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INTRODUCTION OF TELE-OPHTHALMOLOGY IN THE SCREENING OF DIABETIC RETINOPATHY: COST AND EFFECTIVENESS STUDY

J. Coll Clavero,
M. Zazo Romojaro,
V. Valles Gallego.

SUMMARY:
The prevalence of diabetes mellitus in Spain is 6% of the population. The diabetic retinopathy (DR) is the main cause of blindness in the 20-70 years age group. The study makes a comparison between traditional (ST) and remote (TOF) detection methods. To reduce the loss of effectiveness of previous experiments it has been introduced the tele-ophthalmology as a detection method of DR with a double reading by a GP and an ophthalmologist. The benefits in TOF introduction in Aragon are: the screening of diabetic retinopathy can be done on patient not previously examined, the examination can be done in their own HC Centre, TOF index of increased cost effectiveness rate is 3,31 Euro/year.

Key Words: *tele-ophthalmology, diabetic retinopathy*

Introducerea tele-oftalmologiei in screeningul retinopatiei diabetice : studiu cost – eficienta

Rezumat:
Prevalenta diabetului zaharat in Spania este de 6% din populatie. Retinopatia diabetica este cauza principala a pierderii vederii in grupul de varsta 20 – 70 de ani. Studiul descris face o comparatie intre metodele traditionale si metodele noi 9 la distanta) de depistare a retinopatiei diabetice. Pentru a creste eficienta diagnosticului retinopatiei diabetice s-a introdus tele-oftalmologia cu citirea rezultatului de catre un medic de familie si un oftalmolog. Beneficiile introducerii acestei metode sunt efectuarea screeningului retinopatiei diabetice pentru pacientii neexaminati anterior, posibilitatea efectuarii acestei metode in propriile centre medicale, cresterea indexului cost-eficienta 3.31Euro/ an.

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1. - Sector Sanitario de Barbastro (Spain)

The estimated prevalence of diabetes mellitus in Spain is 6% of the population. It is estimated that 100% of patients with diabetes mellitus type 1 will develop diabetic retinopathy within 20 years, 60% of patients with diabetes mellitus type 2 will develop diabetic retinopathy within 20 years, 20% prevalence of diabetic retinopathy in patients with diabetes mellitus type 2.

Diabetic Retinopathy (DR) is the main cause of blindness in the 20-70 years age group. In previous studies comparisons between traditional (ST) and remote (TOF) detection methods show a loss of effectiveness between 2,2% and 3% (false negatives) in using TOF.

Main traditional Diabetic Retinopathy (DR) detection methods are:

- Standard ophthalmic exam after dilating patient eye is the gold standard (ST) ;
- Flourishing angiography;
- Stereoscopic retinography with 7 fields of 30º with mydriasis.

To reduce the loss of effectiveness of previous experiments it has been introduced the tele-ophthalmology as a detection method of DR with a double reading by a GP and an ophthalmologist.

The technical equipment that is necessary is retinal camera Karl Zeiss digital. The study area is Health Care

Correspondence to: Juan I. Coll Clavero, *Responsable de Informática e Innovación Médica, Sector Sanitario de Barbastro. SALUD; Tel.: + 34 974 249011, Móvil: + 34 650 028 366 ,*
e-mail: jcoll@salud.aragon.es

Table 1

#c	Costs	TOF (euro/u)	ST (euro/u)
1	Consumables	0,20	0,50
2	Technician	7,50	0,00
3	Retinal Camera	2,03	2,03
4	Slit lamps	0,00	1,74
5	GP	2,00	0,00
	2.Nd Reading (O)	9,00	0,00
	Nurse	0,00	6,64
	Ophthalmologist	0,00	11,69
6	Patient's loss	6,50	20,80
	Relative's loss	3,25	10,40
	Transportation	0,00	13,13
	Total	**30,48**	**66,93**

Sector of Barbastro. The methods used in the study were used in all health care centers of the sector available for TOF. One technician can move the retinal camera between health care centers and obtain the image.

In the first 464 diagnostic GPs gave 9 false negatives and 18 false positive results. In the future the learning effect of communication between GPs and ophthalmologists will reduce this error. The sensibility tests was 0,89 and the specificity test was 0,95.

Consumable (eye drops, bends) cost was: 0,20 euro/p (TOF) and 0,50 euro/p (ST).

Technician cost was 7,50 euro/p (TOF) and 0,00 euro/p (ST) but the technician salary was 20.274,8 euro/year. Retinal camera cost was 2, 03 euro/p (TOF) and 2,03 euro/p (ST). Retinal camera cost is 21.900 euro but the recovery period is 4 years and the productivity is 15 a./day x 20 days/month x 9 months. Slit lamps cost was 0,00 euro/p (TOF) and 1,74 euro/p (ST). Average slit lamps cost is 30.000 euro but the recovery period is 4 years and the productivity is 18 a./day x 20 days/month. Medical personnel cost was 0.00 euro/p (TOF) for nurse and ophthalmologist and 6,64 euro/p (ST) for nurse and respectively 11,69 euro/p (ST) for ophthalmologist. The others aspects are: for TOF extra-time accorded cost, includes urgent revision if necessary and for ST during normal working time, according to salary and time dedication. The patient`s loss was 6,50 euro/p (TOF) and 20,80 euro/p (ST) and the costs for transportation was 0,00 euro/p (TOF) and 13,13 euro/p (ST).

The cost summary show a saving of 36,45 euro (54,5%) for analysis: table1

In conclusion we can remarke the following benefits in TOF introduction in Aragon:

- screening of diabetic retinopathy can be done on patient not previously examined: the Aragon population = 1,300,000 inhabitants; estimation of 78,800 diabetics, 15,600 with DR and 47,000 with DR in next years.
- the examination can be done in their own HC Centre
- only one piece of portable equipment per HC Sector is needed
- net costs and savings are: 36,45 euro saving/patient (54,5%), with a global savings of 2.843.000 euro/year . In the future 2nd reading should not be necessary, increasing savings by 9 euro, with a potential saving of 3.545.000 euro/year
- according to Marbeley, TOF index of increased cost effectiveness rate is (66,9-30,5)/(67-56)= 3,31 euro/year

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