EyePACS: Prevention of Blindness in Primary Care

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Meredith Morgan Eye Center
Traditional Health Care Encounter

- Health Problem →
- Visit Trusted Doctor →
- Get Advice and Remedy →
- Go Home

“Take this, in case it flares up again.”
Telemedicine/Telehealth:

“Rapid access to shared and remote medical expertise by means of telecommunications and information technologies, no matter where the patient or relevant information is located.” - European Commission Health Care

Telematics Programme
My First Telemedicine Case -1994
15% Traumatic Hyphema
Traditional Visit Emulation
Types of Telemedicine:

- **Real Time**: Consultation where both parties are available and interacting simultaneously via videoconferencing.

- **Store-and-Forward**: Asynchronous transfer of images, video, and data for rendering a medical opinion. Internet or point-to-point.

- **Telemetry**: Remote measurement and transmission of patient data to a provider’s site for analysis and decision making.

- California Telehealth and eHealth Center, www.cteconline.org
Schematic View of Health Care Encounter:

Gather Data

Make Decisions <-> Communicate
Schematic View of Health Care Encounter:

Gather Data:
- Automation
- Delegation
- Telemetry

Electronic Data Interchange

Make Decisions:
- Experts, EBM
- Best Practices, DSS
- Knowledge Bases

Communicate:
- Cultural Comp.,
- Health Promoters,
- Advocacy Groups
Digital Retinal Photography
Optomap
Visual Pathways’ ARIS
DigiScope
Clarity RetCam
Panoret

Panoret 1000™
Wide-Angle Digital Retinal Camera

Medibell
Medical Vision Technologies

A Medibell Company
VISION Instruments Vi R3

Non-mydriatic (design pupil 4 mm)
Digital image :- 45 degrees, 4 Mpxnels
Suggested Price: $5000

Centre for Eye Research Australia
Department of Ophthalmology
Lions’ Eye Institute, Australia
How Does the JVN Work?

While in the eye care center or primary care office, images of the patient's retina are taken using JVN's proprietary software and imaging methods. The procedure is fast and pain free, eliminating the risks and recovery time of traditional pupil dilation. Staff technicians are trained and certified by Joslin to image patients and no special licensure is required to become a certified JVN imager.

In addition to the patient images, important risk factors that influence progression and care management are identified. While the patients are being imaged, key education material is presented to help them understand how general diabetes management affects their vision.

The images and risk factors are sent to Joslin where clinicians expert in diabetes care evaluate the studies. Evaluation and care summaries are returned to the ophthalmologist or primary care physician within 48-hours.

The JVN is the only retinal evaluation service that identifies urgent and emergent conditions. Retinal abnormalities can be indicative of serious and life-threatening conditions that may require hospitalization or immediate cardiovascular care. Joslin's review of the patient's multiple color, stereo images along side relevant risk factors can reveal emerging acute and chronic conditions that require immediate medical attention and prevent expensive care and debilitating outcomes.
Preserving sight is our vision.

Quality • Performance • Economic value

Please select the section of our site that interests you most:

- Patients
- Medical Professionals
- Investors and Analysts
Wilmer Eye-Tel Reading Center

1. Fundus images and visual acuity of diabetic patients are acquired by your office staff using the DigiScope.

2. Images are sent from the DigiScope to the Reading Center via the Internet utilizing the latest encryption technology.

3. Images are read by an expert clinical reader under the supervision of a Wilmer Eye Institute-John Hopkins University retinal specialist.

4. A patient report with the results of the image interpretation and a referral recommendation is sent back to the physician from the Wilmer-EyeTel Reading Center.
Welcome to EyePACS

EyePacs is a platform for clinical communication in eye care.

Its goals are to:

To improve the prevention and treatment of ocular disease complications.

To create a tool which allows clinicians to communicate easily about cases of interest using text, images and other digital diagnostic information.

To establish functional, convenient, and effective interclinical networks using inexpensive means.

Made possible by the California Health Care Foundation and the California Telehealth and eHealth Center
EyePACS Workflow
EyePACS Design Objectives

- Enable scalable, freely accessible, standards-compliant, image-capable inter-clinician communication in eye care.
- Develop a reliable, but simple and easily constructed system that accommodates useful clinical information with sufficient structure.
- Reduce barriers to communication among clinicians.
Design Principles

- Minimize barriers to access and use
  - Adapt to users current work patterns: email and web browsers
  - Open-source, non-proprietary application: no licensing fees
  - Interoperable with relevant health information systems and diagnostic devices: DICOM, HL7, Registries
  - Extensible to different settings: evolves over time
What Is the Problem?

