The 3rd Report of the National Eye Database 2009

Included reports on:

Cataract surgery registry 2002, 2003, 2004, 2007, 2008 and 2009

Age- related macular degeneration 2008, 2009

Retinoblastoma registry 2008, 2009

Ophthalmology service census 2002 to 2010

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THE 3rd REPORT OF THE NATIONAL EYE DATABASE 2009

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Disclaimer
There is a potential that data published for previous years in current reports may differ from annual reports published earlier. This is because analysis is based on latest dataset in NED database which may have been updated by source data producers.

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Thank you.

NED Steering Committee Members
May 2011

NED STEERING COMMITTEE MEMBERS 2009-2010

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Secretariat	**Teng Kam Yoke** Ophthalmic trained staff nurse, NED Clinical Registry Manager

ABOUT NATIONAL EYE DATABASE

Introduction
The National Eye Database (NED) is an eye health information system supported by MOH. It is a clinical database consisting of six patient registries and a monthly ophthalmology service census. The patient registries are Cataract Surgery Registry, Diabetic Eye Registry, Contact Lens-Related Corneal Ulcer Surveillance, Glaucoma Registry, Retinoblastoma Registry, and Age-Related Macular Degeneration Registry. The source data producers are eye care providers, currently from the public. Information collected, both clinical and epidemiological, are very useful in assisting the MOH, Non-Governmental Organizations, private healthcare providers and industry in the planning, evaluation and continuous improvement of eye care services, leading to prevention and control of blindness in the nation.

Vision
An accessible eye health information.

General Objectives of the National Eye Databases

1. To establish and maintain a web based eye health information system on natural history of visual threatening eye diseases, which are of public health importance. The information is useful in the planning and evaluation of eye care service.
2. To determine the effectiveness of treatment, both clinical outcomes and cost, and to identify factors influencing outcomes. This serves the needs of outcome assessment.
3. To provide information necessary to evaluate ophthalmology services through census and key performance indicators, as well as on safety or harm of products and services used in the treatment of a disease. This contributes to continuous quality initiative.
4. To evaluate the accessibility and equity in health care provision. This information enhances accountability.
5. To provide a mean of prompt and wide dissemination of epidemiological and clinical information through web such as real time registries reports and notification of epidemic of contact lens-related corneal ulcer. This is essential for public health advocacy.
6. To stimulate and facilitate research on eye diseases.

Cataract Surgery Registry
The Cataract Surgery Registry (CSR) was initiated in 2002 and collects data pertaining to patients who have had cataract surgery. Data collected include demography, medical history, operative events, post-operative visual outcomes and probable causes for poor outcome. Since 2008, data on posterior capsular rupture, visual outcome and post-operative endophthalmitis were linked to online key performance indicator for monitoring centre performance while data on incidence of posterior capsular rupture and patients with poor visual outcome are linked to online cumulative sum (CUSUM) to monitor competency of individual surgeon. Annual reports for the year 2002, 2003, 2004 and 2007 are available at *www.acrm.org.my/ned*, under the section of publication.

Specific Objectives

1. To determine the frequency, distribution and practice pattern of cataract surgery in Malaysia.
2. To determine the outcomes and factors influencing outcomes of cataract surgery.
3. To evaluate cataract surgery services based on rate of posterior capsular rupture, post-operative infection, post-operative visual outcome and induced astigmatism.
4. To stimulate and facilitate research on cataract and its management.

Retinoblastoma Registry
Retinoblastoma registry collects data on the pattern of clinical presentation, mode of treatment and outcome of patients with retinoblastoma seen at ophthalmology clinics with paediatric ophthalmology service. The main SDP is Hospital Kuala Lumpur.

Specific Objectives

1. To determine the incidence and distribution of retinoblastoma in different states in Malaysia.
2. To determine the ethnic-specific prevalence of retinoblastoma in Malaysia.
3. To study characteristics of RB patients in terms of clinical presentation and stage of disease based on International Intraocular Retinoblastoma Classification.
4. To evaluate types of treatments and monitor treatment trends.
5. To evaluate treatment outcomes including complications related to treatment.

Age-Related Macular Degeneration Registry
Age-Related Macular Degeneration (AMD) registry collects data on demographics, risk factors, clinical features and methods of treatment used in newly diagnosed patients with AMD. Hospital Selayang is the only SDP in 2008.

Specific Objectives

1. To determine patients' characteristics, risk factors and clinical presentation of AMD.
2. To study types of AMD based on clinical and investigative examinations.
3. To evaluate quality of life among AMD patients.
4. To evaluate types of treatments given to patients.

Monthly Ophthalmology Service Census
Since 2002, Ophthalmology Service of MOH has been collecting annual census from all the hospitals with ophthalmology departments. Data include essential service census and key performance indicators for ophthalmology service. There are 13 sections in the census return, namely out-patients, inpatients, major eye operations, cataract service, diabetic service, glaucoma service, and optometry service, and subspecialty services which include vitreoretinal, corneal, paediatric ophthalmology, oculoplasty, medical retinal, and a public health ophthalmology, and data on training records and prevention of blindness activities. Data are entered monthly by staff at sites via on-line data entry. Heads of ophthalmology department can view their own and other hospitals' real-time reports.

Specific Objectives

1. To evaluate service output in all ophthalmology departments.
2. To study trends in service output and service patterns.
3. To get baseline and norm from services provided by MOH ophthalmology departments.
4. To determine norm and set standards for performance indicators for centres which differ in strength of physical and human resources.

Cusum-Ophthalmology
Cataract surgery is the most common procedure done in ophthalmology departments. The procedure is quite consistent and outcome is measured by visual acuity. Cataract surgery outcome depends greatly on surgeons' skill. With advancement in technology and intraocular lens implantation, good visual outcome is almost certain among patients without pre-existing ocular co-morbidity. Hence, monitoring and evaluating surgeons' competency, especially trainees' performance, are essential in ensuring standard of care.

Cumulative Sum (CUSUM) software auto-mine data on occurrence of posterior capsular rupture and patients with post-operative vision worse then 6/12 from cataract surgery registry on surgery done by individual surgeon using unique surgeon ID. From 2008, by using individual unique username and password, surgeon can access his/her own CUSUM charts via eCUSUM web page. Consultant ophthalmologists can view their own as well as their trainees' charts. By doing so, monitoring on surgeons' competency in cataract surgery is made most effectively and easily.

Key Performance Indicator
The Ministry of Health (MOH) launched the implementation of Key Performance Indicators (KPIs) in February 2008 with the aim to assess the overall performance of services provided by Clinical Departments in MOH. The MOH Ophthalmology Service has identified eight KPIs which measure clinical performance of core ophthalmology service such as out-patient service, cataract surgery and diabetic eye screening.

Key Performance Indicators related to cataract surgery such as rate of infectious endophthalmitis following cataract surgery, posterior capsular rupture and postoperative visual acuity better than 6/12 in patients without ocular co-morbidity are data mined from cataract surgery registry.

Ophthalmology Service KPIs:

Aspect of Performance : QUALITY & SAFETY

	Dimension: Patient-focused Care	**Optimal Target / Standard**
No. 1	Waiting time to see a doctor at the Specialist Clinic	> 90% of the patients are seen within ninety (90) minutes
No. 2	Waiting Time to get an appointment for First Consultation for Diabetic Patients at the Specialist Clinic	> 80% of the patients are given an appointment for First Consultation within 6 weeks
No. 3	Waiting Time for Cataract Surgery	> 80% of patients have appointment given for cataract surgery within 16 weeks
	Dimension: Clinical Effectiveness & Risk Management	
No. 4	Rate of Infectious Endophthalmitis following Cataract Surgery	< 0.2% (2 cases per 1000 operations)
No. 5	Rate of Posterior Capsular Rupture during Cataract Surgery	< 4% (40 cases per 1000 operations)
No. 6	Rate of Post-operative Visual Acuity of 6/12 or better within 3 months following Cataract Surgery in Patients without Ocular Co-morbidity	> 90% (900 cases per 1000 operations)*
No. 7	Average Frequency of Mortality / Morbidity Review being Conducted in Ophthalmology Department Monthly	At least 6 times in 6 months
	Aspect Of Performance : PRODUCTIVITY	
	Dimension: Workload	
No. 8	Percentage of Out-patients seen by Specialist in specialist clinic per Month	To be decided

The NED website also has interactive online registry charting that allows public users to review data captured in cataract surgery registry and adverse incident reporting to notify defect in intraocular lens (IOL) noted during or after cataract surgery by public and private eye care providers, an initiative to promote patient safety.

Methods of the National Eye Database

The National Eye Database is designed as a cohort study. It is an online clinical database hosted at the Association of Clinical Registry Malaysia website at *www.acrm.org.my/ned*. Its protocol was approved by the Medical Research Ethical Committee of MOH on 2nd September 2008 (reference number NMRR 08-552-1707) and is accessible at the NED website.

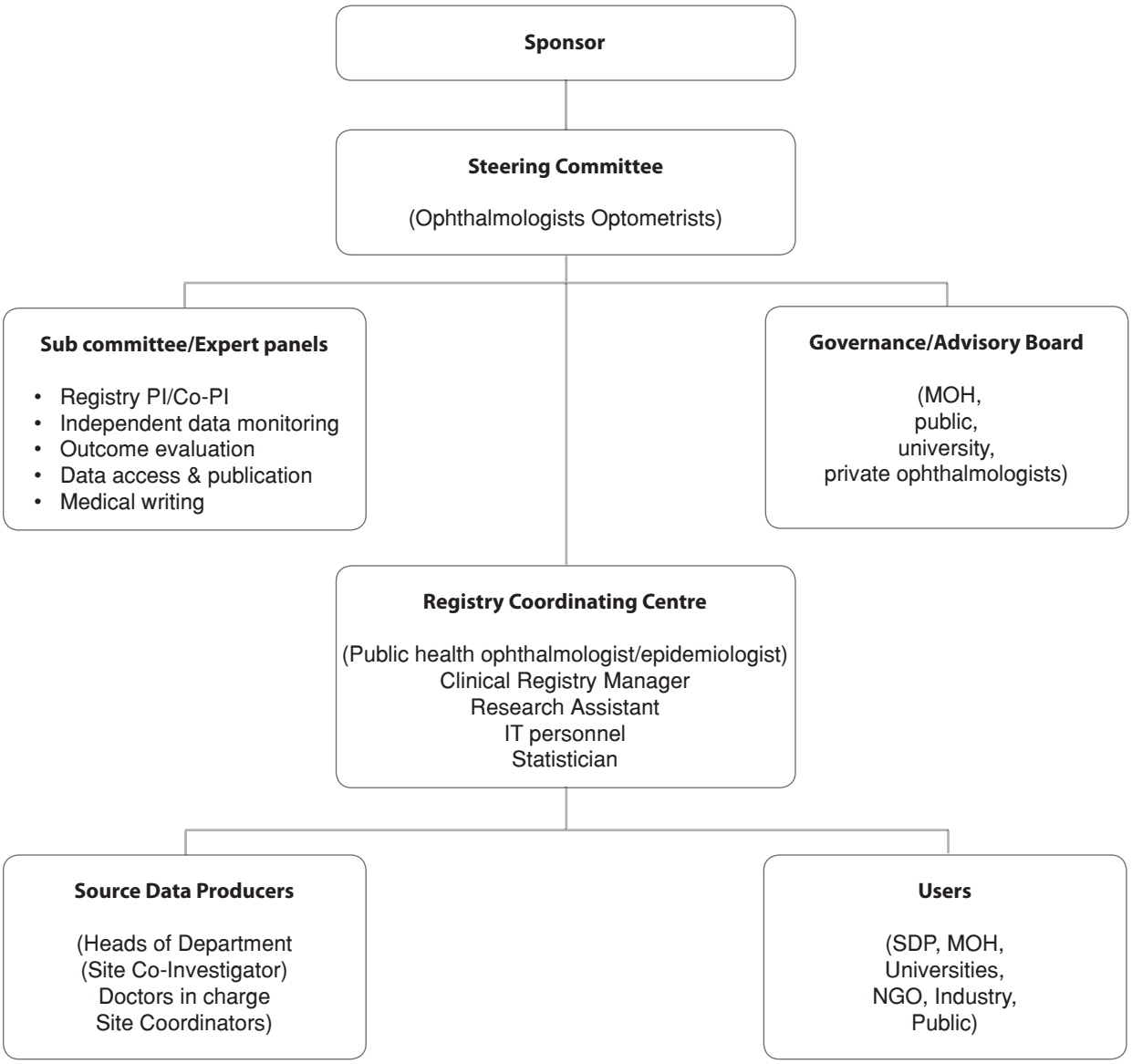
Data collection and data entry are done at SDP sites. Data are collected either using case report forms (CRF) which are later entered into the web application, or are directly entered into the web application during the course of clinical work.

Data management using data query are set in the web application to reduce inconsistency, out-of-range or missing values. Authorised staff at each SDP is given passwords to perform data entry. Individual SDP reports and aggregated reports based on cumulative data of all SDPs are available real-time at NED website. These reports are only accessible by heads of department, doctors-in-charge and site coordinators via authorised password. The web reports are descriptive analysis of data which have been entered. Annual statistical report will be produced based on data collected for a specific year. The statistical reports will be published yearly and distributed to users in MOH divisions and units, all the ophthalmology departments, universities, other relevant public agencies and non-governmental organisations.

The NED has high level of security for protection of its data. Data protection is ensured at all times through strict compliance with regulatory requirements such as authentications of users and web application owners, access control, encryption, audit trail, control of external communication links and access, as well as system backup and disaster recovery.

NED ORGANIZATION

Organisation Chart



NED SOURCE DATA PROVIDERS

List of doctors in charge & site coordinators for 2009-2010

Northern Zone			
No.	**SDP**	**Doctor-in-charge**	**Site Coordinator**
1.	Hospital Kangar	Dr Noram Azian bin Ramli	Roslinda bt Rahman
2.	Hospital Sultanah Bahiyah	Dr Lee Annie	Nur Diana Mohd Zani
3.	Hospital Sungai Petani	Dr Nor'aini Ramlee	Juliana Md Desa
4.	Hospital Pulau Pinang	Dr Ang Ee Ling	Noor Asmah Md Azmi
5.	Hospital Bukit Mertajam	Dr Ng Seok Hui	Marhaini Othman
6.	Hospital Ipoh	Dr Ummi Kalsom	Noraini Harith
7.	Hospital Taiping	Dr Ng Sok Lin	Rohaiza bt Abdul Hamid
8.	Hospital Teluk Intan	Dr Mimi Marina	Adawiyah Ismail
9.	Hospital Sri Manjung	Dr Yushaniza Yaacob	Juhaida bt Zahri

Central Zone			
No.	**SDP**	**Doctor-in-charge**	**Site Coordinator**
10.	Hospital Kuala Lumpur	Dr Rohanah Alias	Intan Khusiah Abd Rahman
11.	Hospital Putrajaya	Dr Salmah Othman	Lily Muhanifa Mustafa
12.	Hospital Selayang	Dr Haireen Kamaruddin	Nurul Aini Yusoff
13.	Hospital Tengku Ampuan Rahimah	Dr Fiona Chew Lee Min	Najihah Muhammad Sharif
14.	Hospital Serdang	Dr Zaida Mohd Kasim	Yusrina Mohamat Hata
15.	Hospital Sungai Buloh	Dr. Chan U-Teng	Majidah Zainal Abidin
16.	Hospital Ampang	Dr Zalifa Zakiah bt Asnir	Noriah binti Abdullah

Southern Zone			
No	**SDP**	**Doctor in charge**	**Site Coordinator**
17.	Hospital Tuanku Jaafar	Dr Norlelawati Abu	Normalisa Muhammad Som
18.	Hospital Tuanku Ampuan Najihah Kuala Pilah	Dr Khairul Husnaini binti Mohd Khalid	Nazura Selamat
19.	Hospital Melaka	Dr Juliana Jalaluddin	Eryanti Md Omar
20.	Hospital Sultanah Aminah	Dr Kevin Ong	Nurazilah Ismail
21.	Hospital Pakar Sultanah Fatimah	Dr Ngim You Siang	Roziana Sumardi
22.	Hospital Batu Pahat	Dr. Liu Han Seng	Nur Adilah Abdullah
23	Hospital Sultan Ismail	Dr Hooi Siew Tong	Nursalinah bt Adam
24	Hospital Tengku Ampuan Afzan	Dr. Mohamad Aziz Husni	Noor Azhari bin Ahmad
25.	Hospital Temerloh	Dr Fatimah Suhaila Sukaimi	Nor Hanim Ahmad Adnan

Southern Zone			
No	**SDP**	**Doctor in charge**	**Site Coordinator**
26.	Hospital Kuala Terengganu	Dr Nor Anita Che Omar	Noor Hayati Mohammad
27.	Hospital Kota Bharu	Dr Azma Azalina Ahmad Alwi	Rossaidah bt Mustapa
28.	Hospital Kuala Krai	Dr. Hj Abdul Mutalib Othman	Farawahida Fakaruddin
East Malaysia Zone –Sarawak			
No	**SDP**	**Doctor-in-charge**	**Site Coordinator**
29.	Hospital Umum Sarawak	Dr Mohamad Aziz Salowi	Nazirin bin Arshad
30.	Hospital Sibu		Mohammad Ridzwan Bihem
31.	Hospital Bintulu	Dr KM Reddy	Mohd Zharif Mohd Nor
32.	Hospital Miri	Dr Chieng Lee Ling	Nur Hafizah Mat Jalil
East Malaysia Zone –Sabah			
No	**SDP**	**Doctor-in-charge**	**Site Coordinator**
33.	Hospital Queen Elizabeth	Dr Chin Kelvin	Iramayanah Ambo Mase
34.	Hospital Duchess Of Kent	Dr Suriana Suaibun	Norhafizah Abd Razik
35.	Hospital Tawau	Dr Ajit Majumder	Arni Rehny Ahmad Rakhli
36.	Hospital Keningau	Dr Christina Lee Lai Ling	Hr Shredznear

FOREWORD

The much awaited 3rd NED report 2009 has finally been published. It contains report for cataract surgery registry, retinoblastoma registry, age-related macular degeneration registry and ophthalmology service census reports and does not have report on diabetic eye registry and contact lens related corneal ulcer surveillance. This is because the NED steering committee, with consensus from the heads of ophthalmology departments decided in 2009 to withhold data collection for diabetic eye registry and contact lens related corneal ulcer surveillance due to manpower shortage. However source data providers who wish to continue data entry to eNED web application can do so and they can download the online report of their hospitals from the NED website.

Cataract surgery registry has data for 6 years now. In this report, one can see trends in surgical practice and outcome. The aggregated data showed increasing number of cataract surgery performed using phacoemulsification technique, from 39.7% in 2002 to 72.5% in 2009. and reducing intraoperative complication rate from 10.4% in 2002 to 6.7% in 2009.

From 2010, NED website has a direct link to National Transplant Registry which captures data on corneal transplant. The NED website still hosts the eCUSUM charting, aims to monitor individual cataract surgeon's performance and ophthalmology service key performance indicator (KPI) charting which allows comparison of achievement in selected performance among hospitals and against a national set KPI as benchmark. The home page of NED website continues to have adverse incident reporting for defective intraocular lens and online registry charting that are accessible to public. We hope all these features NED puts on its web site will be utilized or accessed by people who need the information. Like many other patient registries, NED faces the problems of incomplete data ascertainment. Continuous effort by doctors in charge and site coordinators and firm directives from heads of department are needed as data capture depends solely on the doctors who see or operate on the patients. Besides these challenges, NED needs to continuously seek financial support from professional bodies and industry. We are glad that MMA Foundation, through Malaysian Society of Ophthalmology has given some funding to NED in 2011.

NED has rich data repository for cataract surgery registry from 2002 to 2010, ophthalmology service census 2007-2010, age-related macular degeneration, 2008-2010, retinoblastoma registry 2008-2010, diabetic eye registry 2007-2008, contact lens-related corneal ulcer surveillance 2007-2008, glaucoma registry 2007. We sincerely hope more doctors and optometrists will use the data captured to either publish scientific papers or use the database as baseline for future research. Those interested can contact the NED manager for detail.

This 2009 report also adds in the appendix on the 2009 survey findings on Ophthalmology Devices in Malaysian Hospitals and Ophthalmology Services in Malaysian Hospitals.

Thank you.

NED Advisor

.....
Dr Elias Hussein

Head, Ophthalmology service (2010- till date)
Hospital Selayang

NED Chairperson

.....
Dr Goh Pik Pin

Director, Clinical Research Centre
National Institute of Health

ABBREVIATION

ADED	Advanced Diabetic Eye Disease
AMD	Age-related Macular Degeneration
CAI	Carbonic Anhydrase Inhibitor
CF	Counting Finger
CLRCU	Contact Lens-Related Corneal Ulcer
CSMO	Clinically Significant Macular Odema
CMO	Cystoid Macular Oedema
CSR	Cataract Surgery Registry
DER	Diabetic Eye Registry
DM	Diabetes Mellitus
DR	Diabetic Retinopathy
ECCE	Extracapsular
FU	Follow Up
HM	Hand Movement
HPT	Hypertension
ICCE	Intracapsular Cataract Extraction
IOL	Intraocular Lens
MOH	Ministry Of Health
NED	National Eye Database
NPDR	Non Proliferative Diabetic Retinopathy
NPL	No Perception Of Light
OT	Operating Theatre
PCO	Posterior Capsule Opacification
PCR	Posterior Capsule Rapture
PDR	Proliferative Diabetic Retinopathy
Phaco	Phacoemulsification
PL	Perception Of Light
PI	Principal Investigator
RB	Retinoblastoma
RCC	Registry Coordinating Centre
SD	Standard Division
SDP	Source Data Producers
VA	Visual Acuity
VR	Vitreoretinal Surgery
ZD	Zonular Dialysis

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REPORT SUMMARY

Cataract Surgery Registry

1. Stock and Flow

- From the year 2008 to 2009, all the 36 MOH Ophthalmology departments take part in CSR.
- The number of SDP has increased from 25 SDPs in 2002 to 36 SDPs in 2009.
- The total number of cataract surgery registered to CSR has increased from 12798 in 2002 to 24438 in 2009.
- The CSR ascertainment rate has increased from 87.6 % in 2002 to 93.0% in 2009.

2. Characteristics of Patients

- The mean age of patients at the time of cataract surgery has maintained at 64 years old from 2002 to 2009. The age is younger than data published by Swedish cataract surgery register which is 74 years.
- Up to 1/3 of patients presented within the age group of 65-74 years old (39.0% in 2009).
- The proportion of patients with systemic co-morbidity has increased from 56.8% in 2002 to 71.0% in 2009.
- There is a significant increase in the proportion of patients presented for cataract surgery who have hypertension (from 35.4% in 2002 to 53.4% in 2009) and diabetes mellitus (from 28.9% in 2002 to 39.1% in 2009).
- Senile cataract was the commonest cause of primary cataract (98.6% in 2009).
- Trauma was the commonest cause for secondary cataract (56.2% in 2009).
- The proportion of patients who returned for cataract surgery in the fellow eye remained the same from 2002 to 2009, i.e. only one third (32.5% in 2009).
- Majority of the eyes had no prior ocular surgery (96.9% in 2009).The commonest prior ocular surgery was vitreoretinal surgery (1.2% in 2009).
- One third of the eyes had ocular co-morbidity (38.6% in 2009). The commonest ocular co-morbidity was diabetic retinopathy in any forms (11.0% in 2009).
- About half of the eyes had unaided vision in the blindness category (2/60-NPL) (54.3% in 2009). With refracted vision, the proportion decreased to less than 30% (27.4% in 2009). This trend was consistent over the years.
- Refraction was not done in more than 2/3 of the eyes (78.9% in 2009).
- Bimodal pattern of pre-operative vision was consistently observed over the years with one peak at the range between 6/18 to 6/36 and another peak at CF-HM.
- In term of the choice of IOL power, majority of surgeons chose target refraction as emmetropia or slightly myopic. The mean target refractive power in 2009 was -0.4D (SD 0.4).

3. Cataract Surgery Practice Patterns

- The number of cataract surgery performed by SDPs varied. Of the 36 SDPs, 16 performed less than 500 surgeries, 12 performed between 501 to 1000, and 8 performed more than 1000 cataract surgeries a year.
- The number of surgery performed was lower than average in the month of February and September.
- Selangor (5 SDPs), Perak (4 SDPS), Johor (4 SDPS), Penang (2 SDPS), and Sarawak (4 SDPS), performed higher number of cataract surgeries compared to other state. This is mainly because of population density and higher number of ophthalmology department in these states.
- More than 2/3 of the cataract surgery was performed by specialists (79.4% in 2009).
- The mean duration taken to do a cataract surgery was 33.6 min for phaco and 49.1 min for ECCE in 2009
- Though there is an increasing trend for day care surgery, from 39.3% in 2002 to 47.2% in 2009. However, the percentage varied among the SDPs. In 2009, 3 SDPs did not perform any cataract surgery under day care, 17 SDPs performed less than 50.0% and only 5 SDPs performed more than 90.0% of cataract surgery as day care.
- Phaco is the preferred method of cataract surgery and the proportion increased from 39.7% in 2002 to 72.5% in 2009. Percentage of ECCE decreased from 54.0% in 2002 to 22.3% in 2009.
- The preferred IOL material is acrylic and non-foldable type.
- The percentage of phaco converted to ECCE was 2.3% in 2009. It remained constant over the years.
- Among combined surgery, VR surgery has shown an increasing trend (0.2% in 2002 to 1.6% in 2009) while filtering surgery has shown a decreasing trend (1.2% in 2002 to 0.5% in 2009).
- Majority of cases were done under local anaesthesia (93.2% in 2009). The preferred type of local anesthesia was subtenon (50.6% in 2009).
- The use of topical anesthesia has increased from 11.7% in 2002 to 36.8% in 2009.
- The use of retrobulbar anesthesia has decreased from 25.9% in 2002 to 4.6% in 2009.
- There is a decrease in the use of oral sedation (33.3% in 2002 to 15.5% in 2009).
- Majority of the patient operated had IOL implantation (98.1% in 2009). Among these patients who had IOL, 96.0% had posterior chamber IOL.

