Scottish Glaucoma triage redesign using existing community optometry infrastructure

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Introduction

The NHS is facing huge backlog of glaucoma patients. In 2020 an entire glaucoma service was redesigned to develop a three level system, see **Diagram 1.**

Level 1 patients are discharged to the Scottish general optometry service (GOS).

Level 2 patients are seen in glaucoma accredited community optometry (GAC), accreditation by NHS Education Scotland glaucoma accreditation and training (NESGAT). GAC optometrists are able to discuss any patients they have concerns with on a weekly basis with a glaucoma consultant through video conference calls, where a decision is made if a patient warrants a visit to Level 3.

Level 3 patients are retained in hospital (HES). This study presents the results after 2 years of prospective data collection. Level 1 and Level 2 optometrist receive funding by NHS Fife and the Scottish Government.

Methods

Between August and December 2020, 2276 glaucoma patients were identified and triaged to three levels in keeping with Glauc-strat-fast guidance and local protocols, see **Table 1.** Every patient detail was entered into a bespoke glaucoma database to include demographic, diagnosis, clinical findings such as visual acuity, intraocular pressures, corneal pachymetry, disc appearance with cup disc ratio, visual field description, all Humphery Sita Standard 24-2 (HSS24-2), and highest mean deviation, along with current glaucoma treatment including surgical interventions.

Using this database, patient data was collected prospectively over a 24 month period and analysed looking at differences between the three different levels. See **Table 1** for summary.

Patient satisfaction was also collected through questionnaires at the hospital and in community.

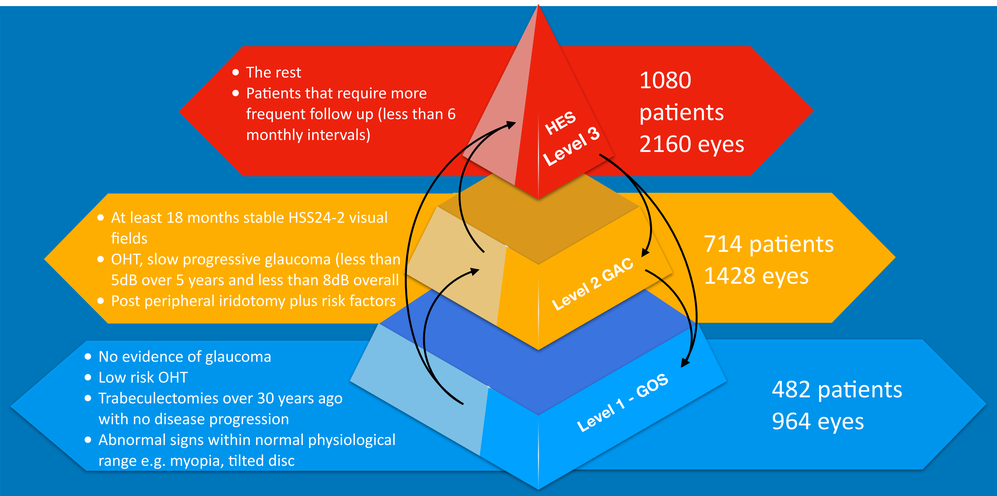
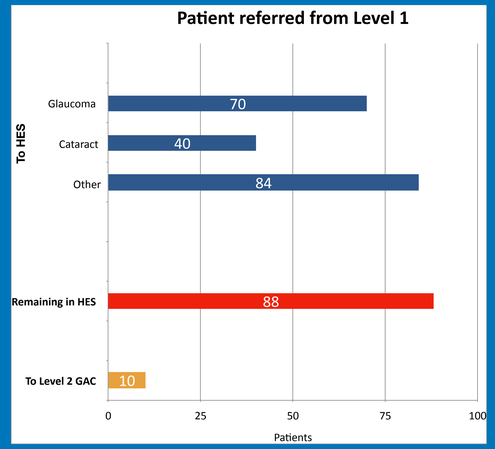
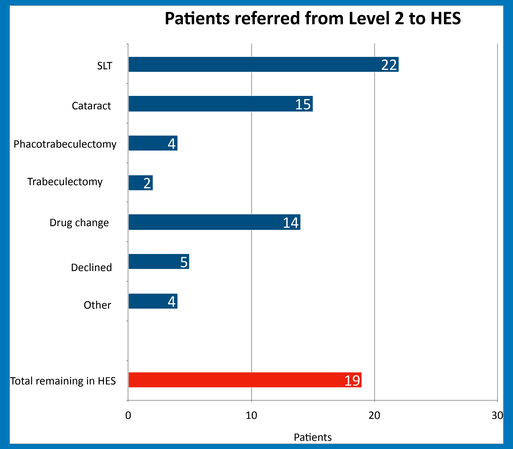


Diagram 1. The new Glaucoma Triage system for NHS Fife



Graph 1. Illustrating that most re-referred Level 1 patients were for non-glaucomatous reasons, such as development of other ocular conditions. Minority remained in HES.



Graph 2. Illustrating the reasons for Level 2 patient referral to HES.

