Diabetic Retinopathy Screening in Primary Care: Workflow Optimization

The University of Vermont
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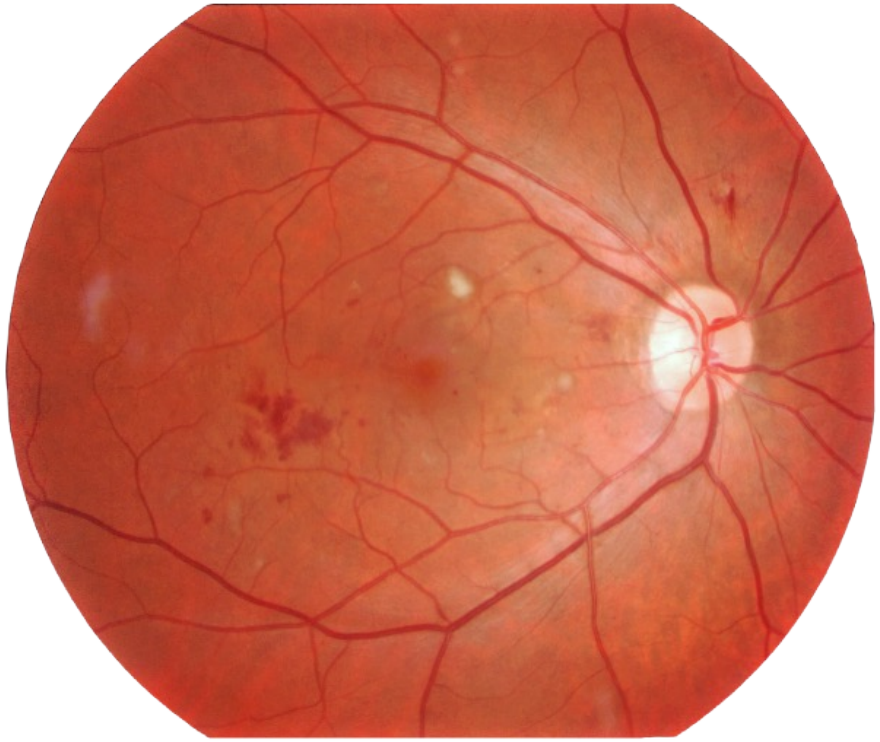

DIABETIC RETINOPATHY SCREENING IN PRIMARY CARE: WORKFLOW OPTIMIZATION

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Vergennes, VT

February – March, 2022

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PROBLEM IDENTIFICATION

Background

- Diabetic retinopathy is the number one cause of vision loss in working-age people in the United States[1]
- Permanent vision loss is largely preventable with early detection and treatment[2]
- Diabetic retinopathy screening can be accomplished via telehealth using automated retinal cameras placed in primary care clinics. This system has the potential to improve screening rates and reduce costs for patients and the healthcare system[3, 4]

Local Relevance

- Prior to 2019, the documented screening rate for diabetic retinopathy at Little City Family Practice was 18.5%
- Through a UVM ocular telehealth initiative, a retinal imaging camera was placed in the clinic in 2019
- The camera was initially used regularly, however use of the camera decreased over time
- As of February 2022, the camera had not been used for over 6 months
- Providers and staff agreed that the primary reason the camera was not being used was the amount of time it added to each visit

GOAL: Increase the Screening Rate for Diabetic Retinopathy at Little City Family Practice

PUBLIC HEALTH COSTS

- Diabetes mellitus affects over 46,000 adult Vermonters — 8.8% of the population[5]
- Every year, an estimated 4,437 people in Vermont are diagnosed with diabetes[5]
- Total direct medical expenses for diagnosed diabetes in Vermont were estimated at $362 million in 2017, with an additional $158 million spent on indirect costs from lost productivity due to diabetes[5]
- 35% of people with diabetes will develop retinopathy[1]
- The direct medical costs for diabetic retinopathy in the United States are estimated at $493 million per year[6]
- Screening for diabetic retinopathy via telehealth has the potential to provide significant cost savings by increasing patients' working ability, increasing independent living ability, increasing quality of life and reducing travel costs[3]
- The benefits of telehealth screening are greatest in rural populations with high transportation costs.[3] Many of the patients at Little City Family Practice fall into this group

COMMUNITY PERSPECTIVES

Emily Beringer
CHT Registered Dietitian

"Many patients are not always aware of the correlation [between diabetes and eye disease], and I think many either don't get their eyes checked unless a problem arises or are not concerned as they may not even know about it until it's too late"

"If patients knew they could have in-clinic eye screening available at the primary care follow up visit… it may be a driving force for patients to get more comprehensive screening done"

"With something as important as vision, I think regular screening would hugely encourage patient to adhere to dietary and lifestyle goals. Screening plays a crucial step in prevention"

Melanie Bissett
RN at Little City Family Practice

When asked about the barriers to completing in office screenings, Melanie responded that the difficulty is not with patient education or motivation, but the amount of time the exam takes:

"The entire exam often takes 20 minutes or more… for one elderly patient it took nearly 45 minutes to get an adequate exam. The clinic needs more staff and more time during the day for screening to work well"