4. Intra-operative Complications

- There is a reduction in intra-operative complication from 10.4% in 2002 to 6.7% in 2009.
- The rate of PCR decreased from 6.0% in 2002 to 3.5% in 2009 and vitreous loss decreased from 5.7% in 2002 to 2.6% in 2009.
- Intra-op complication was seen among 48.2% of patients who had phaco converted to ECCE and 47.8% who had ICCE in 2009.
- The percentage of intra-op complication was higher if cataract surgery was combined with filtering surgery (12.1%) pterygium excision (9.0%) or vitreoretinal (8.0%). For cataract surgery combined with VR surgery, the intra-operative complication rate dropped from 35.0% in 2002 to 8.0% in 2009 and rate of vitreous loss reduced from 19.0% in 2002 to 1.2% in 2009.
- The rate of intra-operative complication was higher in surgeries performed by MO (8.8% in 2009), followed by gazetting specialists (8.3% in 2009) as compared to specialist (6.3%).
- In 2009, 32 out of 36 SDPs achieved the national KPI standard of PCR below 5%.

5. Cataract Surgery Outcome

- Up to 80% of patient registered to CSR has cataract surgery outcome data (85.7% in 2007, 88.7% in 2008 and 84.3% in 2009.
- The rate of post-operative endophthalmitis has declined from 0.2% in 2002 (25 patients) to 0.09% in 2009 (19 patients)
- The percentage of patients with unplanned return to OT has increased over the years, from 0.34% in 2004 to 0.53% in 2009. The common reasons for the need to have re-operation were iris prolapse, wound dehiscence and IOL related problems.
- In eyes without ocular co-morbidity, less than 50% of eyes had post-op unaided visual acuity 6/12 or better and the patterns were consistent over the years. With refraction, more than 80% achieved post-op vision 6/12 or better (81.0% in 2002, 89% in 2003, 90% in 2004, 84% in 2007, 88% in 2008, 90.9% in 2009). This observation suggests that poor post- op unaided vision is due to refractive error and patients' vision can be improved with glasses.
- Patients who had phaco have better post-op visual outcome when compared to other type of surgeries. 93.3% of phaco patients had refracted vision of 6/12 or better in 2009 as compared to ECCE (84.5%), phaco convert to ECCE (77.2%), lens aspiration (69.5%) and ICCE (60.0%).
- Post-op visual outcome has improved over the years. Refracted visual outcome of better than 6/12 among phaco patient has improved from 87.0% in 2002 to 93.3% in 2009 and among ECCE patients from 78.0% in 2002 to 84.5% in 2009.
- In all type of surgeries, visual outcome became less favourable when there were intra-operative complications.
- The post-op visual outcomes within 1 week to 3 months was better in eyes with IOL implantation compared to non IOL, in eyes with foldable IOL and IOL made of acrylic.
- The main contributing factor for eyes with post-operative refracted VA worse than 6/12 was pre-existing ocular co-morbidity followed by high astigmatism and posterior capsule opacification.
- When patients with preexisting ocular co-morbidity were excluded from analysis, high astigmatism followed by preexisting ocular co-morbidity (not detected preoperatively) were the major causes of poor visual outcome.
- In 2009, the choice of IOL power was aimed towards targeted refraction of -0.4D and post-operative actual refraction was -0.4 D for all eyes, -0.7D for phaco eyes, and -1.0D for ECCE eyes. Thus, eyes which had undergone ECCE had more myopic shift than eyes which had phaco.
- There was disparity between the targeted and the actual refraction. 26.5% of eyes had a different in target and actual refraction of between 0 and -0.5D, and 20.8% had a different of between 0 to +0.5D.

Age-Related Macular Degeneration Registry

1. ***Stock and Flow***
   - A total of 70 patients registered with 112 affected eyes.

2. ***Patient Demography and Vision***
   - Mean age was 64.4 years
   - Mean duration of symptom was 12.9 months
   - Proportion of eye with VA 6/6-6/12 was 37.9%, VA 6/18-4/60 was 30.0% and VA 3/60 or worse was 31.4%.

3. ***Status of AMD***
   - Half of the eyes had exudative AMD
   - Majority of patients present late to the tertiary referral centre.
   - Disciform scar was present in 1/3 of eyes.
   - Only 50% of cases were treatable of which 20% were polypoidal choroidal vasculopathy and 30 % were choroidal neovascularisation.
   - Approximately 13% of patients had past history of ischemic heart disease and stroke which shows that majority of patients do not have contraindications to anti VEGF therapy
   - Anti VEGF therapy was the main form of therapy in 45% of cases followed by photodynamic therapy.
   - Only a small number of patients received combination therapy with PDT and anti VEGF in view of the financial constraints.

Retinoblastoma Registry

1. ***Stock and Flow***
   - A total of 72 patients registered, of which 11 patient were diagnosed in 2009.

2. ***Patients Demography***
   - Mean age at presentation was 2.2 years.
   - Youngest age was 3 weeks and the oldest was 10.2 years.
   - About a third (34.7%) of these patients was in the age group of 13 to 24 months and 23.6% were less than 12 months at presentation.
   - More boys (61.1%) than girls were affected.
   - Majority were of Malay ethnicity (62.5%), followed by Chinese (13.9%) and Indians (9.7%).

3. ***Ocular History and Presentation***
   - The most common presentation was leukocoria.
   - Mean duration of disease from onset of symptoms to presentation was 4.1 months with the majority (82.9%) within 1 to 6 months.
   - A total of 96 eyes were affected.
   - 30 patients (33.4%) had bilateral disease.
   - 1 patient had positive family history of retinoblastoma.

4. ***Investigation and Classification***
   - All patients except one had imaging studies.
   - In 100% of the studies, there was presence of mass. 94.2% had calcifications.
   - 19.8% of the eyes showed evidence of extraocular extension through CT scan, of which the majority involved the optic pathway.
   - Two-thirds (62.4%) of the patients presented with Group E Retinoblastoma.

5. ***Management***
   - 55.6% of patients had systemic chemotherapy with a mean of 8 cycles (maximum 15 chemotherapy cycles).
   - 63 affected eyes (65.6%) were enucleated. 24 eyes (32.2%) of the enucleated eyes showed histopathological extension outside the eyeball.
   - 5 (6.9%) patients had external beam radiotherapy.
   - 77.8% of eyes had good response with complete regression of tumour.
   - 5 eyes had progressive disease or recurrence within a year of diagnosis.

CHAPTER 1

CATARACT SURGERY REGISTRY 2009

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CHAPTER 1: CATARACT SURGERY REGISTRY

1.1 STOCK AND FLOW

The number of CSR source data provider (SDP) continued to increase over the years; from 25 SDPs in 2002 to 36 SDPs in 2009. The number of cataract surgeries being registered to CSR also increased from 12798 in 2002 to 24438 in 2009.

From 2002-2004, CSR was a paper-based registry. During this period, there was a constant decrease in the percentage of eyes with visual outcome recorded in CSR. When the web-based registry was introduced in 2007, there was a moderate increase in the percentage for 2007 and 2008 (from 85.7% to 88.7% respectively) followed by a decrease again in 2009 (84.3%).

Table 1.1(a): Stock and Flow

Year	2002		2003		2004		2007		2008		2009	
Number of SDP	25*		32*		33*		32		36		36	
Total number of cataract surgery registered to CSR	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	N	%	n	%	n	%
Cataract surgery with visual outcome records	12512	97.7	14683	87.3	6228	33.9	15786	85.7	19063	88.7	20590	84.3

**2002, 2003 and 2004 included private centre and University Hospital*

Figure 1.1(a): Stock and Flow

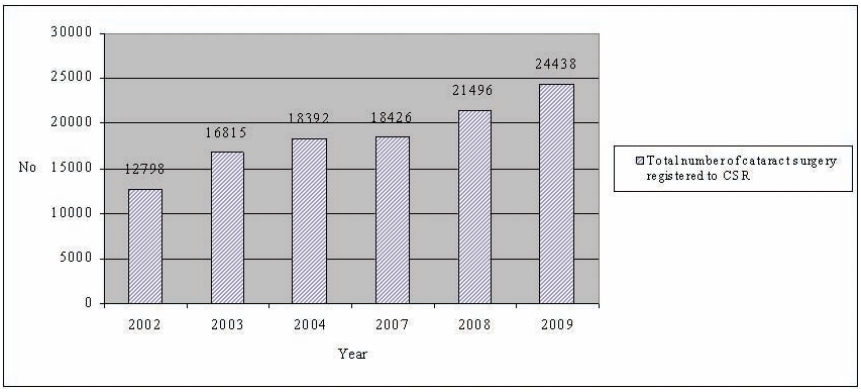
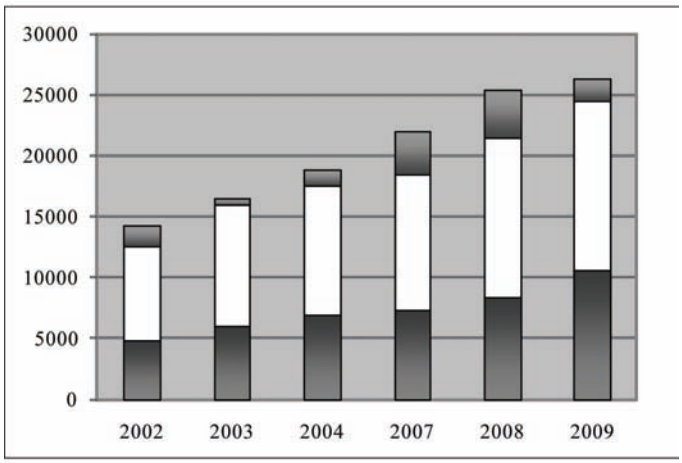


Figure 1.1(b): Number of cataract extraction in the Malaysian Ministry of Health from 2002-2004 and 2007-2009. Bars = number of cataract extractions in the year; middle + lower bar = number of cataract extractions reported to CSR: lower bar only = number of cataract extractions performed as daycare. (Data were not available from 2005 to 2006)



The ascertainment was maintained at more than 80% for the year 2002-2004 and 2007-2009. The reduced ascertainment which was observed in 2007 was possibly to the change from a paper-based to a web-based registry. The percentage increased from 2007 onwards. In the year 2009, Hospital AG only reported 42.6% of cataract surgery performed to CSR. Out this proportion, only 71.3% had outcome form submitted. Other hospital with poor percentage of outcome form submitted were Hospital G (35.6%), Hospital L (61.3%) and Hospital Z (76.3%).

Table 1.1(b): Ascertainment for MOH Hospitals, CSR 2002-2009

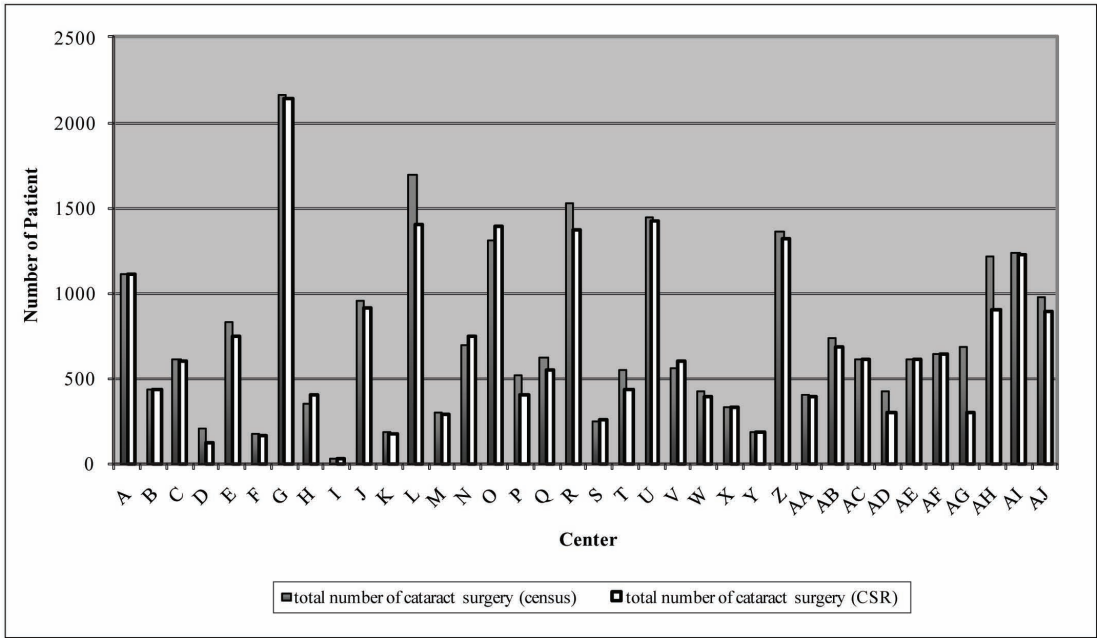
Year	2002	2003	2004	2007	2008	2009
Total number of cataract surgery performed at MOH Hospitals (Source: MOH census returns)	14316	16498	18884	22051	25393	26274
Total number of cataract surgery performed at MOH hospitals and registered to CSR	12552	16039	17536	18426	21496	24438
Ascertainment (%)	87.6%	97.2%	92.9%	83.6%	84.6%	93.0%

Table 1.1(c): Ascertainment for CSR by SDP in 2009

	Ascertainment								
	Total no. of cataract surgery (based on census) (a)	Total no. of cataract surgery registered to CSR (based on operative record) (b)	Total no. of outcome form submitted (c)	Total no. of outcome form with unaided vision (d)	Total no. of outcome form with refracted vision (e)	% Ascertainment for CSR (b/a*100)	% Ascertainment for Outcome form submitted (c/b*100)	% Ascertainment for Outcome with unaided vision (d/c*100)	% Ascertainment for Outcome with refracted vision (e/c*100)
All Centres	26474	24438	21851	20590	18886	92.3	89.4	94.2	86.4
A	1117	1110	1110	985	856	99.4	100	88.7	77.1
B	434	433	433	429	390	99.8	100	99.1	90.1
C	616	602	602	504	505	97.7	100	83.7	83.9
D	212	124	123	107	81	58.5	99.2	87.0	65.9
E	835	743	725	686	636	89.0	97.6	94.6	87.7
F	175	158	151	148	111	90.3	95.6	98.0	73.5
G	2165	2137	760	658	652	98.7	35.6	86.6	85.8
H	359	399	392	385	380	111.1	98.2	98.2	96.9
I	31	31	31	26	24	100	100	83.9	77.4
J	961	911	819	770	655	94.8	89.9	94.0	80.0
K	190	175	174	150	148	92.1	99.4	86.2	85.1
L	1693	1405	861	854	823	83.0	61.3	99.2	95.6
M	301	290	281	272	263	96.3	96.9	96.8	93.6
N	700	743	743	729	667	106.1	100	98.1	89.8
O	1308	1387	1387	1288	1131	106	100	92.9	81.5
P	516	404	404	402	402	78.3	100	99.5	99.5
Q	629	542	542	519	491	86.2	100	95.8	90.6
R	1528	1374	1369	1262	1182	89.9	99.6	92.2	86.3
S	251	251	250	250	235	100	99.6	100	94.0
T	555	433	433	383	353	78.0	100	88.5	81.5
U	1452	1418	1418	1404	1215	97.7	100	99.0	85.7
V	564	598	598	572	510	106	100	95.7	85.3
W	424	387	386	386	311	91.3	99.7	100	80.6
X	336	327	327	323	297	97.3	100	98.8	90.8
Y	185	185	185	179	179	100	100	96.8	96.8
Z	1360	1318	1006	927	896	96.9	76.3	92.1	89.1

AA	411	387	387	370	342	94.2	100	95.6	88.4
AB	741	684	684	680	561	92.3	100	99.4	82.0
AC	612	612	612	598	570	100	100	97.7	93.1
AD	424	298	298	209	153	70.3	100	70.1	51.3
AE	618	612	602	527	526	99.0	98.4	87.5	87.4
AF	642	640	587	557	555	99.7	91.7	94.9	94.5
AG	688	293	209	195	174	42.6	71.3	93.3	83.3
AH	1216	904	896	868	810	74.3	99.1	96.9	90.4
AI	1243	1229	1172	1138	1055	98.9	95.4	97.1	90.0
AJ	982	893	893	849	746	90.9	100	95.1	83.5

Figure 1.1(c): Ascertainment for CSR by SDP in 2009



1.2 CHARACTERISTICS OF PATIENT

1.2.1 Patient Demography

The mean age for patients presented for cataract surgery showed an increasing trend over the years. In 2009, the minimum age, increased to 1.2 months old and the maximum age reduced to 99 years old.

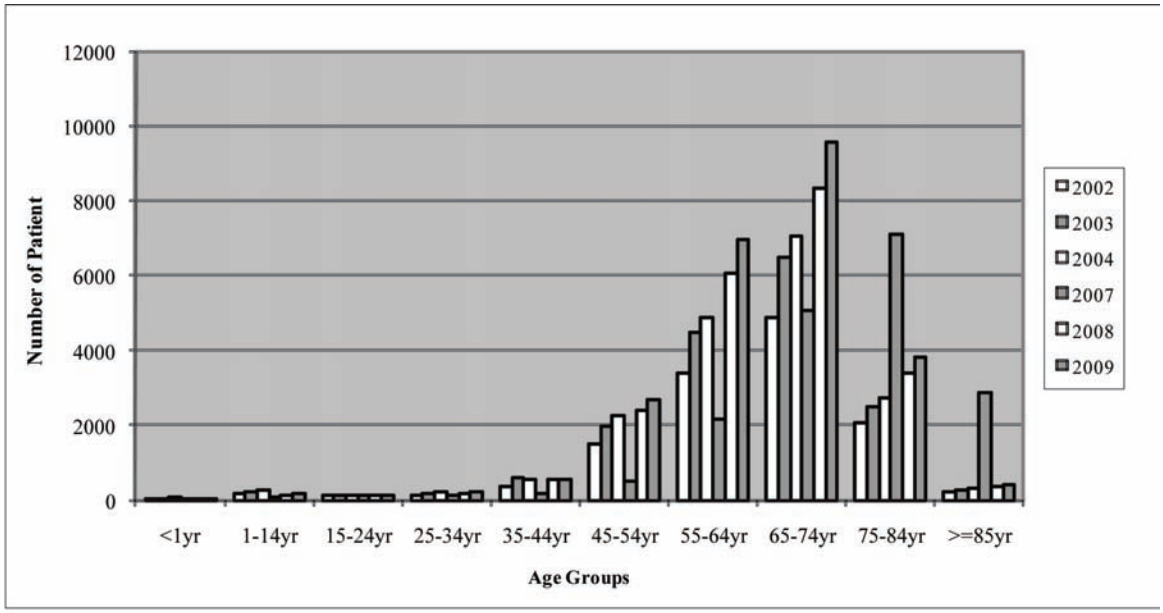
A larger percentage of patients presented within the age group of 65-74 years old except for the year 2007. There were an increasing number of patients registered within the age group 45 to 84 year old. There was no marked gender difference over the years. The slight female preponderance reflected higher female ratio in the aging population.

Table 1.2.1: Age and Gender Distributions, CSR 2002-2009

Year	2002*		2003*		2004*		2007		2008		2009	
Total number of cataract surgery	12798		16815		18392		18426		21496		24438	
Age												
Mean (years)	64.0		63.7		63.5		64.3		64.6		64.7	
Median (years)	66		66		66		66		66		66	
Minimum (month)	1.0		1.0		1.0		1.0		1.0		1.2	
Maximum (years)	97		100		104		97		102		99	
% Distribution												
Age group, years	n	%	n	%	n	%	n	%	n	%	n	%
<1	21	0.2	23	0.1	50	0.3	18	0.1	34	0.2	17	0.1
1-14	171	1.3	202	1.2	266	1.5	50	0.3	116	0.5	148	0.6
15-24	101	0.8	139	0.8	134	0.7	141	0.8	133	0.6	129	0.5
25-34	115	0.9	147	0.9	207	1.1	120	0.7	167	0.8	210	0.9
35-44	376	2.9	575	3.4	526	2.9	157	0.9	539	2.5	557	2.3
45-54	1472	11.5	1974	11.7	2238	12.2	499	2.7	2407	11.2	2697	11.0
55-64	3415	26.7	4496	26.7	4882	26.5	2135	11.6	6037	28.1	6956	28.5
65-74	4880	38.1	6480	38.5	7051	38.3	5031	27.3	8307	38.6	9534	39.0
75-84	2041	16.0	2511	14.9	2722	14.8	7103	38.6	3391	15.8	3802	15.6
>=85	206	1.6	264	1.6	316	1.7	2889	15.7	344	1.6	388	1.6
Missing	NA	-	4	0.0	NA	-	283	1.5	21	0.1	0	0.0
Gender												
Male	6308	49.3	8397	49.9	9034	49.1	8820	47.9	10295	47.9	11829	48.4
Female	6490	50.7	8418	50.1	9358	50.9	9606	52.1	11168	52.0	12609	51.6
Missing	0	0	0	0	0	0	0	0	33	0.2	0	0

**2002, 2003 and 2004 included private centres and university hospitals*

Figure 1.2.1: Age Distribution, CSR 2002-2009



1.2.2 Medical history

1.2.2.1 Systemic co-morbidity

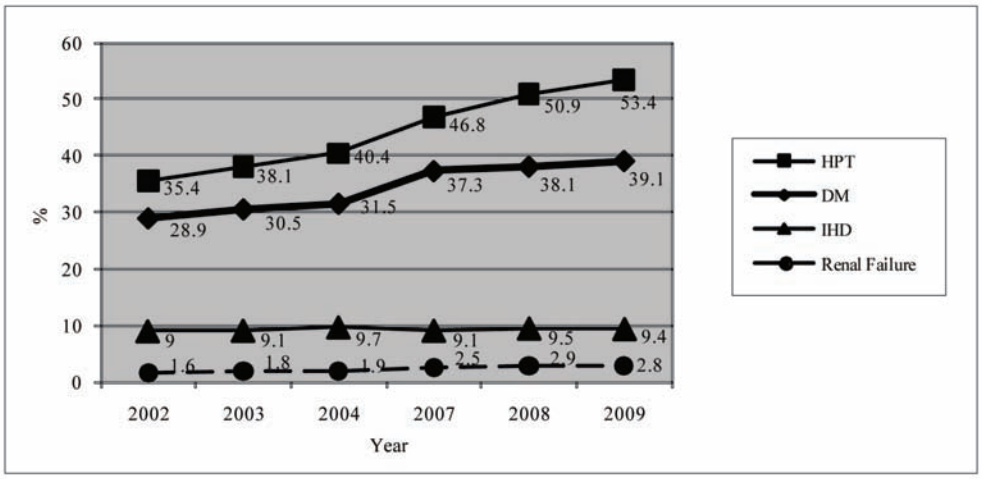
The common systemic co-morbidity encountered in patients who came for cataract surgery were hypertension, diabetes mellitus, ischemic heart disease and renal failure The overall percentage of such patients showed an increasing trend over the years. The percentages of patients with hypertension and diabetes mellitus were increasing.

Table 1.2.2.1: Distribution of Systemic Co-Morbidity, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
Percentage of patients with any systemic co-morbidity	56.8		59.1		59.9		67.5		68.7		71.0	
Percentage of patients with specific systemic co-morbidity												
	n	%	n	%	n	%	n	%	n	%	n	%
1. Hypertension	4529	35.4	6408	38.1	7425	40.4	8630	46.8	10932	50.9	13050	53.4
2. Diabetes Mellitus	3694	28.9	5136	30.5	5800	31.5	6869	37.3	8188	38.1	9556	39.1
3. Ischaemic Heart Disease	1148	9.0	1538	9.1	1782	9.7	1668	9.1	2037	9.5	2294	9.4
4. Renal Failure	211	1.6	303	1.8	351	1.9	461	2.5	624	2.9	679	2.8
5. Cerebrovascular accident	106	0.8	165	1.0	174	0.9	0	0.0	29	0.1	305	1.2
6. COAD/Asthma	669	5.2	907	5.4	955	5.2	798	4.3	955	4.4	1039	4.3
7. Others	935	7.3	2409	7.2	861	4.7	1399	7.6	1974	9.2	2460	10.1

Number or Percentage may be more than total or 100% as patients might have more than one systemic co-morbidity

Figure 1.2.2.1: Percentage of Patients with Specific Ocular Co-morbidity, CSR 2002-2009



1.2.2.2 Causes of cataract

Majority of the patients presented with primary cataract. In eyes with primary cataract, senile or age-related cataract was the commonest. In eyes with secondary cataract, trauma was the commonest. This pattern remained unchanged over the years.

Table 1.2.2.2: Causes of Cataract, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
Primary cataract	12294	96.1	16161	96.1	17697	96.2	17410	94.4	20329	94.6	23117	94.6
Secondary cataract	499	3.9	654	3.9	695	3.8	557	3.0	530	2.5	587	2.4
Missing value	-	-	-	-	-	-	460	2.5	637	3.0	734	3.0
Primary Cataract (N)	**12294**		**16161**		**17697**		**17410**		**20329**		**23117**	
	n	%	n	%	n	%	n	%	n	%	n	%
Senile/age-related	11960	97.3	15623	96.7	17290	97.7	17075	98.1	19995	98.4	22782	98.6
Congenital	130	1.1	175	1.1	173	1.0	129	0.7	124	0.6	124	0.5
Development	155	1.3	317	2.0	209	1.2	169	1.0	156	0.8	166	0.7
Others	49	0.4	46	0.3	25	0.1	37	0.2	54	0.3	45	0.2
Secondary Cataract (N)	**499**		**654**		**695**		**557**		**530**		**587**	
	n	%	n	%	n	%	n	%	n	%	n	%
Trauma	325	65.1	399	61	440	63.3	355	63.7	330	62.3	330	56.2
Drug induced	53	10.6	81	12.4	84	12.1	55	9.9	76	14.3	79	13.5
Surgery induced	23	4.6	67	10.2	56	8.1	82	14.7	39	7.4	107	18.2
Others	98	19.6	107	16.4	115	16.5	65	11.7	85	16.0	71	12.1

1.2.2.3 First or Fellow Eye Surgery

Two third of patients were operated for the first time. Only one third of the patients returned for second surgery (for the fellow eye). This pattern remained unchanged since 2002. This was despite the declining percentage of eyes with intra-operative complications during surgery in the previous eye surgery (from 24.4% in 2002 to 4.4% in 2009).
Overall data showed that, the percentage of patients who had fellow eye surgery in the same year showed an increasing trend (from 4.5% in 2002 to 11.1% in 2009). The mean duration between the first and fellow eye surgery was between 16 to 24 months.

