopathy.

Research Question

The research question for this study is: Is there any association between early education and the improvement of retinopathy outcomes induced by type II diabetes?

Literature Review

Reducing the risk of developing diabetic retinopathy in patients with Type II Diabetes through early education has not been sufficiently emphasized. Through extensive database research using Iceberg and Pubmed, several articles were able to form a protocol of educational measures to increase adherence to diabetes management and diabetic retinopathy. The objective of this literature review is to explore the research, clearly define diabetic retinopathy and identify educational practices, and determine the correlation between early education/screenings and the prevention of diabetic retinopathy in individuals with Type II diabetes .

To locate articles that are pertinent to the topic, a variety of search terms were applied. Search terms included the following: “diabetic retinopathy”, “early education and screening”, “preventative measures”, “type II diabetes”, “lifestyle”, and “risk reduction”. The search produced thousands of articles using the terms listed above. After careful elimination of articles, a total of six articles were chosen to be used for this review which can be broken down into the

following categories: (1) Awareness and prior knowledge on diabetes and diabetic retinopathy, (2) Education effects on medical compliance, and (3) Preventive care with telemedicine.

The first category focuses specifically on prior knowledge of retinopathy and diabetes among participants in the study population. The articles selected for this category will take into account the knowledge and awareness of the participants on topics such as diabetes, hypertension, and diabetic retinopathy. The design of these studies supports the review's goals in which findings confirm the hypothesis that early education and the prevention of retinopathy are related. The second category incorporates articles that provide evidence on how education plays a factor in one's compliance with probable retinopathy. Studies from the second category further support the objective by utilizing the educational applications to improve the understanding and health literacy of the participants' condition(s). Finally, the third category will include the use of interventions and management techniques for diabetes and retinopathy. Moreover, these studies will include a variety of study methods and different sample sizes which increases generalizability.

Category I: Awareness and prior knowledge on diabetes and diabetic retinopathy

The first study by Lingam et al. (2018) studied people's prior knowledge and attitudes regarding diabetes, hypertension, and diabetic retinopathy as well as other factors that encourage screening for these conditions in a pyramidal model of eye health care. In this study, a total of 202 diabetic and non-diabetic participants were surveyed on their knowledge, attitude, and practice (KAP) related to diabetes mellitus (DM), hypertension, and diabetic retinopathy (DR). This study took place in India at different levels (Primary, Secondary, and Tertiary) of a pyramidal model of eye health care. Community DR screening programs were held at the primary facility in Prakasam District, India. Patients with eye issues were referred to the

secondary facility for follow-up after receiving a diagnosis at the primary level. The secondary institution offers services such as diagnosis of all conditions, operations, and rehabilitation. These are connected to urban Tertiary facilities that offer training, a wide range of services, and care for complicated ailments. After the questionnaires were conducted in the three facilities, Chi-square tests were used to compare systemic and demographic variables among the locations. Additionally, unpaired heteroscedastic t-tests were also conducted to compare the mean KAP scores between the groups divided by location and diabetic status. For all tests, significance was assumed at $p < 0.05$. This study then revealed that the diabetic participants scored higher in the knowledge category compared to the non-diabetic participants. Despite the fact that the majority of participants in each area were aware of hypertension, less than a third of participants in each site recognized that hypertension might impair the eyes or be linked to diabetic complications. In other words, the study's findings also showed disparities in systemic diseases and demographic characteristics especially within the differences regarding education level. With the education level being higher among the diabetic participants presents an alarming concern that non-diabetic participants are undiagnosed due to their lack of awareness and knowledge to get screened for DM. These findings demand that specific education programs, lobbying strategies, and advertising of eye and healthcare facilities be implemented for the relevant demographics (Lingam et al., 2018).

