

Sources of patient knowledge and financing of cataract surgery in rural China: the Sanrao Study of Cataract Outcomes and Up-Take of Services (SCOUTS), Report 6

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ABSTRACT

Aim: To study patient sources of knowledge about cataract surgical services, and strategies for financing surgery in rural China.

Design: Cross-sectional case series.

Methods: Patients undergoing cataract surgery by local surgeons in a government, village-level facility in Sanrao, Guangdong between 8 August and 31 December 2005 were examined and had standardised interviews an average of 12 months after surgery.

Results: Of 313 eligible patients, 239 (76%) completed the questionnaire. Subjects had a mean (SD) age of 69.9 (10.2) years, 36.4% (87/239) were male, and 87.0% (208/239) had been blind (presenting visual acuity \leq 6/60) before surgery. Word-of-mouth advertising was particularly important: 198 (85.0%) of the subjects knew a person who had undergone cataract surgery, of whom 191 (96.5%) had had cataract surgery at Sanrao itself. Over 70% of subjects (166/239) watched TV daily, whereas 80.0% (188/239) "never" read the newspaper. Nearly two-thirds of suggestions from participants ($n = 211$, 59.6%) favoured either TV advertisements or word-of-mouth to publicise the programme. While the son or daughter had paid for surgery in over 70% of cases (164/233), the patient's having paid without help was the sole predictor of undergoing second-eye surgery (OR 2.27 (95% CI 1.01 to 5.0, $p = 0.04$)).

Discussion: Strategies to increase uptake of cataract surgery in rural China may benefit from enhancing word-of-mouth advertising (such as with pseudophakic motivators), using television advertising where affordable, and micro-credit or other programmes to enable patients to pay their own fees, thus increasing uptake of second-eye surgery.

Cataract is the leading cause of blindness in the world.¹ Despite highly effective surgical interventions,^{2,3} progress in reducing the burden of visual disability associated with age-related lens opacity has been slow.⁴ It has been repeatedly shown that, even when surgical services are made available, the proportion of the population willing to take up such services often remains modest.⁵⁻⁶ A number of studies in Asia,⁷⁻¹⁰ Africa¹¹⁻¹³ and elsewhere¹⁴ have pinpointed barriers to cataract surgical care, including cost,^{5,8-12} lack of knowledge,^{8-11,15,16} fear of pain or poor outcomes,^{5,9,11} and various "attitudinal" barriers,^{5,9} such as acceptance of poor vision among women or the old.

Whereas studies of barriers to uptake of cataract services are comparatively plentiful, relatively few studies¹⁴ have focused on subjects who have successfully accessed services in relatively under-served areas, in order to assess how they overcame impediments of knowledge or cost.

China, a country with 24 000 ophthalmologists,¹⁷ has one of the lowest cataract surgical rates in Asia, 446 cases/million population/year in 2004.¹⁸ Approximately 550 000 cataract operations are performed in China annually, or 24 cases per ophthalmologist. Surgery is thus performed on only 15% of those requiring operations.¹⁸ Unoperated cataract remains the leading cause of blindness in population-based surveys.¹⁹⁻²¹

The Study of Cataract Outcomes and Up-Take of Services (SCOUTS) is an intensive study of outcomes and service uptake among ~300 patients undergoing sutureless, manual cataract extraction performed by local surgeons in rural China. The present report examines:

1. Channels for knowledge about local availability of surgical services among people who have undergone cataract operations in rural China.
2. Payment strategies for surgery within the family, and their effect on uptake of services such as second-eye surgery.
3. Implications for programme strategies to broaden uptake of cataract surgical services in this setting.

MATERIALS AND METHODS

The methods used in the Sanrao SCOUTS have been reported in detail elsewhere.²² Patients undergoing cataract surgery by either of two local, rural surgeons through Project Vision (the eye care component of the Caring is Hip medical relief programme) at the Sanrao Hospital in rural Guangdong Province, China, between 8 August and 31 December 2005 were invited by telephone to return to the hospital for a comprehensive ocular examination and to complete a series of questionnaires relating to sources of knowledge about the programme. The study cohort comprised patients who had received the first independent operations performed by the two surgeons after a 6-month training period in which 460 operations were carried out under supervision. Written informed consent was obtained from all subjects, and the study protocol was approved by the institutional review board at the Joint Shantou

International Eye Center, which serves as a parent hospital for Sanrao. The tenets of the Declaration of Helsinki were followed in all study procedures.