Table 1.2.2.3: First or Fellow Eye Surgery, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
First eye surgery	8958	70.0	11851	70.5	12911	70.2	12810	69.5	14610	68.0	16446	67.3
Fellow eye surgery	3840	30.0	4964	29.5	5481	29.8	5559	30.2	6849	31.9	7938	32.5
Missing	NA	-	NA	-	NA	-	57	0.3	37	0.2	54	0.2
Patients who had second surgery in the same year	573	4.5	713	4.2	825	4.5	759	4.1	1135	5.3	2702	11.1
Period of time between first and fellow eye surgery (Months)												
N	2716		3322		3673		4860		5953		7353	
Mean	16.7		16.3		16.9		23.4		22.0		24.4	
SD	18.0		17.1		18.8		24.3		22.8		31.5	
Median	10.3		10.1		10.5		13.3		13.1		12.1	
Patients who had cataract surgery before	3840		4964		5481		5559		6849		7938	
	n	%	n	%	n	%	n	%	n	%	n	%
Eyes with intra-operative complications during surgery in the first eye	939	24.4	1179	23.8	1235	22.5	313	5.6	298	4.4	346	4.4

1.2.2.4 Past Ocular Surgery of the Operated Eye

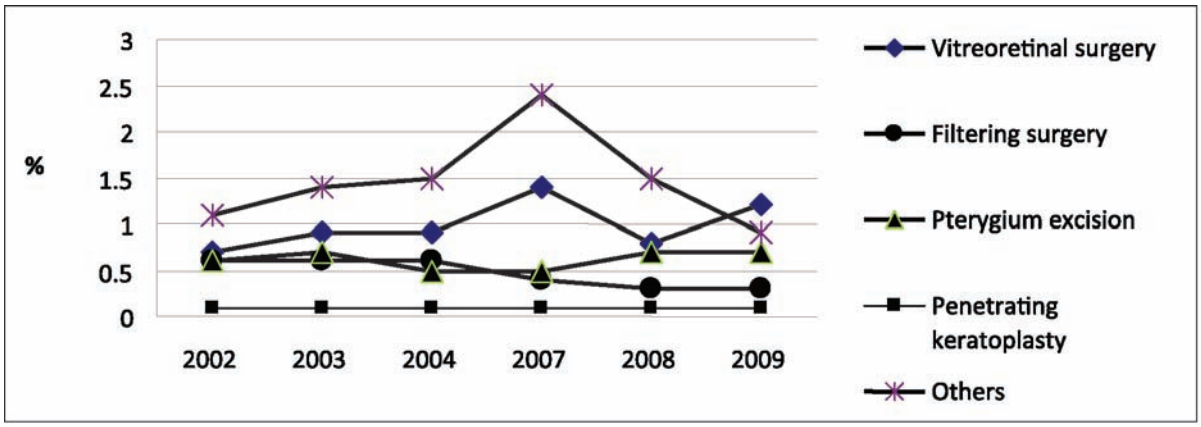
Most eyes to be operated had no prior ocular surgery. The commonest past ocular surgery was vitreoretinal (VR) surgery followed by pterygium excision; VR surgery appeared to be in increasing trend while pterygium excision remained unchanged throughout the years. Filtering surgery demonstrated a declining trend in percentage. The percentage of eyes with past history of penetrating keratoplasty remained low.

Table 1.2.2.4: Past Ocular Surgery of the Operated Eye, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients	12798		16815		18392		18426		21496		24438	
No of eyes with past ocular surgery (N)	12798		16782		18372		17379		20674		23109	
	n	%	n	%	n	%	n	%	n	%	n	%
Patients with no past ocular surgery	12414	97.0	16178	96.4	17711	96.4	16545	95.2	20010	96.8	22387	96.9
Vitreoretinal surgery	8959	0.7	1510	0.9	1653	0.9	261	1.4	161	0.8	267	1.2
Pterygium excision	77	0.6	1177	0.7	92	0.5	869	0.5	140	0.7	164	0.7
Filtering surgery	77	0.6	1007	0.6	1102	0.6	1043	0.4	57	0.3	69	0.3
Penetrating keratoplasty	13	0.1	168	0.1	184	0.1	1738	0.1	14	0.1	18	0.1
Others	1408	1.1	235	1.4	276	1.5	417	2.4	304	1.5	216	0.9

Number or Percentage may be more than total or 100% as patients might have more than one past ocular surgery

Figure 1.2.2.4 Percent Distribution of Past Ocular Surgery of the Operated Eye, CSR 2002-2009



1.2.2.5 Preexisting Ocular Co-morbidity

One third of the eyes to be operated had ocular co-morbidities. The commonest was diabetic retinopathy (DR) in any forms then followed by glaucoma. The percentage of eyes in both conditions appeared to be increasing over the years. However these figures might not be accurate because the posterior segment could not be assessed in 1/10 of the eyes. Therefore the percentage of eyes with DR might be underestimated. The percentage of eyes presented with lens related complications (phacolytic and phacomorphic) appeared to be decreasing.

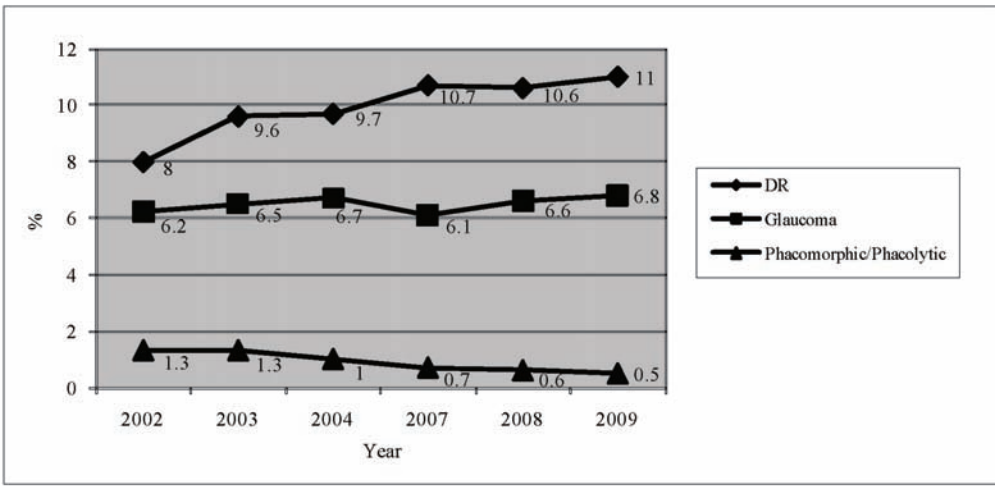
Table 1.2.2.5: Distribution of Pre-existing Ocular Co-Morbidity, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
Patients with any ocular co-morbidity	3691	28.8	6068	36.1	6993	38.0	5973	32.4	7269	33.8	9442	38.6
Patients with specific ocular co-morbidity												
Anterior segment												
1. Glaucoma	795	6.2	1096	6.5	1238	6.7	1126	6.1	1408	6.6	1655	6.8
2. Pterygium involving the cornea	342	2.7	393	2.3	349	1.9	288	1.6	319	1.5	345	1.4
3. Pseudoexfoliation	184	1.4	254	1.5	209	1.1	221	1.2	253	1.2	318	1.3
4. Corneal opacity	184	1.4	200	1.2	183	1.0	176	1.0	194	0.9	231	0.9
5. Chronic uveitis	54	0.4	48	0.3	80	0.4	81	0.4	63	0.3	80	0.3
Len related complication												
1. Phacomorphic	106	0.8	152	0.9	118	0.6	89	0.5	85	0.4	83	0.3
2. Phacolytic	61	0.5	63	0.4	79	0.4	44	0.2	45	0.2	47	0.2
3. Subluxated/Disclosed	87	0.7	110	0.7	86	0.5	101	0.5	89	0.4	83	0.3
Posterior segment												
1. Diabetic Retinopathy: Non Proliferative	642	5.0	965	5.7	956	5.2	1125	6.1	1273	5.9	916	3.7
2. Diabetic Retinopathy: Proliferative	218	1.7	366	2.2	510	2.8	465	2.5	614	2.9	1307	5.3
3. Diabetic Retinopathy: CSME*	96	0.8	177	1.1	163	0.9	198	1.1	221	1.0	278	1.1
4. Diabetic Retinopathy: Vitreous haemorrhage	66	0.5	106	0.6	138	0.8	176	1.0	165	0.8	230	0.9
5. ARMD	145	1.1	215	1.3	308	1.7	231	1.3	259	1.2	387	1.6
6. Other macular disease (includes hole or scar)	77	0.6	106	0.6	140	0.8	118	0.6	148	0.7	188	0.8
7. Optic nerve disease, any type	43	0.3	76	0.5	78	0.4	71	0.4	69	0.3	118	0.5
8. Retinal detachment	70	0.5	177	1.1	247	1.3	218	1.2	204	0.9	294	1.2
9. Cannot be assessed	884	6.9	1962	11.7	2290	12.5	1357	7.4	2092	9.7	3139	12.8
Miscellaneous												
1. Amblyopia	64	0.5	61	0.4	78	0.4	71	0.4	65	0.3	62	0.3
2. Significant previous eye trauma	52	0.4	80	0.5	96	0.5	41	0.2	39	0.2	39	0.2
3. Pre-existing non glaucoma field defect	2	0.0	3	0.0	4	0.0	4	0.0	2	0.0	6	0.0
4. Others	380	3.0	827	4.9	1153	6.3	668	3.6	755	3.5	1053	4.3

**CSME=Clinically Significant Macular Oedema*

Number or Percentage may be more than total or 100% as patients might have more than one ocular co-morbidity

Figure 1.2.2.5: Percent Distribution of Eyes with Diabetic Retinopathy, Glaucoma or Lens-induced Glaucoma, CSR 2002-2009



1.2.2.6 Pre-operative Vision

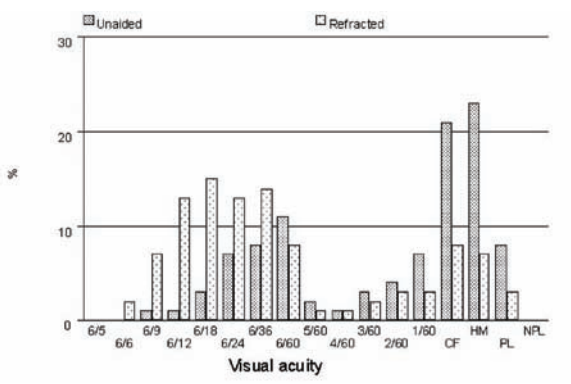
The proportion of eyes with unaided vision in the blindness category (2/60-NPL) appeared to be decreasing. Conversely, the proportion of these eyes in the low vision category (6/18-3/60) was in an upward trend. However, the proportion of eyes with refracted vision in each category of vision remained unchanged.
In each year, more than 70% of all patients did not have refraction pre-operatively.
The bimodal pattern of pre-operative vision remained the same over the years. The first peak was at 6/18 and the second peak was at CF/HM. There was a low proportion of patients between 5/60 to1/60.

Table 1.2.2.6: Distribution of Pre-Operative Vision, CSR 2002-2009

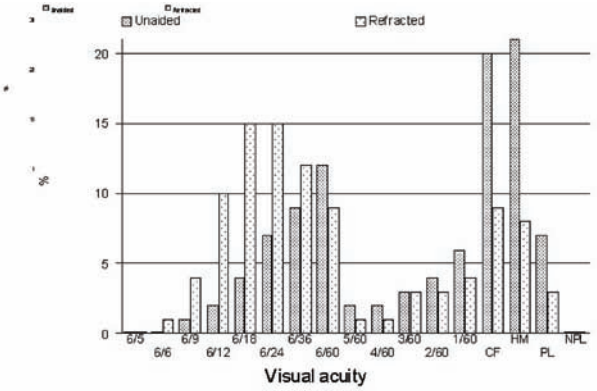
Year		2002		2003		2004		2007		2008		2009	
No of patients (N)		12798		16815		18392		18426		21496		24438	
		n	%	n	%	n	%	n	%	n	%	n	%
Patients with unaided VA		12691	99.2	16723	99.4	18222	99.1	18356	99.6	21212	98.7	23796	97.4
Patients with refracted VA		700	5.5	2104	12.6	2319	12.7	5071	27.8	5683	26.4	5150	21.1
Patients with no refraction		12098	94.5	14711	87.5	16073	87.4	13355	72.5	15813	73.6	19288	78.9
6/5-6/12	Unaided	281	2.2	396	2.4	523	2.9	602	3.3	646	3.0	788	3.3
	Refracted	155	22.1	327	15.5	396	17.1	678	13.3	935	16.4	944	18.3
6/18-3/60	Unaided	4465	35.2	6440	38.5	7235	39.7	7734	42.4	9375	44.2	10849	45.6
	Refracted	374	53.4	1198	56.9	1315	56.7	2375	46.9	2892	50.9	2796	54.3
2/60-NPL	Unaided	7945	62.6	9887	59.1	10464	57.4	9920	54.3	11180	52.7	12159	51.1
	Refracted	171	24.4	579	27.5	608	26.2	2018	39.8	1845	32.5	1410	27.4

Figure 1.2.2.6(a): Distribution of Pre-Operative Vision (Unaided/presenting and refracted), CSR 2002-2009

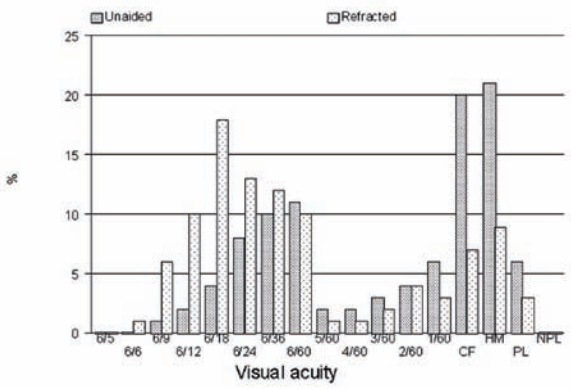
2002



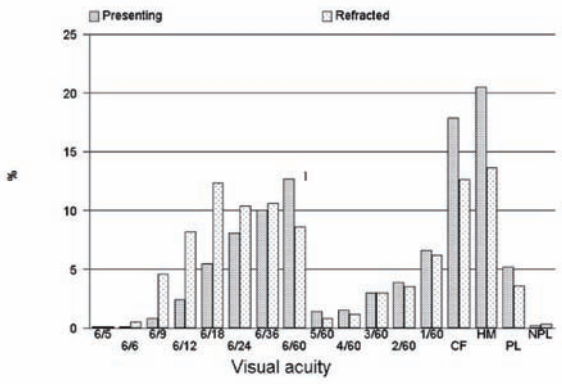
2003



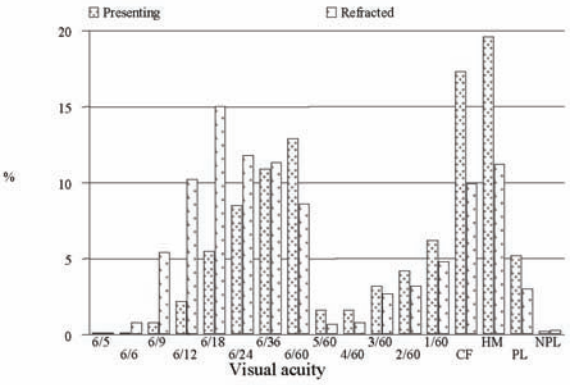
2004



2007



2008



2009

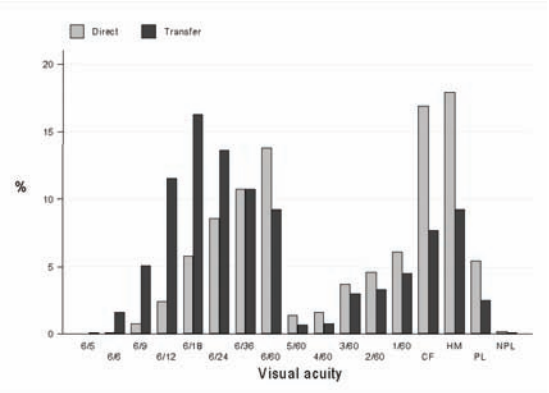


Figure 1.2.2.6(b): Distribution of Pre-Operative Vision (Unaided/presenting), CSR 2002-2009

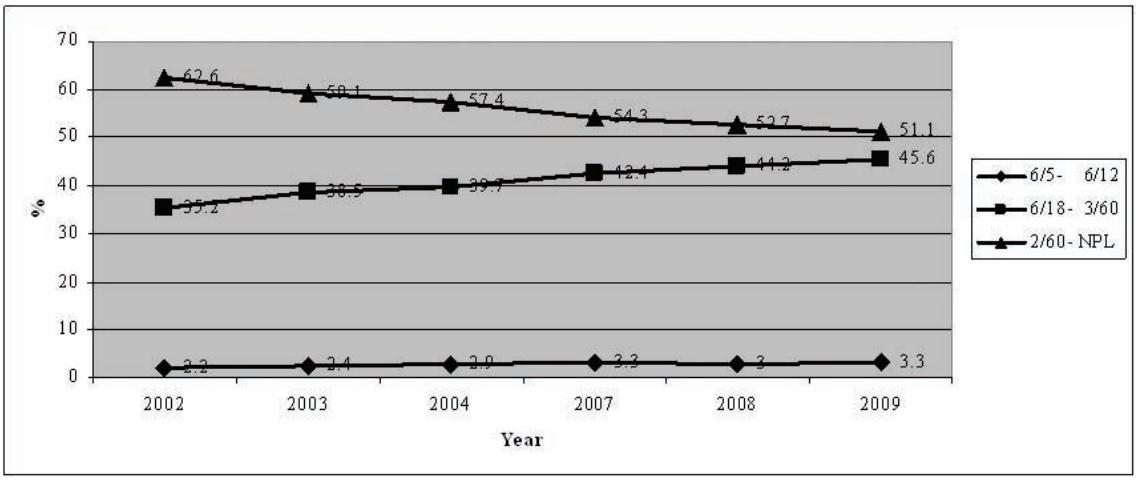
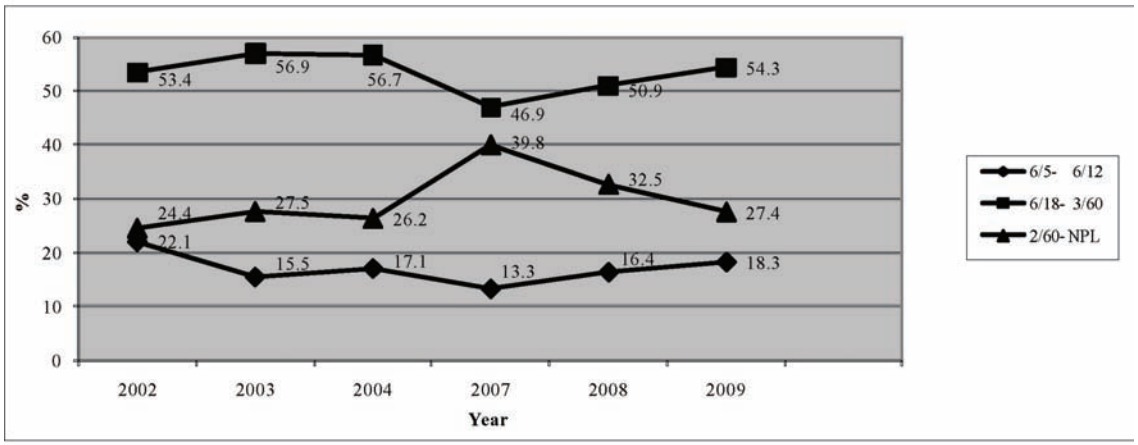


Figure 1.2.2.6(c): Distribution of Pre-Operative Vision (Refracted), CSR 2002-2009



1.2.2.7 Target Refractive Power

The mean target refractive power in 2009 was -0.4D (SD 0.4), with minimum at -9.9D and maximum at +5.9D. The percentage of eyes aimed to have target refraction within (-0.5 to 0 D) increased slightly to 52.3% in 2009. Overall data demonstrated that most surgeons participated in CSR aimed to give patient either emmetropic or slightly myopic refraction post- operatively.

Table 1.2.2.7(a): Distribution of Target Refractive Power, CSR 2007-2009

Year	2007	2008	2009
Operated eye (N)	11876	15083	20279
Mean	-0.5	-0.1	-0.4
SD	0.4	0.4	0.4
Median	-0.5	-0.5	-0.5
Minimum	-9	-9.9	-9.9
Maximum	+5	+9.5	+5.9

Table 1.2.2.7(b): Distribution of Target Refractive Power, CSR 2007-2009

Year	2007		2008		2009	
Target refractive power (Dioptres)	Operated eye N=11876		Operated eye N=15083		Operated eye	N=20279
	n	%	n	%	n	%
-10-<(-9.5)	0	0	1	0	2	0
-9.5-<(-9)	2	0	1	0	1	0
-9-<(-8.5)	0	0	1	0	0	0
-8.5-<(-8)	1	0	1	0	0	0
-8-<(-7.5)	2	0	3	0	1	0
-7.5-<(-7)	1	0	0	0	1	0
-7-<(-6.5)	3	0	1	0	0	0
-6.5-<(-5)	1	0	2	0	7	0
-5-<(-4.5)	3	0	4	0	7	0
-4.5-<(-4)	1	0	3	0	5	0
-4-<(-3.5)	7	0.1	8	0.1	11	0.1
-3.5-<(-3)	6	0.1	7	0	11	0.1
-3-<(-2.5)	12	0.1	22	0.1	18	0.1
-2.5-<(-2)	26	0.2	21	0.1	29	0.1
-2-<(-1.5)	77	0.6	48	0.3	58	0.3
-1.5-<(-1)	414	3.5	373	2.5	260	1.3
-1-<(-0.5)	4299	36.2	6151	40.8	7972	39.3
-0.5-<0	6077	51.2	7480	49.6	10604	52.3
0-<0.5	821	6.9	731	4.8	977	4.8
0.5-<1	91	0.8	158	1	182	0.9
1-<1.5	8	0.1	31	0.2	17	0.1
1.5-<2	5	0	14	0.1	22	0.1
2-<2.5	13	0.1	10	0.1	85	0.4
2.5-<3	1	0	6	0	4	0
3-<3.5	1	0	2	0	2	0
3.5-<4	0	0	2	0	0	0
4-<4.5	2	0	0	0	0	0
4.5-<5	1	0	1	0	1	0
5-<5.5	1	0	0	0	0	0
5.5-<6	0	0	0	0	2	0
6-<6.5	0	0	0	0	0	0
6.5-<7	0	0	0	0	0	0
7-<7.5	0	0	0	0	0	0
7.5-<8	0	0	0	0	0	0
8-<8.5	0	0	0	0	0	0
8.5-<9	0	0	0	0	0	0
9-<9.5	0	0	0	0	0	0
9.5-10	0	0	1	0	0	0

Values outside the +10 and -10D were excluded from analysis as they would skew the Mean

1.3 CATARACT SURGICAL PRACTICES

1.3.1 Number of Cataract Surgery by SDP

Majority of SDPs performed between 100-1000 cataract surgeries per year.

Table 1.3.1: Range of Cataract Surgery Registered by SDP per year, Census versus CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
	Census	CSR	Census	CSR	Census	CSR	Census	CSR	Census	CSR	Census	CSR
Number of SDP	29	25	31	32	32	33	33	32	36	36	36	36
	Census	CSR	Census	CSR	Census	CSR	Census	CSR	Census	CSR	Census	CSR
<100	4	1	1	5	2	4	1	3	1	1	1	1
100-500	13	15	11	10	14	15	15	14	15	15	12	15
501-1000	7	5	15	14	8	9	8	8	11	11	14	12
>1000	5	4	4	3	8	5	9	7	9	9	9	8

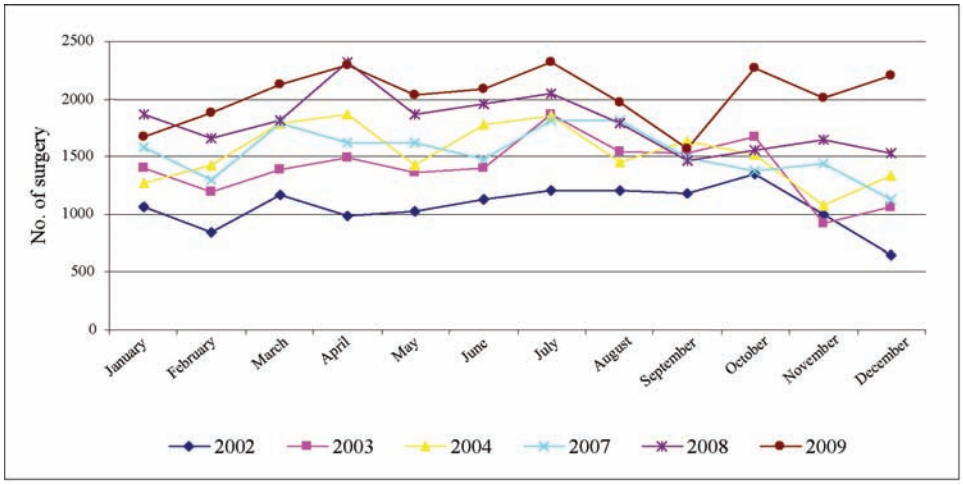
1.3.2 Number of Cataract Surgery by Month

The number was lower than average in February and September. The numbers which were previously low from September to December from 2002 to 2008 appeared to be increasing in 2009.

Table 1.3.2: Number of Cataract Surgery by Month, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
Month	n	%	n	%	n	%	n	%	n	%	n	%
January	1064	8.3	1399	8.3	1265	6.9	1579	8.6	1862	8.7	1668	6.8
February	838	6.5	1197	7.1	1424	7.7	1290	7.0	1653	7.7	1884	7.7
March	1166	9.1	1389	8.3	1782	9.7	1782	9.7	1812	8.4	2122	8.7
April	986	7.7	1495	8.9	1868	10.2	1625	8.8	2321	10.8	2295	9.4
May	1018	8.0	1364	8.1	1426	7.8	1618	8.8	1871	8.7	2036	8.3
June	1127	8.8	1400	8.3	1778	9.7	1476	8.0	1950	9.1	2086	8.5
July	1207	9.4	1862	11.1	1854	10.1	1808	9.8	2049	9.5	2322	9.5
August	1210	9.5	1538	9.1	1447	7.9	1814	9.8	1791	8.3	1975	8.1
September	1184	9.3	1530	9.1	1626	8.8	1486	8.1	1462	6.8	1572	6.4
October	1346	10.5	1666	9.9	1513	8.2	1376	7.5	1552	7.2	2266	9.3
November	1003	7.8	917	5.5	1077	5.9	1443	7.8	1646	7.7	2006	8.2
December	649	5.1	1058	6.3	1332	7.2	1129	6.1	1527	7.1	2206	9.0

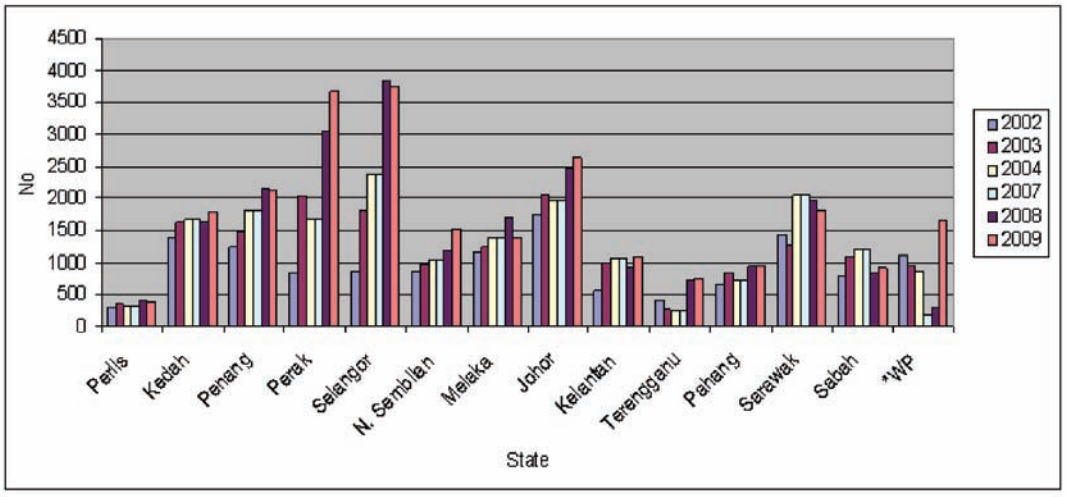
Figure 1.3.2: Number of Cataract Surgeries by Month, CSR 2002-2009



1.3.3 Number of Cataract Surgery Registered to CSR by State

The states which performed higher number of cataract surgeries were Selangor, Perak, Johor, Penang and Sarawak.

