

1 **Title**

2 Exploring patients' expectations and preferences of glaucoma surgery outcomes to facilitate
3 healthcare delivery and inform future glaucoma research.

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18 **Synopsis**

19 Focus group study was performed on glaucoma patients who had undergone surgical
20 treatments, to identify treatment outcomes important to them. Independent living was one
21 of the most important outcomes identified in this study.

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30 Bina Kulkarni (BK) was the Principal Investigator and facilitator of the focus group study and
31 was involved in recruiting and consenting the patients for the study. BK transcribed and
32 analysed the data on NVIVO and prepared the manuscript. Paul Leighton (PL) was a facilitator
33 of the focus group discussions and advised on data analysis and troubleshooting NVIVO
34 software application of the qualitative data and reviewed the manuscript. AWK conceived the
35 study and had supervisory role overlooked the administration and financial aspect of the
36 project. BK, PL and AWK participated in its design. BK submitted the project proposal for REC,
37 Midlands for ethics approval. BBK created a draft of the manuscript, AWK and PL helped in
38 editing and reviewed the manuscript. All authors have read and approved the manuscript.

39 **Abstract**

40 **Introduction**

41 Glaucoma is a lifelong condition often requiring surgical intervention. To allow us to inform
42 patients expectations of surgery effectively it is important to understand patients'
43 preferences and concerns regarding outcomes from glaucoma treatments including surgery.

44 **Aims**

45 To explore what clinical and social outcomes of glaucoma surgery are important to patients.

46 **Methods**

47 Forty-five glaucoma patients undergoing medical glaucoma treatments or surgery were
48 recruited for focus groups interviews to determine their opinions regarding the outcomes of
49 glaucoma treatments. Thematic analysis was performed with NVIVO software.

50 **Results**

51 Themes identified were: understanding glaucoma, understanding surgery treatments and
52 understanding treatment outcomes. The most important outcomes of the glaucoma surgery
53 reported by the patients were social factors. Patients felt that being able to maintain their
54 driving licence is a strong indicator of successful glaucoma treatment/surgery. Other
55 important outcomes were independent living, ability to care for their family and have a quality
56 of social life.

57 When considering the novel surgical treatments most patients felt that certainty of successful
58 outcome and proven longevity of the effect would be the primary motivator for choosing
59 these treatments.

60 **Conclusions**

61 Patients understood that the clinical measures were surrogates for maintaining visual
62 function but maintaining quality of life (QOL) for independent living was the most important
63 outcome from their treatment. For newer treatment patients wished to know more about
64 long term outcomes when considering this option.

65 **Background**

66 Glaucoma is a pressure related optic neuropathy affecting 1-2% of population over 40 years
67 of age and is the second commonest cause for visual impairment registration in the over 65
68 years age group [1, 2]. Untreated glaucoma is a progressive condition [3] which may severely
69 impact on quality of life. It is a significant cause of falls [4]; road traffic accidents [4]; loss of
70 driving licence [5] loss of independence [4, 6-9] and may lead to blindness [2].

71 Lowering the intraocular pressure (IOP) is the only known modifiable risk factor for glaucoma
72 [3, 10, 11]. IOP reduction can be achieved with medical, laser treatments or surgery [12]. The
73 criteria for clinical success of the treatment is reduction of IOP which is associated with visual
74 acuity retention and stabilisation of visual field progression. However, patients'
75 understanding, and perception of glaucoma treatment especially surgical treatments
76 outcomes is unknown. It remains unclear whether these clinical assessments translate into
77 improvements recognised and valued by patients. It is also unclear how patients conceive the
78 relative merits of IOP reduction, retention of visual acuity, stabilisation of visual field
79 progression, or whether they might consider lifestyle influences of the treatment to be more
80 important.