An important element in the early identification and therapy of diabetic retinopathy is raising the degree of knowledge of the condition among people with type II diabetes mellitus. This study's objective was to determine how well a sample of Jordanian individuals with type II diabetes mellitus understood what diabetic retinopathy was. This cross-sectional study by Bakkar et al. (2017) was conducted between August and December 2015. A total of 237 participants

(107 females and 130) with type II DM were given a questionnaire to evaluate their knowledge of diabetes and DR. The questionnaire was divided into three main sections: sociodemographic information, knowledge of diabetes and DR, and patients' compliance to available treatments and routine eye exams along with any obstacles they might experience when getting an early eye exam. Using the SPSS software version 20, numbers and percentages were computed to summarize categorical and nominal data. Next, the chi-square test was applied for univariate analysis and for identifying significant differences in participant characteristics for categorical outcomes. The level of significance was set at $p < 0.05$ for all tests. According to the data, 209 (88.2%) of the 237 participants knew that DM can impair the retina through DR, and 194 (81.9%) of the patients said that DR can cause blindness. Furthermore, 196 patients (82.7%) were aware that blood glucose level control can lower the risk of DR development in terms of their knowledge of DR control and treatment. Despite the high number of awareness in blood glucose control, many of the participants reported measuring blood sugars only when feeling unwell. The findings of this study revealed that the lack of awareness about DR is highly related to education levels which serves as a barrier towards proper management and prevention of visual impairment. To summarize, the primary variable that was discovered to be significantly linked with knowledge of DR was education level of the study population (Bakkar et al., 2017).

The third study by Liu et al. (2018) was conducted to determine the reasoning behind low screening rates for DR as it remains the leading cause of blindness among U.S. adults. In other words, the purpose of this study was to identify other factors influencing rural patients' adherence to diabetic eye screening recommendations. This qualitative study included interviews in a small population of 29 participants: 20 adult patients with type 2 DM and 9 primary care providers from Mile Bluff Family. In these interviews, the participants were able to openly

express and describe elements that discouraged them from adhering to routine screenings for their conditions. After conducting interviews with the participants from the rural areas, a model was developed to reproduce the variables affecting patient adherence. These elements comprise environmental, societal, and individual components. This study revealed that these rural patients struggle with severe barriers that make it difficult for them to consistently receive yearly diabetic eye exams. These barriers may range from lack of transportation, limited access to healthcare, financial issues, and the list goes on and on. By addressing these additional barriers, it may become possible to close the significant gaps in diabetic eye screening in remote regions (Liu et al., 2018).

Summary of Category I Research

The review of the studies from Category I highlights the fast growing epidemics of hypertension, DM, and DR. Due to large inequities and limitations of healthcare resources, it is crucial to lower risk of these disorders by better awareness and screening, and to determine the best strategy to do so for varied groups through studies like these.

Category II: Education effects on medical compliance

The objective of the first study in this category, by Khair et al. (2020) was to assess the effectiveness of a locally tailored, five-month health education program on participants' compliance with referrals that was culturally, geographically, and socially acceptable. This study recruited a randomized group of individuals with type II DM who attended basic eye screenings at a diabetes hospital between September 2017 and August 2018. These participants were then randomly assigned into a health education intervention group (n = 143) and control group (n = 156), however, both groups received information regarding DR and referral instruction at the diabetes hospital. The only difference was that the intervention group received consistent and

personalized education followup via telephonic reminders. Using Pearson's chi-square analysis, the referral compliance and changes in knowledge measures of the two groups were compared. After the analysis, the compliance rate of the intervention's group was discovered to be significantly higher than the control group because they were able to learn more about DR. The results of this study suggest that comprehensive diabetes and DR education should be coupled since it has shown a substantial increase in referral compliance (Khair et al., 2020).

In the second study of this category by Moinul et al. (2020), the goal was to evaluate if patient education can improve increased rates of compliance to routine DR screenings. Between May 2014 and May 2016, DR screening was carried out in a group of 101 diabetic patients in Southern Ontario in which the patients attended a training session at the screening location with the explicit goal of improving patient comprehension of DR. Additionally, these enrolled participants had optical coherence tomography (OCT) and fundus photography images taken to visualize the retina better. Patient compliance to follow-up exams within 6–12 months was then evaluated using a chi-squared test while HbA1c values were compared using a dependent t-test. After completion of the study, it was identified that 33 of the 101 patients have never been screened for DR. Moreover, 89 patients (88%) were referred to an optometrist for continued care while 12 patients (11.9%) were referred to an ophthalmologist for management of DR. Following the tele-retina program, baseline compliance to annual screening increased from 36 patients (35.6%) to 51 patients (50.5%) ($p = 0.03$). Overall, general satisfaction with the tele-retina screening was expressed by 100 patients and the study revealed no significant alterations within HbA1c values (Moinul et al., 2020).

