

# Iranian Cataract Surgery Survey: Design and Study Protocol

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## Abstract

**Purpose:** Cataract is one of the most common diseases of older ages and, at present, the leading cause of avoidable blindness in the world. Along with the population growth, the rate of cataract surgeries is increasing in most countries worldwide. The number of cataract operations per million population per year is known as the cataract surgery rate (CSR) and is one of the indicators introduced by Vision 2020 initiative. This index is a useful indicator of the level of eye care services. The main purpose of the ICSS was to determine the CSR from 2000 to 2005 in Iran and use results to develop improved strategies towards the elimination of cataract.

**Methods:** In a descriptive, retrospective, cross-sectional survey, the Iranian population which has undergone cataract surgery is targeted. First, all major and minor cataract surgery services are identified and the required sample is randomly selected. Data from 8000 cases of cataract surgery is collected and studied.

**Conclusion:** The Iranian cataract surgery survey (ICSS) determines the CSR over a five year period and provides valuable information in terms of cataract surgery methods and intraocular lens (IOL) implantation. The results will definitely be useful in developing strategies to eliminate cataract from the causes of avoidable blindness and improve eye care services.

**Keywords:** Cataracts, Cataract Surgery Rate, Cataract Survey, Protocol

*Iranian Journal of Ophthalmology 2010;22(2):39-44 © 2010 by the Iranian Society of Ophthalmology*

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Received: February 28, 2009

Accepted: January 25, 2010

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## Introduction

Cataract is the most common disease in the aged,<sup>1</sup> and the leading cause of avoidable blindness in the world. The only treatment option for cataract is surgery, and cataract surgery with intraocular lens (IOL) implantation may be the most effective treatment in medicine. Of the 45 million blind in the year 2000, cataract and refractive errors (treatable causes) were responsible in 60% of cases. Another 15% were due to vitamin A insufficiency and onchocerciasis, and (preventable) 15% were caused by diabetic retinopathy and glaucoma (partially preventable). In the remaining 10%, age related macular degeneration and other causes were accountable. According to the reports by the World Health Organization (WHO), the rate of reversible blindness due to cataract will reach 40 million by the year 2020, and the need for cataract surgery will triple. This means that the annual number of cataract surgeries should increase from 12 million in year 2000 to 20 million in 2010, and 32 million in 2020. The number of cataract surgeries per year per million population is known as the cataract surgical rate (CSR) which is a useful indicator of eye services in different areas.<sup>2</sup> The CSR in different areas of the world varies greatly; ranging from 5000 in the United States, 500 in China, to 200 in Africa.<sup>3,4</sup> As an increased number of cataract surgeries should be performed, the CSR should rise considerably. The CSR should reach 3000 in India and other south-east Asian countries and 2000 in Africa or other areas where the elderly population is small.<sup>5</sup> Vision 2020 also emphasizes on increasing the quality of these services to improve quality of life.

The Iranian cataract surgery survey (ICSS) was designed and conducted to determine the CSR, and extract information concerning the types of cataract surgery and IOLs throughout the nation in Iran for every year between 2000 and 2005. In the present report we present the details of its protocol.

## Methods

### Methodology

The ICSS is a retrospective cross-sectional descriptive survey. The target population in

this survey is the Iranian population inflicted with cataract who had surgery at one of the cataract surgery sites during 2000 to 2005.

### 1. Sampling

First, all cataract surgery centers throughout the nation were identified and we collected the necessary information to divide them into major and minor centers based on the total number of surgeries performed in 2004. All centers with more than 1000 cataract surgeries were grouped as major centers, and those with fewer surgeries were grouped as minor sites. Eventually, we identified 292 centers, 213 of which had more than 50 surgeries in 2004 and we included in the survey. Of these, 9 centers had more than 1000 surgeries in 2004 and were considered major cataract surgery sites (Table 1).

