Chronic Disease and Medical Innovation in an Aging Nation

The Silver Book®: Diabetic Retinopathy
Diabetic retinopathy (DR) is a serious, irreversible eye disease that can occur in people with diabetes, and is a leading cause of blindness around the world. Because diabetes is becoming increasingly common in industrialized and even developing countries, DR could impact as many as 191 million people around the globe by 2030.

Vision loss from DR can be avoided with proper management and treatment, and risk is more common in people who have poorly controlled diabetes. The International Council of Ophthalmology (ICO) Diabetic Eye Care Guidelines outline best practices for screening and detection of DR, as well as assessment and management of DR patients.

Despite these clinical standards and the availability of effective treatments, as many as 50% of people with diabetes are not getting regular eye exams, or are diagnosed too late for treatment to be effective. Patients are often unaware of the seriousness of DR and the need for early detection and treatment, many countries lack the capacity to screen patients with diabetes, and treatment may be accessible to only a few. Countries and communities need to adopt policies that promote effective education, screening, detection, and management of DR.

**Non-proliferative diabetic retinopathy (NPDR)** is the early stage of DR, and **proliferative diabetic retinopathy (PDR)** is the late stage of the disease. PDR is sight-threatening and is characterized by the growth of abnormal blood vessels in the retina. These blood vessels can bleed and cause scarring and retinal detachment. **Diabetic macular edema (DME)** is an accumulation of fluid from leaking blood vessels in the macula — the part of the retina that controls detailed vision — and can occur at any stage of DR, but is more likely as the disease progresses and can lead to total blindness.
The Human Burden

- In 2010, approximately 2.6% of people worldwide were affected by vision-threatening diabetes.
- Zheng (2012) found that 23.1% of people with diabetes reported reduced vision.
- A quality of life survey of 200 people with diabetes found that 41% reported reduced vision.
- A survey of 1,000 people with diabetes found that 30% had reduced vision.

The Economic Burden

- The direct and indirect costs of diabetic retinopathy are estimated to be $1.6 billion annually in the U.S.
- A survey of 1,000 people with diabetes found that 41% reported reduced vision.
- A survey of 1,000 people with diabetes found that 30% had reduced vision.

The Future Burden

- The rise of DR will disproportionately impact the poor and low-income populations, since the poorest populations, since the poorest populations, since the poorest populations, since the poorest populations.
- Of those who have diabetes for 20+ years, 30% will develop vision-threatening DR.
- The value of innovation in people with diabetes reduced their:
  - Vision loss by more than 15 letters
  - Appropriate treatment for DME
  - Rates of laser surgery by 56%
  - Risk of progression by 54%
  - Adjusted mean risk of DR by 36-51%

The Value of Innovation

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Challenges & Opportunities

- Challenges: 
  - Inadequate screening and treatment for DR
  - Limited resources for eye care services
  - Socioeconomic barriers to accessing care
  - Lack of awareness and education about DR

- Opportunities: 
  - Implementing telemedicine for screenings
  - Developing innovative treatments
  - Increasing awareness through educational campaigns
  - Supporting research for new treatments and technologies

Raising Awareness About Impact

- Patients with diabetes are often unaware of the serious implications of DR.
- Many patients delay seeking care until vision loss is irreversible.
- Educational campaigns are critical in raising awareness about the impact of DR.

Building Capacity

- Building capacity in healthcare professionals is essential for improving patient care.
- Investing in workforce development and training is crucial for addressing the needs of patients.
- Collaborative efforts between healthcare professionals and patients are necessary for improving outcomes.

Securing Resources

- Securing resources for DR prevention and treatment is essential.
- Public and private funding is necessary to support research and development.
- Affordable healthcare and insurance coverage for DR treatments are needed.

Monitoring, Barriers

- Quality of care depends on early detection and timely treatment.
- Barriers include lack of access to care, healthcare providers, and funding.
- Monitoring progress and overcoming barriers are essential for improving outcomes.

