OPERATIONAL RESEARCH & CONTRIBUTIONS

Operational Challenges in Delivery of a Charity Care Program for Diabetic Retinopathy Screening in an Urban Setting

Erica H Chedid, AM; Quin R Golden, MBA; Rama D Jager, MD, MBA, FACS

Abstract

Introduction: The University of Chicago Medicine (UCM) partners with Chicago Family Health Center (Chicago Family) in the Diabetic Retinopathy Screening Program (DRP), a charity care program to screen uninsured and underinsured patients with diabetes for diabetic retinopathy, which is a leading cause of preventable vision loss in the US. The DRP faced operational challenges throughout its pilot year: a high number of ungradable retinal images, slow turnaround time for reading retinal images and sending results, incomplete referrals, and a high rate of no-shows for diagnostic appointments.

Approach: Chicago Family recalled patients with ungradable images for repeat imaging, and regular training was provided to staff taking the images. Weekly e-mails were sent to the physician champion reminding him to read images, and image software was installed on his laptop. Patients received reminder cards and preappointment and postappointment phone call reminders, and appointment information was shared with referring physicians. The UCM clinic was double-booked, so patients were seen within four weeks of referral. Discussions were held with UCM/Chicago Family teams to stress the influence of timely referrals on no-show rate; reminders were sent to referring physicians for referrals.

Results: Complete referrals were received within five days; the overall number of ungradable images decreased; image report turnaround time continued to be a challenge because of difficulties related to physician availability and technology; show rates began to increase.

Conclusions: The methods of this intervention will translate well to other programs that provide care for similar patient populations in urban areas.

Introduction

Background

The University of Chicago Medicine’s (UCM) Urban Health Initiative (UHI) and Department of Surgery, Section of Ophthalmology and Visual Science (OVS) partners with Chicago Family Health Center (Chicago Family), a federally qualified health center, in a charity care program called the Diabetic Retinopathy Screening Program (DRP). The purpose of the program is to screen uninsured and underinsured patients with diabetes for diabetic retinopathy, a leading cause of preventable vision loss in the working-age population of the US.  

The goal of this article is to describe the operational challenges encountered by UCM and Chicago Family in delivering care to an indigent population and the methods used to address them. We believe that our experience is transferrable to other health care systems attempting to provide care to similar populations outside of their regular care delivery model.

Diabetes is a major public health problem. It is estimated that almost 26 million individuals, or 8% of the total US population, currently has diabetes. Diabetes disproportionately affects African Americans, who are 77% more likely to develop this disease than non-Hispanic, white adults; Hispanics are 66% more likely to develop the disease than non-Hispanic, white adults. At present, approximately 40% of patients with diabetes have some degree of diabetic retinopathy, and approximately 8% have severe diabetic retinopathy, a disease that progresses in stages from nonproliferative (mild) to proliferative (severe). The Centers for Disease Control and Prevention estimates that by 2050 approximately 16 million patients with diabetes will be afflicted with diabetic retinopathy, compared with 5.5 million in 2005.

Less than 50% of patients with diabetes in the US receive the recommended annual eye examination. This screening rate rarely exceeds 10% to 20% for underserved, minority, uninsured, and elderly patients, similar to the population served at Chicago Family. This is largely because of poor access to eye specialists in low-income areas as well as the belief that public insurance will not cover such visits and services. Review of Chicago Family electronic medical records in 2009, at the outset of this program, revealed that approximately 25% of their diabetic patients received the recommended eye examination.

Almost all patients with type 1 diabetes and approximately 60% of those with type 2 diabetes will develop diabetic retinopathy in the first 20 years of the disease. The incidence of type 2 diabetes, and resulting diabetic retinopathy, is expected to increase with increasing rates of obesity, physical inactivity, and poor nutrition among these populations. Annual screening for diabetic retinopathy remains the primary method of diabetic retinopathy prevention.

Digital retinal screening provides a mechanism allowing for nonmydriatic retinal evaluation of patients with diabetes in the primary care setting and for more appropriate triage based on disease severity. Digital diabetic retinopathy screening is an ideal method because its sensitivity (98%) and specificity (100%) are superior to dilated funduscopic examination, which the American Diabetes Association and the American Academy of Ophthalmology recommend for patients with diabetes. Such screening is also
simple to perform (it takes approximately 15 to 20 minutes total clinic time), provides clinicians an opportunity to educate patients about their disease onsite, and is affordable. For patients with subsequent diagnosis of proliferative diabetic retinopathy, laser photocoagulation has been shown to decrease vision loss by as much as 52% and for as long as 10 years after treatment.

