Automated Retinal Imaging for Enterprise Screening

How to Improve Population Health and Reduce Care Costs with Cloud-enabled, Diabetic Retinopathy Screening Technology
As the rates of diabetes continue to increase throughout the United States and across the globe, so do the rates of diabetic retinopathy, which affects up to 80 percent of all patients who have had diabetes for 10 years or more. These trends are particularly troublesome for healthcare providers who are transitioning toward new care and reimbursement models, such as value-based purchasing, bundled payments and accountable care. Under these risk-sharing models, as well as socialized medicine outside of the United States, the incentives are to identify conditions early and intervene before conditions worsen and costs escalate. Doing so will help reduce the costs of long-term care.

However, when it comes to diabetic retinopathy, early identification has traditionally been quite challenging for several reasons. First, not enough patients are currently getting screened for the condition. Up to 7 million Americans with diabetic retinopathy remain undiagnosed, and there are tens of millions more when you consider all other countries. On the surface, solving this challenge seems like a simple matter of increased patient education and engagement, but there is a second challenge – there are currently not enough qualified clinicians or robust technology to meet the screening demands of entire populations. In fact, one of the nation’s largest integrated delivery networks (IDNs) based in California recently estimated that evaluating its population through actual eye examinations would require 150 full-time equivalent ophthalmologists and several years to complete.

Without identifying patients with diabetic retinopathy and getting them treatment, conditions will worsen and costs will continue to rise – cutting into the margins of healthcare organizations operating under risk-sharing arrangements or adding preventable costs to government-funded healthcare delivery systems.

Perhaps the best solution to these challenges is retinal screening, which can be easily and cost-effectively deployed throughout communities in provider’s offices and other locations frequently visited by patients with diabetes. With minutes of training, assistants and providers can capture high-quality images of the retina with a fully automated screening camera. Captured images are then sent electronically to reading centers leveraging cloud technologies and advanced interoperability. At the reading centers, trained clinicians interpret the images, document findings and then send reports back to providers who can coordinate patient care and provide additional patient engagement.

This white paper examines market factors dictating the need for end-to-end, cloud-enabled retinal screening and how the technologies and advanced interoperability work. In addition, this paper details how increased screenings and detection can help health organizations better compete in today’s risk-sharing environments, as well as assist governments who need to provide increased population health management while reducing overall costs for providing care.

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382 million people worldwide have diabetes, with 37 million of those being North Americans. Diabetes costs nations throughout the world hundreds of billions of dollars per year in treatment costs and lost productivity. Considering these statistics, it’s vital that eye examinations – including diabetic retinopathy examinations – become a routine component of care within diabetic patient populations.

**Interoperable, Cloud-enabled Retinal Screening**

Traditional retinal screening requires highly skilled ophthalmologists or retinal specialists, as well as ophthalmic photographers, who are trained in performing advanced retinal photography. These photographers use complex retinal cameras that often require the eyes of patients to be dilated during the screening. Proper camera orientation, eye fixation, exposure setting and precise camera focus on the retina are necessary for a successful examination. Clinicians at primary care, optometric and other clinics where diabetic patients are most commonly encountered, typically lack the training, knowledge or time to perform diabetic retinopathy screenings with traditional equipment and software. This is an opportunity too often missed to catch a prolific disease and its effects early.

Automated and cloud-enabled retinal screening solutions simplify these tasks so clinicians with no special training or skills can perform them. These solutions are specially designed for the screenings to perform the following:

- Automatic and proper alignment on the eyes with facial-recognition software
- Fixate and properly align the eye with an LED light device
- Focus to automatically capture the correct areas of the eyes in under two minutes
- Transmit eye images directly to a reading center for expert interpretation

**Retinal Screening Deployment and Patient Outreach**

Retinal screening solutions are self-contained and easily deployed. They are ideal for primary care physician offices, endocrinologists, internists, optometrists, health fairs, pharmacy clinics, community outreach programs and other locations. The solutions contain all of the necessary components for clinicians to complete end-to-end examinations, rather than requiring staff to assemble multiple hardware and software components to create a complete solution. Additionally, cloud-based connectivity provides additional cost benefits, such as minimizing up-front capital and IT costs with a subscription-based, software-as-a-service (SaaS) pricing model.