INTERVENTION AND METHODOLOGY

- Interviewed staff to identify barriers to efficient examination
- Developed a streamlined workflow based on company-provided operating manual and input from staff
- Created an easy-to-follow printout and workflow reminders placed near the machine itself to encourage long-term adherence to improved workflow
- Posted optimum workflow reminders near the operating screen
- Addressed problems with staff in real-time
- Surveyed staff for additional insight while implementing the workflow
- Recorded the number of exams before and after intervention

Retinal Camera Operating Area
with Streamlined Instructions Posted for Easy Access

Anonymous IRIS Workflow Survey

Please circle the statement that best represents your opinion:

Question 1. **"I feel comfortable using the IRIS Camera"**

1 Strongly Disagree	2 Disagree	3 Neither Agree nor Disagree	4 Agree	5 Strongly Agree

Question 2. **"The IRIS system is too complicated to be added to many patient visits"**

1 Strongly Disagree	2 Disagree	3 Neither Agree nor Disagree	4 Agree	5 Strongly Agree

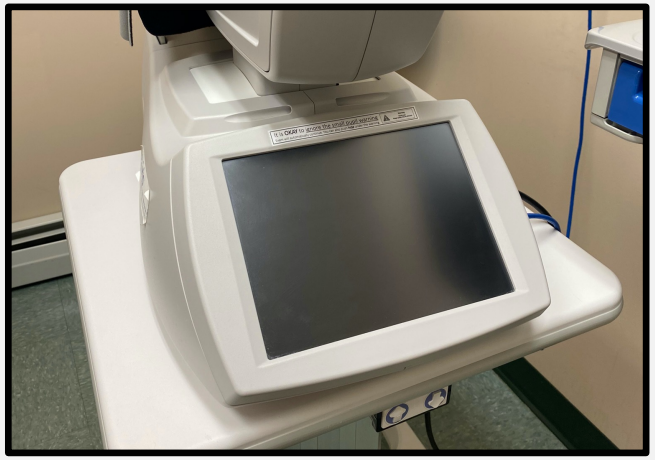
Question 3. **"The IRIS system is too time consuming to be added to many patient visits"**

1 Strongly Disagree	2 Disagree	3 Neither Agree nor Disagree	4 Agree	5 Strongly Agree

Are there any specific challenges that you have experienced when using the IRIS system?

Do you have any suggestions for improving the workflow for using the camera?

Survey to Assess Attitudes and Identify Barriers



Workflow Reminders Placed on Machine

IRIS Operation Instructions

Starting Machine

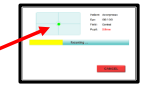
- Arrange machine and chair in center of room
- Remove lens cap
- Have patient sit down, then slide machine close to patient (patient chair does not move once weighted)
- Turn on machine with switch on right side of base
- If return patient, select **PATIENT LIST** and search using last name
- If new patient, enter last name, first name and date of birth
- For new patients, enter patient MRN into the field marked as "code"

Positioning Patient

- Ask patient to sit forward and place chin in chin rest with forehead touching band. Patient may need to sit near edge of chair.
- For patient comfort, adjust chinrest up and down using touchscreen
- If needed, adjust table height up and down using the arrow buttons on underside of table (directly below screen)

Performing Exam

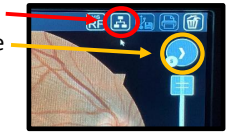
- Turn off overhead lights
- Let the patient know you are starting the exam, and instruct patient to look forward and keep eyes as open as possible
- Push **START**
- When a **green dot** shows up on the screen, remind patient to "*keep eyes wide open and get ready for a flash*"



- It is OKAY to ignore the small pupil warning (), the exam will automatically continue. You can also push **hide** under the warning.
- After image shows up on screen, let patient know there will be a ten second break, then camera will move to other eye.
- After second image is captured, exam is over and patient is okay to leave

Uploading Images

- From patient home screen, select the first image on the bottom bar
- Confirm date of image, and push the **upload button**
- Select the **forward arrow** to move to the next image
- Confirm date again, and push the **upload button**
- Select **home** on the top left of the screen
- Press the **power button** on top right of the screen
- Once screen is black, turn off machine with switch on right side
- Replace lens cap and rearrange machine and chair in room



Streamlined Operating Instructions

RESULTS

Number of Exams Completed and Sent for Grading

Time Period	Exams	Exams per Month (approx.)
18 Months Prior to Rotation	17	0.95
6 Months Prior to Rotation	0	0
During the Rotation (2/14/22 – 3/17/22)	12	12
3 Weeks after Rotation Ended (3/18/22 – 4/11/22)	13	16.5

Barriers Identified

- **Significant amount of time was spent having the patients sit in a dark room in order to achieve maximal pupil dilation**
- **Performing the exams prior to visits could result in delayed provider encounter times**
- **Staff members did not have someone to go to when they had difficulty with the camera**