Chicago Family is a community-based health center located on Chicago’s South Side. Its patients reside in more than 70 zip codes throughout Chicago and its neighboring suburbs. Patients at Chicago Family are 42% Hispanic, 51% African American, and 3% Caucasian. Review of Chicago Family’s 2011 Uniform Data System Report revealed that the payer mix (adult and children) was 30% uninsured, 60% Medicaid and Medicaid HMO, 4% Medicare, and 6% private insurance. In 2011, the income distribution of Chicago Family’s patient population, expressed as percentage of the federal poverty level, was 22,847 patients at 100% or below; 3915 at 101%-150%; 1195 at 151%-200%; 222 over 200%.

Of the 28,179 patients seen at Chicago Family in 2011, 1888 adults between the ages of 18 and 75 years had diabetes as a primary diagnosis.

The Diabetic Retinopathy Screening Program

The DRP provides an opportunity to explore barriers to diabetic eye care access in a disadvantaged urban community and to directly measure the impact of screening. In 2010, UCM set up a digital retina camera at Chicago Family, to be operated by Chicago Family medical assistants screening for retinopathy in patients with diabetes. Images are electronically transmitted to UCM attending retinal physicians, who use iSite software (© 2006 Koninklijke Philips Electronics NV 3.6.114.1; Amsterdam, Netherlands; Date of Manufacture: Wednesday, 2011 June 29) to review them and determine which patients will likely need an urgent referral to a UCM ophthalmologist.

The multidisciplinary team that planned the DRP spanned the medical campus and community health center involved. It included the OVS physician champion, UHI leadership, the UHI project manager, the OVS section chief, the OVS section administrator, the OVS clinic manager, OVS schedulers, UCM Department of Radiology, UCM Outpatient Services, UCM Finance and Billing, the UCM Executive Vice President for Strategic Affiliations and Associate Dean for Community-Based Research, the UCM Legal Department, the Chicago Family physician champion, Chicago Family medical assistants, Chicago Family case managers, the Chicago Family clinic manager, Chicago Family physicians, the Chicago Family Chief Executive Officer, and the Chicago Family Senior Director of Clinical Affairs.

Problems Encountered in Actuating the Program

Many operational challenges occurred throughout the DRP’s pilot year, despite the fact that its operational flow mirrored that of the Illinois Breast and Cervical Cancer Program, a similar program involving Chicago Family that has operated effectively between the two sites since 2009. From the DRP’s beginning in October 2010, the UHI project manager has recorded and monitored basic data as it relates to DRP operational processes. Several operational challenges were observed:

1. a high number of poor-quality retinal images from Chicago Family (Figure 1),
2. long turnaround time for reading retinal images at UCM and sending results to Chicago Family,
3. long turnaround time and incomplete contact information for referrals from Chicago Family to UCM, and
4. a high rate of no-shows for diagnostic appointments at UCM.

In April 2011, OVS clinic staff and UHI staff convened to discuss these challenges. At that time, methods were implemented to address the problems, and the UHI Project Manager began monitoring progress.

Assessment of Problems and Analysis of Causes

Before the project’s October 2010 launch, the physician champion at UCM OVS left the hospital. Upon recruitment of new leadership within OVS, there was a lack of urgency in reading patient retinal images, along with information technology issues (eg, problems with the server and software). Additionally, the new physician champion was only in the clinic three days per month, reducing access to the images and increasing turnaround time to read the images.

There was also a high rate of poor-quality images sent to UCM from Chicago Family. A pilot study at the University of Chicago Endocrinology Clinic had shown that technicians without any prior experience in ophthalmic imaging could obtain high-quality ophthalmic images after completing a two-hour training session; however the Chicago Family medical assistants struggled with retinal image capture even after similar training.

