Screening of diabetic retinopathy in the mobile eye examination unit in Finland

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Johanna Alaloukusa
Deputy ward manager, RN, MNSc
Oulu University Hospital
The Northern Ostrobothnia Hospital District

Oulu University Hospital
Northern Ostrobothnia Hospital District

- Home to 403,000 people
- 29 municipalities
- Long distances: over 200 km from Kuusamo (east) and from Pyhäjärvi (south) to Oulu and Oulu University Hospital
Oulu University Hospital

- Specialised healthcare services
- About 6,000 employees
- Department of Ophthalmology
  - About 90 employees work in our department
Diabetic retinopathy (DR) is a leading cause of blindness in working-age individuals in Finland and other industrialized countries. Regular screening of all patients with diabetes is recommended. Fundus photography is claimed to be the most sensitive method for detecting retinopathy. Reliable screening for DR poses a major challenge to a health care system.
In Finland municipal health care centres arrange the screening for DR

The Northern Ostrobothnia Hospital District is responsible for organizing specialized healthcare services, like treatment of DR

Long distances to health centre (over 200 km) > mobile eye examination unit (EyeMo) was conceived in 1999 by Tuulonen et al.

Second EyeMo:
- weight: 3 500 kg
- length: 10,5 m
- width: 2.6 m
EyeMo

- since 2000
- visits most of the Northern Ostrobothnia Hospital District municipalities and screens individuals with diabetes (takes also some glaucoma controls)
EyeMo

- was developed
  - to improve screening of DR (in Finland all patients with diabetes are offered **free access** to screening of DR using digital fundus photography)
  - to deliver
    - high-quality fundus images and
    - rapid electronic feedback of analysed fundus images to municipal health care centres
- at low unit costs
- to guarantee equal access to care throughout the region
EyeMo

- A nurse and an imaging technician work together
  - five nurses and four technicians can work in EyeMo
  - four days a week, about 45 weeks per year
EyeMo

- Optic disc- and macula-centered images of each eye are taken
  - 2011: 3,412 images
  - 2014: 3,743 images
- Images are taken after dilatation
- Camera: Canon CX-1
  - The quality of images taken by EyeMo is very good
- Department of Ophthalmology (Oulu University Hospital) is responsible for the service

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- If needed immediately consultation is available by phone
- The aim is to analyse the images and to provide feedback without delay (optimally within one week)
  - During 2007-2011 75% of images were analysed by a nurse and 25% by an ophthalmologist
- Images with more severe DR are transferred to ophthalmologist
EyeMo

- Schedule is determined each year
- Patients are invited by municipalities by
  - A letter
  - A phone
  - An advertisement in a local newspaper
- The majority (80%) of all patients with diabetes in our area is screened by EyeMo
- Screening interval varies from one year up to three years
### Recommendations of the Finnish Current Care Guideline of Diabetic Retinopathy for fundus photography screening intervals

<table>
<thead>
<tr>
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<th>The stage of diabetic retinopathy</th>
<th>Proposed screening interval</th>
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<tbody>
<tr>
<td><strong>T1D</strong></td>
<td>No retinopathy</td>
<td>2 years</td>
</tr>
<tr>
<td></td>
<td>Mild background retinopathy</td>
<td>1 year</td>
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<tr>
<td></td>
<td>Moderate background retinopathy</td>
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<tr>
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<td>Proliferative retinopathy</td>
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The rate of visual impairment has slightly decreased in our area.
Screening can prevent nearly all cases of severe vision loss and blindness.


NOHD: 86 %
Whole Country: 35%
p<0.0005, trend test
Effects of EyeMo

- Decrease the workload of the ophthalmologist
- The resources of the University Eye Clinic can be targeted more towards diagnoses and treatment
- Effective screening and rapid access to care evidently lowers the total costs incurred by the health care system now when the number of diabetic patient is increasing
Effects of EyeMo

- Digital photography with telemedicine
  - Is a strategy
    - To deliver cost-effective, accessible screening to rural, remote and hard-to-reach population
    - To improve accessibility to health care
  - Is reliable and valid system which increases patient attendance to fundus screening
Thank you and have a nice summer

Johanna Alaloukusa
Deputy ward manager, RN, MNSc
Department of Ophthalmology
Oulu University Hospital
Kajaanintie 50
90029 OYS, Finland
Tel: +358405081227
Email: johanna.alaloukusa(at)ppshp.fi, johanna.alaloukusa(at)gmail.com