Setting

Sanrao township is located in the north-central part of Raoping county in Eastern Guangdong Province. The population of Sanrao is ~50 000, most of whom are farmers, and the territory is very mountainous.²³ The mean income for Raoping county, which is the catchment area for the eye services at Sanrao Hospital, was 6601 ¥ (US\$870) for a population of 960 380 in 2003.²⁴ This can be compared with a figure of 18 864 ¥ (US\$2482) for Guangdong Province in 2004.²⁵ Sanrao Hospital is a township-level, government-run facility. Before training of the two local surgeons, cataract surgery was not performed at the Sanrao Hospital. Cataract surgery is not available regularly at other facilities in Sanrao, but is performed locally on occasion during campaigns. Other surgical facilities are available in the larger towns of Shantou and Chaozhou, each about 2 h drive from Sanrao.

A door-to-door campaign was carried out in early 2005 to inform patients in Sanrao of the opening of the eye clinic, and there was significant newspaper and television coverage of the event. The programme has not carried out regular media campaigns since that time, and in fact a goal of the present study was to determine how most effectively to implement such campaigns. A regular outreach and screening programme is now in place, but was not at the time of this study.

Examination techniques

All patients undergoing cataract surgery at Sanrao received a preoperative examination with measurement of vision and dilation of the pupil. Intraocular lens (IOL) power was calculated for a postoperative target refraction of -0.5 Dioptres. Data recorded for all patients included age, gender, preoperative presenting visual acuity in the operated eye, IOL power, and presenting visual acuity in the operated eye on the first day after surgery.

Having had at least one eye operated on for cataract at Sanrao by the two recently trained study surgeons between 8 August and 31 December 2005 was the only eligibility criterion for the study. All eligible patients presenting to Sanrao Hospital

between 16 and 21 October 2006 (10–14 months after surgery) had a study-specific examination including measurement of vision in each eye separately at near and distance with and without refraction (KR-8800; Topcon Optical (HK) Ltd, Hong Kong), with subjective refinement by an ophthalmologist. Distance vision was measured using an illuminated tumbling E Snellen chart at a distance of 6 m, and near vision was measured at 33 cm with a hand-held chart.

After an examination including dilation of the pupil, subjects who were thought in the view of the examiner (NGC) to have visually significant cataract in the second eye were offered surgery under the same terms as for the first eye (a price of US\$90, inclusive of IOL and postoperative care). Subjects refusing the surgery were asked to indicate their reason for refusal.

Questionnaire

The questionnaire was administered orally in the local dialect (Chaozhouhua) after completion of the examination by three trained ophthalmology residents not involved in the measurement of vision, refraction or examination. It consisted of questions about patients' sources of knowledge of the Sanrao facility, access to various media including television and newspapers, suggestions about publicising the Sanrao programme, and sources of funds for the surgery. Subjects who were unwilling or unable to return to the Sanrao Hospital for examination were requested to complete the questionnaire by telephone, in which case the same instrument was administered by the same three trained study personnel using the same script as for subjects interviewed at the time of examination.

Statistical methods

Data are presented as mean (SD) or frequency (%), as appropriate. The log minimum angle of resolution (logMAR, the decimal equivalent of the Snellen fraction) was used for all calculations involving vision. Logistic regression was used to assess potential factors associated with willingness to undergo second-eye surgery among 176 people undergoing cataract surgery in rural China. Statistical analyses were performed using SPSS V14.0 (SPSS Inc, Chicago, Illinois, USA). All statistical tests were two-sided, and $p < 0.05$ was considered to indicate significance.