Similar to the physician champion at UCM, the physician champion at Chicago Family left the organization at the onset of the DRP. This led to challenges for clinicians and case managers completing DRP referrals, given large patient caseloads and little time to access charts needed to complete referrals. Also, Chicago Family case managers were initially unaware that DRP referrals required no scheduling on Chicago Family’s part. Case managers were three months behind schedule for referral appointments. DRP referrals accumulated on desks and were sent to UCM incomplete. A secondary result was that UCM was unable to connect with patients and scheduling of appointments in OVS was delayed.

Figure 1. Examples of poor-, acceptable-, and good-quality retinal images taken by Chicago Family Health Center medical assistants.
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Table 1. Results

<table>
<thead>
<tr>
<th></th>
<th>Average ungradable images, %</th>
<th>Average report TAT, days</th>
<th>Average show rate, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before intervention</td>
<td>44</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>(month 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After intervention</td>
<td>0</td>
<td>22</td>
<td>71</td>
</tr>
<tr>
<td>(final month measured)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall average</td>
<td>26</td>
<td>21.3</td>
<td>37</td>
</tr>
</tbody>
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*Full duration of study. See Figures 2-4 for monthly figures. TAT = turnaround time.

Many of these referred patients provided incorrect or otherwise unreliable contact information, often because they were uninsured or underinsured and afraid of having to pay a large bill. Such patients could not be contacted by Chicago Family or UCM staff, which led to a high rate of no-shows for appointments at UCM. Also, OVS appointments were scheduled three months in advance because of low clinic availability.

Thus, the causes of the challenges in this program included the following:
1. The UCM physician champion left the hospital before launch.
2. Training of medical assistants proved more challenging than expected.
3. The Chicago Family lead physician left the organization early in the program.
4. There were referral glitches.
5. Patients gave incorrect contact information to avoid billing.
6. The wait for appointments in the OVS clinic was three months.

**Methods—The University of Chicago Medicine’s Approach to the Problems**

**Aim**

The aim of this quality-improvement process was to ensure seamless delivery of care for patients with diabetes seeking treatment for retinopathy by
1. decreasing the rate of ungradable images, from 44% to <10%;
2. decreasing the average turnaround time for report generation by UCM, from 21 days to ≤10 days;
3. increasing the show rate of patients at UCM, from 20% to ≥75% in year 2 of the program; and
4. producing complete referrals in a timely manner.

This article seeks to analyze the success and failures of the strategy for improving the operations of the DRP.

**Methods**

Close study of image quality, show rates, quality of incoming referrals, and image reporting turnaround time for the first six months of the program verified that operational challenges were having a negative influence on the overall patient experience. Members of the original planning team involved in the daily operations of the program at UCM convened to discuss these problems and possible solutions.

Chicago Family has five locations throughout the South Side of Chicago. As mentioned previously, Chicago Family’s patients are mostly uninsured and underinsured. Discussions with Chicago Family’s team revealed that no-shows and incorrect contact information are common in their clinic because patients often cannot afford to pay.

**Outline of Project Strategy for Change**

The following steps were taken to address the high number of ungradable images:
- Chicago Family recalled patients with ungradable images to Chicago Family to take a second image; those with a second ungradable image were referred to UCM for further diagnostic testing.
- UCM began to provide additional training on image capture for Chicago Family medical assistants.
- UCM posted examples of good and poor images at the Chicago Family workstation (Figure 1).

The following steps were taken to address the lengthy turnaround time for image reports sent by the OVS physician champion to Chicago Family:
- The UHI project manager sent weekly e-mails to remind the OVS physician champion to read DRP images.
- UCM Radiology installed iSite software on the champion physician’s laptop so he could access images outside of the clinic (the physician champion was only in clinic at UCM three days per month).

To address the high no-show rate at UCM, the following steps were taken:
- UCM Outpatient Services verified that all patient referrals had complete contact information. If an OVS scheduler encountered incorrect contact information, the UHI Project Manager contacted Chicago Family to verify contact information.
- The UHI project manager mailed appointment reminder cards directly to inform them of the needed referrals.
- UHI patient advocates made preappointment and postappointment phone calls.
- OVS rescheduled no-show patients up to three times.
- The UHI Project Manager informed the patient’s primary care physician at Chicago Family of patient appointment information so that the primary care physician could communicate UCM appointment information to the patient as well.
- The OVS physician champion’s clinic schedule was double-booked so that patients could be seen sooner than three months; patients were then seen within three to four weeks of referral receipt. There was no issue with longer than normal wait times on the day of appointment.