81 Prior work has shown that patients demonstrate a varied level of understanding about
82 glaucoma, its causes and treatments, it also highlights that medical and surgical treatments
83 are considered quite differently by some patients [13]. Although both treatments are
84 effective in controlling glaucoma [3, 11, 14, 15] some patients regard surgery more
85 skeptically, as a treatment of *last resort* as it is associated with greater risk of side effects and
86 more severe consequences if complications occur (e.g. blindness) [13]. Consequently, it might
87 be assumed that patients may expect more from surgical treatment, to counter-balance the
88 perception of greater risks and they will accept *more moderate improvements* from medical
89 treatments; or that they might point to different types of benefits associated with different
90 types of treatment (*surgery to save sight, medical to maintain lifestyle*).

91 In recognition of the importance of patient centered outcomes some large clinical trials have
92 used quality of life as their primary outcome measures [16, 17].

93 Consequently, there is a need to explore patients' perspectives, hopes, concerns and
94 expectations on the outcomes of glaucoma treatment especially surgical treatment. A better
95 understanding of these will improve patient counselling, by providing clearer and more
96 explicit patient defined success criteria which might inform the appropriateness of the
97 medical and surgical options available for glaucoma management in terms important to
98 patients.

99 This study will address a lack of information about patients' notions of glaucoma surgery
100 outcomes and will explore if patients express different preferences and expectations of
101 medical and surgical treatment outcomes. The unique insight of patients' perspectives and
102 treatment expectations will complement the clinical potential of medical and surgical
103 glaucoma treatments.

104 **Methods**

105 Ethics approval for this study was obtained from the REC West Midlands, (REC reference
106 number: 16/WM/0172). Patients attending the glaucoma service at Nottingham University
107 Hospital were invited to participate in the study. Participant consent was obtained in
108 accordance with the REC guidance, and Good Clinical Practice (GCP).

109 **Study Procedures:**

110 The focus group sessions were conducted by two researchers (BK and PL). A semi-structured
111 topic outline based on the COREQ checklist was used to guide the discussions (*Figure 1*). The
112 topic guide was structured to navigate through *experience of glaucoma, treatment outcomes,*
113 *defining success* to encourage discussion amongst the participants guided by the
114 facilitators[18, 19].

115 All discussions were digitally recorded, transcribed in full and handled using the NVivo
116 software package (*NVivo qualitative data analysis Software; QSR International Pty Ltd.*
117 *Version 11, 2015*). Data was analysed following the conventions of thematic analysis and
118 consisted of data familiarisation, data coding and generation of over-arching themes. The
119 endpoint of data collection was considered to have been reached when similar themes and
120 subthemes continued to emerge in the latter focus groups hence it was regarded that ‘data
121 saturation’ was achieved.

122 **Results**

123 **Demographics**

124 45 participants with glaucoma were recruited in this study and organised into seven focus
125 groups of which 3 groups comprised of patients on medical treatments only and patients in
126 the remaining four groups had undergone surgical treatments. On average there were 6
127 patients in each group, females slightly outnumbered male patients in ratio of 1.3:1. The
128 patients’ age ranged from 52-90 years, all of these patients were residents of East Midlands.
129 3/4th of the total number of participants were married or in civil partnership at the time of
130 study (*Table 1*).

131 **Table 1 Demographic chart of the focus group participants**

Focus group	No of patients	Age range	M:F ratio	Marital status	Ethnicity
ST1	7	60-79	1:6	3 married	All British
ST2	2	68, 80	1:1	1 married	All British
ST3	9	61-86	3:6	5 married	5 British 2 Caribbean 2 Unknown
ST4	11	52-87	4:7	9 married	
MT1	5	66-82	2:3	4 married 1 unknown	5 British
MT2	4	71-88	3:1	3 married 1 widow	4 British
MT3	7	69-90	5:2	6 married 1 unknown	7 British

132

133 Legend - Demographics of patients in focus groups

134

135 **Abbreviations: MT Medical treated for glaucoma, ST Glaucoma surgery group**

136 **Thematic evaluation**

137 Initial coding recognised 781 data points which were grouped into 24 distinct codes (concepts
 138 or ideas). These codes were broadly classified in 3 thematic areas (*Figure 2*). The hierarchical
 139 organisation of the thematic map, with *understanding outcomes* considered as a result of a
 140 culmination of participants' *understanding of glaucoma, treatment* and outcomes highlights
 141 that the attitudes about treatment outcomes are not detached from but informed by how
 142 the participants understand glaucoma and its management. leading to realistic expectations
 143 about their treatment outcomes.