Figure 1.3.3: Number of Cataract Surgery Registered to CSR by State, CSR 2002-2009



**Wilayah Persekutuan in 2007 and 2008 for Putra Jaya Hospital only*

1.3.4 Surgeon Status

Specialists performed the highest number of cataract surgery followed by the medical officers (MO) and the gazetting specialists. This trend remained unchanged throughout the years. The percentage of eyes operated by the specialists appeared to be increasing corresponding to the decrease in the percentage operated by the MOs.

Table 1.3.4: Surgeon Status, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
Specialist	8763	68.5	12072	71.8	13165	71.6	14327	77.8	16846	78.4	19400	79.4
Gazetting Specialist	1762	13.7	1510	9.0	1757	9.6	1276	6.9	1399	6.5	2053	8.4
Medical Officer	2273	17.8	3233	19.2	3470	18.8	2690	14.6	2697	12.5	2750	11.3
Missing	0	0	0	0.0	0	0	133	1	554	2.6	235	1.0

1.3.5 Duration of Surgery

The average time taken to complete cataract surgery was 40.2 min in 2007. It was the same in 2008 and 2009 (38.2 min). The mean duration appeared to be decreasing for phaco but increasing for ECCE. There was no difference in the mean duration of surgery for specialist/gazeting specialist and MOs.

Table 1.3.5(a): Duration of Surgery by Types of Cataract Surgery in minutes, CSR 2007-2009

Year	2007		2008		2009*	
	Mean	SD	Mean	SD	Mean	SD
All eyes	40.2	20.6	38.2	19.6	38.2	20.4
Phaco	36.8	19.7	34.1	17.7	33.6	17.7
ECCE	45.3	19.7	45.8	19.5	49.1	20.9
Phaco ECCE	57.8	20.6	44.8	24.0	59.7	24.2
ICCE	57.6	23.7	57.5	23.7	58.1	24.4
Lens Aspiration	47.8	27.2	60.0	25.6	46.1	25.9

Data entered with extreme values i.e. more than 3 hours and less than 15 minutes were not analyzed as they would skew the data

Table 1.3.5(b): Duration of Surgery by Surgeon Status, CSR 2007-2009

Year		2007		2008		2009	
		Mean	SD	Mean	SD	Mean	SD
Phaco	Specialist	36.0	19.8	35.4	17.9	32.6	17.3
	Gazetting Specialist	40.2	18.0	47.5	20.8	39.8	19.9
	Medical Officers	42.2	18.2	49.2	22.8	41.5	17.7
ECCE	Specialist	40.2	17.6	43.9	69.5	42.6	18.0
	Gazetting Specialist	45.9	17.8	54.0	71.5	48.4	19.1
	Medical Officers	53.9	20.2	63.0	89.8	60.5	21.4

1.3.6 Distribution of Cataract Surgery Performed Under Day Care Setting

The day care cataract surgery percentages were calculated by excluding eyes of children and combined surgeries because surgeries done in these eyes might require general anaesthesia therefore hospital admission.
The total number of eyes (excluding children and combined surgeries) and the total number of eyes operated as day care were increasing corresponding to the increasing numbers of cataract surgery registered to CSR. The percentages appeared to be increasing over the years. However, there were still below 50.0% and varied among the SDPs. In 2009, 3 SDPs did not perform surgery under day care at all, 17 SDPs performed less than 50.0% and only 5 SDPs performed more than 90.0%.

Table 1.3.6(a): Distribution of Cataract Surgery Performed Under Day Care Setting, CSR 2003-2009

Year	2002		2003		2004		2007		2008		2009	
Number of SDPs	25*		32*		33*		32		36		36	
Total number of cataract surgery registered to CSR	12798		16815		18392		18426		21496		24438	
Number of surgery excluding children and combined surgery	12445		15981		17336		17402		19835		22517	
	n	%	n	%	n	%	n	%	n	%	n	%
Number and % of day care surgery excluding children and combined surgery	4887	39.3	6089	38.1	6934	40.0	7297	41.9	8449	42.6	10633	47.2

**SDP in 2002, 2003 and 2004 included private centres and university hospitals*

Table 1.3.6(b): Distribution of Cataract Surgery (Excluding Children and Combined Surgery) Performed as Day Care by SDP, CSR 2003-2009

Year	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	N	%	n	%
All Centers	4887	39.3	6089	38.0	6934	40.0	7297	41.9	8449	42.6	10633	47.2
A	218	24.0	262	26.0	30	70.0	91	1.3	74	8.0	3	0.3
B	-	-	-	-	-	-	3	0.0	181	99.5	412	97.4
C	207	98.0	519	85.0	85	15.0	317	4.3	311	56.9	303	52.0
D	-	-	-	-	-	-	-	-	2	7.7	1	0.9
E	20	16.0	139	26.0	24	76.0	82	1.1	25	5.5	650	88.8
F	0	0.0	0	0.0	2	98.0	-	-	0	0.0	0	0.0
G	1	4.0	27	3.0	3	97.0	672	9.2	896	58.1	1267	66.0
H	10	4.0	5	2.0	2	98.0	0	0.0	2	0.5	3	0.8
I	-	-	-	-	-	-	1	0.0	1	3.5	3	10.7
J	14	5.0	26	5.0	8	92.0	8	0.1	17	2.5	124	14.8
K	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
L	926	91.0	708	84.0	69.0	31.0	-	-	35	92.1	725	53.3
M	1	3.0	2	1.0	44	56.0	61	0.8	49	19.0	10	5.1
N	206	54.0	100	41.0	38	62.0	142	2.0	194	28.0	168	24.3
O	875	90.0	884	92.0	92	8.0	1420	19.5	1483	95.9	1121	89.3
P	-	-	NA	-	92	8.0	15	0.2	385	99.7	397	99.7
Q	10	2.0	0	0.0	4	96.0	2	0.0	0	0.0	1	0.2
R	759	69.0	759	82.0	82	18.0	960	13.2	1193	91.9	1232	92.0
S	26	63.0	68	79.0	91	9.0	182	2.5	201	81.7	191	76.7
T	51	11.0	55	8.0	31	69.0	124	64.2	212	64.8	384	97.0
U	NA	NA	733	84.0	88	12.0	1011	13.9	995	78.8	1026	86.8
V	-	-	-	-	-	-	313	4.3	382	57.4	388	67.2
W	0	0.0	0	0.0	0	100.0	0	0.0	1	0.4	1	0.3
X	-	-	-	-	-	-	10	0.1	45	13.1	83	25.9
Y	-	-	-	-	-	-	1	0.0	8	4.6	1	0.5
Z	100	10.0	47	6.0	4	96.0	48	0.7	44	3.3	42	3.5
AA	-	-	-	-	-	-	99	1.4	230	74.4	312	81.0
AB	48	12.0	130	24.0	3	97.0	5	0.1	2	0.4	3	0.5
AC	34	8.0	175	52.0	32	68.0	54	0.7	46	12.7	95	16.4
AD	0	0.0	1	0.4	1	99.0	1	0.0	0	0.0	0	0.0
AE	207	54.0	166	28.0	11	89.0	2	0.0	66	11.5	1	0.2
AF	-	-	-	-	-	-	1	0.0	5	1.0	2	0.3
AG	172	42.0	105	27.0	12	88.0	7	33.3	50	14.8	20	7.9
AH	21	3.0	8	1.0	2	98.0	11	0.2	22	1.9	65	7.5
AI	345	44.0	390	53.0	57	43.0	589	8.1	399	69.3	789	85.3
AJ	578	83.0	544	88.0	87	13.0	863	11.8	893	93.6	809	95.2

Figure 1.3.6(a): Distribution of Cataract Surgery Performed as Day Care by SDP, CSR 2009

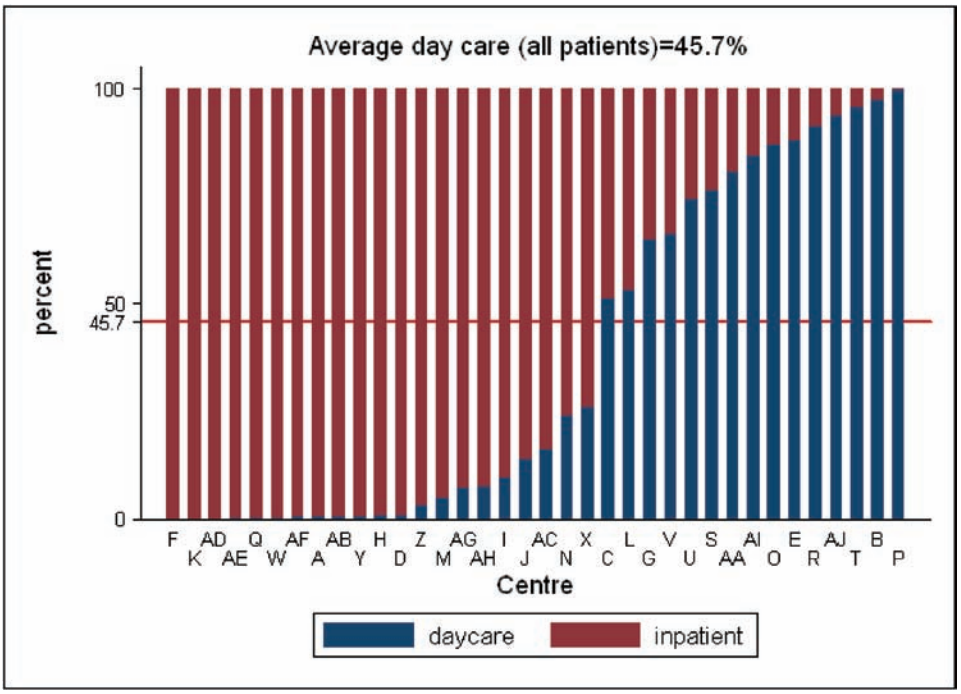


Figure 1.3.6(b): Distribution of Cataract Surgery Performed as Day Care and In-patient by SDP (Excluding Surgery Done in Children and Combined Surgery), CSR 2009

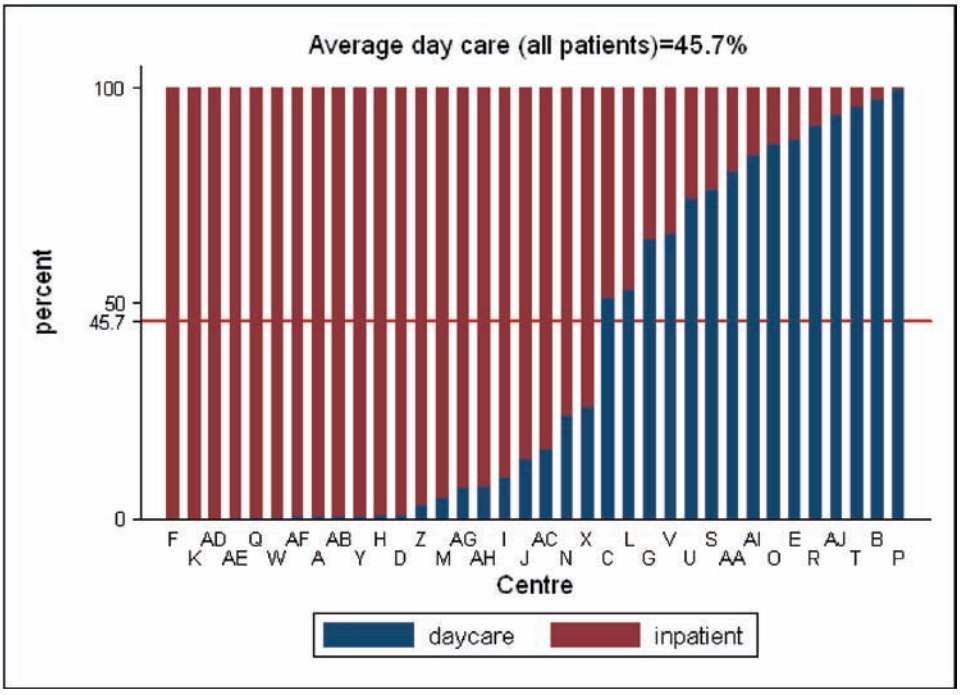
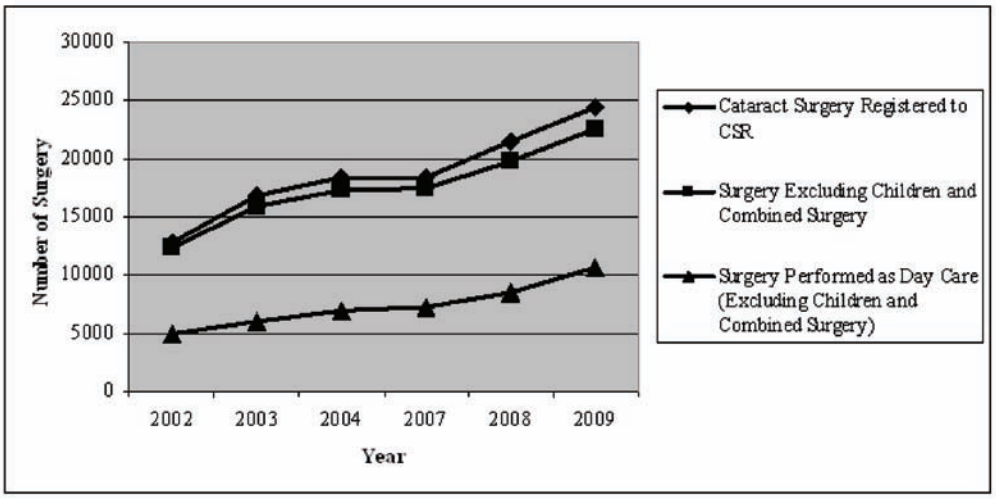


Figure 1.3.6(c): Distribution of Cataract Surgeries Performed as Day Care all SDPs (Excluding Surgery Done in Children and Combined Surgery), CSR 2002-2009



1.3.7 Distribution of Types of Cataract Surgery

There is a constant shift from ECCE to phaco as the preferred method of performing cataract surgery. The percentage of phaco converted to ECCE, the proxy indicator for competency in performing phaco surgery, remained constant over the years.

Hospital D started phaco in 2009 (60.5%). Similar to previous years, there was no phaco surgery done in Hospital F and I. Hospital AD performed phaco initially but none in 2009. For the rest of the SDPs, the percentage of phaco surgery showed an increasing trend over the years.

Table 1.3.7(a): Distribution of Types of Cataract Surgery, CSR 2002-2009

Year	2002		2003		2004		2007		2008*		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
Phacoemulsification	5085	39.7	7674	45.6	9282	50.5	11960	65.1	14781	69.1	17717	72.5
ECCE	6914	54.0	8012	47.6	7830	42.6	5524	30.1	5627	26.3	5457	22.3
Lens Aspiration	372	2.9	435	2.6	550	3.0	323	1.8	340	1.6	400	1.6
Phaco Converted to ECCE	311	2.4	469	2.8	454	2.5	432	2.4	524	2.4	573	2.3
ICCE	81	0.6	94	0.6	103	0.6	141	0.8	129	0.6	134	0.5

Figure 1.3.7 Distribution of Phacoemulsification, ECCE and Phaco Converted to ECCE, CSR 2002-2009

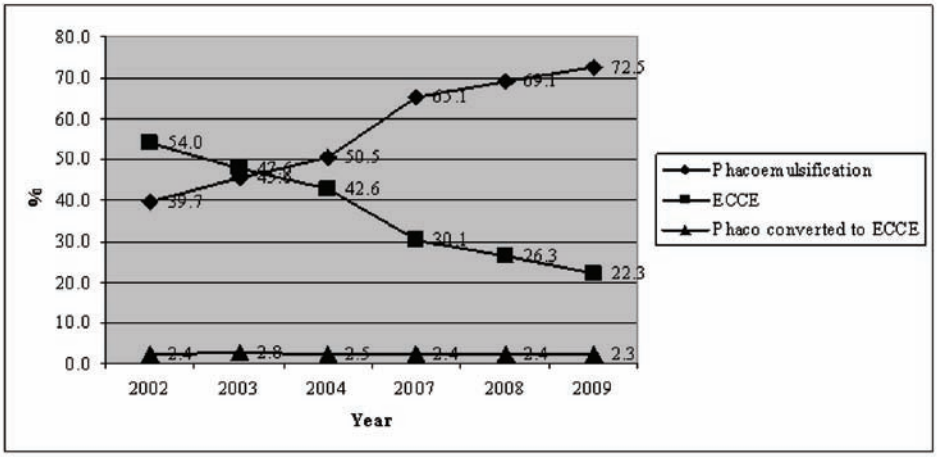


Table 1.3.7(b): Distribution of Types of Cataract Surgery by SDP, CSR 2009

	Type of Cataract Surgery											
	All Surgeries		Phaco		ECCE		Lens Aspiration		Phaco Converted to ECCE		ICCE	
	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	24438	100	17717	72.5	5457	22.3	400	1.6	573	2.3	134	0.5
A	1110	100	702	63.2	349	31.4	27	2.4	25	2.3	3	0.3
B	433	100	308	71.1	102	23.6	8	1.8	8	1.8	6	1.4
C	602	100	443	73.6	130	21.6	9	1.5	14	2.3	1	0.2
D	124	100	75	60.5	38	30.6	3	2.4	6	4.8	1	0.8
E	743	100	462	62.2	265	35.7	3	0.4	9	1.2	4	0.5
F	158	100	0	0.0	154	97.5	1	0.6	0	0.0	1	0.6
G	2137	100	1801	84.3	238	11.1	15	0.7	17	0.8	13	0.6
H	399	100	367	92.0	18	4.5	8	2.0	4	1.0	0	0.0
I	31	100	0	0.0	28	90.3	3	9.7	0	0.0	0	0.0
J	911	100	538	59.1	302	33.2	36	4.0	24	2.6	10	1.1
K	175	100	85	48.6	82	46.9	3	1.7	4	2.3	1	0.6
L	1405	100	925	65.8	403	28.7	9	0.6	57	4.1	5	0.4
M	290	100	73	25.2	175	60.3	6	2.1	29	10	2	0.7
N	743	100	473	63.7	226	30.4	26	3.5	10	1.3	5	0.7
O	1387	100	1111	80.1	205	14.8	25	1.8	29	2.1	8	0.6
P	404	100	392	97.0	10	2.5	1	0.2	1	0.2	0	0.0
Q	542	100	452	83.4	52	9.6	12	2.2	19	3.5	4	0.7
R	1374	100	1208	87.9	124	9.0	9	0.7	25	1.8	8	0.6
S	251	100	186	74.1	57	22.7	1	0.4	7	2.8	0	0.0
T	433	100	331	76.4	62	14.3	13	3.0	18	4.2	4	0.9
U	1418	100	1255	88.5	106	7.5	20	1.4	16	1.1	7	0.5
V	598	100	483	80.8	79	13.2	14	2.3	19	3.2	2	0.3
W	387	100	126	32.6	258	66.7	0	0.0	3	0.8	0	0.0
X	327	100	203	62.1	122	37.3	0	0.0	1	0.3	1	0.3
Y	185	100	131	70.8	49	26.5	2	1.1	2	1.1	1	0.5
Z	1318	100	1166	88.5	55	4.2	38	2.9	35	2.7	6	0.5
AA	387	100	272	70.3	88	22.7	5	1.3	19	4.9	3	0.8
AB	684	100	580	84.8	58	8.5	11	1.6	28	4.1	6	0.9
AC	612	100	440	71.9	154	25.2	7	1.1	11	1.8	0	0.0
AD	298	100	0	0.0	292	98.0	4	1.3	0	0.0	0	0.0
AE	612	100	465	76.0	111	18.1	7	1.1	26	4.2	3	0.5
AF	640	100	393	61.4	204	31.9	7	1.1	27	4.2	9	1.4
AG	293	100	218	74.4	46	15.7	7	2.4	9	3.1	2	0.7
AH	904	100	486	53.8	368	40.7	17	1.9	24	2.7	5	0.6
AI	1229	100	912	74.2	261	21.2	14	1.1	28	2.3	8	0.7
AJ	893	100	654	73.2	186	20.8	29	3.2	19	2.1	5	0.6

Table 1.3.7(c): Distribution of Phacoemulsification by SDP, CSR 2002-2009

Years	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	5085	40	7674	46	9282	50	11960	65.1	14781	69.1	17717	72.5
A	263	28	351	33	467	41	240	58.4	715	72.9	702	63.2
B	-	-	-	-	-	-	3	75.0	75	36.1	308	71.1
C	-	-	240	39	276	49	453	81.6	451	79.1	443	73.6
D	-	-	-	-	-	-	-	-	9	31.0	75	60.5
E	-	-	350	65	529	78	403	59.2	163	33.5	462	62.2
F	0	0	0	0	0	0	NA	NA	0	0.0	0	0.0
G	22	7	339	32	293	36	1117	71.4	1434	83.6	1801	84.3
H	496	46	16	4	35	11	91	28.1	303	75.9	367	92.0
I	-	-	-	-	-	-	-	-	0	0.0	0	0.0
J	43	20	209	35	259	41	406	49.9	383	51.8	538	59.1
K	-	-	-	-	-	-	0	0	78	45.9	85	48.6
L	157	37.0	440	51.0	387	51.0	NA	NA	25	62.5	925	65.8
M			2	1	1	1	24	11.4	58	20.6	73	25.2
N	488	66	74	27	70	30	242	46.5	429	59.4	473	63.7
O	255	49	630	61	742	61	1152	75.9	1335	80.3	1111	80.1
P	-	-	-	-	-	-	7	46.7	296	74.7	392	97.0
Q	509	45	398	66	277	76	281	80.1	236	70.7	452	83.4
R	273	57	432	46	577	51	751	68.1	1116	82.3	1208	87.9
S	96	41	9	10	13	11	93	45.8	166	64.8	186	74.1
T	169	20.0	406	58.0	630	71.0	346	65.4	260	74.3	331	76.4
U	-	-	671	68	1031	79	1305	92.4	1291	91.0	1255	88.5
V	-	-	-	-	-	-	412	68.1	521	75.0	483	80.8
W	519	51	1	0	6	2	0	0.0	0	0.0	126	32.6
X	-	-	-	-	-	-	14	9.3	111	31.7	203	62.1
Y	-	-	-	-	-	-	64	63.4	114	63.7	131	70.8
Z	133	32	484	57	579	56	1418	91.9	1293	94.0	1166	88.5
AA	-	-	-	-	-	-	121	82.9	271	85.2	272	70.3
AB	153	36	321	58	381	72	410	82.5	483	76.4	580	84.8
AC	1	1	116	34	176	44	100	35.8	169	44.6	440	71.9
AD	205	52	1	0	14	7	0	0	3	1	0	0.0
AE	206	49	470	76	199	43	435	64.8	358	60.9	465	76.0
AF	-	-	-	-	-	-	210	47.3	354	67.0	393	61.4
AG	315	39.0	245	62.0	294	57	22	91.7	314	80.9	218	74.4
AH	19	7	323	46	462	57	570	55.0	655	53.8	486	53.8
AI	0	0	203	26	420	46	589	61.9	610	68.9	912	74.2
AJ	593	58	377	56	389	44	680	68.0	702	69.4	654	73.2

Table 1.3.7(d): Distribution of ECCE by SDP, CSR 2002-2009

Years	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	6914	54	8012	48	7830	43	5524	30.1	5627	26.3	5457	22.3
A	649	68	664	62	603	53	160	38.9	247	25.2	349	31.4
B	-	-	-	-	-	-	1	25.0	106	51.0	102	23.6
C	-	-	328	53	272	48	83	15.0	95	16.7	130	21.6
D	-	-	-	-	-	-	-	-	19	65.5	38	30.6
E	-	-	135	25	100	15	265	38.9	315	64.7	265	35.7
F	123	95	130	98	119	99	NA	NA	130	99.2	154	97.5
G	261	89	669	63	479	59	396	25.3	240	14.0	238	11.1
H	513	48	335	92	262	83	223	68.8	86	21.6	18	4.5
I	-	-	-	-	-	-	-	-	33	97.1	28	90.3
J	162	76	323	54	304	48	337	41.4	302	40.9	302	33.2
K	-	-	-	-	-	-	119	95.2	81	47.6	82	46.9
L	223	53.0	356	41.0	280	37.0	NA	NA	12	30.0	403	28.7
M			161	96	139	96	164	77.7	190	67.6	175	60.3
N	208	28	163	59	121	52	243	46.7	238	33.0	226	30.4
O	234	45	329	32	404	33	307	20.2	271	16.3	205	14.8
P	-	-	-	-	-	-	7	46.7	95	24.0	10	2.5
Q	557	49	177	29	69	19	49	14.0	81	24.3	52	9.6
R	161	34	466	49	486	43	270	24.5	177	13.1	124	9.0
S	123	53	75	86	103	86	104	51.2	79	30.9	57	22.7
T	606	73.0	230	33.0	180	20.0	155	29.3	74	21.1	62	14.3
U	NA	NA	248	25	197	15	44	3.1	70	4.9	106	7.5
V	-	-	-	-	-	-	151	25.0	133	19.1	79	13.2
W	449	44	288	93	272	91	372	97.1	257	97.7	258	66.7
X	-	-	-	-	-	-	134	88.7	233	66.6	122	37.3
Y	-	-	-	-	-	-	32	31.7	61	34.1	49	26.5
Z	244	59	326	39	385	37	53	3.4	30	2.2	55	4.2
AA	-	-	-	-	-	-	8	5.5	25	7.9	88	22.7
AB	232	54	187	34	109	21	57	11.5	99	15.7	58	8.5
AC	184	98	196	57	194	48	159	57.0	194	51.2	154	25.2
AD	176	45	252	96	176	86	196	97.5	305	97.1	292	98.0
AE	183	43	125	20	250	55	222	33.1	193	32.8	111	18.1
AF	-	-	-	-	-	-	210	47.3	138	26.1	204	31.9
AG	431	54.0	134	34.0	176	34.0	1	4.2	37	9.5	46	15.7
AH	219	82	323	46	292	36	403	38.9	499	41.0	368	40.7
AI	256	98	517	65	435	48	319	33.5	219	24.7	261	21.2
AJ	356	35	229	34	403	45	276	27.6	263	26.0	186	20.8

1.3.8 Distribution of Combined Surgery

The proportion of cataract surgery which was performed in combination with VR surgery showed an initial exponential rise from 2002 to 2007. The percentage reduced sharply in 2008 but increased again in 2009. The percentage when it was combined with filtering surgery showed a decreasing trend over the years. Cataract surgery combined with penetrating keratoplasty remained infrequently performed over the years.