Summary of Category II Research

The articles in category II emphasize the necessity for educational practices in order to reduce the risk and management of DR. This was done by applying interventions such as educational seminars and programs to evaluate the correlation with compliance rates. These studies provided further evidence that interprofessional cooperation relies on education and vision screenings. Correspondingly, outcomes can be long-lasting if interventions are institutionalized at the moment of referral.

Category III: Preventive care with telemedicine

In this study by Agrawal et al. (2021), a cross sectional analysis was used to assess the prevalence of comorbidities and DR, clinical traits, preventative practices, and attitudes toward telemedicine in patients with diabetes. In a sample of 300 participants with DM (Type I and II), a questionnaire was given asking about demographics, disease history, health status, and willingness to engage in telemedical solutions. After completion of the questionnaire, the participants were divided into a DR subgroup and non-DR group. Consequently, the patients with DR were under supervision of medical staff in comparison to those without DR. It was then discovered that the DR group was utilizing diabetic training via seminars, conferences, and websites. The findings also show that patients in the DR subgroup undergo various medical tests more frequently. However, attendance of medical tests was a challenge for some of the participants due to financial issues. Despite expenses, the DR group expressed a large interest in wanting to participate in more diabetes training to gain knowledge in understanding how to manage DR. New ways to reach patients with DR are made possible by the ongoing development of telemedical technologies. Additionally, it has the ability to deliver superior, uninterrupted medical care, which might lead to better treatment outcomes. Programs for DR screening based

on telemedicine are becoming more and more well-liked and have shown to be effective in raising DR screening rates (Siddarth Agrawal et al, 2021).

Summary of Category III Research

Diabetic retinopathy is a severe, incapacitating condition that has a significant economic and medical impact on society. A multimodal medicinal strategy is necessary since many comorbidities coexist with DR and influence the onset and progression of the condition. The development of telemedicine presents the promise of low-cost, ongoing illness monitoring that could enhance treatment outcomes. The findings from this article highlight the concept of DR as a complicated illness in which patient education and ongoing monitoring, particularly via telemedicine techniques, are essential for advancing chronic treatment.

Summary of the Research Literature

Overall, the articles selected for this literature review helps bring awareness to the potential development of retinopathy in patients with diabetes. Barriers that affect one's ability to manage their diabetes and DR were identified in these articles. Lack of education and financial issues were the main causes. With financial issues being a big issue for the majority of the study populations, the use of multiple routes in education will help increase compliance and attain favorable outcomes.

Proposal of Further Study

This research proposal aims to investigate the personal experience and perception of diabetes management. The articles above highlights the positive advantages of additional educational interventions and the use of telemedicine to monitor their conditions. This pilot study will interview a group of individuals with type II diabetes mellitus on their education level and awareness of their chronic condition. The study group will also be divided into two groups: a

control group and intervention group. From there, the primary aim of this study will be to analyze if the intervention group's compliance rate will increase according to diabetes management.

Theoretical Framework

Pender's Health Promotion Model will serve as the foundation for the proposal for this further study. This model by Nola Pender aims to improve a person's well-being by defining health as a dynamic state that is positive rather than only the absence of disease (Petirin, 2020). Pender's approach focuses on the distinctive traits and experiences, cognitions that are specific to behavior, and behavioral outcomes that may be altered for each individual. The model incorporates predictably occurring biological, psychological, and sociocultural elements that are influenced by the characteristics of an individual's behavior (Petirin, 2020). Interpersonal effects like behaviors, beliefs, and attitudes are also taken into consideration in this approach. This model is relevant to the study due to the study's focus on the participants' behavior and desire for compliance with their diabetes care. The participants' behaviors for the management of their disease will be incorporated by focusing on boosting awareness to raise the level of compliance. The Pender's Health Promotion Model will also take into account the various perceptions and attitudes that participants had previous to the study.

Proposed Sample

This further study will take place in Northern California. Moreover, utilizing San Francisco as the primary location can ensure a very diverse demographic along with its data collection. The sample would represent people of different locations in the bay area with type II diabetes mellitus. In addition, participants of the sample population will be required to be at least 18 years of age. It is also expected that a healthcare professional will review the medical records

of applicants to ensure that they fit the criteria. Correspondingly, this study would take place in an ophthalmology practice in the bay area with the hopes to provide proper vision screenings and management of complex eye diseases.