RESULTS

Of 313 patients operated on within the study window, 242 (77%) could be contacted by telephone; study examinations and interviews were performed on 176 (73%), 63 (26%) had

Table 1 Frequency of reading a newspaper, watching TV and listening to the radio among 239 patients undergoing cataract surgery in rural China (note that four subjects (1.7%) failed to respond to these questions)

Medium and regularity of access	Number (%)
Reading the newspaper	
Daily	14 (6.0)
1–3 times a week	6 (2.6)
Occasionally	27 (11.5)
Never	188 (80.0)
Watching TV	
Daily	166 (70.6)
1–3 times a week	13 (5.5)
Occasionally	46 (19.6)
Never	10 (4.3)
Listening to the radio	
Daily	53 (22.6)
1–3 times a week	5 (2.1)
Occasionally	31 (13.2)
Never	146 (62.1)

Table 2 Effective ways to disseminate information on the Sanrao cataract programme suggested by 239 people who had received cataract surgery in rural China

Strategy	Number* (%)
Word-of-mouth advertising through friends	107 (30.2)
TV advertisement	104 (29.4)
Telephone	70 (19.8)
Radio advertisement	17 (4.8)
Newspaper advertisement	9 (2.5)
Meeting	9 (2.5)
Banner	1 (0.3)
Poster	0
Others	37 (10.5)

*Multiple responses were allowed.

telephone interviews without examination, and three (1%) refused examination or interview. Thus, 239/313 (76%) of eligible subjects completed the interview questionnaire. These 239 subjects had a mean (SD) age of 69.9 (10.2) years, 36.4% (87/239) were male, and 87.0% (208/239) had been blind (presenting visual acuity $\leq 6/60$) in the first operated eye before surgery. As reported previously,²² examined and interviewed patients did not differ significantly with regard to age, gender, preoperative presenting visual acuity, or day 1 postoperative presenting visual acuity in the surgical eye from those who could not be contacted.

Of the 176 patients examined, 109 had been operated on in only one eye by the two Sanrao surgeons, 32 were operated on in one eye by the two Sanrao surgeons and in the other eye by others (five fellow eyes were operated on by Sanrao surgeons not participating in the study and 27 were operated on locally outside the Sanrao facility), and 35 were operated on in both eyes by the two Sanrao surgeons. Thus, a total of 211 eyes operated on by the two recently trained Sanrao surgeons were examined. As reported previously,²² both visual outcomes (presenting visual acuity $>6/18$: 83.4% at Sanrao, 40.7% other local surgeons, $p < 0.001$) and surgical complication rates (8.5% at Sanrao, 55.6% other local surgeons, $p < 0.001$) were significantly worse for the 27 eyes operated on locally outside Sanrao Hospital compared with the 211 eyes operated on by the two trained Sanrao surgeons.

Subjects were asked several questions about how they came to know about the availability of cataract surgery at Sanrao. Most (223/235 = 94.9% of respondents to the question) had learned about it from friends or relatives, with fewer than 5% having acquired the information through TV, newspaper or radio, despite the existence of advertising programmes. A large majority (198/233 = 85% of respondents to this question) knew someone who had undergone cataract surgery, of whom 195 (98.5%) were relatives or close friends. Among those whom

respondents indicated that they knew, 191 (96.5%) had received cataract surgery at Sanrao itself.

Examining various media through which potential patients might be contacted to increase awareness of surgical services, it was apparent that television was by far the most regularly accessed by those having been operated on for cataract at this rural site. Over 70% (166/235 = 70.6%) of respondents watched TV daily, whereas 80.0% (188/235) "never" read the newspaper and 62.1% (146/235) "never" listened to radio. Over 95% (225/235 = 95.7%) of subjects watched TV at least occasionally (table 1).

The subjects' strong preference for television as a medium and their tendency to have close contact with someone who had been operated on for cataract at Sanrao were reflected in their suggestions for disseminating knowledge of the Sanrao programme: nearly two-thirds of suggestions ($n = 211$, 59.6%) favoured either TV advertisements or word-of-mouth advertising through friends (table 2). Besides these, only telephone advertising ($n = 70$, 19.8%) was mentioned in more than 10% of responses; radio and newspaper advertisements and public meetings were not popular (table 2).

Subjects who had received surgery were also asked who in the household had paid for the cataract operation. The son or daughter had paid in over 70% of cases (164/233 = 70.4%), while about a quarter of subjects (59/233 = 25.3%) had paid their own fees.