Table 1.3.8(a): Distribution of Combined Surgery all SDP, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
All types of combined surgeries	375	2.9	581	3.4	733	4.9	891	4.8	664	3.1	871	3.6
Specific types of combined surgery												
Pterygium Surgery	86	0.7	120	0.7	147	0.8	135	0.7	94	0.4	100	0.4
Filtering Glaucoma Surgery	148	1.2	210	1.2	235	1.3	131	0.7	142	0.7	132	0.5
Vitreoretinal Surgery	26	0.2	100	0.6	186	1.0	435	2.4	237	1.1	402	1.6
Penetrating Keratoplasty	1	0.007	0	0.0	3	0.02	0	0.0	3	0.0	6	0
Others	124	1.0	170	1.0	149	0.8	190	1.0	188	0.9	259	1.1

Figure 1.3.8(a): Distribution of Specific Combined Surgery, CSR 2002-2009

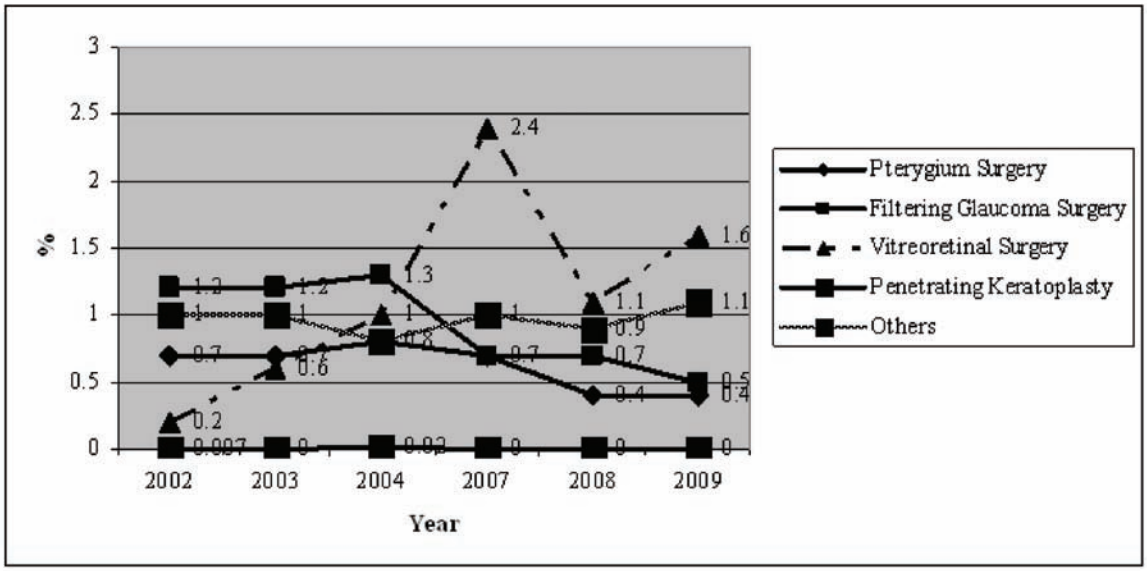


Table 1.3.8(b): Distribution of Combined Surgery by SDP, CSR 2009

	Combined Surgery												
	All Surgeries	All Combined Surgery		Pterygium Surgery		Filtering Surgery		Vitreo-Retinal Surgery		Penetrating Keratoplasty		Others	
	N	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	24438	871	3.6	100	0.4	132	0.5	402	1.6	6	0	259	1.1
A	1110	140	12.6	9	0.8	8	0.7	92	8.3	0	0	43	3.9
B	433	1	0.2	0	0	1	0.2	0	0	0	0	0	0
C	602	16	2.7	7	1.2	4	0.7	0	0	0	0	5	0.8
D	124	11	8.9	4	3.2	2	1.6	0	0	0	0	6	4.8
E	743	8	1.1	0	0	3	0.4	1	0.1	0	0	4	0.5
F	158	3	1.9	1	0.6	1	0.6	0	0	0	0	1	0.6
G	2137	41	1.9	8	0.4	30	1.4	0	0	0	0	3	0.1
H	399	1	0.3	0	0	0	0	0	0	0	0	1	0.3
I	31	1	3.2	0	0	1	3.2	0	0	0	0	0	0
J	911	50	5.5	1	0.1	7	0.8	22	2.4	0	0	23	2.5
K	175	4	2.3	1	0.6	0	0	2	1.1	0	0	1	0.6
L	1405	25	1.8	2	0.1	0	0	0	0	1	0.1	22	1.6
M	290	2	0.7	0	0	0	0	0	0	0	0	2	0.7
N	743	31	4.2	10	1.3	6	0.8	5	0.7	0	0	12	1.6
O	1387	57	4.1	6	0.4	29	2.1	17	1.2	1	0.1	5	0.4
P	404	5	1.2	4	1	0	0	0	0	0	0	1	0.2
Q	542	25	4.6	0	0	1	0.2	2	0.4	0	0	22	4.1
R	1374	14	1	2	0.1	10	0.7	0	0	0	0	2	0.1
S	251	1	0.4	1	0.4	0	0	0	0	0	0	0	0
T	433	12	2.8	1	0.2	0	0	0	0	0	0	11	2.5
U	1418	206	14.5	2	0.1	4	0.3	178	12.6	0	0	25	1.8
V	598	6	1	1	0.2	0	0	0	0	0	0	5	0.8
W	387	11	2.8	7	1.8	0	0	0	0	0	0	4	1
X	327	0	0	0	0	0	0	0	0	0	0	0	0
Y	185	1	0.5	0	0	0	0	0	0	0	0	1	0.5
Z	1318	62	4.7	6	0.5	2	0.2	40	3	1	0.1	15	1.1
AA	387	1	0.3	0	0	1	0.3	0	0	0	0	0	0
AB	684	5	0.7	3	0.4	1	0.1	0	0	0	0	1	0.1
AC	612	23	3.8	11	1.8	4	0.7	0	0	0	0	8	1.3
AD	298	13	4.4	2	0.7	0	0	1	0.3	0	0	11	3.7
AE	612	7	1.1	3	0.5	0	0	0	0	0	0	4	0.7
AF	640	10	1.6	5	0.8	0	0	0	0	0	0	5	0.8
AG	293	23	7.8	1	0.3	3	1	17	5.8	0	0	3	1
AH	904	16	1.8	1	0.1	4	0.4	10	1.1	0	0	2	0.2
AI	1229	19	1.5	1	0.1	8	0.7	4	0.3	2	0.2	4	0.3
AJ	893	20	2.2	0	0	2	0.2	11	1.2	1	0.1	7	0.8

1.3.9 Anaesthesia in Cataract Surgery

The number of eyes operated under local anaesthesia (LA) was initially increasing. It slightly decreased in 2009. Similar to previous years, the preferred type of LA was subtenon. However, there was a constant increase in the use of topical anaesthesia and a constant decrease in the use of peribulbar, retrobulbar and facial block for anaesthesia. Even though subtenon is preferred in most centers, retrobulbar is the commonest mode of local anaesthesia in Hospital A.
The percentage of surgeons using combined LA was initially decreasing but increased again to 8.4% in 2009.
Among eyes where the surgeries were done under LA, a large percentage was also given oral sedation (Hospital E, M, R, AB, AE, AF). This practice remained unchanged throughout the years. Only Hospital F practiced giving intramuscular sedation among patients given LA in the year 2009.
Hospital I, Y, AA, AG and AH performed > 15.0% of cases under GA

Table 1.3.9(a): Types of Anaesthesia all SDPs, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
General Anesthesia	818	6.4	1136	7.0	1379	7.3	1207	6.6	1223	5.7	1578	6.5
Local Anesthesia	11980	93.6	15679	93.2	17013	92.5	17143	93.4	20188	94.3	22776	93.2
Type of local anesthesia												
Subtenon	5647	47.1	8076	51.5	9260	54.4	9990	58.3	11014	54.6	11525	50.6
Topical	1406	11.7	2819	18.0	3978	23.4	4853	28.3	6680	33.1	8382	36.8
Peribulbar	2601	21.7	2575	16.4	2940	1.3	1282	7.5	1227	6.1	1244	5.5
Retrobulbar	3100	25.9	2952	18.8	2186	12.8	1031	6.0	1182	5.9	1037	4.6
Intracameral	NA	NA	NA	NA	NA	NA	249	1.5	710	3.5	1596	7.0
Subconjunctival	28	0.2	141	0.9	139	0.8	232	1.4	251	1.2	437	1.9
Facial block	1348	11.3	865	5.5	226	1.3	20	0.1	143	0.7	95	0.4
Others	12	0.1	0	0.0	1	0.0	223	1.3	NA	NA	0	0.0
Combined local anaesthesia	1983	16.6	1685	10.7	1678	9.9	497	2.9	537	2.7	1918	8.4
Types of sedation for patients under LA												
No sedation	7507	62.7	12021	76.7	14031	82.5	9668	56.4*	11234	55.6	12809	56.2
Oral sedation alone	3995	33.3	3354	21.4	2729	16	2387	13.9	2923	14.5	3532	15.5
Intravenous alone	108	0.9	91	0.6	144	0.8	72	0.4	37	0.2	35	0.2
Intravenous plus oral	83	0.7	53	0.3	15	0.1	0	0.0	NA	NA	NA	NA
Intramuscular	426	3.6	261	1.7	104	0.6	3	0.02	121	0.6	52	0.2

**There was a significant percentage of missing values in sedation for 2007; these missing values may be in 'no sedation' category where data were not entered.*

Figure 1.3.9: Types of Anaesthesia all SDPs, CSR 2002-2009

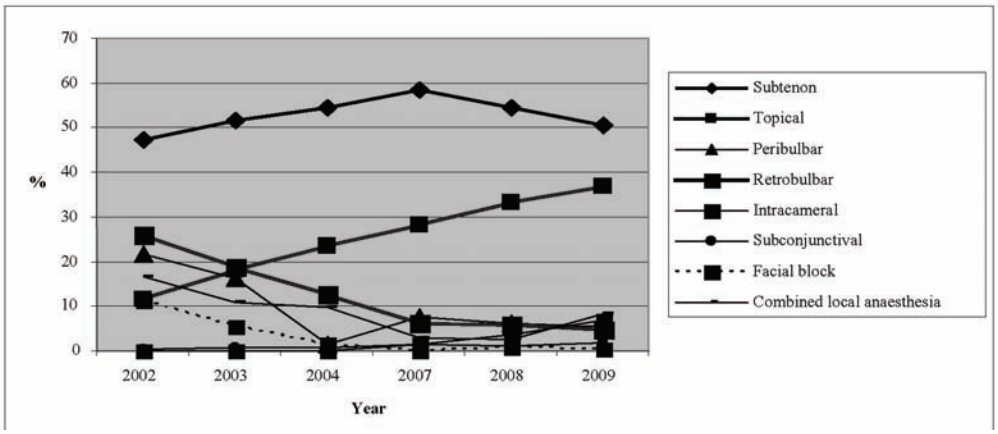


Table 1.3.9(b): Types of Anaesthesia by SDPs, CSR 2009

	Types of Anaesthesia				
		General		Local	
	N	n	%	n	%
All Centres	24438	1578	6.5	22776	93.2
A	1110	166	15.0	943	85.0
B	433	27	6.2	406	93.8
C	602	9	1.5	593	98.5
D	124	5	4.0	119	96.0
E	743	12	1.6	730	98.3
F	158	8	5.1	149	94.3
G	2137	124	5.8	2006	93.9
H	399	9	2.3	389	97.5
I	31	8	25.8	23	74.2
J	911	57	6.3	854	93.7
K	175	3	1.7	171	97.7
L	1405	182	13.0	1222	87.0
M	290	8	2.8	281	96.9
N	743	44	5.9	698	93.9
O	1387	64	4.6	1319	95.1
P	404	4	1.0	399	98.8
Q	542	10	1.8	532	98.2
R	1374	99	7.2	1270	92.4
S	251	9	3.6	242	96.4
T	433	18	4.2	403	93.1
U	1418	40	2.8	1369	96.5
V	598	36	6.0	560	93.6
W	387	3	0.8	384	99.2
X	327	1	0.3	324	99.1
Y	185	60	32.4	125	67.6
Z	1318	50	3.8	1259	95.5
AA	387	59	15.2	327	84.5
AB	684	29	4.2	651	95.2
AC	612	72	11.8	540	88.2
AD	298	8	2.7	288	96.6
AE	612	14	2.3	598	97.7
AF	640	13	2.0	627	98.0
AG	293	67	22.9	224	76.5
AH	904	162	17.9	740	81.9
AI	1229	57	4.6	1160	94.4
AJ	893	41	4.6	850	95.2

Table 1.3.9(c): Types of Local Anaesthesia by SDPs, CSR 2009

	Local Anaesthesia																
	All	Retrobulbar		Peribulbar		Subtenon		Sub-conjunctival		Facial block		Topical		Intracameral		Combined	
	N	n	%	n	%	n	%	n	%	n	%	n	%	n	%	N	%
All Centres	22776	1037	4.6	1244	5.5	11525	50.6	437	1.9	95	0.4	8382	36.8	1596	7.0	1918	8.4
A	943	588	62.4	3	0.3	239	25.3	2	0.2	0	0.0	124	13.1	10	1.1	40	4.2
B	406	0	0.0	0	0.0	110	27.1	6	1.5	1	0.2	248	61.1	228	56.2	187	46.1
C	593	0	0.0	0	0.0	562	94.8	4	0.7	0	0.0	25	4.2	1	0.2	1	0.2
D	119	1	0.8	0	0.0	118	99.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
E	730	8	1.1	51	7.0	239	32.7	0	0.0	0	0.0	62	8.5	390	53.4	42	5.8
F	149	2	1.3	52	34.9	86	57.7	2	1.3	45	30.2	34	22.8	1	0.7	78	52.3
G	2006	3	0.1	9	0.4	872	43.5	127	6.3	4	0.2	1137	56.7	541	27.0	670	33.4
H	389	4	1.0	0	0.0	383	98.5	1	0.3	0	0.0	3	0.8	0	0.0	2	0.5
I	23	1	4.3	22	95.7	0	0.0	0	0.0	2	8.7	21	91.3	0	0.0	21	91.3
J	854	2	0.2	1	0.1	837	98.0	2	0.2	0	0.0	12	1.4	0	0.0	2	0.2
K	171	0	0.0	0	0.0	169	98.8	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0
L	1222	38	3.1	185	15.1	620	50.7	9	0.7	1	0.1	208	17.0	296	24.2	126	10.3
M	281	0	0.0	9	3.2	252	89.7	2	0.7	0	0.0	0	0.0	0	0.0	0	0.0
N	698	0	0.0	0	0.0	417	59.7	9	1.3	0	0.0	274	39.3	0	0.0	6	0.9
O	1319	3	0.2	0	0.0	376	28.5	1	0.1	2	0.2	1014	76.9	2	0.2	107	8.1
P	399	0	0.0	0	0.0	187	46.9	0	0.0	0	0.0	211	52.9	0	0.0	0	0.0
Q	532	0	0.0	0	0.0	528	99.2	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0
R	1270	0	0.0	1	0.1	474	37.3	15	1.2	1	0.1	814	64.1	5	0.4	55	4.3
S	242	0	0.0	0	0.0	240	99.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
T	403	0	0.0	6	1.5	82	20.3	1	0.2	1	0.2	265	65.8	1	0.2	30	7.4
U	1369	200	14.6	7	0.5	190	13.9	4	0.3	0	0.0	989	72.2	3	0.2	34	2.5
V	560	0	0.0	2	0.4	396	70.7	6	1.1	0	0.0	151	27.0	0	0.0	4	0.7
W	384	18	4.7	124	32.3	155	40.4	0	0.0	0	0.0	173	45.1	93	24.2	181	47.1
X	324	0	0.0	0	0.0	28	8.6	0	0.0	0	0.0	298	92.0	0	0.0	2	0.6
Y	125	12	9.6	0	0.0	0	0.0	113	90.4	12	9.6	1	0.8	0	0.0	13	10.4
Z	1259	45	3.6	3	0.2	942	74.8	114	9.1	1	0.1	159	12.6	0	0.0	16	1.3
AA	327	0	0.0	0	0.0	325	99.4	0	0.0	0	0.0	6	1.8	0	0.0	4	1.2
AB	651	0	0.0	0	0.0	646	99.2	1	0.2	0	0.0	0	0.0	13	2.0	13	2.0
AC	540	2	0.4	204	37.8	121	22.4	0	0.0	1	0.2	213	39.4	0	0.0	2	0.4
AD	288	0	0.0	0	0.0	287	99.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
AE	598	0	0.0	1	0.2	397	66.4	0	0.0	1	0.2	287	48.0	0	0.0	88	14.7
AF	627	0	0.0	0	0.0	425	67.8	0	0.0	0	0.0	234	37.3	1	0.2	43	6.9
AG	224	79	35.3	2	0.9	143	63.8	0	0.0	0	0.0	2	0.9	0	0.0	3	1.3
AH	740	0	0.0	62	8.4	178	24.1	1	0.1	2	0.3	427	57.7	2	0.3	19	2.6
AI	1160	31	2.7	496	42.8	356	30.7	16	1.4	18	1.6	273	23.5	7	0.6	104	9.0
AJ	850	0	0.0	4	0.5	145	17.1	1	0.1	3	0.4	714	84.0	2	0.2	25	2.9

Table 1.3.9(d): Types of Local Anaesthesia by SDPs Excluding Combined Surgery, CSR 2009

	Local Anesthesia																
	All	Retrobulbar		Peribulbar		Subtenon		Sub-conjunctival		Facial block		Topical		Intracameral		Combined	
	No	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
All	22088	670	3	973	4.4	10382	47	314	1.4	31	0.1	6675	30.2	737	3.3	1853	8.4
A	838	475	56.7	2	0.2	206	24.6	1	0.1	0	0	103	12.3	5	0.6	35	4.2
B	405	0	0	0	0	101	24.9	5	1.2	0	0	62	15.3	47	11.6	187	46.2
C	579	0	0	0	0	548	94.6	3	0.5	0	0	25	4.3	0	0	1	0.2
D	109	1	0.9	0	0	108	99.1	0	0	0	0	0	0	0	0	0	0
E	722	4	0.6	35	4.8	218	30.2	0	0	0	0	24	3.3	377	52.2	41	5.7
F	146	0	0	8	5.5	54	37	0	0	1	0.7	1	0.7	0	0	76	52.1
G	1974	3	0.2	8	0.4	643	32.6	48	2.4	3	0.2	476	24.1	79	4	664	33.6
H	388	3	0.8	0	0	380	97.9	0	0	0	0	3	0.8	0	0	2	0.5
I	23	0	0	2	8.7	0	0	0	0	0	0	0	0	0	0	21	91.3
J	826	1	0.1	1	0.1	807	97.7	2	0.2	0	0	11	1.3	0	0	2	0.2
K	167	0	0	0	0	165	98.8	0	0	0	0	1	0.6	0	0	0	0
L	1204	31	2.6	156	13	587	48.8	7	0.6	0	0	109	9.1	188	15.6	125	10.4
M	279	0	0	9	3.2	250	89.6	2	0.7	0	0	0	0	0	0	0	0
N	676	0	0	0	0	400	59.2	4	0.6	0	0	264	39.1	0	0	4	0.6
O	1281	3	0.2	0	0	249	19.4	0	0	2	0.2	899	70.2	2	0.2	98	7.7
P	394	0	0	0	0	182	46.2	0	0	0	0	211	53.6	0	0	0	0
Q	507	0	0	0	0	503	99.2	0	0	0	0	1	0.2	0	0	0	0
R	1263	0	0	1	0.1	425	33.7	8	0.6	1	0.1	758	60	0	0	55	4.4
S	241	0	0	0	0	239	99.2	0	0	0	0	0	0	0	0	0	0
T	392	0	0	3	0.8	54	13.8	1	0.3	1	0.3	233	59.4	0	0	28	7.1
U	1174	19	1.6	3	0.3	161	13.7	0	0	0	0	960	81.8	1	0.1	19	1.6
V	555	0	0	2	0.4	388	69.9	6	1.1	0	0	146	26.3	0	0	4	0.7
W	373	4	1.1	78	20.9	85	22.8	0	0	0	0	0	0	29	7.8	175	46.9
X	324	0	0	0	0	26	8	0	0	0	0	296	91.4	0	0	2	0.6
Y	125	10	8	0	0	0	0	102	81.6	0	0	0	0	0	0	13	10.4
Z	1205	15	1.2	2	0.2	909	75.4	110	9.1	0	0	154	12.8	0	0	5	0.4
AA	327	0	0	0	0	321	98.2	0	0	0	0	2	0.6	0	0	4	1.2
AB	646	0	0	0	0	628	97.2	1	0.2	0	0	0	0	0	0	13	2
AC	523	2	0.4	199	38	107	20.5	0	0	1	0.2	211	40.3	0	0	2	0.4
AD	277	0	0	0	0	276	99.6	0	0	0	0	0	0	0	0	0	0
AE	592	0	0	0	0	306	51.7	0	0	1	0.2	197	33.3	0	0	88	14.9
AF	618	0	0	0	0	375	60.7	0	0	0	0	190	30.7	1	0.2	42	6.8
AG	222	76	34.2	0	0	140	63.1	0	0	0	0	2	0.9	0	0	3	1.4
AH	735	0	0	55	7.5	168	22.9	0	0	1	0.1	406	55.2	0	0	18	2.4
AI	1145	23	2	407	35.5	258	22.5	13	1.1	17	1.5	248	21.7	7	0.6	103	9
AJ	832	0	0	2	0.2	115	13.8	1	0.1	3	0.4	681	81.9	1	0.1	23	2.8

Table 1.3.9(e): Subtenon Anaesthesia by SDPs, CSR 2002-2009

Years	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	5647	47.0	8076	52.0	9260	54.0	9990	58.3	11014	54.6	11525	50.6
A	86	9.0	101	10.0	394	37.0	35	9.5	109	12.1	239	25.3
B	-	-	-	-	-	-	3	75	162	78.3	110	27.1
C	-	-	599	99.0	556	99.0	545	99.6	567	99.5	562	94.8
D	-	-	-	-	-	-	-	-	24	0.0	118	99.2
E	-	-	371	73.0	405	66.0	422	69.5	294	64.1	239	32.7
F	0	0.0	0	0.0			NA	NA	0	0.0	86	57.7
G	283	99.0	627	68.0	463	64.0	702	47.1	921	56.2	872	43.5
H	604	60.0	344	100.0	294	99.0	313	98.4	389	98.5	383	98.5
I	-	-	-	-	-	-	-	-	0	0.0	0	0.0
J	212	100	558	99.0	577	99.0	726	99.2	672	99.3	837	98.0
K	-	-	-	-	-	-	115	100	142	86.6	169	98.8
L	201	55.0	488	61.0	480	76.0	NA	NA	27	73.0	620	50.7
M	-	-	24	15.0	55	39.0	208	99.5	270	97.8	252	89.7
N	98	14.0	140	59.0	120	63.0	419	85.2	590	84.8	417	59.7
O	507	99.0	400	41.0	531	47.0	443	30.1	463	28.9	376	28.5
P	-	-	-	-	2	1.0	1	6.3	352	90.0	187	46.9
Q	1004	95.0	585	100	350	99.0	166	49.7	326	98.5	528	99.2
R	2	0.0	883	99.0	1036	99.0	967	97.6	687	54.5	474	37.3
S	2	1.0	73	95.0	112	100	188	98.9	236	99.6	240	99.2
T	83	11.0	184	28.0	112	13.0	195	39.2	81	24.1	82	20.3
U	-	-	467	49.0	350	28.0	152	11.1	174	12.7	190	13.9
V	-	-	-	-	-	-	522	91.7	375	56.9	396	70.7
W	76	8.0	25	9.0	23	8.0	33	9.6	96	38.9	155	40.4
X	-	-	-	-	-	-	136	92.5	133	38.7	28	8.6
Y	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
Z	3	1.0	40	5.0	197	21.0	1103	74.0	801	60.1	942	74.8
AA	-	-	-	-	-	-	98	80.3	221	90.2	325	99.4
AB	344	85.0	1	0.0	193	37.0	472	99.0	591	98.2	646	99.2
AC	0	0.0	240	74.0	216	58.0	156	71.2	166	54.2	121	22.4
AD	200	54.0	2	1.0	68	34.0	195	100	303	98.4	287	99.7
AE	47	12.0	184	33.0	249	57.0	190	28.6	406	72.0	397	66.4
AF	-	-	-	-	-	-	390	94.4	429	83.1	425	67.8
AG	633	90.0	63	19.0	196	46.0	9	47.4	162	54.9	143	63.8
AH	207	90.0	582	95.0	546	80.0	468	57.1	297	27.3	178	24.1
AI	0	0.0	175	25.0	215	26.0	210	24.1	294	35.4	356	30.7
AJ	510	53.0	292	46.0	616	73.0	404	42.7	254	26.3	145	17.1