Minor sites were also organized according to the number of surgeries performed at each center, and one out of every ten center was systematically selected (a total of 21). At the conclusion of data entry, we found that the surgical rates at two centers, Apadana and Mashhad Farabi, were low, while the surgical rates at Tabriz Nikookari and Khalili Shiraz were high, and so they were switched. Unfortunately, the survey was not successfully conducted at Tabas Mostafa Khomeini and Shiraz Artesh centers. Eventually, there were 28 centers; 9 major and 19 minor centers (Table 2).

Excluding the first two weeks of the year when elective surgeries are not conducted because of the Iranian New Year Holidays, one week per season during 2000 to 2005 was randomly selected for each center; a total of 24 weeks for every center. Data on surgeries performed during the selected weeks for every center was extracted by trained physicians.

### Sample population

Considering a prevalence of about 10%, a margin of error of 3.0%, and first order error of 5.0%, we needed 400 samples in each group, per season per year, bringing us to a total sample size of 8000. In total, 13409 files were reviewed.

**Table 1.** List of centers with more than 1000 cataract surgeries in 2004, and their location

Number	Hospital	Location
1	Farabi	Tehran
2	Apadana	Ahvaz
3	Aban Ambulatory Surgical Center	Esfahan
4	Khatam al-Anbia	Mashhad
5	Feiz Training Center	Esfahan
6	Alavi Training Center	E. Azerbaijan
7	Matini	Kashan
8	Farabi	Mashhad
9	Shahid Shoorideh Center	Tehran

**Table 2.** List of surgical centers entered in this survey

Number	Hospital	Location	Number	Hospital	Location
1	Farabi	Tehran	15	Salman Farsi	Booshehr
2	Shahid Shoorideh	Tehran	16	Hafez	Ardebil
3	Apadana	Ahvaz	17	Imam Khomeini	Estahban
4	Aban	Esfahan	18	Arya	Mashhad
5	Khatam al-Anbia	Mashhad	19	Shahid Beheshti	Minab
6	Feiz	Esfahan	20	Fajr	Marivan
7	Alavi	E. Azerbaijan	21	Firoozabadi	Rey
8	Matini	Kashan	22	Golsar	Rasht
9	Farabi	Mashhad	23	Falsafi	Gorgan
10	Nikookari	Tabriz	24	Amir al-Momenin	Asadabad
11	Khalili	Shiraz	25	Kasra	Shiraz
12	Vase'i	Sabzevar	26	Iran Naja	Shiraz
13	Kosar	Boroojerd	27	Mohammad Rasool Allah	Mobarakeh
14	Moosa Ibn Jafar	Mashhad	28	Shams	Tabriz

## 2. Conducting the survey

According to the patient contact points (Figure 1), patients with cataracts who present at care centers (private practices, clinics, and hospitals) are referred to cataract surgery sites when there is an indication for surgery. Since cataract surgery in Iran is only conducted in the operating room, this stage was selected as the point for identifying patients. In surgery, the surgeon and the operating room staff are involved, and when IOL implantation is planned, providing companies join the team. After surgery, patients have their follow-up visits at the original private practice, clinic or hospital.

Sampling could have been done at each of these stages, but in stages 1, 2, and 7 (Figure 1), the wide distribution of the centers and the impracticality of identifying all centers made sampling impossible. In addition, in stages 1 and 2, surgery has not been done yet, and so much of the desired information would not be available. Collecting data from

surgeons (stage 3), would be hindered by their wide distribution, high likelihood of bias, and low response rate, and low accuracy could be expected. In stage 5, on a practical point of view, the few number of IOL distributing companies would make it easier. However, there would be no data on patients' age, gender, surgical site, or surgeon, nor would we learn about the number of surgeries done without IOL implantation. Also, the data would probably be biased due to competitive reasons or to avoid tax, etc, and could only be used as supplementary.