Of 233 subjects who responded to this question, 147 (63.1%) had either had both eyes operated on or would be willing to have surgery in the second eye, whereas 70 (30.0%) were not willing and 16 (6.9%) were unsure. In a logistic regression model, having paid the full fee without help from son or daughter was the sole significant predictor of willingness to undergo second-eye surgery, with such subjects twice as likely to have surgery in the second eye as those whose children had paid (table 3). Other potential predictors including age, gender, postoperative vision in the first eye, and urban versus rural

Table 3 Potential predictors of willingness to have second-eye surgery among 176 patients undergoing cataract surgery and subsequent examination in rural China (note that 15 subjects who were unsure if they wanted second-eye surgery are not included in this analysis)

Predictive factor	Willing to undergo or has had second-eye surgery*		Univariate analysis		Multivariate analysis	
	No (n = 64)	Yes (n = 97)	OR _U	p Value	OR _A (95% CI)	p Value
Age (years)	71.0 (9.3)	68.6 (10.9)	0.98	0.152	0.98 (0.95 to 1.02)	0.356
Gender						
Female	48 (44.9%)	59 (55.1%)	1		1	
Male	16 (29.6%)	38 (70.4%)	1.93	0.064	1.78 (0.86 to 3.69)	0.12
Preoperative VA						
6/60	56 (40.6%)	82 (59.4%)	1		1	
$>6/60$	8 (34.8%)	15 (65.2%)	1.28	0.600	0.93 (0.34 to 2.55)	0.89
Postoperative VA in first eye† (logMAR)	0.31 (0.27)	0.29 (0.30)	0.99	0.797	1.00 (0.89 to 1.13)	0.96
Residence						
≥ 50 km from city	33 (38.8%)	52 (61.2%)	1		1	
< 50 km from city	31 (41.9%)	43 (58.1%)	0.88	0.694	0.88 (0.45 to 1.72)	0.71
Payer of the surgical fee						
Patient's son or daughter	50 (47.2%)	56 (52.8%)	1		1	
Patient	12 (25.0%)	36 (75.0%)	2.70	0.011	2.27 (1.01 to 5.0)	0.04
Others	2 (28.6%)	5 (71.4%)	0.83	0.840	0.76 (0.12 to 4.68)	0.77

*Values are either mean (SD) or number (%).

†Odds ratio was calculated on the basis of a change in logMAR VA of 0.1.

OR_U, univariate odds ratio; OR_A, odds ratio adjusted for the following factors in a logistic regression model: age, gender, preoperative vision, postoperative vision in the first eye, distance of residence from the city, payer of the surgical fee; VA, visual acuity.

residence were not significantly associated with willingness to undergo second-eye surgery (table 3).

DISCUSSION

The goal of this study was to supplement the fairly rich literature on barriers to uptake of cataract surgery⁵⁻¹⁶ with information on sources of knowledge and financial strategies which have allowed people in rural China, an area with generally poor surgical access,¹⁷ to take advantage of existing surgical services. Our results emphasise the importance of word-of-mouth advertising among people accessing services in this rural area, the significance of which has been acknowledged previously,²⁶ but for which few published data exist. In our cohort of 239 people operated on for cataract in this setting, 85% had direct contact with someone who had undergone cataract surgery. Specific knowledge of someone who had been operated on at the Sanrao facility itself seems to have been especially important. Although other surgical programmes exist in the area, and 15% of our patients had been operated on elsewhere in the fellow eye, 97% of patients responding to this survey indicated that their contact had received their operation at Sanrao Hospital itself. It should be noted that the word-of-mouth approach may have limited ability to reach marginalised or less-well-connected members of the community.

Although word-of-mouth knowledge appears to be a critical factor in the decision to have cataract surgery in this rural Chinese setting, our results suggest that television could also be used effectively to disseminate information about surgical availability. Nearly three-quarters of our subjects watched television daily and over 95% occasionally, while most respondents denied ever reading the newspaper or listening to the radio. When asked to suggest strategies to disseminate knowledge of the Sanrao programme, roughly equal numbers of respondents suggested using television ($n = 104$, 44.3%) and word-of-mouth ($n = 107$, 44.5%), while other media were not felt to be promising sites of advertisement (table 3). Although we are unaware of other studies of the potential of television for disseminating awareness of cataract services in rural China, other reports underscore the rapid growth in exposure to Chinese television. For instance, whereas data from the 1997 China Health National Survey reveal weekly mean television watching of 5 h among Chinese children,²⁷ our own data from 2007 in the same Chaozhou region as the present study indicate mean weekly self-reported television exposure of 15.2 (7.3) h (L Bei, N Congdon, ZX Zhou, K Choi, DSC Lam, MZ Zhang, MW Zheng, ZL Xie, LP Li, XY Liu, A Sharma, Y Song. Associations between gender, near work and myopia among secondary school students in rural China: the Xichang Pediatric Refractive Error Study, Report 2; unpublished).