To address the slow turnaround time for receiving referrals and to address the issue of incomplete referrals from Chicago Family to UCM, the following steps were taken:
- Discussions were held with UCM/Chicago Family teams to stress the importance of this problem and its influence on no-show rates.
- The UHI Project Manager e-mailed primary care physicians directly to inform them of the needed referrals.
To assess the success of the interventions, the team set goals in accordance with data from the first 6 months of the program. The following targets were set:

- decrease the number of ungradable images (target ≤ 10%)
- decrease the turnaround time for report generation by UCM (target ≤ 10 days)
- increase the show rate at UCM (target ≥ 75%)
- receive complete referrals for every patient (target = 100%).

The team established quarterly meetings to assess the impact of the interventions by comparing current data with data from the first six months of the DRP.

Analysis

Data from months 6 through 12 were analyzed using annotated run charts to measure improvement. A run chart is a graph where quality is on the vertical axis, time is on the horizontal axis, and data points represent the level of quality at a particular point in time. An annotated run chart has comments with arrows indicating when different interventions were implemented. The team expected to see incremental, monthly improvements.

Results

After careful analysis and review of the data for months 6 through 12, results were reviewed in each area (Table 1). Although not all targets were achieved, progress was made. After discussions with the new Chicago Family physician champion and Senior Director of Clinical Operations, UCM began receiving complete referrals within 5 business days of patient image report generation. The overall number of ungradable images decreased, however fewer images were sent compared with the first few months of the program; additional image capture training was needed (Figure 2). Image report turnaround time by UCM continued to be a struggle, mainly because of the UCM physician champion’s limited availability and heavy patient case load (Figure 3). Also, the iSite software installed on the physician champion’s laptop was much slower than expected, making it difficult to read images remotely. Finally, show rates in OVS began to increase after the implementation of mail reminder cards to patients, preappointment and postappointment calls by UHI patient advocates, and more direct involvement by primary care physicians (Figure 4).

Discussion

Lessons Learned and Application to Similar Projects

Many operational challenges arose at the onset of the DRP and negatively affected the overall patient experience. The high number of ungradable images made it necessary for patients to return to Chicago Family for repeat screening, which may have been a
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financial hardship for those of limited means. Poor turnaround time by UCM for reporting image results to primary care physicians at Chicago Family led to additional delays. Members of the UCM-Chicago Family teams thought that if the date of the UCM appointment was three months after imaging, then patients would not have a sense of urgency and would be less likely to show up. The poor turnaround time for referrals of patients in need of an appointment at UCM and the incomplete information for these referrals were causing a delay in scheduling, which also contributed to the high no-show rate. Those with signs of retinopathy in their initial images would then miss the care needed to preserve their vision.

It is apparent that each operational issue was key to a positive overall patient experience. Several important successes resulted from the interventions that were implemented. The lower rate of ungradable images led to fewer repeat screenings. Faster receipt of referrals with complete information led to appointments scheduled in OVS soon after image reporting. Higher show rates led to improved patient care and therefore increased probability that the DRP would reduce blindness among patients with diabetes. Only 1 of 15 patients referred to UCM required laser treatment. This patient’s initial image had signs of moderate to very severe diabetic retinopathy or proliferative diabetic retinopathy. Endolaser photocoagulation was performed in the right eye, which remained stable through follow-up.

Many lessons were learned from this intervention process. Strong physician leadership is key to streamlining processes, and Chicago Family’s new physician champion exercised such leadership in the process of patient follow-up for referrals and UCM appointments. Timely follow-up with patients, via phone and mail, and scheduling appointments soon after screening increased the show rate for appointments because patients remained aware of the importance of being seen by an ophthalmologist. Finally, staff responsible for image capture need periodic training to polish skills and learn new techniques.

Conclusion

Those involved with managing and implementing charity care programs must have a good understanding of the population being served and the importance of maintaining consistency to ensure a positive patient experience. The methods used for this intervention will translate well to other programs that provide care for underserved populations and rely on multidisciplinary teams and several departments and organizations to provide quality care. The UHI Project Manager continues to monitor the monthly data, and the team meets quarterly to ensure that improvements are maintained.

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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References