Table 1.3.9(f): Topical Anaesthesia by SDPs, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	1406	12.0	2819	18.0	3978	23.0	4853	28.3	6680	33.1	8382	36.8
A	7	1.0	1	0.0	72	7.0	1	0.3	95	10.6	124	13.1
B	-	-	-	-	-	-	3	75.0	64	30.9	248	61.1
C	-	-	0	0.0	-	-	1	0.2	0	0.0	25	4.2
D	-	-	-	-	-	-	-	-	0	0.0	0	0
E	-	-	0	0.0	1	0.0	0	0.0	2	0.4	62	8.5
F	0	0.0	0	0.0	1	1.0	NA	NA	12	9.2	34	22.8
G	0	0.0	183	20.0	156	21.0	573	38.5	594	36.2	1137	56.7
H	33	3.0	0	0.0	-	-	0	0.0	0	0.0	3	0.8
I	-	-	-	-	-	-	-	-	28	93.3	21	91.3
J	0	0.0	0	0.0	1	0.0	0	0.0	1	0.1	12	1.4
K	-	-	-	-	-	-	0	0.0	9	5.5	1	0.6
L	160	44.0	210	26.0	94	15.0	NA	NA	2	5.4	208	17.0
M	-	-	0	0.0	-	-	0	0.0	1	0.4	0	0.0
N	380	54.0	93	39.0	72	38.0	75	15.2	99	14.2	274	39.3
O	0	0.0	568	58.0	600	53.0	1075	73.1	1233	76.9	1014	76.9
P	-	-	-	-	80	36.0	0	0.0	12	3.1	211	52.9
Q	10	1.0	0	0.0	1	0.0	160	47.9	4	1.2	1	0.2
R	92	20.0	4	0.0	-	-	8	0.8	560	44.4	814	64.1
S	-	-	0	0.0	-	-	0	0.0	0	0.0	0	0.0
T	0	0.0	237	36.0	416	50.0	242	48.7	221	65.8	265	65.8
U	-	-	256	27.0	602	47.0	983	71.5	981	71.7	989	72.2
V	-	-	-	-	-	-	33	5.8	247	37.5	151	27.0
W	54	6.0	1	0.0	-	-	0	0.0	0	0.0	173	45.1
X	-	-	-	-	-	-	11	7.5	201	58.4	298	92.0
Y	-	-	-	-	-	-	0	0.0	0	0.0	1	0.8
Z	0	0.0	9	1.0	197	21.0	359	24.1	501	37.6	159	12.6
AA	-	-	-	-	-	-	27	22.1	15	6.1	6	1.8
AB	62	15.0	94	17.0	111	21.0	0	0.0	0	0.0	0	0.0
AC	1	1.0	84	26.0	157	42.0	63	28.8	102	33.3	213	39.4
AD	148	40.0	0	0.0	1	1.0	0	0.0	0	0.0	0	0.0
AE	4	1.0	386	69.0	219	50.0	469	70.6	152	27.0	287	48.0
AF	-	-	-	-	-	-	27	6.5	103	20.0	234	37.3
AG	1	0.0	18	5.0	26	6.0	4	21.1	40	13.6	2	0.9
AH	0	0.0	0	0.0	-	-	210	25.6	566	52.1	427	57.7
AI	1	0.0	1	0.0	2	0.0	1	0.1	102	12.3	273	23.5
AJ	453	47.0	481	76.0	788	93.0	528	55.8	733	75.9	714	84.0

Table 1.3.9(g): Types of Sedation in Eyes Given Local Anaesthesia by SDPs, CSR 2009

	Types of sedation								
	All Local Anaesthesia	No Sedation		Oral Alone		Intravenous Alone		Intra-Muscular	
	N	n	%	n	%	n	%	n	%
All Centres	22776	12809	56.2	3532	15.5	35	0.2	52	0.2
A	943	617	65.4	23	2.4	0	0.0	0	0.0
B	406	384	94.6	1	0.2	0	0.0	0	0.0
C	593	580	97.8	3	0.5	0	0.0	0	0.0
D	119	0	0.0	29	24.4	0	0.0	0	0.0
E	730	108	14.8	466	63.8	2	0.3	0	0.0
F	149	70	47.0	0	0.0	0	0.0	50	33.6
G	2006	1435	71.5	9	0.4	6	0.3	0	0.0
H	389	378	97.2	0	0.0	0	0.0	0	0.0
I	23	1	4.3	0	0.0	0	0.0	0	0.0
J	854	826	96.7	15	1.8	6	0.7	0	0.0
K	171	122	71.3	0	0.0	0	0.0	0	0.0
L	1222	1208	98.9	1	0.1	1	0.1	0	0.0
M	281	26	9.3	205	73.0	0	0.0	0	0.0
N	698	582	83.4	72	10.3	7	1.0	0	0.0
O	1319	619	46.9	7	0.5	0	0.0	0	0.0
P	399	33	8.3	0	0.0	0	0.0	0	0.0
Q	532	526	98.9	0	0.0	0	0.0	0	0.0
R	1270	7	0.6	1018	80.2	0	0.0	0	0.0
S	242	240	99.2	0	0.0	2	0.8	0	0.0
T	403	83	20.6	0	0.0	0	0.0	0	0.0
U	1369	686	50.1	10	0.7	3	0.2	0	0.0
V	560	433	77.3	0	0.0	0	0.0	0	0.0
W	384	5	1.3	141	36.7	0	0.0	0	0.0
X	324	284	87.7	0	0.0	0	0.0	0	0.0
Y	125	119	95.2	0	0.0	0	0.0	0	0.0
Z	1259	1115	88.6	57	4.5	4	0.3	0	0.0
AA	327	289	88.4	4	1.2	0	0.0	1	0.3
AB	651	2	0.3	578	88.8	0	0.0	1	0.2
AC	540	280	51.9	0	0.0	0	0.0	0	0.0
AD	288	9	3.1	0	0.0	0	0.0	0	0.0
AE	598	58	9.7	366	61.2	0	0.0	0	0.0
AF	627	5	0.8	511	81.5	1	0.2	0	0.0
AG	224	55	24.6	0	0.0	0	0.0	0	0.0
AH	740	560	75.7	0	0.0	2	0.3	0	0.0
AI	1160	273	23.5	14	1.2	1	0.1	0	0.0
AJ	850	790	92.9	2	0.2	0	0.0	0	0.0

Number or Percentage may be more than total or 100% as patient might have more than one type of local Anaesthesia

Table 1.3.9(h): Oral Sedation by SDPs, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
All Centres	3995	33.0	3354	21.0	2729	16.0	2387	13.9	2923	14.5	3532	15.5
A	450	50.0	601	61.0	106	10.0	4	1.1	9	1.0	23	2.4
B	-	-	-	-	-	-	0	0.0	0	0.0	1	0.2
C	-	-	1	0.0	5	1.0	0	0.0	1	0.2	3	0.5
D	-	-	-	-	-	-	-	-	7	24.1	29	24.4
E	-	-	0	0.0	2	0.0	204	33.6	356	77.6	466	63.8
F	0	0.0	0	0.0	-	-	-	-	0	0.0	0	0.0
G	119	41.0	90	10.0	126	17.0	7	0.5	6	0.4	9	0.4
H	194	19.0	202	59.0	202	68.0	4	1.3	0	0.0	0	0.0
I	-	-	-	-	-	-	-	-	1	3.3	0	0.0
J	2	1.0	7	1.0	30	5.0	5	0.7	5	0.7	15	1.8
K	-	-	-	-	-	-	3	2.6	11	6.7	0	0.0
L	4	1.0	32	4.0	10	2.0	NA	NA	0	0.0	1	0.1
M	-	-	5	3.0	24	17.0	99	47.4	97	35.1	205	73.0
N	2	0.0	9	4.0	-	-	16	3.3	2	0.3	72	10.3
O	3	1.0	3	0.0	6	1.0	0	0.0	2	0.1	7	0.5
P	-	-	-	-	14	6.0	0	0.0	0	0.0	0	0.0
Q	653	61.0	1	0.0	7	2.0	4	1.2	0	0.0	0	0.0
R	4	1.0	555	62.0	638	61.0	847	85.5	1124	89.2	1018	80.2
S	0	0.0	0	0.0	-	-	0	0.0	1	0.4	0	0.0
T	620	79.0	1	0.0	2	0.0	0	0.0	0	0.0	0	0.0
U	-	-	19	2.0	10	1.0	13	0.9	2	0.1	10	0.7
V	-	-	-	-	-	-	2	0.4	0	0.0	0	0.0
W	894	95.0	30	11.0	98	36.0	323	94.2	57	23.1	141	36.7
X	-	-	-	-	-	-	3	2.0	0	0.0	0	0.0
Y	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
Z	362	93.0	677	85.0	529	56.0	188	12.6	212	15.9	57	4.5
AA	-	-	-	-	-	-	1	0.8	1	0.4	4	1.2
AB	0	0.0	344	63.0	173	33.0	253	53.0	487	80.9	578	88.8
AC	173	97.0	1	0.0	1	0.0	7	3.2	20	6.5	0	0.0
AD	0	0.0	24	9.0	27	14.0	0	0.0	0	0.0	0	0.0
AE	7	2.0	0	0.0	-	-	0	0.0	158	28.0	366	61.2
AF	-	-	-	-	-	-	400	96.9	357	69.2	511	81.5
AG	193	27.0	9	2.0	7	2.0	0	0.0	0	0.0	0	0.0
AH	92	40.0	2	0.0	3	0.0	1	0.1	2	0.2	0	0.0
AI	211	90.0	552	78.0	338	41.0	3	0.3	5	0.6	14	1.2
AJ	1	0.0	1	0.0	6	1.0	0	0.0	0	0.0	2	0.2

Table 1.3.9(i): Intravenous Sedation by SDPs, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
All Centres	108	1.0	91	1.0	144	1.0	72	0.4	37	0.2	35	0.2
A	21	2.0	9	1.0	42	4.0	1	0.3	1	0.1	0	0.0
B	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
C	-	-	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0
D	-	-	-	-	-	-	-	-	0	0.0	0	0.0
E	-	-	0	0.0	-	-	2	0.3	0	0.0	2	0.3
F	55	47.0	1	1.0	-	-	-	-	0	0.0	0	0.0
G	0	0.0	43	5.0	22	3.0	6	0.4	8	0.5	6	0.3
H	12	1.0	0	0.0	-	-	0	0.0	0	0.0	0	0.0
I	-	-	-	-	-	-	-	-	0	0.0	0	0.0
J	0	0.0	0	0.0	-	-	5	0.7	2	0.3	6	0.7
K	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
L	1	0.0	2	0.0	1	0.0	NA	NA	0	0.0	1	0.1
M	-	-	0	0.0	-	-	0	0.0	0	0.0	0	0.0
N	2	0.0	6	3.0	7	4.0	7	1.4	14	2.0	7	1.0
O	0	0.0	1	0.0	-	-	1	0.1	0	0.0	0	0.0
P	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
Q	3	0.0	0	0.0	-	-	0	0.0	0	0.0	0	0.0
R	0	0.0	4	0.0	7	1.0	3	0.3	4	0.3	0	0.0
S	1	0.0	0	0.0	-	-	0	0.0	0	0.0	2	0.8
T	4	1.0	0	0.0	-	-	0	0.0	0	0.0	0	0.0
U	-	-	8	1.0	33	3.0	33	2.4	0	0.0	3	0.2
V	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
W	2	0.0	2	1.0	2	1.0	1	0.3	0	0.0	0	0.0
X	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
Y	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
Z	0	0.0	1	0.0	-	-	0	0.0	0	0.0	4	0.3
AA	-	-	-	-	-	-	0	0.0	0	0.0	0	0.0
AB	0	0.0	2	0.0	-	-	1	0.2	0	0.0	0	0.0
AC	0	0.0	0	0.0	-	-	0	0.0	0	0.0	0	0.0
AD	1	0.0	0	0.0	-	-	0	0.0	1	0.3	0	0.0
AE	1	0.0	0	0.0	1	0.0	0	0.0	1	0.2	0	0.0
AF	-	-	-	-	-	-	0	0.0	2	0.4	1	0.2
AG	1	0.0	0	0.0	-	-	0	0.0	0	0.0	0	0.0
AH	3	1.0	0	0.0	7	1.0	11	1.3	3	0.3	2	0.3
AI	0	0.0	1	0.0	6	1.0	1	0.1	1	0.1	1	0.1
AJ	0	0.0	1	0.0	6	1.0	0	0.0	0	0.0	0	0.0

1.3.10 Intraocular Lens Implantation

The percentage of eyes with IOL implantation was 98.0%. Out of this proportion, 97.0% had posterior chamber IOL. The material and type of IOL used demonstrated a constant shift from PMMA to Acrylic and from non-foldable to foldable. This pattern was consistent with the constant shift from ECCE to Phaco as the preferred method of cataract surgery. The use of silicone IOL was decreasing.

Table 1.3.10(a): Intraocular Lens Implantation, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
No of patients (N)	12798		16815		18392		18426		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
With IOL	12472	97.5	16396	97.5	17944	97.6	17873	97.0	21115	98.2	23982	98.1
Without IOL	326	2.5	419	2.5	448	2.4	553	3.0	375	1.7	423	1.7
Not Available	-		-		-		-		6	0.0	33	0.1
IOL Placement												
No of IOL	12472		16396		17944		17873		21115		23982	
PCIOL	12074	96.8	15957	97.3	17410	97.0	17350	97.1	20342	96.3	23032	96.0
ACIOL	386	3.1	404	2.5	497	2.8	482	2.7	454	2.2	570	2.4
Scleral Fixated IOL	11	0.1	34	0.2	34	0.2	35	0.2	36	0.2	21	0.1
Others		0.0		0.0	2	0.0	6	0.0	14	0.1	22	0.1
Not Available /missing	1	0.0	1	0.0	1	0.0	-		269	1.3	337	1.4
Materials of IOL												
No of IOL	12472		16396		17944		17873		21115		23982	
1. Acrylic	1641	13.2	4418	26.9	7105	39.6	11955	66.9	15382	72.8	19160	79.9
2. PMMA	9161	73.5	10203	62.2	9758	54.4	5547	31.0	5300	25.1	4313	18.0
3. Silicone	1670	13.4	1776	10.8	1078	6.0	97	0.5	113	0.5	137	0.6
4. Others	0	0.0	4	0.0	12	0.1	74	0.4	19	0.1	58	0.2
Not Available /missing	-		1	0.0	-		200	1.1	301	1.4	314	1.3
Types of IOL												
No of IOL	12472		16396		17944		17873		21115		23982	
1. Foldable	3311	26.5	6195	37.8	8186	45.6	11972	67	15320	72.6	19093	79.6
2. Non foldable	9161	73.5	10201	62.2	9757	54.4	5590	31.3	5316	25.2	4280	17.8
Not Available /missing	-		-		1	0.0	311	1.7	479	2.3	609	2.5

Figure 1.3.10: Intraocular Lens Implantation, CSR 2002-2009

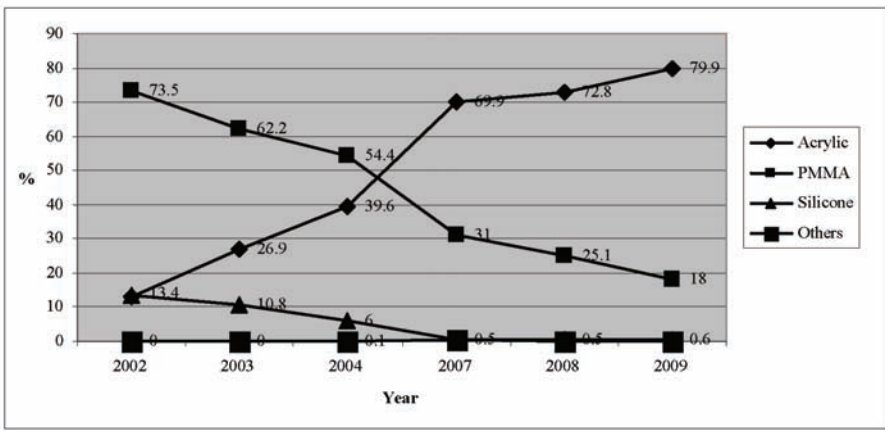


Table 1.3.10(b): Distribution of IOL Placement by SDP, CSR 2009

	Cataract Surgery With IOL						
		Posterior Chamber IOL		Anterior Chamber IOL		Scleral Fixated IOL	
	N	n	%	n	%	n	%
All Centres	23982	23032	96	570	2.4	21	0.1
A	1072	1043	97.3	14	1.3	0	0.0
B	430	404	94.0	19	4.4	0	0.0
C	599	574	95.8	20	3.3	2	0.3
D	121	114	94.2	3	2.5	0	0.0
E	727	698	96.0	11	1.5	0	0.0
F	149	134	89.9	12	8.1	0	0.0
G	2108	2054	97.4	38	1.8	0	0.0
H	393	384	97.7	6	1.5	0	0.0
I	29	28	96.6	0	0.0	0	0.0
J	883	867	98.2	9	1.0	1	0.1
K	171	167	97.7	2	1.2	0	0.0
L	1381	1369	99.1	5	0.4	1	0.1
M	289	275	95.2	9	3.1	0	0.0
N	701	681	97.1	16	2.3	2	0.3
O	1352	1301	96.2	23	1.7	5	0.4
P	403	393	97.5	1	0.2	0	0.0
Q	535	509	95.1	20	3.7	1	0.2
R	1352	1295	95.8	30	2.2	0	0.0
S	249	236	94.8	12	4.8	0	0.0
T	416	391	94.0	7	1.7	0	0.0
U	1404	1315	93.7	45	3.2	1	0.1
V	591	579	98.0	9	1.5	0	0.0
W	380	374	98.4	2	0.5	0	0.0
X	325	312	96.0	9	2.8	0	0.0
Y	180	178	98.9	1	0.6	0	0.0
Z	1292	1249	96.7	27	2.1	1	0.1
AA	379	363	95.8	11	2.9	0	0.0
AB	674	625	92.7	19	2.8	0	0.0
AC	606	587	96.9	13	2.1	0	0.0
AD	292	278	95.2	10	3.4	0	0.0
AE	607	578	95.2	26	4.3	0	0.0
AF	630	602	95.6	21	3.3	1	0.2
AG	279	272	97.5	4	1.4	0	0.0
AH	897	853	95.1	35	3.9	0	0.0
AI	1215	1099	90.5	68	5.6	5	0.4
AJ	870	850	97.7	13	1.5	1	0.1

1.4 INTRA-OPERATIVE COMPLICATIONS

1.4.1 Intra-operative Complications by Years

The percentage of intra-operative complications declined further to 6.7% in 2009. The cumulative percentage throughout the years was 9.2%. The occurrences of PCR, vitreous loss and central corneal edema were decreasing. The occurrence of zonular dehiscence was initially decreasing then later leveled off. The more serious complications such as drop nucleus and suprachoroidal haemorrhage were not frequent and the trend remained unchanged.

Table 1.4.1(a): Distribution of Type of Intra-operative Complications, CSR 2002-2009

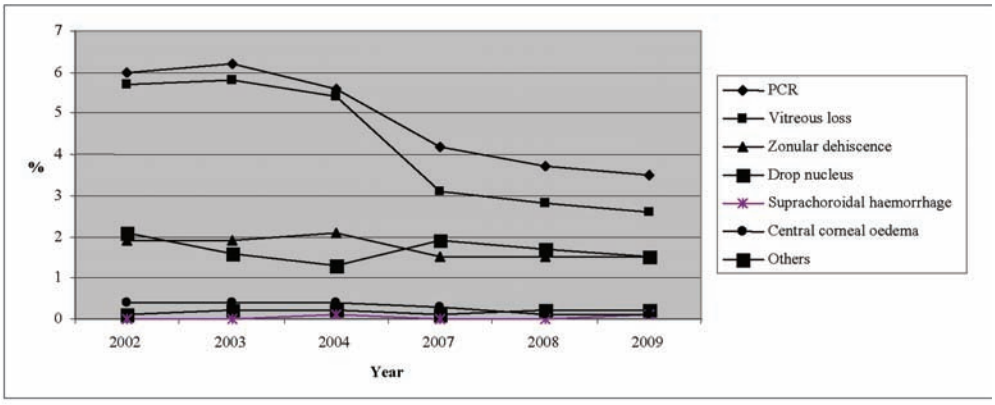
Year	2002		2003		2004		2007		2008		2009	
No. of patients (N)	12798		16815		18391		18380		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
Patient with intra-op complication	1328	10.4	1673	9.9	1730	9.4	1999	10.9	1636	7.6	1645	6.7
Types of complications												
PCR	773	6.0	1036	6.2	1025	5.6	764	4.2	798	3.7	858	3.5
Vitreous loss	734	5.7	979	5.8	994	5.4	569	3.1	608	2.8	642	2.6
Zonular dehiscence	246	1.9	327	1.9	380	2.1	275	1.5	322	1.5	372	1.5
Drop nucleus	13	0.1	27	0.2	34	0.2	21	0.1	33	0.2	40	0.2
Suprachoroidal haemorrhage	5	0.0	8	0.0	10	0.1	9	0.0	10	0.0	13	0.1
Central corneal oedema	56	0.4	73	0.4	78	0.4	58	0.3	27	0.1	22	0.1
Others	274	2.1	266	1.6	235	1.3	350	1.9	361	1.7	373	1.5

Table 1.4.1(b): Distribution of Type of Intra-operative Complications – Posterior Capsule Rupture, CSR 2002-2009

Year	2002*		2003*		2004*		2007*		2008		2009	
No. of patients (N)	12798		16815		18391		18380		21496		24438	
	n	%	n	%	n	%	n	%	n	%	n	%
Patient with intra-op complication	1328	10.4	1673	9.9	1730	9.4	1999	10.9	1636	7.6	1645	6.7
Types of complications												
PCR and Others	773	6.0	1036	6.2	1025	5.6	764	4.2	798	3.7	858	3.5
PCR Only									347	1.6	403	1.6

**Data from 2002-2007 could not be analyzed due to improper organized old data.*

Figure 1.4.1: Distribution of Specific Type of Intra-operative Complications, CSR 2002-2009



1.4.2 Intra-operative Complication by Type of Surgery

Similar to previous years, phacoemulsification demonstrated the lowest rate of intra-operative complication in 2009. It was followed by ECCE and lens aspiration. Although the percentage of intra-operative complications in phaco, ECCE and lens aspiration improved over the years, the percentage of intra-operative complication in ICCE and 'phaco converted to ECCE' showed an increasing trend.

Table 1.4.2(a): Intra-operative Complications by Types of Cataract Surgery, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
Phaco	438	8.6	667	8.7	747	8.0	969	8.1	753	5.1	787	4.4
ECCE	684	9.9	697	8.7	680	8.7	691	12.5	532	9.5	460	8.4
Lens Aspiration	51	13.7	50	11.5	58	10.5	51	15.8	31	9.1	38	9.5
ICCE	27	33.3	39	41.5	50	48.5	63	44.7	60	46.5	64	47.8
Phaco ECCE	128	41.2	206	43.9	177	39.0	225	52.1	240	45.8	276	48.2
Others	-	-	14	10.7	18	10.5	-	-	16	25.8	8	10.8
Missing	-	-	-	-	-	-	9	20.0	4	12.1	12	14.5

Figure1.4.2: Intra-operative Complications by Types of Cataract Surgery, CSR 2002-2009

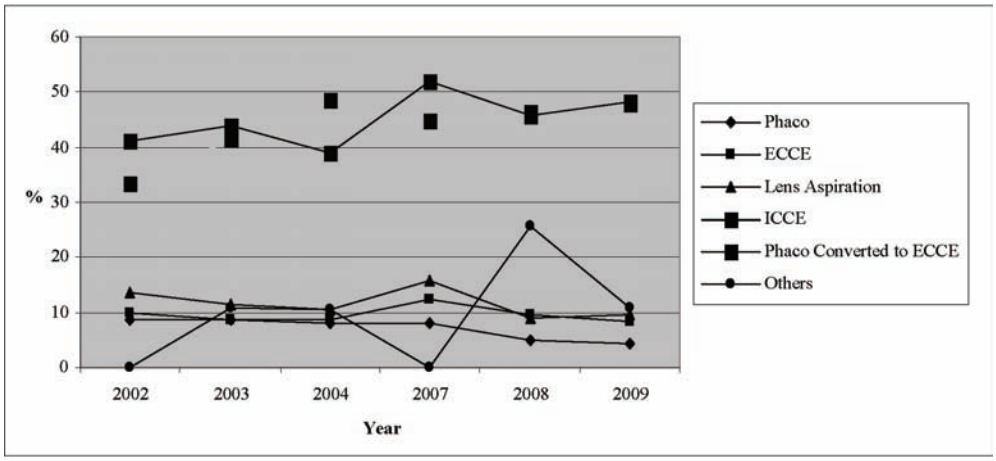


Table 1.4.2(b): Distribution of Types of Intra-operative Complications by Specific Types of Cataract Surgery, CSR 2009

	All Surgeries		Phaco		ECCE		Lens Aspiration		ICCE		Phaco Converted to ECCE		Others	
Number of patients (N)	24438		17717		5457		400		134		573		74	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Any intra-op complication	1645	6.7	787	4.4	460	8.4	38	9.5	64	47.8	276	48.2	8	10.8
Posterior capsule rupture	858	3.5	471	2.7	216	4.0	22	5.5	8	6.0	135	23.6	1	1.4
Vitreous loss	642	2.6	267	1.5	187	3.4	12	3.0	40	29.9	130	22.7	3	4.1
Zonular dehiscene	372	1.5	137	0.8	103	1.9	6	1.5	28	20.9	89	15.5	4	5.4
Drop nucleus	40	0.2	28	0.2	2	0.0	0	0.0	1	0.7	7	1.2	1	1.4
Suprachoroidal haemorrhage	13	0.1	3	0.0	6	0.1	1	0.3	1	0.7	2	0.3	0	0.0
Central corneal oedema	22	0.1	15	0.1	2	0.0	0	0.0	1	0.7	4	0.7	0	0.0
Others	373	1.5	177	1.0	120	2.2	11	2.8	13	9.7	49	8.6	1	1.4

Table 1.4.2(c): Distribution of Types of Intra-operative Complications by SDP, CSR 2009