The other analytical goal of this study was to understand financial strategies within the family to pay for surgery, and their effect on the uptake of ancillary services such as second-eye surgery, which are critical for the financial sustainability of programmes such as this one. Geaneau *et al*²⁸ used anthropological methods to describe the complex interactions that take place in families leading to the decision for an older family member to have surgery, but few other reports have touched on this area. Our own results indicate that over two-thirds of patients receive financial assistance from their children in order to access cataract surgery. Interestingly, however, having paid for one's own surgery was the single most important determinant of being willing to undergo second-eye surgery in this cohort, an association that persisted after adjustment for other potential predictors such as age, visual result in the first

eye, and urban versus rural residence (table 3). Second-eye surgery has been shown to significantly improve self-reported visual function in this setting,²⁹ and can be an important source of income in self-sustaining programmes such as this one.

A principal focus of SCOUTS has been to critically assess the implications of our findings for the programme to increase uptake of cataract surgical services in rural China. Although care must be taken in generalising broadly from data gathered at a single facility, there do appear to be potential programmatic implications from these findings. Firstly, as most patients having surgery at rural hospitals such as this may obtain information about the programme directly from contacts that have been operated on at the same facility, efforts to supplement the natural dissemination by word-of-mouth may be particularly effective in enhancing uptake of services. Using "pseudophakic motivators"—that is, people who have had successful operations at the facility—may be a useful example of this. Secondly, television may be helpful in the early stages of a programme before word-of-mouth can be expected to reach a wide audience, although the cost of advertisements may be prohibitive for some programmes. The impact of other, potentially less-expensive, media appears to be quite limited, at least in this setting. Finally, our data on family payment strategies suggest that cataract surgery programmes seeking to maximise visual impact and financial sustainability by encouraging second-eye surgery should consider the use of tiered pricing,²⁶ micro-credit³⁰ and other methods to increase the proportion of people able to pay for their own surgery. Patients forced to rely on their children to assist with payment of more expensive fees are significantly less likely to have surgery in the second eye.

The results of SCOUTS must be understood within the context of its limitations. In the first place, we succeeded in interviewing only 76% of eligible subjects, and the use of the telephone to contact subjects may have introduced bias with regard to income. Thus, it is possible that the interviewed sample is not fully representative of people operated on at the Sanrao facility. However, participants and non-participants have been shown not to differ with regard to important factors such as age, gender, preoperative presenting visual acuity or day 1 postoperative presenting visual acuity in the operated eye,²² and all operated subjects were able to provide a telephone contact through a neighbour or family member at the time of surgery.

Secondly, this sample is clinic-based rather than population-based, and thus conclusions drawn may only be applied with care to the population as a whole, let alone to other comparable settings in rural Asia. An even more significant implication of this clinic-based approach is that we were unable to discuss awareness of the Sanrao facility, access to various media, and other issues of significance to outreach programmes with people who did not present to Sanrao Hospital. The study design, in which patients were brought back for examination and interview a year after the initial surgery, raises the possibility of inaccurate or biased responses because of the length of the intervening period. The number of subjects available for the logistic regression analysis of refusal or acceptance of second-eye surgery is relatively small, and so these findings must be interpreted with care. Finally, our information on exposure to various media was obtained from responses to a questionnaire, and was not validated with reference to potentially more reliable sources such as viewing logs. This introduces the possibility of inaccuracies or bias in subject responses.

Despite these limitations, this report is one of the first of which we are aware to describe sources of knowledge about locally available cataract surgical services and family financial strategies for accessing such services in rural Asia. Although lack of cataract surgical services due to under-funded facilities and a paucity of well-trained surgeons remain important problems in rural China, low demand for existing services is also an important constraint. As such, the results are of potential interest to programme planners hoping to broaden uptake of cataract surgical services in these large, under-served populations.

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