The most appropriate way to collect data regarding the number of cataract surgeries was to review operating room and patient archives. For this purpose, the steps below were followed:

### 1. Selecting centers

First all centers with operating rooms supporting ophthalmic surgeries were

identified. This was done through communication with the Ministry of Health and medical universities throughout the country. To facilitate the communication, a correspondent was designated at each medical university. These centers were contacted to get an estimate of the number of ophthalmic surgeries and surgeons. Their feedback would allow us to categorize these centers according to the number of surgeries and surgeons.

2. Selecting interviewers

Since data collection in this survey would involve making trips to surgical centers,

meeting with hospital officials, supervising record extraction from the archives, and most importantly, reviewing patient records and procedures, the interviewers had to be 4<sup>th</sup> year medical students or graduates, be experienced in research projects, have strong interpersonal skills, be willing to make trips to other cities, and have the ability to deal with unexpected issues. Therefore, student research centers at medical universities were asked to recommend suitable candidates, and after conducting interviews, 5 medical graduates and 2 5<sup>th</sup> year medical students were selected.

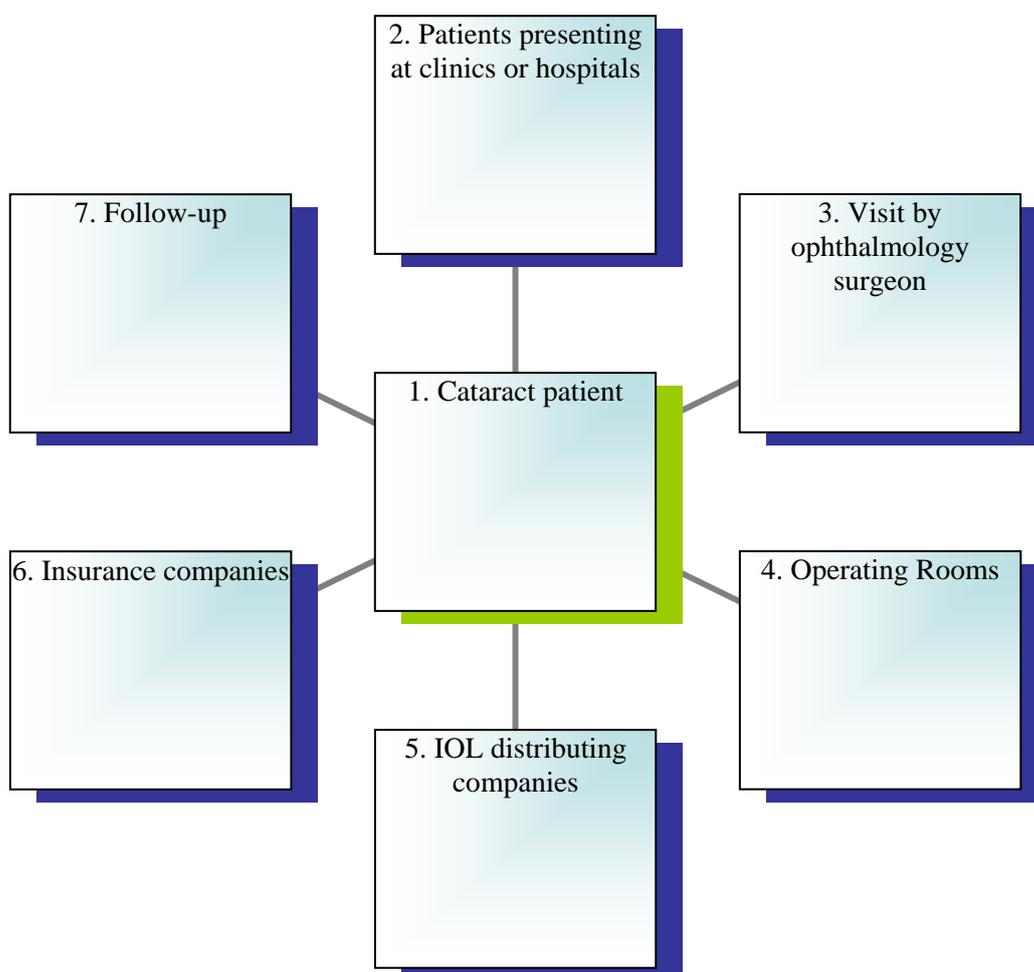


Figure 1. Points where cataract surgery patient data may be collected from

### 3. Training interviewers

The selected interviewers attended two sets of training courses covering the following topics