Ethical Considerations

In order to demonstrate the potential eligibility for the study, potential participants in the sample will either receive a letter outlining the purpose of the study with the waiver attached on the research team's behalf. After collection of the signed waivers, which acknowledges the study and research process, an agreement is set in place stating that the medical records of the participants can be reviewed for the purpose of providing data for the study. When the waiver and invitation to participate in the study are received, the participant's right to privacy must be addressed and will be of priority.

Only data from currently available medical records will be examined, and new participants who meet the requirements for sample screening must undergo the complete consent process before the research team can contact them. Medical records can only be examined by qualified healthcare professionals when present on site. The structure of this is to ensure protection of participant privacy. Additionally, any discussion of information gleaned from medical records should only take place under supervision with a healthcare professional present.

Since this study intends to pose no risk to its participants, data collection will be performed with the approval of a healthcare professional which will then be reviewed by the Internal Review Board. The duration of the study is unknown as it relies on data collection overtime in which continual reviews can also be required.

Study Design

The study design for this proposal will be a mixed method of both quantitative and qualitative studies utilizing interviews as the main source for data collection. The results of the individuals' education levels will be analyzed. From there, these individuals will be divided into groups to determine if application of additional information and interventions will have an effect on their compliance with diabetes management. Appropriate strategies and models will be created in light of the early screening techniques that are currently available and cost-effective. Such models will include a thoroughly designed system for screening, diagnosis, and referral at each hierarchical level, starting with primary health facilities and ending with specialized eye care institutions. Moreover, compliance and changes in knowledge measures of the two groups will then be compared using t-tests and a Pearson's chi-square analysis with a p value < 0.5 is considered statistically significant.

Before the start of data collection, a consent form will be handed to each participant requiring their signed consent towards the study. Once the forms have been completed, the interview given to each participant will be a set of open ended questions to encourage a unique experience to capture an individuals' perception of their condition. With using open ended questions, this will also increase generalizability for the study and allow opportunities for further explanations if needed.

- Were you provided with educational information regarding your type II diabetes mellitus upon the time of diagnosis?
 - If yes, what type of information was provided other than instructions on how to manage diabetes?

- What lifestyle changes have you made since your diagnosis? For example, this can refer to diet and exercise and many other factors.
- Are you aware of the complications that can stem from diabetes if management is not done appropriately?
- When was your last vision screening test? Are you aware of why annual screenings should be implemented for an individual with type II diabetes mellitus?
- Do you feel as if the healthcare team does not address all needs and concerns, as they are expected to be?
 - Would you be interested in learning more about the development of retinopathy and ways to reduce the risk of development?

After interviews are completed for the qualitative portion of the study, participants will be selected for the control group and intervention group. With the control group, there will be no change in treatment or management plan as the study will continue to observe compliance rates of the participants. Meanwhile, the intervention group will be instructed to attend additional meetings providing more educational tips to reduce the risk of retinopathy. These educational measures will include the following: seminars for information on diabetes and diabetic retinopathy, vision screenings, diagnostics such as optical coherence tomography (OCT) scans and fundus photos, and additional follow-up if requested. It is anticipated that we should see a positive correlation between early education and outcomes induced by type II diabetes mellitus. In other words, this study aims to affirm that the intervention group will exhibit a higher compliance rate if given the proper resources and information.

Conclusion

The goal of this paper is to better understand the preventable contribution towards the development of retinopathy. As acknowledged, our world is predisposed to diabetes and the burdens that may come with that diagnosis. It is known that diabetes can project further complications in which some can be prevented through proper management. For instance, diabetic retinopathy remains one of the greatest complications of diabetes. In this paper, a literature review is included which calls attention to the need for education of diabetes at the time of diagnosis. The literature review also emphasizes other socioeconomic factors such as financial issues that may prevent an individual from receiving annual vision screenings. To reiterate, diabetic retinopathy is a severe complication that can lead to permanent blindness if not diagnosed and treated appropriately. Furthermore, anyone with diabetes can develop diabetic retinopathy. With the emphasis on early education, consistent vision screenings, and potential development of telemedicine, the development of retinopathy can be reduced. Overall, the promotion of this research and the articles included can contribute to the general diabetic population at risk of adult blindness due to retinopathy.