Table 1: Demographics and clinical results for patients in level 1, 2 and 3

Characteristic		Level 1 Discharged	Level 2 Community Optometrists	Level 3 Hospital Eye Service	*P-value*
N of patients (n of Eyes)		482 (964)	714 (1428)	1080 (2160)	-
Gender (F)		229 (47.7%)	344 (48.2%)	511 (47.4%)	0.93 †
Age (years): Median (IQR)		72.8 (66.2, 79.9)	74.6 (67.4, 81.4)	74.8 (66.8, 80.9)	0.099 ††
Diagnosis:	'Normal' Eye	112 (11.6%)	88 (6.2%)	169 (7.8%)	<0.001 †
	POAG n (%)	179 (18.6%)	552 (38.7%)	1059 (49.0%)	<0.001 †
	OHT n (%)	462 (47.9%)	328 (23.0%)	286 (13.2%)	<0.001 †
	Glaucoma Suspect n (%)	92 (9.5%)	223 (15.6%)	283 (13.1%)	<0.001 †
	NTG n (%)	32 (3.3%)	110 (7.7%)	163 (7.5%)	<0.001 †
	Secondary Glaucoma n (%)	14 (1.5%)	24 (1.7%)	39 (1.8%)	0.78 †
	NAD n (%)	30 (3.1%)	57 (4.0%)	60 (2.8%)	0.13 †
	Other n (%)	43 (4.5%)	46 (3.2%)	101 (4.7%)	0.091 †
Cataract Surgery n (%)		191 (19.8%)	355 (24.9%)	560 (25.9%)	0.001 †
Trabeculectomy n (%)		37 (3.8%)	118 (8.3%)	228 (10.6%)	<0.001 †
Iridotomy n (%)		57 (5.9%)	79 (5.5%)	100 (4.6%)	0.25 †
Max average IOP Right Eye (mm Hg): mean (SD) *		26.4 (7.1)	26.1 (6.6)	25.7 (7.3)	0.157 ‡
Max average IOP Left Eye (mm Hg): mean (SD) *		26.2 (6.9)	26.3 (7.2)	25.5 (7.0)	0.058 ‡
CCT average Right Eye (µm): mean (SD) *		551 (37)	540 (37)	541 (43)	0.002 ‡
CCT average Left Eye (µm): mean (SD) *		550 (37)	538 (37)	542 (42)	0.002 ‡
MD average Right Eye (dB): median (IQR) *		-1.46 (-3.4, 0.0)	-3.54 (-8.6, -1.2)	-6.4 (-13.2, -2.6)	<0.001 ††
MD average Left Eye (dB): median (IQR) *		-1.97 (-4.2, -0.21)	-4.01 (-9.0, -1.7)	-6.87 (-13.2, -3.0)	<0.001 ††
Number (%)of patients not on any glaucoma medication		129(26.7%)	86(12.0%)	178(16.5%)	<0.0001 †
SIMD 2020 quintile 1 (most deprived) (%)		15.30%	16.20%	19.70%	0.003 †
SIMD 2020 quintile 5 (least deprived) (%)		25.30%	20.60%	19.90%	

SD: Standard Deviation, POAG: Primary Open Angle Glaucoma, OHT: Ocular Hypertension, NTG:

† Chi-Square test, †† Kruskal-Wallis test, ‡ ANOVA

* IOP missing values = 290 (12.7%) for right eye and 284 (12.4%) for left eye

* CCT missing values = 1258 (55.3%) for right eye and 1257 (55.2%) for left eye

* MD missing values = 469 (20.6%) for right eye and 483 (21.2%) for left eye

Summary Box

What was known before
Glaucoma patients have variable risk and considerable comorbidity

What this study adds
Safe triage is possible with strong leadership, team collaboration and communication
Triage shows that approximately 40% of glaucoma patients can be safely discharged to glaucoma accredited community clinics

Results

This study demonstrates statistically significant parameters between the three groups. Namely, Level 1 patients included more normal eyes, less pharmacological and surgical intervention, less mean deviation on visual fields and less social deprivation.

After 24 months, 194 Level 1 patients (40.2%) returned to HES, with 62.8% of re-referrals being for cataract surgery or other eye related disease. 20.4% of re-referrals remained in HES or Level 2. See **Graph 1.**

For Level 2 patients, 66 patients (9.26%) returned to HES, for SLT (33.3%), cataract surgery (22.7%), drug change (21.2%), glaucoma surgery (9.1%). 2.7% of Level 2 referrals remained in HES. See **Graph 2.** Patient satisfaction was above 97%.

Discussion

Glaucoma is a chronic progressive condition, therefore a delay in diagnosis and treatment can have devastating effects on patients quality of life. Recently a patient took a healthboard to court for a delay in diagnosis and loss of sight winning £3.2 million[1].

Glaucoma progression varies depending on disease type and whether it is high or low pressure disease. The Early Manifest Glaucoma Trial[2] (EMGT) showed that after 4 years of follow-up 49% of individuals without treatment progressed. Another study[3] suggested that perimetric mean deviation values deteriorate between -0.36 dB/year to -3.13 dB/year, with the overall mean being -1.08 dB/year.

The redesign of an entire glaucoma service has allowed for effective risk stratification of patients, allowing new glaucoma patients to be seen within 6 weeks and review patients in allocated time with a 25% margin. This means stable and low risk patients are seen in the community and high risk and complex patients are seen by HES. A statistical difference has been demonstrated between the groups, see **Table 1**. The system is also safe as Level 1 and 2 patients have a significantly reduced MD average compared to Level 3 patients, which suggests that stable patients remain in the community. To date, no Level 1 patient has had glaucoma induced visual loss.

The key strength of this redesign are the strong communication channels between primary and secondary care, which is key to any frontline redesign in chronic disease management. It allows for progressing patients in Level 1 and 2 to be flagged and appropriately escalated.

References
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