Authoritative Framework

- The framework for evaluating the economic impact of DR includes:
  - Direct costs: 
    - Medical care and hospital stays
    - Drug costs
    - Ancillary services
  - Indirect costs: 
    - Lost productivity
    - Reduced earning potential

Impact Assessment

- Impact assessment includes:
  - Economic impact
  - Healthcare utilization
  - Quality of life

Conclusion

- The economic burden of DR is significant, affecting millions of people worldwide.
- Early detection and timely treatment are crucial in reducing the impact of DR.
- Building capacity and securing resources are necessary for improving outcomes and reducing the burden of DR.

Proportions of People with Diabetes with Diabetic Retinopathy of Any Severity, by Country

- **Global**: 402,000,000
- **North America, high income**: 4.20%
- **North Africa/Middle East**: 2.50%
- **Latin America, central**: 4.50%
- **Latin America, Andean**: 2.50%
- **Europe, central**: 3.00%
- **Asia, southeast**: 2.20%
- **Asia, south**: 2.00%
- **Caribbean**: 1.50%
- **Australasia**: 1.40%
- **Oceania**: 1.00%
- **Sub-Saharan Africa, west**: 4.40%
- **Sub-Saharan Africa, southern**: 3.10%
- **South Africa**: 3.60%
- **Egypt**: 1.50%
- **Saudi Arabia**: 3.30%
- **Iran**: 3.30%
- **Yemen**: 3.30%
- **China**: 2.80%
- **Indonesia**: 2.80%

Annual Direct and Indirect Costs of Diabetic Retinopathy

- **United States**: $1.6 billion annually
- **Global**: $87 billion annually
- **China**: $12.4 billion annually
- **India**: $10.5 billion annually
- **Saudi Arabia**: $4.9 billion annually
- **Egypt**: $1.9 billion annually
- **Iran**: $1.1 billion annually
- **Yemen**: $0.6 billion annually

Key

- **DR**: Diabetic Retinopathy
- **PDR**: Proliferative Diabetic Retinopathy
- **DME**: Diabetic Macular Edema

Important Facts

- **90%** of cases of visual loss due to diabetes could be prevented.
- **75%** of those with diabetes for 20+ years will develop vision-threatening DR.
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Raising Awareness About Impact

Patients with diabetes are often unaware of the seriousness of DR and the critical need for regular retinal exams, prevention, and timely treatment. Educational campaigns should:

- Discuss DR as a serious disease itself, not just as a complication of diabetes.
- Be patient-centered and emphasize the potential for vision loss and blindness.
- Involve primary care providers (PCPs) and allied health professionals in encouraging annual retinal exams to detect the often asymptomatic early stages of DR.
- Promote diabetes management and regular monitoring of eye health.
- Adapt messaging to be accessible for all cultures and groups within a society.

Building Capacity

Many countries still have only one ophthalmologist per 250,000 to 1 million people, located mostly in urban areas — often leaving rural areas underserved (Resnikoff 2012). New and existing programs must:

- Provide special and continuing education for PCPs on importance of diabetes management and screening.
- Build capacity of physicians who manage patients with diabetes at primary, secondary and tertiary levels.
- Offer training and incentives to increase the number of ophthalmologists available to treat DR.
- Improve infrastructure and equipment in secondary and tertiary level eye care treatment centers.
- Institute screening for DR using approaches adapted to the local setting, preferably using digital imaging.
- Make screening affordable and use low-cost interventions that target improved compliance.
- Ensure clear referral pathways to diagnosis and treatment for those who fail screening.
- Provide a clear path to reimbursement for healthcare professional time and services.
- Explore mobile health care services to supplement traditional medical offices, as a way to connect with available treatments.

Measuring Success

Quality DR care extends beyond self-reports of yearly retinal exams. Successful programs should:

- Promote compliance and self-management strategies for effective control of diabetes.
- Reduce the incidence of sight threatening DR through improved control of risk factors.
- Use sustainable, cost-effective approaches to the detection and treatment of DR.
- Increase the proportion of known people with diabetes who undergo annual retinal examination.
- Ensure that all identified with sight threatening DR undergo timely examination and treatment by a competent ophthalmologist.
- Promote collaboration between physicians and eye care providers at every level in the health system.
- Encourage collaboration amongst projects and countries using common indicators.
References


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