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Appendix

Authors/Citation	Sample - Population of interest, sample size	Type of Study - Design	Measures of IV and DV	Procedures and subject burdens	Analysis	Major Finding(s)	Strengths and Weaknesses
<p>Lingam, S., Rani, P. K., Sheeladevi, S., Kotapati, V., & Das, T. (2018). Knowledge, attitude and practices on diabetes, hypertension and diabetic retinopathy and the factors that motivate screening for diabetes and diabetic retinopathy in a pyramidal model of eye health care. Rural and remote health, 18(1), 4304. https://doi.org/10.22605/RRH4304</p>	<p>202 participants in India were surveyed about their knowledge, knowledge sources, attitudes, practices, and variables that encourage use of eye health services at a Tertiary urban facility (T), a Secondary rural facility (S), and a Primary (P) community-screening program.</p>	<p>Descriptive research using quantitative data</p>	<p><u>IV</u>: Socio-economic factors and health characteristics <u>DV</u>: Knowledge about eye care and conditions</p>	<p>Chi-square tests were used to compare systemic and demographic variables among the three locations. Unpaired heteroscedastic t-tests were used to compare the mean knowledge and attitude scores as well as the practice patterns. T-tests and one-way ANOVA were used to compare the scores with practice patterns. For all tests, significance was taken to be at $p < 0.05$.</p>	<p>In comparison to non-diabetics, people with diabetes demonstrated a higher mean knowledge and attitude scores about DM, hypertension, and DR ($p < 0.001$). At all sites, diabetics were more aware of DR than non-diabetics, who were less aware (22.0%). The majority of participants across all sites were aware of hypertension, but few were aware that it could have an impact on the eyes or be linked to complications from diabetes.</p>	<p>The results of the study revealed differences in terms of demographic factors and systemic conditions. In comparison to participants at the Secondary and Primary levels, participants at the Tertiary facility appeared to be younger, better educated, and of higher socioeconomic standing. They also had a higher prevalence and longer duration of hypertension and DM. Participants with DM generally had higher levels of education and a longer duration of hypertension.</p>	<p><u>Strengths</u>: Identification of motivating factors and knowledge sources were established. <u>Weaknesses</u>: It is unknown how many people in the study locations did not go to eye care facilities or whether they knew that getting their eyes checked was important. Another drawback is that data were self-reported as participants were instructed to report any questions they were doubtful of, yet some may have guessed the right answers.</p>

Authors/Citation	Sample - Population of interest, sample size	Type of Study - Design	Measures of IV and DV	Procedures and subject burdens	Analysis	Major Finding(s)	Strengths and Weaknesses
<p>Bakkar, M. M., Haddad, M. F., & Gammoh, Y. S. (2017). Awareness of diabetic retinopathy among patients with type 2 diabetes mellitus in Jordan. <i>Diabetes, metabolic syndrome and obesity : targets and therapy</i>, 10, 435–441. https://doi.org/10.2147/DMSO.S140841</p>	<p>237 participants (107 females and 130 males) were randomly selected from patients with type 2 DM in the cities of Jordan. All DM participants received a questionnaire to gauge their understanding of diabetes and diabetic retinopathy.</p>	<p>Cross-sectional study</p>	<p><u>IV</u>: Level of education and compliance to DM <u>DV</u>: Awareness and knowledge of DR</p>	<p>The questionnaire was given to all patients, which included 24 questions divided into the following three main sections: sociodemographic info, knowledge about DM and DR, and patient’s compliance. Chi-square test was used for a univariate analysis in determining significant differences among the study population. Level of significance was set at $p < 0.05$.</p>	<p>88.2% of the participants in the survey were aware that diabetes can have an impact on the eyes, and 81% said that diabetic retinopathy can result in blindness. Higher levels of formal education were associated with patients who were more aware of diabetic retinopathy ($p < 0.05$). General practitioners were cited as the primary source of knowledge regarding diabetic retinopathy by 47.3% of patients.</p>	<p>Diabetes patients in Jordan are generally well-informed about the symptoms and effects of diabetic retinopathy. Although the majority of patients reported having high levels of awareness, the majority of diabetic patients did not follow DM management guidelines in order to lower their risk of developing DR. The primary factor that was discovered to be strongly linked with awareness of DR was level of education.</p>	<p><u>Strengths</u>: High level of awareness about DR was established in the study population <u>Weaknesses</u>: Studies evaluating the degree of DR knowledge among urban DM patients in Jordan are lacking</p>