144 **Understanding Glaucoma**

145 At the beginning of the focus group meetings the patients were asked to discuss their
 146 glaucoma condition and its impact on their lives. This part of the discussion was grouped into
 147 theme of "understanding glaucoma ". The patients in medical treatment group had glaucoma
 148 from 1-10 years in duration and were on a variety of antiglaucoma eye drops. Most patients
 149 in the medical treatment group had not noted any problems with vision at the time of
 150 diagnosis. Some patients had noted gradual deterioration of vision over a period due to
 151 progression of glaucoma or worsening of cataracts or both. In the surgery group patients had
 152 glaucoma for longer duration of (approx. 30 years). Initially they were treated with glaucoma
 153 eye drops before having glaucoma surgery.

154 The diagnosis of glaucoma had generated anxiety in both the group of patients about losing
 155 vision sufficiently to affect their driving, reading, watching television and maintaining
 156 independent life styles.

157 For most patient work was not an issue as most of them were retired. ***“That’s gone out of my***
158 ***life style all together”***. Patients demonstrated good understanding of differences between
159 visual acuity and visual fields and if given a choice they would consider retaining either of
160 these visual functions depending on their lifestyles. ***“I suppose it will depend on a person’s***
161 ***expectations in their lifestyle and someone who is a hermit and does lots of sewing and***
162 ***embroidery will probably go for acuity”***.

163 **Understanding Treatments**

164 Most of the patients were satisfied with their treatments and glaucoma control. Few patients
165 had noted that their glaucoma was not well controlled with eye drops only, and few
166 anticipated further surgical treatment. Glaucoma patients in the medically treated group
167 described their experience of treatment with regard to effect of eye drops on their lifestyle,
168 compliance with treatment, IOP control and side-effects of the treatment. Patients in both
169 groups expressed their preference to be on antiglaucoma eye drops for as long as possible in
170 order to avoid surgery. Even those already exposed to surgery expressed these sentiments:
171 ***“If I’d had the choice, I would have stayed on the drops rather than have surgery I must***
172 ***admit ...”***; ***“ when you come to the end of the line with the medications, as I have done now***
173 ***because nothing’s working any more, you can have an operation and that’s a sort of last***
174 ***resort and that seems to be quite successful”***. As did those who had not had surgery: “Well
175 from beginning I think I would prefer drops rather than surgery as its easier and not invasive”.

176 Patients in the surgery group mentioned that they did not notice any improvement in vision
177 following surgery and still need to use glasses, although this was not a surprise to them,
178 “Surgery can’t make it (vision) better, he’s (consultant) always explained that”.

179 *Expectations of glaucoma surgery*

180 There were approximately 21 responses from patients in medical group on their expectations
181 from glaucoma surgery and 43 comments from patients in surgery group. In the glaucoma
182 surgery group this subtheme included preoperative perception of glaucoma surgery,
183 operative and postoperative experience, expectations from glaucoma surgery and number of
184 glaucoma surgeries. On the other hand, patients in the medical treatment group had variable
185 information on glaucoma surgeries. Many patients would rely on the decision of the
186 consultants regarding glaucoma surgery. ***“And I thought no issues I’m happy to go with it, I***
187 ***said right, fine, I’ll have an op”***.

188 The patients in both groups had expressed anxiety to have surgery the most important reason
189 being losing the eye sight and there were no guarantees that the procedure (trabeculectomy)
190 would work and for how long would it remain effective. ***“Well the only concern I’ve got is***
191 ***about the operation is a trial and error process, you know, sort of, cutting some slots in your***
192 ***eyes and then you go in every day and he sews a bit up more up if the pressures are not***
193 ***quite right”***.