Year	Number of patients	Any intra-op complication		PCR		Vitreous loss		Zonular Dehiscence		Drop nucleus		Suprachoroidal Haemorrhage		Central Corneal Edema		Others	
	(N)	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
All Centres	24438	1645	6.7	858	3.5	642	2.6	372	1.5	40	0.2	13	0.1	22	0.1	373	1.5
A	1110	51	4.6	22	2	13	1.2	15	1.4	1	0.1	1	0.1	0	0	14	1.3
B	433	32	7.4	14	3.2	12	2.8	11	2.5	0	0	0	0	0	0	7	1.6
C	602	37	6.1	26	4.3	26	4.3	4	0.7	0	0	0	0	2	0.3	3	0.5
D	124	18	14.5	10	8.1	8	6.5	4	3.2	0	0	0	0	1	0.8	2	1.6
E	743	54	7.3	16	2.2	11	1.5	12	1.6	0	0	1	0.1	1	0.1	28	3.8
F	158	28	17.7	3	1.9	10	6.3	3	1.9	0	0	0	0	0	0	16	10.1
G	2137	89	4.2	48	2.2	43	2	31	1.5	2	0.1	1	0	0	0	7	0.3
H	399	13	3.3	11	2.8	0	0	0	0	0	0	0	0	0	0	2	0.5
I	31	2	6.5	1	3.2	1	3.2	0	0	0	0	0	0	0	0	0	0
J	911	49	5.4	33	3.6	18	2	11	1.2	0	0	0	0	0	0	5	0.5
K	175	7	4	4	2.3	1	0.6	1	0.6	0	0	0	0	0	0	2	1.1

L	1405	66	4.7	35	2.5	28	2	15	1.1	1	0.1	0	0	0	0	19	1.4
M	290	13	4.5	7	2.4	4	1.4	3	1	1	0.3	0	0	1	0.3	3	1
N	743	72	9.7	35	4.7	20	2.7	3	0.4	1	0.1	0	0	0	0	35	4.7
O	1387	121	8.7	84	6.1	52	3.7	18	1.3	6	0.4	2	0.1	0	0	18	1.3
P	404	12	3	5	1.2	1	0.2	0	0	1	0.2	0	0	1	0.2	5	1.2
Q	542	57	10.5	29	5.4	16	3	14	2.6	0	0	0	0	0	0	15	2.8
R	1374	97	7.1	46	3.3	52	3.8	43	3.1	2	0.1	2	0.1	0	0	11	0.8
S	251	19	7.6	9	3.6	11	4.4	8	3.2	1	0.4	1	0.4	0	0	2	0.8
T	433	34	7.9	16	3.7	6	1.4	2	0.5	1	0.2	0	0	1	0.2	16	3.7
U	1418	84	5.9	42	3	38	2.7	21	1.5	8	0.6	0	0	0	0	17	1.2
V	598	62	10.4	32	5.4	15	2.5	8	1.3	1	0.2	0	0	2	0.3	19	3.2
W	387	22	5.7	6	1.6	12	3.1	2	0.5	0	0	0	0	0	0	4	1
X	327	14	4.3	7	2.1	4	1.2	5	1.5	0	0	0	0	0	0	3	0.9
Y	185	8	4.3	2	1.1	1	0.5	3	1.6	2	1.1	0	0	0	0	3	1.6
Z	1318	96	7.3	57	4.3	43	3.3	31	2.4	1	0.1	0	0	1	0.1	8	0.6
AA	387	29	7.5	19	4.9	13	3.4	1	0.3	2	0.5	0	0	0	0	7	1.8
AB	684	22	3.2	9	1.3	11	1.6	9	1.3	0	0	0	0	0	0	5	0.7
AC	612	45	7.4	22	3.6	24	3.9	15	2.5	2	0.3	0	0	0	0	11	1.8
AD	298	14	4.7	9	3	5	1.7	2	0.7	0	0	0	0	0	0	4	1.3
AE	612	50	8.2	22	3.6	25	4.1	15	2.5	0	0	0	0	0	0	15	2.5
AF	640	80	12.5	28	4.4	26	4.1	15	2.3	1	0.2	0	0	10	1.6	33	5.2
AG	293	15	5.1	5	1.7	4	1.4	2	0.7	2	0.7	0	0	0	0	7	2.4
AH	904	62	6.9	27	3	26	2.9	21	2.3	0	0	1	0.1	0	0	14	1.5
AI	1229	112	9.1	79	6.4	48	3.9	17	1.4	3	0.2	2	0.2	1	0.1	5	0.4
AJ	893	59	6.6	38	4.3	14	1.6	7	0.8	1	0.1	2	0.2	1	0.1	8	0.9

Table 1.4.2(d): Distribution of Types of Intra-operative Complications in "Phaco Converted to ECCE" by SDP, CSR 2009

Year	Number of patients	Any intra-op complication		PCR		Vitreous loss		Zonular Dehiscence		Drop nucleus		Suprachoroidal Haemorrhage		Central Corneal Edema		Others	
	(N)	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
All Centres	573	276	48.2	135	23.6	130	22.7	89	15.5	7	1.2	2	0.3	4	0.7	49	8.6
A	25	8	32	4	16	3	12	2	8	0	0	0	0	0	0	2	8
B	8	7	87.5	2	25	1	12.5	4	50	0	0	0	0	0	0	1	12.5
C	14	5	35.7	1	7.1	4	28.6	0	0	0	0	0	0	1	7.1	0	0
D	6	6	100	3	50	2	33.3	2	33.3	0	0	0	0	1	16.7	0	0
E	9	6	66.7	4	44.4	4	44.4	1	11.1	0	0	0	0	0	0	2	22.2
F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	17	10	58.8	3	17.6	7	41.2	6	35.3	0	0	0	0	0	0	1	5.9
H	4	3	75	2	50	0	0	0	0	0	0	0	0	0	0	1	25
I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
J	24	10	41.7	9	37.5	5	20.8	2	8.3	0	0	0	0	0	0	0	0
K	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L	57	13	22.8	8	14	6	10.5	2	3.5	0	0	0	0	0	0	3	5.3
M	29	2	6.9	2	6.9	2	6.9	0	0	0	0	0	0	0	0	0	0
N	10	9	90	5	50	5	50	2	20	0	0	0	0	0	0	2	20
O	29	16	55.2	9	31	9	31	4	13.8	1	3.4	0	0	0	0	2	6.9
P	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q	19	15	78.9	8	42.1	6	31.6	6	31.6	0	0	0	0	0	0	0	0
R	25	18	72	8	32	12	48	8	32	1	4	0	0	0	0	3	12
S	7	2	28.6	0	0	1	14.3	2	28.6	1	14.3	0	0	0	0	0	0
T	18	10	55.6	5	27.8	1	5.6	1	5.6	0	0	0	0	0	0	6	33.3
U	16	13	81.3	5	31.3	9	56.3	4	25	0	0	0	0	0	0	3	18.8
V	19	12	63.2	6	31.6	5	26.3	2	10.5	1	5.3	0	0	0	0	2	10.5
W	3	2	66.7	0	0	1	33.3	1	33.3	0	0	0	0	0	0	0	0
X	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Y	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Z	35	27	77.1	13	37.1	12	34.3	13	37.1	0	0	0	0	0	0	3	8.6
AA	19	7	36.8	5	26.3	4	21.1	0	0	0	0	0	0	0	0	1	5.3
AB	28	12	42.9	4	14.3	7	25	8	28.6	0	0	0	0	0	0	2	7.1
AC	11	5	45.5	3	27.3	3	27.3	1	9.1	0	0	0	0	0	0	1	9.1
AD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AE	26	7	26.9	1	3.8	4	15.4	5	19.2	0	0	0	0	0	0	2	7.7
AF	27	21	77.8	12	44.4	7	25.9	3	11.1	1	3.7	0	0	2	7.4	8	29.6
AG	9	4	44.4	2	22.2	1	11.1	0	0	1	11.1	0	0	0	0	1	11.1
AH	24	14	58.3	5	20.8	7	29.2	7	29.2	0	0	0	0	0	0	2	8.3
AI	28	8	28.6	4	14.3	2	7.1	3	10.7	1	3.6	1	3.6	0	0	0	0
AJ	19	4	21.1	2	10.5	0	0	0	0	0	0	1	5.3	0	0	1	5.3

1.4.3 Intra-operative Complications by Combined Surgery

The intra-operative complications were higher in combined surgery when compared to cataract surgery alone. PCR and vitreous loss remained the commonest complications encountered.
Higher percentages of intra-operative complication were noted when cataract surgeries were combined with VR, filtering surgery and pterygium excision. For cataract surgery combined with VR surgery, the intra-operative complication percentages were declining and vitreous loss specifically showed a downward trend over the years. The other types of intra-operative complications in VR and the percentages of intra-operative complications when combined with filtering surgery or pterygium excision did not reveal any particular trend.

Table 1.4.3(a): Distribution of Intra-operative Complications by Any Combined Surgery, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
Number of combined surgery (N)	375		581		733		891		664		871	
	n	%	n	%	n	%	n	%	N	%	n	%
Any intra-operative complication	64	17.1	105	18.1	120	16.4	131	14.7	89	10.0	113	13.0
Types of complications												
PCR	35	9.3	60	10.3	77	10.5	56	6.3	54	6.1	62	7.1
Vitreous loss	46	12.3	66	11.4	72	9.8	41	4.6	40	4.5	51	5.9
Zonular dehiscence	18	4.8	22	3.8	23	3.1	21	2.4	15	1.7	21	2.4
Drop nucleus	3	0.8	5	0.9	5	0.7	4	0.4	3	0.3	8	0.9
Suprachoroidal haemorrhage	0	0.0	0	0.0	4	0.5	0	0.0	0.0	0.0	4	0.5
Central corneal oedema	1	0.3	10	1.7	4	0.5	7	0.8	3	0.3	1	0.1
Others	12	3.2	18	3.1	16	2.2	30	3.4	14	1.6	21	2.4

Table 1.4.3(b): Distribution of Intra-operative Complications by Specific Combined Surgery, CSR 2009

	All Surgeries		Any Combined Surgery		Pterygium Surgery		Filtering Surgery		Vitreo-Retinal Surgery		Penetrating Keratoplasty		Others	
Number of patients (N)	24438		871		100		132		402		6		259	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Any intra-op complication	1645	6.7	113	13.0	9	9.0	16	12.1	32	8.0	0	0.0	62	23.9
Posterior capsule rupture	858	3.5	62	7.1	4	4.0	4	3.0	18	4.5	0	0.0	38	14.7
Vitreous loss	642	2.6	51	5.9	4	4.0	7	5.3	5	1.2	0	0.0	36	13.9
Zonular dehiscene	372	1.5	21	2.4	1	1.0	5	3.8	2	0.5	0	0.0	13	5.0
Drop nucleus	40	0.2	8	0.9	0	0.0	0	0.0	6	1.5	0	0.0	2	0.8
Suprachoroidal haemorrhage	13	0.1	4	0.5	0	0.0	2	1.5	2	0.5	0	0.0	2	0.8
Central corneal oedema	22	0.1	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	1	0.4
Others	373	1.5	21	2.4	3	3.0	3	2.3	5	1.2	0	0.0	12	4.6

Table 1.4.3(c): Distribution of Intra-operative Complications when Combined with Filtering Surgery, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
N	148		210		235		131		142		132	
	n	%	n	%	n	%	n	%	n	%	n	%
Any intra-op complication	20	14.0	18	9.0	24	10.0	24	18.3	9	6.3	16	12.1
Posterior capsule rupture	2	1.0	3	1.0	3	1.0	9	6.9	3	2.1	4	3.0
Vitreous loss	11	7.0	7	3.0	14	6.0	7	5.3	5	3.5	7	5.3
Zonular dehiscence	3	2.0	1	0.0	1	0.0	4	3.1	3	2.1	5	3.8
Drop nucleus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Suprachoroidal haemorrhage	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	1.5
Central corneal oedema	0	0.0	3	1.0	1	0.0	3	2.3	2	1.4	0	0.0
Others	6	3.0	4	2.0	4	2.0	5	3.8	1	0.7	3	2.3

Table 1.4.3(d): Distribution of Intra-operative Complications when Combined with VR Surgery, CSR 2002-2009

Year	2002		2003		2004		2007		2008		2009	
N	26		100		186		435		237		402	
	n	%	n	%	n	%	n	%	n	%	n	%
Any intra-op complication	9	35.0	24	24.0	25	13.0	45	10.3	21	8.9	32	8.0
Posterior capsule rupture	0	0.0	4	4.0	11	6.0	18	4.1	17	7.2	18	4.5
Vitreous loss	5	19.0	12	12.0	8	5.0	11	2.5	6	2.5	5	1.2
Zonular dehiscence	0	0.0	2	2.0	3	2.0	6	1.4	1	0.4	2	0.5
Drop nucleus	1	4.0	2	2.0	3	2.0	3	0.7	2	0.8	6	1.5
Suprachoroidal haemorrhage	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.5
Central corneal oedema	0	0.0	2	2.0	1	1.0	3	0.7	0	0.0	0	0.0
Others	3	12.0	4	4.0	2	1.0	12	2.8	3	1.3	5	1.2

1.4.4 Intra-operative Complications by Types of Local Anaesthesia

Subconjunctival anaesthesia was associated with higher percentages of intra-operative complications except for the year 2002 and 2004. The complications were mainly PCR and vitreous loss. However, the higher percentages in these patients could also be due to the occurrence of complication prompting the use of subconjunctival injection as additional anaesthesia.

Table 1.4.4: Intra-operative Complications by Types of Local Anaesthesia, CSR 2009

	All Local Anaesthesia		Retrobulbar		Peribulbar		Subtenon		Sub-Conjunctival		Facial Block		Topical		Intracameral	
N	22776		1038		1244		11525		437		95		8383		1596	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Any intra-op complication	1527	6.7	52	5.0	105	8.4	932	8.1	35	8.0	7	7.4	424	5.1	85	5.3
Posterior capsule rupture	813	3.6	25	2.4	50	4.0	477	4.1	22	5.0	1	1.1	246	2.9	45	2.8
Vitreous loss	599	2.6	14	1.3	44	3.5	378	3.3	16	3.7	2	2.1	163	1.9	32	2.0
Zonular dehiscene	331	1.5	11	1.1	23	1.8	221	1.9	7	1.6	1	1.1	75	0.9	20	1.3
Drop nucleus	37	0.2	4	0.4	2	0.2	21	0.2	1	0.2	0	0.0	10	0.1	1	0.1
Suprachoroidal haemorrhage	10	0.0	2	0.2	2	0.2	4	0.0	0	0.0	0	0.0	3	0.0	0	0.0
Central corneal oedema	22	0.1	0	0.0	0	0.0	19	0.2	0	0.0	0	0.0	2	0.0	1	0.1
Other	346	1.5	12	1.2	23	1.8	206	1.8	8	1.8	4	4.2	101	1.2	18	1.1

Number or Percentage may be more than total or 100% as patient might have more than one intra-operative complication

1.4.5 Intra-operative Complications by Surgeon Status

Intra-operative complications were highest in surgeries performed by the gazetting specialists. The percentages which were initially increasing appeared to decline in 2009. The complications were mainly PCR and vitreous loss.
Although the occurrence of central corneal edema or significant damage to iris was low among the specialists, the occurrence of other complications was still relatively high. There was no specific trend observed in the types of intra-operative complications among the categories of surgeons.

Table 1.4.5(a): Percentage of Intra-operative Complications by Surgeon Status, CSR 2002-2009

(i) Specialist

Year	2003		2004		2007		2008*		2009	
N	12072		13165		14327		16846		19400	
	n	%	n	%	n	%	n	%	n	%
Any intra-operative complication	1144	9.5	1170	8.9	1485	10.4	1144	6.8	1218	6.3
PCR	199	2.7	180	1.4	546	3.8	538	3.2	610	3.1
Vitreous loss	520	4.3	515	3.9	405	2.8	417	2.5	474	2.4
Zonular dehiscense	151	1.3	163	1.2	204	1.4	232	1.4	293	1.5
Drop nucleus	22	0.2	28	0.2	20	0.1	24	0.1	30	0.2
Suprachoroidal hemorrhage	6	0.1	8	0.1	5	0.0	3	0.0	10	0.1
Central corneal edema	42	0.4	40	0.3	50	0.4	19	0.1	13	0.1
Others	171	1.4	158	1.2	261	1.8	279	1.7	289	1.5

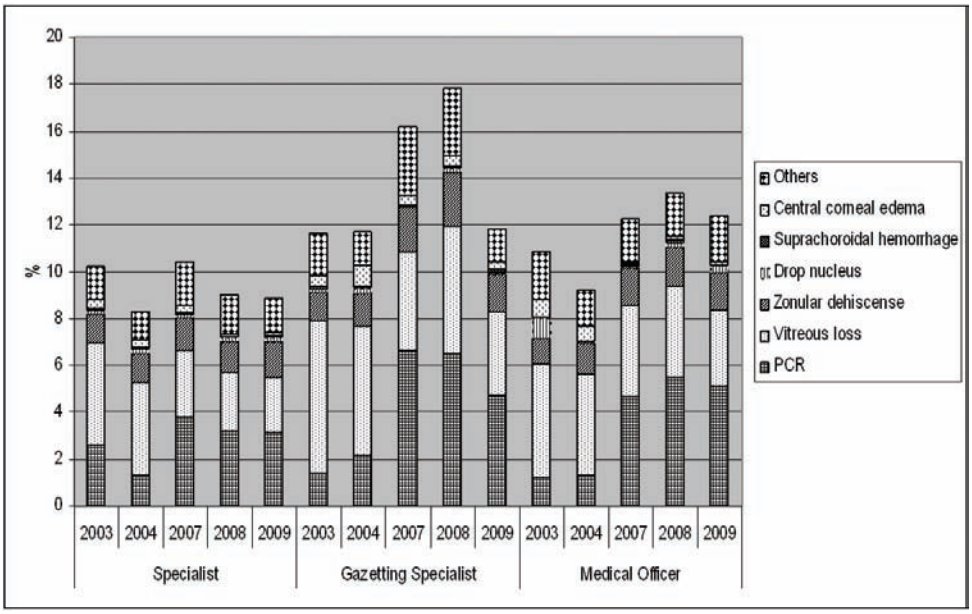
(ii) Gazetting Specialist

Year	2003		2004		2007		2008*		2009	
N	1510		1757		1276		1399		2053	
	n	%	n	%	n	%	n	%	n	%
Any intra-operative complication	185	12.3	222	12.6	175	13.7	167	11.9	171	8.3
PCR	21	1.4	38	2.2	85	6.7	91	6.5	96	4.7
Vitreous loss	99	6.6	97	5.5	54	4.2	76	5.4	73	3.6
Zonular dehiscense	18	1.2	25	1.4	24	1.9	32	2.3	33	1.6
Drop nucleus	2	0.1	4	0.2	0	0.0	3	0.2	3	0.1
Suprachoroidal hemorrhage	2	0.1	1	0.1	1	0.1	1	0.1	2	0.1
Central corneal edema	7	0.5	16	0.9	5	0.4	5	0.4	7	0.3
Others	27	1.8	25	1.4	37	2.9	37	2.9	28	1.4

(iii) Medical Officer

Year	2003		2004		2007		2008*		2009	
N	3233		3470		2690		2697		2750	
	n	%	n	%	n	%	n	%	n	%
Any intra-operative complication	344	10.6	338	9.7	330	12.3	264	9.8	242	8.8
PCR	40	1.2	47	1.4	126	4.7	148	5.5	139	5.1
Vitreous loss	157	4.9	148	4.3	105	3.9	105	3.9	92	3.3
Zonular dehiscense	34	1.1	46	1.3	43	1.6	46	1.7	45	1.6
Drop nucleus	3	0.9	2	0.1	1	0.0	4	0.2	7	0.3
Suprachoroidal hemorrhage	0	-	1	0.0	3	0.1	4	0.2	1	0.0
Central corneal edema	24	0.7	22	0.6	2	0.1	3	0.1	2	0.1
Others	68	2.1	52	1.5	51	1.9	51	1.9	56	2.0

Figure 1.4.5: Percentage Distribution of Intra-operative Complications by Surgeon Status, CSR 2002-2009



1.4.6 PCR

PCR among SDPs varied. Hospital D had the highest PCR among all the SDPs in 2009.

Table 1.4.6: PCR by SDP, CSR 2007-2009

Year	2007			2008			2009		
	N	n	%	N	n	%	N	n	%
A	652	10	1.5	986	29	2.9	1110	22	2.0
B	33	0	0.0	208	3	1.4	433	14	3.2
C	550	20	3.6	573	14	2.4	602	26	4.3
D	0	0	0	30	1	3.3	124	10	8.1
E	697	18	2.6	487	8	1.6	743	16	2.2
F	0	0	0.0	137	3	2.2	158	3	1.9
G	1556	77	4.9	1723	59	3.4	2137	48	2.2
H	318	8	2.5	400	3	0.8	399	11	2.8
I	0	0	0.0	34	1	2.9	31	1	3.2
J	807	38	4.7	739	33	4.5	911	33	3.6
K	125	2	1.6	170	7	4.1	175	4	2.3
L	0	0	0	40	3	7.5	1405	35	2.5
M	201	4	2.0	282	11	3.9	290	7	2.4
N	525	34	6.5	726	35	4.8	743	35	4.7
O	1518	87	5.7	1681	106	6.3	1387	84	6.1
P	18	2	11.1	396	7	1.8	404	5	1.2
Q	349	4	1.1	338	14	4.1	542	29	5.4
R	1102	92	8.3	1357	77	5.7	1374	46	3.3
S	199	8	4.0	256	8	3.1	251	9	3.6
T	565	20	3.5	351	3	0.9	433	16	3.7
U	1400	47	3.4	1429	56	3.9	1418	42	3.0
V	697	43	6.2	696	36	5.2	598	32	5.4
W	380	10	2.6	263	9	3.4	387	6	1.6
X	152	10	6.6	350	11	3.1	327	7	2.1
Y	100	3	3.0	180	9	5.0	185	2	1.1
Z	1520	28	1.8	1376	28	2.0	1318	57	4.3
AA	165	9	5.5	319	14	4.4	387	19	4.9
AB	497	23	4.6	633	14	2.2	684	9	1.3
AC	278	7	2.5	379	10	2.6	612	22	3.6
AD	189	5	2.6	317	10	3.2	298	9	3.0
AE	668	19	2.8	588	16	2.7	612	22	3.6
AF	443	27	6.1	531	28	5.3	640	28	4.4
AG	25	1	4.0	395	20	5.1	293	5	1.7
AH	1040	40	3.8	1217	34	2.8	904	27	3.0
AI	954	40	4.2	898	40	4.5	1229	79	6.4
AJ	998	33	3.3	1011	38	3.8	893	38	4.3

Figure 1.4.6(a): PCR by SDP, CSR 2009-Bar Chart (National KPI set at 5.0%)

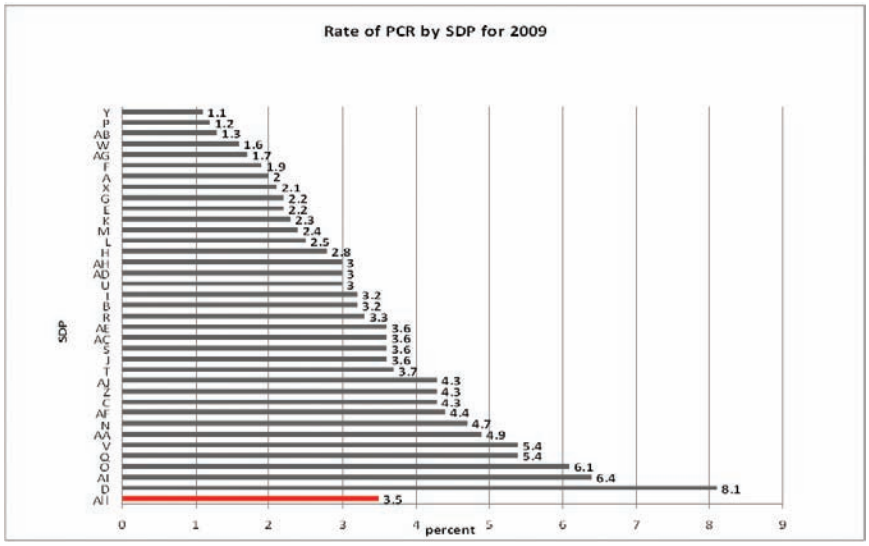
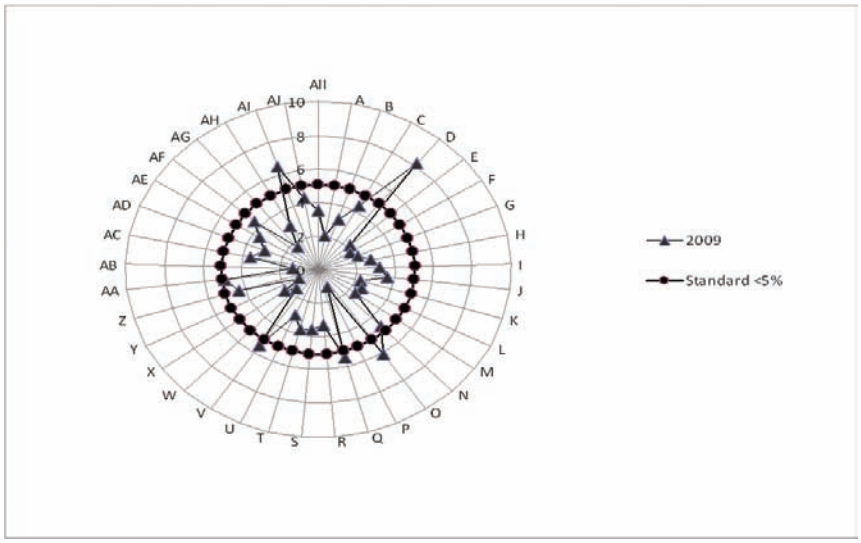


Figure 1.4.6(b): PCR by SDP, CSR 2007-2009-Radar Chart (National KPI set at <5%)



1.4.7 PCR by Type of Cataract Surgery

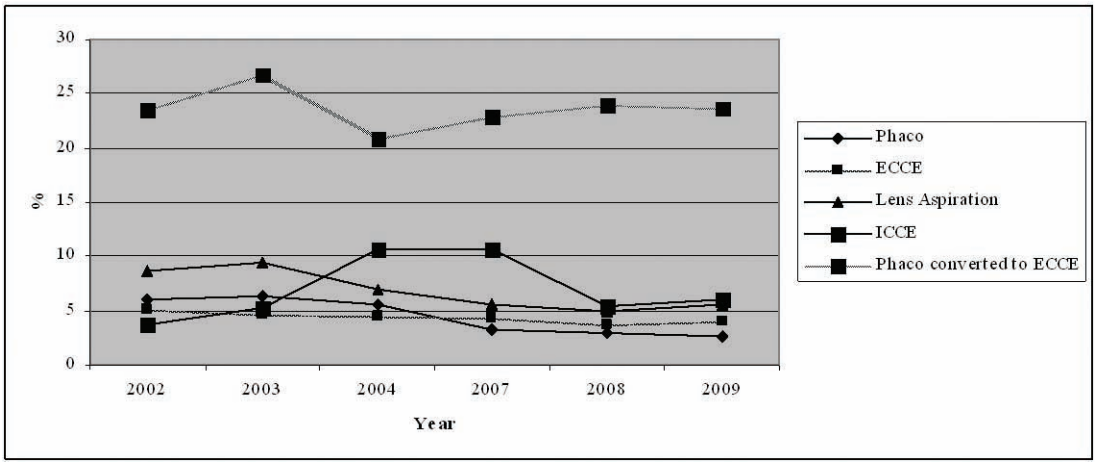
From the year 2002-2004, the percentage of PCR for phaco was higher than ECCE. From 2007 onwards, it demonstrated otherwise. In general, both the PCR percentages for phaco and ECCE were in downward trend over the years.