Authors/Citation	Sample - Population of interest, sample size	Type of Study - Design	Measures of IV and DV	Procedures and subject burdens	Analysis	Major Finding(s)	Strengths and Weaknesses
<p>Khair, Z., Rahman, M. M., Kazawa, K., Jahan, Y., Faruque, A., Chisti, M. J., & Moriyama, M. (2020). Health education improves referral compliance of persons with probable Diabetic Retinopathy: A randomized controlled trial. <i>PloS one</i>, 15(11), e0242047. https://doi.org/10.1371/journal.pone.0242047</p>	<p>The study population were adults (18 years or above) with type 2 DM who underwent basic eye screening at a diabetes hospital between September 2017 and August 2018. Noncompliant participants were randomly divided into a health education intervention group (n = 143) and control group (n = 156).</p>	<p>Experimental research</p>	<p><u>IV:</u> Demographics (education and income) and a 5 month health education package <u>DV:</u> Referral compliance</p>	<p>Both of the intervention and control groups received information regarding DR and referral instruction at the diabetes hospital. The two groups' referral compliance and changes in knowledge measures were compared using Pearson's chi-square analysis. To determine whether certain factors were associated with referral compliance as the main endpoint, a univariate analysis was done.</p>	<p>The intervention group's compliance rate was discovered to be significantly greater than the control group's ($p < 0.001$). The intervention group's participants learned more about DR ($p < 0.05$). In addition to the intervention, the self-perception of vision problems ($p = 0.045$) among participants and participant income ($p = 0.008$) were both found to be substantially correlated with referral compliance rate.</p>	<p>This study's findings imply that comprehensive diabetes and DR education should be combined since it may increase referral compliance by a significant amount. If interventions are institutionalized at the moment of referral, outcomes can be long-lasting.</p>	<p>Strengths: This study's interventions increased participants' understanding of DR, which is similar to prior research that found health education programs were effective in raising retinopathy screening rates. Weaknesses: This study might not be applicable to all people with diabetes in general. Additionally, both the diabetes hospital and the referral institution in this study were in the same neighborhood as the participant's home. The referral compliance rate among those whose referred facility is farther away did not improve as well.</p>

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<p>Siddarth Agrawal, Bartłomiej Strzelec, Rafał Poręba, Anil Agrawal, & Grzegorz Mazur. (2021). Clinical Characteristics, Preventive Care and Attitude to Telemedicine among Patients with Diabetic Retinopathy: A Cross-Sectional Study. <i>Journal of Clinical Medicine</i>, 10(249), 249. https://doi-org.dominican.idm.oclc.org/10.3390/jcm10020249</p>	<p>300 participants (156 male and 144 female) with DM types 1 or 2 were interviewed. These participants were of 18 years or older and resided in Poland. The questions covered demographic information, disease history, health status as it related to the occurrence of symptoms, use of clinical preventive services, and willingness to use telemedical solutions.</p>	<p>Cross-sectional study with quantitative variables</p>	<p>IV: Telemedicine DV: Health literacy</p>	<p>This study revealed that DR was diagnosed in 57 cases of the 300 participants which established the non-DR group and DR subgroup. Chi-square tests were used to calculate the number and percentage of patients in groups that differ in the presence of diabetic retinopathy and telemedical solutions to monitor their disease.</p>	<p>This study indicates that patients in the DR subgroup believe their health is poorer than patients in the non-DR category ($p = 0.043$), which supports earlier research about how DR affects patients' quality of life. However, this study revealed that the DR group is more willing to participate in diabetes training and management such as educational seminars.</p>	<p>DR is a serious, debilitating illness that places a tremendous financial and medical burden on society. Given that various comorbidities coexist with DR and affect the development and progression of the disease, a multimodal medical approach is essential. The development of DR can be stopped and slowed down with proper education. The development of telemedicine provides a chance for low-cost, ongoing disease monitoring that could enhance treatment results and lessen the financial and health burden of DR and other diabetes complications.</p>	<p>Strengths: Earlier research has demonstrated similar results Weaknesses: The small sample size produced wide confidence intervals but ran the risk of missing linked traits. The results of this study also depended on the accuracy of the patient's self-evaluation</p>