194 Patients were interested to know the competency of the surgeon going to perform the
195 surgery before they came for the surgery as patients felt that the success rate of the surgery
196 depended on the surgeon’s experience. Patients didn’t mind having a new procedure if it had

197 high success rate and long-term effects. The concept of successful surgery varied among the
198 participants, some felt it should improve sight, some felt it should stop the condition getting
199 worse, some wanted to protect the ability to drive, or the ability to drive at night, or just
200 walking independently. Participants were quick to suggest that success might mean different
201 things to different people, and that success means “***maintaining your life style in the way***
202 ***you want***”. They hoped this would reduce the number of eye drops they were taking.

203 In the surgery group, patients had described concerns regarding longevity of the surgery,
204 aware that scarring could cause failure of the procedure: “I mean trab is supposedly 90%
205 effective at start and then over 10 years it goes down to 60% because your eye changes and
206 heals, well 10 years is considered good outcome but not to someone who is young, it’s not
207 very long”. Building on this another participant indicated that “I think for the individual you’d
208 think about how long am I likely to live so that’s going to impact into that decision isn’t it”?
209 The main initiative for opting for surgery in both groups was the expectation that the surgery
210 would stabilise their condition by restricting the visual field loss, reduce or stop the use of the
211 eye drops possibly lifelong hence avoiding or minimising their side effects and reduce the
212 amount of follow ups required to once or twice a year.

213 **Understanding Outcomes**

214 Consideration of treatment outcomes showed a complex and multi-faceted reasoning process
215 where participants drew together factors which might be viewed as clinical (*IOP*), alongside
216 more general concerns (*expectations of surgery and lifestyle*), and more specific issues (such
217 as *driving* and *follow-up* procedures).

218 Few study participants did not appreciate the significance of IOP control, although most
219 considered IOP reduction as an important outcome of any glaucoma treatment. However,
220 many noted that the reduction of IOP was not in its own right a meaningful treatment
221 outcome but was broadly conceived as a requirement or mediator for maintaining sight (table
222 2, row A, especially (i)).

223 More than this though maintaining sight was considered key to maintaining *normality* and
224 being able to live independently (table 2, row B), pursuing the sorts of activities that they
225 want to do:

226 ***“[treatment] Success means maintaining your lifestyle in the way you want”***

227 Driving was a commonly used example of independent living, but again, even here, *driving*
228 might be considered a proxy from some other bigger idea about lifestyle and independence:

229 ***“It not the process of driving per se, it’s the fact that driving allows you to lead an***
230 ***independent life”***

231 Driving was viewed in different context by the participants, those who were either married or
232 were with partners especially those who cared for their spouses were more concerned to
233 keep their driving licences, “***Depends entirely on your age and lifestyle to me driving and***
234 ***getting about is very important ... My wife is disabled***”. On the contrary some participants

235 were not keen on driving as their spouse drove them or they were not driving at all, "***I***
236 ***wouldn't be bothered to drive, my husband is good, he drops me off...***".

237 Consideration of visual acuity and visual field as important treatment outcomes offered
238 complex and nuanced perspectives, with personal circumstances, and the type of lifestyle and
239 activities desired, again informing a preference for one over the other (table 1, Row C). Hence
240 it is the personal circumstances which dictate what outcomes a participant desires, rather
241 than some abstract assessment of the relative merits of the different outcomes. Discussion
242 of visual acuity and field did however expose more fundamental concerns about sight loss
243 (table 2, Row D).

244 Reduction of the burden associated with regularly administering eye drops was considered a
245 positive outcome of surgical treatment, although this needs to be weighed against several
246 uncertainties of the surgery:

247 ***"It is the scarring that's the problem isn't it, it works and then the scarring builds up***
248 ***so you have it taken away and then, you know, a few months later or probably a***
249 ***year later or so, its built up again the scar tissue"***.

250 It is notable that in discussion of treatment development, and about new surgical procedures,
251 certainty of outcome was identified as an important and appealing potential. Some
252 participants argued that certainty of outcome was more important to them than scope and
253 scale of outcome, and that they would accept less *improvement* if that *improvement* was
254 guaranteed rather than uncertain.