Once deployed, retinal screening solutions enable organizations to reach a large population base without hiring additional ophthalmology physicians or specialists. The solutions are ideal to assist with the population health strategies of health systems, accountable care organizations (ACOs) and IDNs, enabling them to deploy the solutions within the offices of affiliated providers or throughout the community. Payors and countries with single-payor health systems can also leverage the solutions via outreach efforts to members to identify diabetic retinopathy before conditions worsen and care costs escalate.

Taken a step further, retinal screening centers can be made available to all physicians within a community, since the solutions do not require any technology infrastructure to connect with unaffiliated providers or providers outside of any traditional delivery network.

**How Retinal Screening Works**

Subscription-based retinal screening solutions include the hardware to perform the examination and the back-end infrastructure to capture, store and share the images with specialists at the reading center. Image reading centers with ophthalmologists and retinal specialists are established by the organization to interpret the images. The image reading centers can be within an organization or shared among multiple facilities or organizations.
The screening process entails having providers use the solution to capture the images, which are then uploaded to a secure cloud-based archive. Ophthalmologists and retinal specialists at the reading center access the images from the eye-care-specific picture archiving and communications system (PACS) cloud and interpret them. Image reports are then sent back to the referring provider electronically. These reports can be sent via email, fax or even automatically uploaded directly into the patient’s electronic health record (EHR) that is used by the referring provider – all without special software interfaces due to advanced interoperability capabilities.

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The solution makes it easy for providers to get their patients screened, and it provides a model for clinicians at the reading center to get meaningful referrals. The cloud connectivity between primary care providers and the reading center removes information technology infrastructure requirements, which is one of the largest barriers to screening patients on a large scale.

**Putting Results into Action**

There are numerous benefits to using this type of retinal screening solution, including improvements in patient care. The use of retinal specialists and trained image graders in the reading center improve detection rate accuracy and better identify advanced disease stages. Early detection can lead to treatment that stops disease progression and avoids the costs of caring for patients with advanced disease stages.

From a financial perspective, these improvements in patient care can increase reimbursement under Medicare Advantage and other risk-sharing arrangements. In addition, ACO models may offer bonuses to providers who deliver better care to patients at a lower cost, and to those health plans that increase their scores on the Healthcare Effectiveness Data and Information Set (HEDIS). Data has been provided in dozens of studies on the effectiveness of retinal screening at lowering the costs of delivering care to diabetics over time.

**How Merge Can Help**

Merge is a leading provider of innovative enterprise imaging, interoperability and clinical systems that seek to advance healthcare. Merge’s enterprise and cloud-based technologies for image intensive specialties provide access to any image, anywhere, any time. With solutions that have been used by providers for more than 25 years, Merge is helping to reduce costs, improve efficiencies and enhance the quality of healthcare worldwide. Selected solutions pertaining to this white paper include:

- iConnect® Retinal Screening – A subscription-based solution that includes the hardware and software to conduct retinal screenings, capture images, send them to reading centers for interpretation, return results reports electronically, provide patient engagement and assist in care plans.
- iConnect® Cloud Archive – Store and access medical images securely in the cloud with a comprehensive vendor-neutral, cloud-based image storage and management solution. Images are archived on a short- and/or long-term basis and your archive can grow as your capacity requirements increase.
- iConnect® Network – Share imaging information with referring providers, hospitals and imaging centers that are connected to health information exchanges (HIEs) or EHR networks, such as the Surescripts Network for Clinical Interoperability.
• Merge Eye Care PACS™ – A web-based and cloud-enabled image management system that automatically imports images and diagnostic reports from multiple diagnostic devices into a single, web-based viewer and archive.

Merge is the co-founder of the DICOM image standard, has the number one downloaded medical imaging application in the world and holds 90-plus patents in imaging and health information technology. Merge’s customer base includes 1,500 hospitals and 6,000 clinics.

For more information, visit www.merge.com or follow @MergeHealthcare.