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<p>Liu, Y., Zupan, N. J., Shiyanbola, O. O., Swearingen, R., Carlson, J. N., Jacobson, N. A., Mahoney, J. E., Klein, R., Bjelland, T. D., & Smith, M. A. (2018). Factors influencing patient adherence with diabetic eye screening in rural communities: A qualitative study. PLoS ONE, 13(11), 1–14. https://doi.org/10.1371/journal.pone.0206742</p>	<p>29 participants (20 adult patients with type 2 DM and 9 primary care providers) from Mile Bluff Family were interviewed. Participants described factors influencing rural patients' adherence with screening guidelines.</p>	<p>Qualitative study</p>	<p><u>IV</u>: Environmental, social, and individual factors <u>DV</u>: Adherence to diabetes management</p>	<p>After all conduction of interviews with the rural participants, a model was created to replicate factors influencing patient adherence. These factors include the following: environmental, social, and individual. Patients also expressed a belief that their level of education had a negative affect towards their health literacy along with the burden of navigating through diabetic lifestyle changes and anxiety related to the fear of diabetic complications.</p>	<p>Additionally, patients who did not follow the recommendations for diabetic eye screening may have been less likely to participate and may have encountered other difficulties. However, earlier research has demonstrated that patients who adhere and those who don't experience identical barriers.</p>	<p>Rural patients face significant obstacles that limit their capacity to consistently undergo yearly diabetic eye screenings. Numerous studies place a strong emphasis on patient education to improve adherence, but current approaches fall short in addressing significant individual, societal, and environmental barriers. It may be possible to close significant gaps in diabetic eye screening in remote regions by addressing these issues, boosting patient trust in their healthcare providers, and using tactics tailored specifically to environmental barriers like long travel distances.</p>	<p><u>Strengths</u>: The structured process of interviewing allowed for a reliable method of inquiry. Earlier research has demonstrated that patients who adhere and those who don't experience identical barriers. <u>Weaknesses</u>: Limitations were recognized in environmental factors as study population participants were not provided with the same accessibilities. Additionally, patients who did not follow the recommendations for diabetic eye screening may have been less likely to participate and may have encountered other difficulties.</p>

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<p>Moinul, P., Barbosa, J., Qian, J., Chen, M. L., Mohaghegh, M., Kaur, H., Holmes, J., Radman, H., Robinson, T., & Chaudhary, V. (2020). Does patient education improve compliance to routine diabetic retinopathy screening?. <i>Journal of telemedicine and telecare</i>, 26(3), 161–173. https://doi.org/10.1177/1357633X18804749</p>	<p>101 participants with diabetes residing in Southern Ontario were selected for DR screening between May 2014 and May 2016.</p>	<p>Participatory active research with qualitative data</p>	<p><u>IV</u>: Patient education and tele-retina screening <u>DV</u>: Patient compliance</p>	<p>Retinas of the participants were viewed remotely using fundus photography and optical coherence tomography pictures. Enrolled patients took part in a training session at the screening location with the express goal of improving patient comprehension of DR. Pre-to-post-screening HbA1c values were compared using a dependent t-test, and patient compliance to follow-up exams within 6–12 months was evaluated using a chi-squared test.</p>	<p>Of the 101 patients who completed the study, 33 patients have never previously been screened for DR. Following the tele-retina program, baseline compliance to annual screening increased from 36 patients to 51 patients ($p = 0.03$). In comparison to 12 patients who were sent to an ophthalmologist for the management of DR, 89 patients were provided with ongoing care by an ophthalmologist. Overall satisfaction with the tele-retina screening was expressed by 100 patients</p>	<p>With a high-risk and non-compliant patient population, compliance to follow-up was considerably raised by patient education-focused teleretinal screening for DR. The cohort's management of diabetes were measured by HbA1c levels which did not alter over time. This finding highlights the necessity for continued interprofessional cooperation in education and vision screening.</p>	<p>Strengths: Increased rate of compliance was seen after patient education seminars and tele-retinal screening Weaknesses: Management of diabetes using the HbA1c levels remained stagnant</p>