- Diabetes is the main cause of blindness among working age adults
- 50% of people with diabetes don’t get annual retinal exams
- Those that are most at risk are less likely to comply with retinal exams
- Face-to-face exams may not be the best way to screen for sight-threatening retinopathy
TEAMWORK
Dr. Preciado and staff offer a comprehensive approach to treating the disease among migrant farm workers.
23 yr. old Latin American Female type I, pregnant, HbA1C = 11.7
23 yr old Latin American Female type 23 yr old Latin American Female type I, pregnant, HbA1C = 11.7
23 yr old Latin American Female

Diabetic, type 2

HbA1C = 11.7

Dilated vision

Vitreous: Clear, OU

Fundus: Dilated, direct

Impression:
1. DM OD/DR
2. Astigmatism

Plan / Counseling:
1. Discussed DM + eyes + BS control
2. LTF 1-2 yrs
Diabetic Retinopathy Screening Service

REPORT OF DIABETIC RETINOPATHY SCREENING:

Date of Birth: 01/01/1980  Age: 23
Date of Screening: 05/31/2007 11:35:47 AM
Screening Site: EyePACS No.: 40125
Patient Zip Code: 93266

CLINICAL INFORMATION:
Photographer:
History/Findings: 29 year old Asian female
- Hemoglobin A1C: 6.6
- Blood drawn on: 05/10/2007
- Hypertension: 120/81
- Cholesterol: 140
- Triglycerides: 110
- Control of diabetes: Moderate
- Duration of Diabetes: 10 yrs
- Insulin dependent: Yes
- if so, for how long?: 10 yrs
- Last Eye Exam: 03/29/2007
- Visual Acuities: Right: Left:
- Pinc hole?: Unknown
- With lenses?: Unknown

Medications: Previous EyePACS case: 35932 from January 22, 2007

CONSULTANT'S NOTES:
Consultant: Jorge Cuadros, OD, PhD - EyePACS - Thu May 31 11:57:14
FDT 2007
Assessment: Extensive intraretinal microvascular abnormalities (IRMA) in both eyes, particularly in the temporal quadrants; prominent IRMA next to retinal macula; fibrosis above right optic nerve; few intraretinal hemorrhages/microaneurysms
Recommendations: Severe nonproliferative retinopathy in both eyes due to IRMA; recommend consult with retinal specialist
Diagnosis: Severe Background Diabetic Retinopathy
Referral Status: Referral to Ophthalmology Clinic

IMAGES:
Full size images are available by request.

Image #1
Description:

Image #2
Description:

Image #3
Description:

Image #4
Description:
23 yr. old Latin American Female type I, pregnancy terminated, HbA1C = 6.6

Date: 05/31/2007 01:21:07 PM

Comment: There are IRMAs, most prominent within temporal macula, OU.
There is a 1/3 DA of NVD, just superior to the disc, in the Left eye, along with pre-retinal fibrosis superonasal to the disc.
1. Severe NPDR, OD
2. Proliferative DR with high-risk characteristics, OS
Recommend referral to Retina specialist for fluorescein angiogram and treatment.
23 yr. old Latin American Female type I, pregnancy terminated, HbA1C = 6.6

Date: 06/14/2007 07:18:45 AM

Comment: Agree with IRMAs OU as described by Dr. _____, OD>OS. Both fundi show prominent "water silk" reflexes, which make it more difficult to see the IRMA. The red-free photos are best for enhancing the IRMA. Fibrous tissue from the optic disc OS extending superonasally, with possible traction lines in the retina along the temporal rim of the disc. I cannot definitely confirm the NVD OS.

Additional findings: scattered retinal blot hemorrhages OU; probable old cotton wool spot 1DD along the superior nasal vein OS.
EyePACS – Open Access Diabetic Retinopathy Screening: Phase I

- 13 retinal cameras distributed in 7 rural California counties
- 3145 patient encounters for these sites beginning in September 2005
- EyePACS server program migrated from Windows to open source Unix platform as of 6/22/06 (beta release)
- The EyePACS web interface made available at no cost to community clinics in California via a modified General Public License
Current Status of EyePACS:

- Over 19,000 encounters recorded
- Average ~70 encounters per day, goal is 100,000 per year
- 64 active clinic sites
- Photographer Certification Course
- On-line Retinal Image Reader Certification Course (for primary care clinicians)
- Development: image processing and patient education tools
EyePACS Retinopathy project in Guanajuato, Mexico
EyePACS in Guanajuato, Mexico

- 19 sites: San Felipe, Dolores Hidalgo
- Total Cases: over 6903 in 12 months
- Referred: 20.1%
- Sight threatening retinopathy: 13.9%
- Average Age: 57 yrs all; 60 yrs referred
- Gender: 77.30% Female, 22.70% Male
Challenges

• Connectivity issues (‘last mile’)
• Cost of cameras, computers, and software
• Licensing, Legislative
• FQHC reimbursement
• Medicare reimbursement
• Human and organizational issues
Thank You!

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