- *Scientific sessions*
  - The anatomy of the eye
  - Types of cataract (senile, developmental, congenital, and traumatic)
  - Types of cataract surgery [intracapsular and extracapsular cataract extraction (ICCE, ECCE), phacoemulsification, and lensectomy]
  - Types of IOLs (anterior chamber, posterior chamber, foldable) and their indications
  - Intraoperative complications (posterior capsular rupture, vitreous loss, nucleus drop, IOL drop, choroidal effusion, suprachoroidal hemorrhage)
- *Orientation sessions*
  - Data collection (sampling patient records and data extraction from selected records regarding the patient, hospitalization date, type of cataract surgery, type of IOL, and complications, if any)

### 4. Sending interviewers to allocated centers

At this stage, our correspondents were contacted to make arrangements and receive permits. Introduction letters addressing these centers were issued by the Iranian Society of Ophthalmology. Data collection sheets were provided and a sufficient number was given to each interviewers. For destinations close to Tehran, land travel was arranged. For other destinations, tickets for air travel were obtained for the destination, or the closest airport possible. In some cases, one of the interviewers had to be sent first to make the arrangements before the other interviewers traveled there.

### 5. Patient record extraction for the allocated two weeks

This was done after making necessary arrangements with the hospital head, the head of the department of ophthalmology, and hospital security. The major issue was lack of

an organized archive in 22 out of the 30 centers.

### 6. Completing data forms

The first form concerned general information about the surgical center and was filled by consulting the respective head of the department of ophthalmology and the head of the operating room. The second form was filled by referring to different sections of the patient records including the summary, examination results, and the description of the surgical procedure. One major issue in this step was the uncooperativeness of some private and even public centers who did not consider themselves affiliated with medical universities which lengthened this stage.

In addition to data on cataract surgeries, we collected data on the number of IOLs distributed in the country through companies distributing medical supplies and equipment. With the assistance of the Iranian Society of Ophthalmology, all actively operating companies involved with distributing IOLs in Iran were identified. Then we communicated with company managers to inquire whether they included data about surgical centers, surgeons, and the age and gender of the patients in their archives for every year between 2000 and 2005. They were also approached at their exhibition booths during the annual ophthalmology meeting. Despite all our efforts, none of the companies agreed to share their data with us. Eventually, we had to take a more formal approach through the Bureau of Medical Supplies and the Center for Disease Control until the desired data was collected.

### 3. Data entry and analysis

Data was entered in the SPSS software, and after recheck, analyses was done with SPSS and STATA software. The following equation is to be used to determine the CSR. Results are to be presented in percentages and the total number of surgeries for each year. The design effect of a cluster sampling method is to be considered and adjusted for in calculating the 95% confidence intervals. Trends are to be assessed through repeated measures analysis of variance, with a significance level of 0.05.

$$\text{CSR} = \frac{\sum [(\text{CS.No in major centers} \times 12.5) + (\text{CS.No in minor centers} \times 12.5)]}{\text{Population of Iran on that year (million)}}$$

## Discussion

The present report describes the protocol and methodology of the ICSS which was done in Iran under the CSR acronym. We expect the results to give us a better understanding of the situation with cataract surgery services on Iran and help policy makers with their future plans to achieve the goals of Vision 2020 initiative.

## Acknowledgement

This survey was done with the assistance and financial support of the Bureau of Health and the Center for Disease Control of the Ministry of Health and Medical Education, the Research Office of Tehran University of Medical Sciences and Health Services.

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