Solutions Implemented

- **It is okay to ignore "small pupil" warning if patient does not dilate well; confirmed with screening ophthalmologists that the exam quality remained acceptable in most cases**
- **Exams should be preferentially performed after provider sees patients**
- **Identified staff members who are enthusiastic about the camera and are available for troubleshooting**

EFFECTIVENESS AND LIMITATIONS

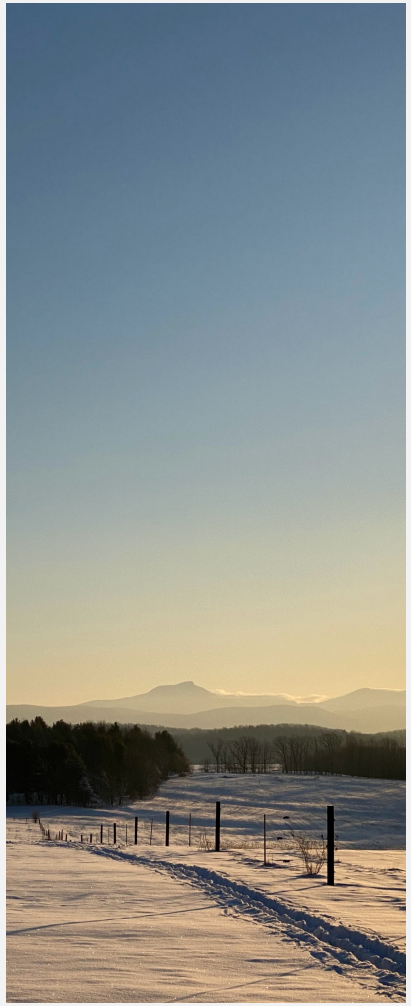
Effectiveness

- Rate of retinal imaging increased from 0.95/month to 12/month during the rotation
- After the rotation ended, the rate of screening continued to increased to over 16/month. This is an 11x increase from the average rate during the most recent 12-month period when the camera was regularly used (8/2020 - 8/2021; 1.42/month)
- Staff motivation to use the camera subjectively improved. One survey respondent stated emphatically, "if anyone has questions, ask me to help!"
- A patient with undiagnosed, advanced diabetic retinopathy was detected in one of the 12 screening exams completed during the rotation. This patient was referred to the appropriate specialist (image at right is an example of a positive screen)

Limitations

- Cannot determine whether the improved screening rate was a direct result of workflow changes, or if it was a result of increased enthusiasm for the screening program due to the attention it was given during this project
- Long-term follow up is necessary to see if the improved screening rate persists

FUTURE DIRECTIONS



- Follow-up on retinal imaging rates at 6- and 12- month intervals will provide insight into the durability of the intervention
- The overall diabetic retinopathy screening rate for patients at Little City Family Practice should be re-evaluated in 12 months to evaluate public health impact
- In order to maintain motivation for diabetic retinopathy screening, the clinic could consider the creation of a "Retinal Imaging Champion" position
- The Retinal Imaging Champion would be responsible for keeping track of the camera's use, troubleshooting problems, training staff, and generally encouraging use of the camera
- This individual could be provided with protected time each month to perform these tasks
- Short training sessions should be held every 6-12 months for all staff involved with screening to review operation of the camera and discuss any problems

REFERENCES

1. Solomon SD, Chew E, Duh EJ, et al. Diabetic Retinopathy: A Position Statement by the American Diabetes Association. *Diabetes Care*. 2017;40(3):412-418.
2. Ferris FL, III. How Effective Are Treatments for Diabetic Retinopathy? *JAMA*. 1993;269(10):1290-1291.
3. Avidor D, Loewenstein A, Waisbourd M, Nutman A. Cost-effectiveness of diabetic retinopathy screening programs using telemedicine: a systematic review. *Cost Effectiveness and Resource Allocation*. 2020;18(1):1-9.
4. Brady CJ, Villanti AC, Gupta OP, Graham MG, Sergott RC. Tele-ophthalmology screening for proliferative diabetic retinopathy in urban primary care offices: an economic analysis. *Ophthalmic Surg Lasers Imaging Retina*. 2014;45(6):556-561.
5. The Burden of Diabetes in Vermont. American Diabetes Association. https://diabetes.org/sites/default/files/2021-11/ADV_2021_State_Fact_sheets_Vermont_rev.pdf. Published 2021. Accessed 04/09/2022, 2022.
6. Rein DB, Zhang P, Wirth KE, et al. The economic burden of major adult visual disorders in the United States. *Arch Ophthalmol*. 2006;124(12):1754-1760.
7. Common Eye Disorders and Diseases. Centers for Disease Control and Prevention. Vision Health Initiative Web site. https://www.cdc.gov/visionhealth/basics/ced/index.html. Published 2020. Accessed February 2, 2022, 2022.
8. Steven Bloom. https://www.retinarocks.org/image-library/. Published 2019. Accessed 04/09/2022, 2022.
9. Take Charge of Your Diabetes: Healthy Eyes. Centers for Disease Control and Prevention. https://www.cdc.gov/diabetes/library/factsheets/diabetes-and-healthy-eyes.html. Published 2021. Accessed 04/09/2022, 2022.