255 ***'A successful surgical outcome is either having an improvement of the existing***
256 ***condition or a sort of guarantee that it would stop the condition getting worse,"***

257 It is pertinent to reflect that in these discussions' participants reported a range of other
258 factors (beyond treatment outcome) such as, the nature of the procedure (how long, how
259 unpleasant), the duration of treatment effect, how well established a procedure is, known
260 risks and side-effects. These factors might inform the patients' preference for any surgical
261 outcome and hence, the surgical procedure itself.

262 Participant 1: ***"To be realistic as the glaucoma surgery is done under local***
263 ***anaesthesia rather than general and you are conscious, so speed is an important***
264 ***part, 10 minutes procedure under local anaesthesia is good and half an hour is bad"***.

265 Participant 2: ***"I think, at the end of the day I wouldn't mind how long the surgery***
266 ***was as long as you get best results from it"***.

267 Participant 3: ***"I would prefer unconscious painless surgery any time for procedure***
268 ***longer than 15 minutes"***.

269 Patients were willing to undergo surgery with increased risk if their eye sight was not good,
270 ***"well if my eye sight was really bad, I'd take a big risk, if it was not too bad I wouldn't want***
271 ***a big risk"***.

272 Stable patients with a successful surgery were keen to have follow-ups at least once a year to
273 ensure that the treatment is working. Most patients gave importance to keeping their follow-
274 up irrespective of frequency and duration of the follow up visits. However, they all preferred
275 to know their review dates in advance, so they can plan accordingly.

276 *Willingness to try new treatments*

277 Patients expressed a willingness to try newer surgical treatments especially if it was suggested
278 as beneficial by the clinicians. The idea of new treatments was seemingly attractive: ***“Could
279 we be kept up to date with any innovations, I mean I come on the internet and I flash my
280 bit of paper at the consultant and then he tells me it doesn’t apply to me, but not everybody
281 does, I mean it would be nice to know if there is something in the pipe line”; “I think stent is
282 a better one because its newer, its not going to be long to do, the drops don’t really come
283 into it. And if you don’t have to come in too often, it’s a bonus.”*** To consider these newer
284 treatments, patients were keen to know the duration of the effect of surgery and amount of
285 aftercare needed. Patients were interested to know if the surgery would be performed under
286 local or general anaesthesia, duration of the surgical procedure and recovery time were also
287 important aspect in choosing new surgical treatment. Patients showed preference for
288 surgeries with long lasting effects and repeatable if not definitive and final treatment.

289 **Table 2: Patients quotations regarding their views on different aspects of glaucoma**
 290 **treatment outcomes**

	Understanding treatment outcomes – subthemes.	Indicative data.
A	Intraocular pressures	<ul style="list-style-type: none"> i. <i>I don't feel the glaucoma's affected my eyes at all. Although every time I come to the hospital they say my pressure is high, we will put you on another drop ... [Q. is pressure an important outcome?] ... Yes, but [only because] the pressure needs to be down to protect the vision.</i> ii. <i>Thank fully you know the pressure seems to be controlled and therefore you know that's never been an issue</i> iii. <i>Lowering of intraocular pressure is important to protect vision</i> iv. <i>Pressure reassures you that everything's working</i>
B	Preserving lifestyle/normality.	<ul style="list-style-type: none"> i. <i>I want my life to be the same... I am quite an active person, so you know, I go to the gym and I go skiing. I do lots of things and I am concerned that I won't be able to do some of these things.</i> ii. <i>I really want my life to be same because you know, it makes me just feel old I have to be careful going down and standing up and can't Hoover.</i> iii. <i>My leisure and driving come in because I play golf and without the driving I can't go and play golf</i> iv. <i>I like to go long distance walking, I don't want to have to do that with a stick. You know, I like to enjoy my walks.</i> v. <i>It certainly interfered with my lifestyle having to put those drops in, it sounds pathetic</i> vi. <i>I have quite a few eyedrops and carry them with me, just thought, "God, Am I going to be trapped in the house doing these eye drops? It felt overwhelming.</i>
C	Field or Acuity? (Preserving lifestyle/normality)	<ul style="list-style-type: none"> i. <i>I mean I am annoyed that I can't focus on things. I do lot of DIY and trying to put a little screw in somewhere I can't see annoys me, but I'd sooner have the broad vision than that because I can always get the magnifying glass out or put a very strong light on.</i> ii. <i>Choosing option of good visual field or visual acuity depends on what is more important to maintain your lifestyle of reading, driving, doing the things you are normally doing.</i> iii. <i>I suppose it depends on a person's expectations in their lifestyle and someone who is a hermit and does lot of sewing and embroidery will probably go for acuity.</i> iv. <i>Again, you would come back to the effect on lifestyle and is field vision more important to maintain your lifestyle of reading, driving, doing the things you're normally doing or is acuity going to be better?</i>
D	Preserving vision	<ul style="list-style-type: none"> I. <i>I'd like a guarantee that I'm not going to go blind before I die.</i> II. <i>Basically, just ask me what I would like in my little life is I'd like to save my sight as much as possible in order to continue with my lifestyle</i> III. <i>So long as the sight is saved it is a sign of success we all agree.</i> IV. <i>Yeah, I don't want my life to get any better, I don't mind, it can deteriorate a bit but the thought of losing my vision</i> V. <i>Saving the vision protects your lifestyle, as well doesn't it?</i> VI. <i>Keeping your sight is basically the most important thing.</i>

291

292 **Discussion**

293 This is the first focus group study to evaluate patients' perception or understanding of
294 glaucoma surgery outcomes. Previous studies to determine impact of glaucoma on patients'
295 lifestyle have relied on questionnaires and surveys [20-23]. The disadvantages of these
296 methods are the lack of opportunity for the patients to elaborate their thoughts.

297 A concern for maintaining functional abilities and independent living influenced the
298 treatment outcomes expectations, especially the sight focussed outcomes. Stable vision and
299 visual fields were considered important and first preferred outcomes of successful surgery by
300 the patients to achieve desired lifestyle, consequently a consideration of individual lifestyle
301 requirements in treatment planning was appreciated by the patients. Green *et al* have noted
302 that self-referrals by patients in the early stages of glaucoma is challenging aspect as patients
303 naturally adapt to their gradually diminishing vision till they can't cope any more by this time
304 the disease would have progressed to moderate to advanced stages, hence early diagnosis
305 and treatment becomes crucial for effective management[24].

306 Therefore, customising the patients' treatments to suit their lifestyle requirements would
307 have positive impact on patients' perceptions of glaucoma treatment outcomes.

308 IOP (in its own right) was not considered an important outcome by the patients as most of
309 the patients failed to appreciate fluctuations or changes to their IOP due to their treatments.
310 Rather stable IOP was recognised as a mediator of stable vision, which was considered an
311 important outcome. The patient's expectations of the surgical treatment were that it should
312 halt the deterioration of glaucoma and on-going treatment with the eye drops.

313 A number of important themes that emerged from our study gave an insight into the clinic
314 visits and regarding visual field testing from the patient's perspective which could help to
315 inform patient-centred care in glaucoma. Although patients appeared frustrated by a number
316 of aspects of their follow-up, they ultimately accepted that some compromises had to be
317 made in order to save their eyesight [19] [20]. Some of the viewpoints illustrated in the focus
318 group discussions may in part explain why research-supported guidelines about more
319 frequent VF testing are not being implemented effectively in clinical practice. A holistic
320 approach that embraces patients' opinions may therefore be vital to help devise the most
321 effective strategies for follow-up care in this chronic disease [25].

322 Differences in the themes of discussion between the medically and surgically treated focus
323 groups were mainly noted in the categories of understanding glaucoma and understanding
324 treatments. In the surgically treated groups, the patients discussed topics such as their
325 experience of glaucoma surgery and postoperative recovery of which they had personal
326 experience. Patients on glaucoma eye drops generally had limited knowledge of glaucoma
327 surgery and these patients discussed the importance of good IOP control to stabilise the visual
328 fields.

329 In both the groups especially in the medical treatment group surgical treatment was
330 considered a 'last resort' and would consider it only when other treatment options were
331 exhausted. Increased anxiety regarding surgical treatment was felt by patients in medical
332 group compared to patients in surgical group who were going to have a repeat procedure.

333 This was due to risk of going blind from complications of surgery weighed heavily on
334 patients in medical treatment group compared to patients who had previously undergone
335 surgical treatment successfully this experience had increased their confidence in the safety
336 of the current glaucoma surgical treatments. Patients in both groups had expressed similar
337 opinions regarding expectations from surgical treatment of glaucoma which were mainly
338 maintaining vision, able to maintain their driving licence and independent living and have a
339 meaningful social life. Most of the patients considered blindness as the most important
340 negative consequence of glaucoma surgery and avoiding this risk for as long as possible was
341 preferable. While it is important to acknowledge that surgery is associated with risks, the
342 risk of blindness from modern glaucoma surgery is small [26]. Similarly, medical treatments
343 are not without potential complications and side effects, and may affect surgical success
344 at a later stage [27]. Discussion of surgery at an early stage of treatment may help to
345 overcome the misconception that surgery is a treatment of last resort. However, the time
346 constraints of clinical practice may make implementation of this practice difficult as this
347 discussion to explore surgery risks and benefits would require additional consultation time.
348 It was noted that different treatments did not result in differences in the expectations of
349 the outcomes, i.e. patients did not want greater gains from surgery (to counteract
350 perceived risks). Also transition from medical to surgical treatment was not associated by
351 changes in the expectations of treatment outcomes.

352 This creates challenges as often; newer surgical techniques have limited information about
353 safety and efficacy and rarely have long term success data available. This patient perspective
354 on newer treatments is important when conducting clinical trials for new glaucoma
355 treatments and when introducing novel procedures into practise.

356 ***Limitations***

357 One of the major limitations of this study was homogeneity of the study population as
358 majority of the patients were Caucasians, above 60 years age and residents of East Midlands,
359 UK. It is likely that the younger service users may have differing views and experiences that
360 also warrant investigation. Articulate, confident and motivated patients were chosen as they
361 would contribute effectively to focus group discussion. Variable number of patients attended
362 the focus groups smallest consisted of two participants due to late cancellations but this is
363 not a major limitation due to adequate number of focus groups conducted in this study [28].
364 Facilitators introduced bias was minimised by taking care to adhere to the interview topic
365 guide [29].

366 **Conclusion**

367 This is the first qualitative research study to evaluate patients' perspective of the important
368 outcomes of glaucoma surgery. While patients understand the relevance of clinical measure
369 such as IOP control and visual field assessment their perspectives of important glaucoma
370 treatment outcomes are much more grounded in experience of daily living and maintenance
371 of quality of life. Patients are not averse to considering newer surgical options but wished to
372 have more information regarding long-term outcomes to inform their choice.

373 **Recommendations:**

374 The patients' perception of glaucoma surgery outcomes can mould the future glaucoma
375 consultations with the patients to plan their surgical treatments. With the availability of
376 various surgical options to manage glaucoma, the treatment plan could be customised for
377 each patient based on their individual needs to suite their lifestyle requirements. Factors
378 which could influence the patient's choices would be their health and fitness at the time of
379 consultation, their age, sex, social conditions, family and friend support, hobbies, driving
380 requirements and ability to manage independent living in postoperative period with
381 minimally induced disability due to the surgery. The patients can be provided with details of
382 the pathways of different treatments including amount of time spend in the hospital for the
383 surgery, postoperative follow-ups required, amount of medications, and the visual recovery
384 expected with each procedure to allow them to make pertinent choices regarding their
385 treatment. Following the surgery around time of discharge a survey could be conducted to
386 determine how useful the patients felt this process was to facilitate any modifications
387 required in future.

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