Table 1.4.7: PCR by Type of Cataract Surgery, CSR 2002-2009

Year	2002			2003			2004		
No. of patients		12798			16815			18391	
Total PCR		773			1036			1013	
	N	n	%	N	n	%	N	n	%
Phaco	5085	309	6.1	7674	489	6.4	9282	513	5.5
ECCE	6914	356	5.1	8012	374	4.7	7830	356	4.5
Lens Aspiration	372	32	8.6	435	41	9.4	550	38	6.9
ICCE	311	3	3.7	469	5	5.3	454	11	10.7
Phaco converted to ECCE	81	73	23.5	94	125	26.7	103	95	20.9

Year	2007			2008			2009		
No. of patients		18380			21496			24438	
Total PCR		764			790			858	
	N	n	%	N	n	%	N	n	%
Phaco	11960	393	3.3	14781	432	2.9	17717	471	2.7
ECCE	5524	239	4.3	5627	210	3.7	5457	216	4.0
Lens Aspiration	323	18	5.6	340	17	5.0	400	22	5.5
ICCE	432	15	10.6	524	7	5.4	134	8	6.0
Phaco converted to ECCE	141	99	22.9	129	124	24.0	573	135	23.6

Figure 1.4.7: PCR by Type of Cataract Surgery, CSR 2002-2009



1.5 CATARACT SURGERY OUTCOME

1.5.1 Post-operative Complications

All eyes had post-operative complication records in 2002 and 2003. In general, the ascertainment was above 80.0%. With exclusion for 2004, the ascertainment for the visual outcome appeared to be declining over the years.

Table 1.5.1: Distribution of Cataract Surgery with Post-operative Complication Record, CSR 2002-2009

Year	2002	2003	2004	2007	2008	2009
Total number of cataract surgery registered to CSR	12798	16815	18392	18426	21496	24438
Cataract surgery with post-operative complication record	12798	16815	15996	17604	20521	21851
Ascertainment on post-operative complication (%)	100	100	87.0	95.5	95.5	89.4
Cataract surgery with visual outcome record	12512	14683	6228	15786	19063	20590
Ascertainment on visual outcome (%)	97.7	87.3	33.9	85.7	88.7	84.3

1.5.1.1 Post-operative Infectious Endophthalmitis

The occurrence of post-operative infectious endophthalmitis appeared to be decreasing over the years. It was an improvement with only 0.9 cases in 1000 cataract surgeries performed in MOH hospitals. The mean duration from the time of surgery to diagnosis of infection for eyes operated in 2007 onwards was 3 weeks.

Table 1.5.1.1(a): Post-operative Infectious Endophthalmitis, CSR 2002-2009

Year	2002	2003	2004	2007	2008	2009
Eyes with post-operative complication records (N)	12798	16815	15996	17604	20521	21851
Eyes with post-operative infectious endophthalmitis (n)	25	41	25	37	22	19
Percentage of eyes with post-operative endophthalmitis (%)	0.2	0.24	0.16	0.21	0.11	0.09

Figure 1.5.1.1(a): Post-operative Infectious Endophthalmitis, CSR 2002-2009

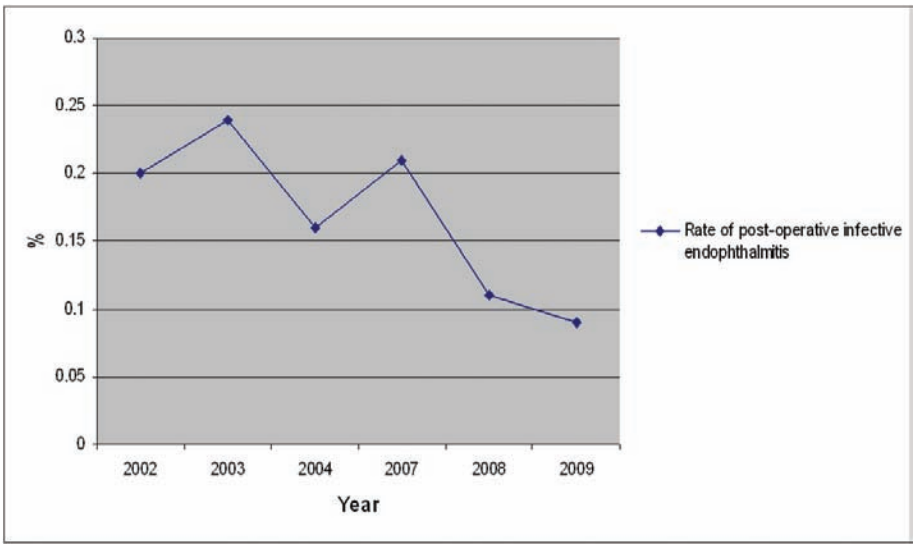


Figure 1.5.1.1(b-i): Post-operative Infectious Endophthalmitis, by SDP CSR 2007

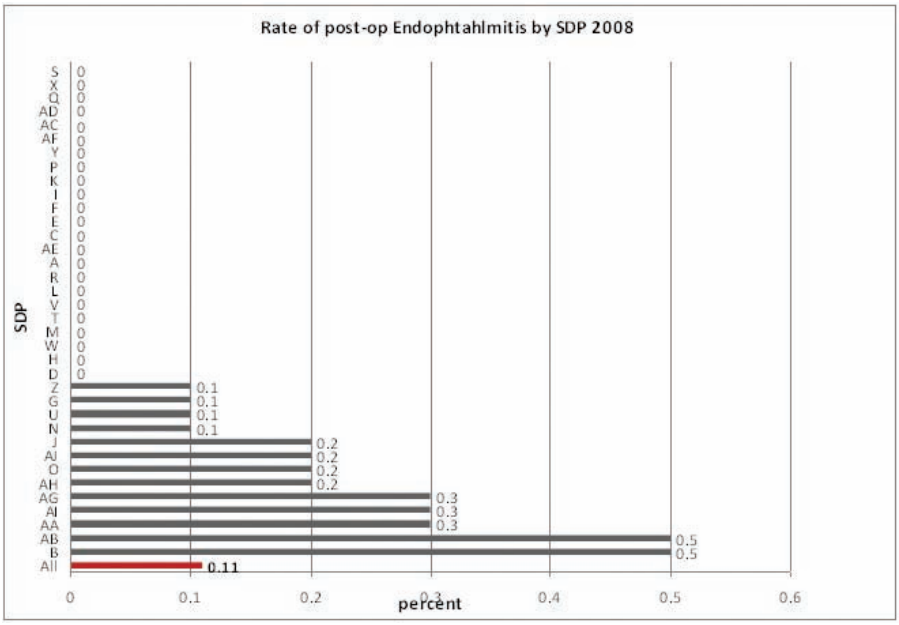


Figure 1.5.1.1(b-ii): Post-operative Infectious Endophthalmitis, by SDP CSR 2008

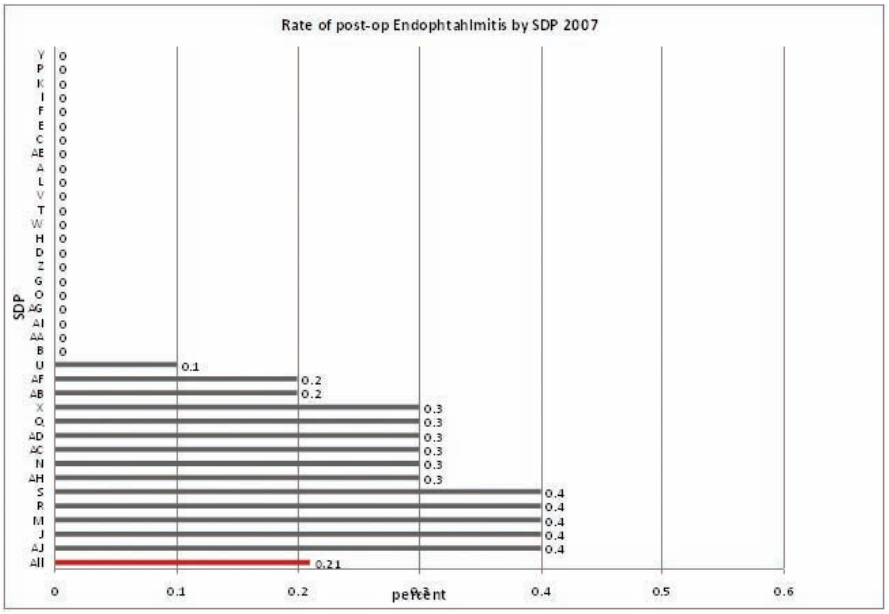


Figure 1.5.1.1(b-iii): Post-operative Infectious Endophthalmitis, by SDP CSR 2009

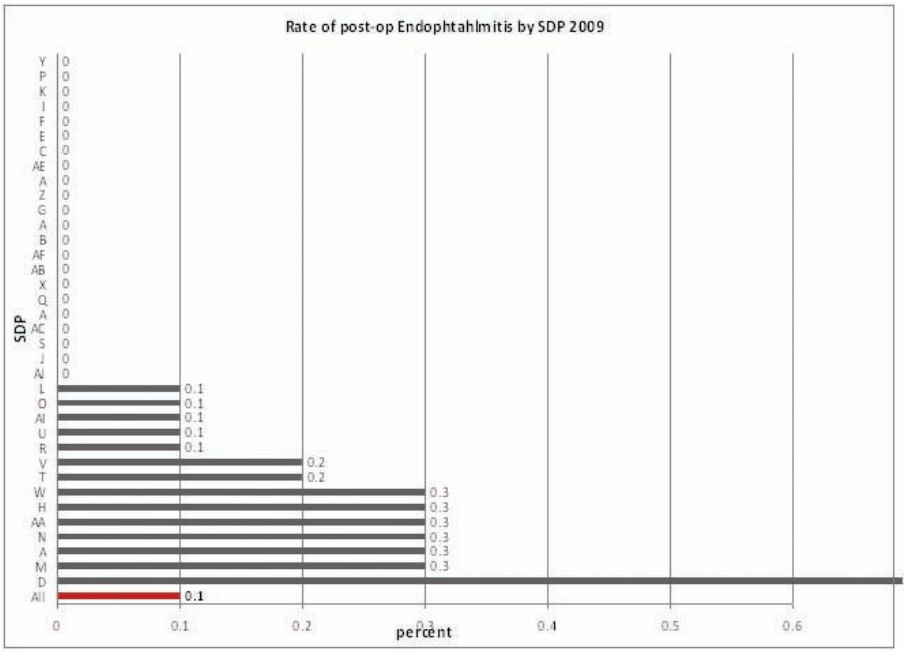


Figure 1.5.1.1(c-i): Post-operative Infectious Endophthalmitis, by SDP CSR 2007

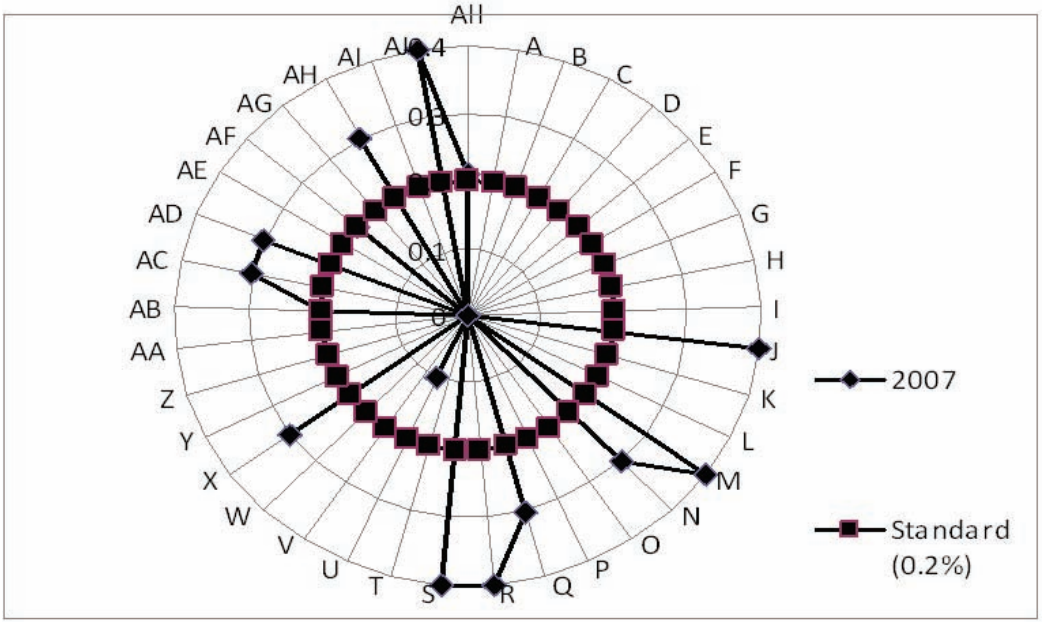


Figure 1.5.1.1(c-ii): Post-operative Infectious Endophthalmitis, by SDP CSR 2008

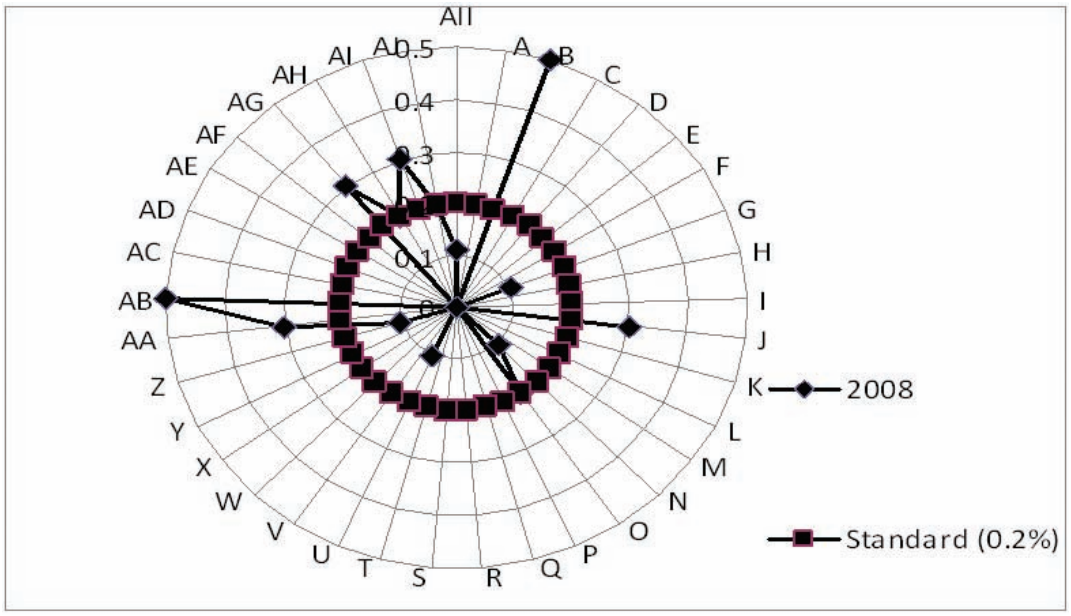


Figure 1.5.1.1(c-iii): Post-operative Infectious Endophthalmitis, by SDP CSR 2009

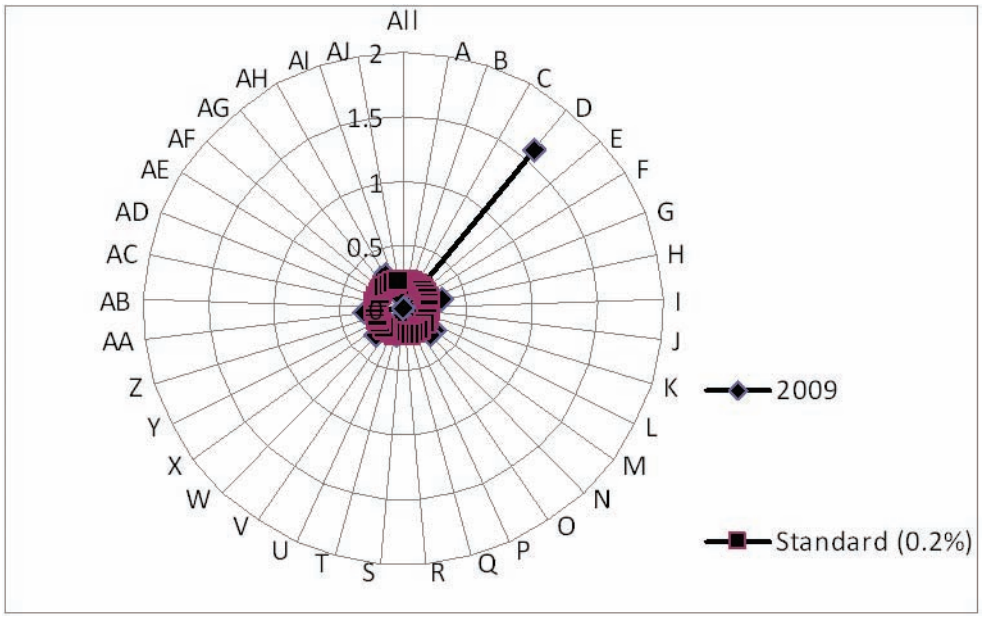


Table 1.5.1.1(b): Time from Surgery to Diagnosis of Post-operative Infectious Endophthalmitis, CSR 2007-2009

Year	2007	2008	2009
Number of patients with post-operative infective endophthalmitis	37	22	19
Time from surgery to diagnosis of infection (day)		**Days**	
Min	1	1	1
Max	92	76	103
Mean	21.6	20.6	20.4
Distribution of patients		**Number of Patients**	
Less than 3 days	2	5	5
3-5 days	4	1	1
6-14 days	8	5	5
More than 14 days	12	9	7
Missing	11	2	1

1.5.1.2 Unplanned Return to Operating Theatre (OT)

Data for unplanned return to OT were available for June to December 2004 and the whole year of 2007 onwards. The average percentage was 0.45% or 4.5 cases per 1000 cataract surgeries.
Iris prolapse, wound dehiscence and high post- operative IOP showed an initial decreasing trend but appeared to increase in 2009. IOL related problem demonstrated otherwise. The average time from surgery to return to OT was in the second week post-operatively

Table 1.5.1.2(a): Unplanned Return to OT, CSR 2004-2009

Year	*2004		2007		2008		2009	
Patients with outcome records (N)	9039		17604		20521		21851	
	n	%	n	%	n	%	n	%
Patients with unplanned return to OT (%)	31	0.34	87	0.50	88	0.43	116	0.53

** Data in 2004 available only from June-December*

Table 1.5.1.2(b): Reasons for Unplanned Return to OT, CSR 2004-2009

Year	*2004		2007		2008		2009	
	n	%	n	%	n	%	n	%
Iris prolapse	10	32.3	20	23.0	12	13.6	18	15.5
Wound dehiscence	7	22.6	13	14.9	7	8.0	22	19.0
High IOP	4	12.9	5	5.7	2	2.3	9	7.8
IOL related	2	6.5	10	11.5	14	15.9	15	12.9
Infective endophthalmitis	7	22.6	12	13.8	6	6.8	6	5.2
Others	9	29.0	38	43.7	48	54.5	53	45.7

** Data in 2004 available only for June-December*

Figure 1.5.1.2: Reasons for Unplanned Return to OT, CSR 2004-2009

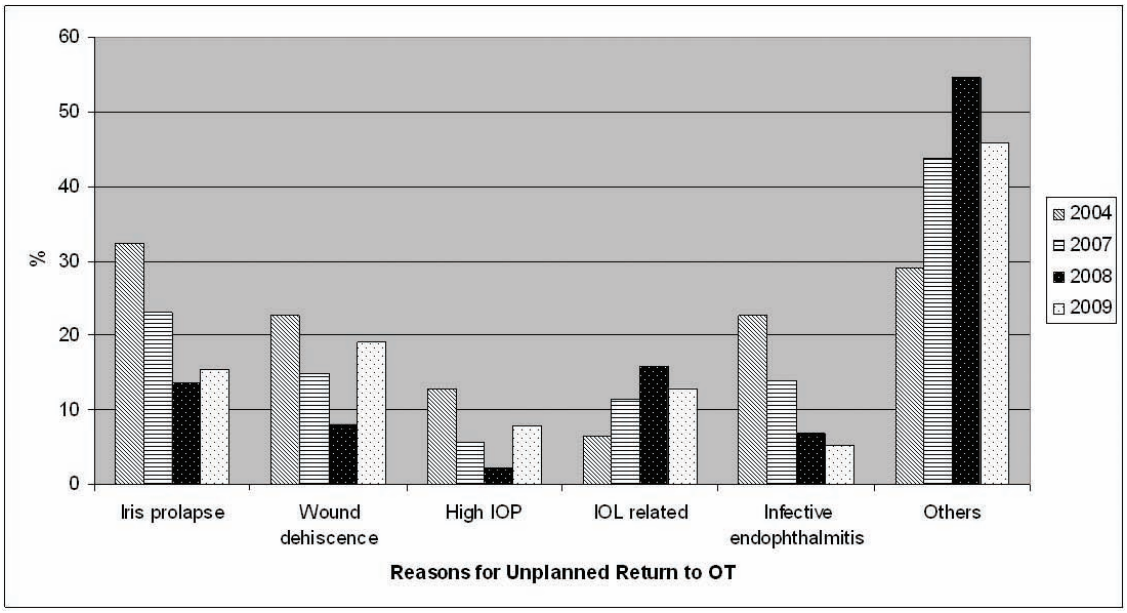


Table 1.5.1.2(c): Time from Surgery to Unplanned Return to OT, CSR 2009

Post-operative period (day)	N	Median	Min	Max	Mean
All cases	116	63	7	147	61
Iris prolapse	18	67	21	147	71
Wound dehiscence	22	70	14	98	59
High IOP	9	56	49	91	67
IOL related	15	53	7	77	53
Infective endophthalmitis	6	74	49	119	78
Others	53	63	7	147	57

1.5.1.3 Post-operative Follow-up Period

Most patients were followed up until 7 weeks post-operatively. Patients who had undergone 'phaco converted to ECCE' were followed up longer.

Table 1.5.1.3(a): Median Follow-up Period for Eyes with Unaided Vision (in weeks) by Types of Surgery, 2009

Types of surgery	N	Median	25th percentile	75th percentile
All surgeries	20557	7	6	10
Phaco	14933	7	6	10
ECCE	4692	8	6	11
Phaco ECCE	474	9	7	11
ICCE	106	7	5	10
Lens aspiration	294	7	6	10

Table 1.5.1.3(b): Median Follow-up Period for Eyes with Refracted Vision (in weeks) by Types of Surgery, 2009

Types of surgery	N	Median	25th percentile	75th percentile
All surgeries	18854	7	6	10
Phaco	13822	7	6	10
ECCE	4211	8	7	11
Phaco ECCE	449	9	7	11
ICCE	86	8	6	11
Lens aspiration	237	8	6	10

1.5.2 Post-operative Visual Acuity

1.5.2.1 Post-operative Visual Acuity (All Eyes)

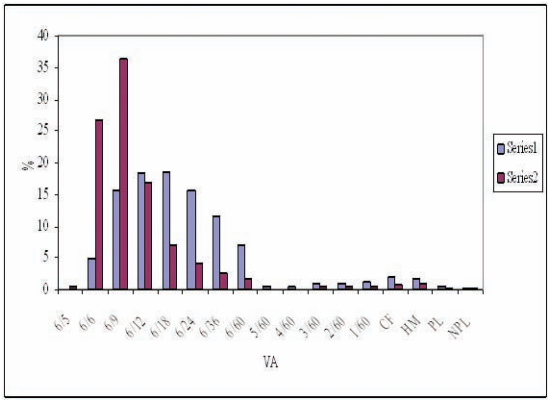
Only approximately 40.0% of eyes had vision unaided VA 6/12 or better i.e. good VA outcome. This percentage increased double folds following refraction. This trend remained unchanged throughout the years

Table 1.5.2.1: Post-operative Visual Acuity, All Eyes, CSR 2002-2009

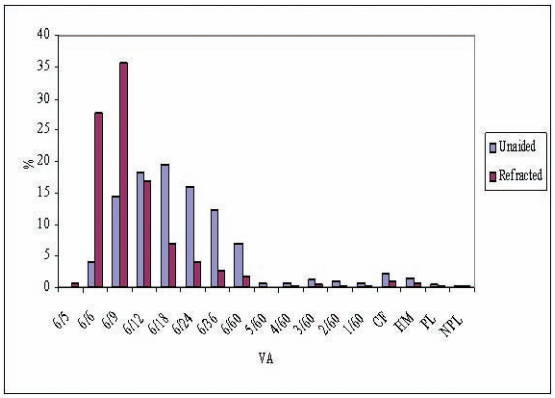
Year	2002				2003				2004				2007				2008				2009			
	Unaided		Refracted		Unaided		Refracted		Unaided		Refracted		Unaided		Refracted		Unaided		Refracted		Unaided		Refracted	
VA	n	%	n	%	n	%	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%
6/5	9	0.1	60	0.6	16	0.1	91	0.7	2	0.0	17	0.3	3	0.0	35	0.2	9	0	51	0.3	10	0	46	0.2
6/6	598	4.8	2784	26.8	648	4.1	3795	27.8	318	4.7	1659	28.6	878	5.6	4409	30.5	1126	5.9	6072	35.2	1100	5.3	6555	34.7
6/9	1968	15.7	3773	36.3	2286	14.5	4857	35.6	1011	15.0	2170	37.4	2806	17.8	4961	34.3	3040	15.9	5714	33.1	3649	17.7	6550	34.7
6/12	2294	18.3	1759	16.9	2858	18.2	2303	16.9	1230	18.3	920	15.8	2717	17.2	2100	14.6	3351	17.6	2577	14.9	3837	18.6	2762	14.6
6/5-6/12	4869	38.9	8376	80.7	5808	36.9	11046	81.0	2561	38.0	4766	82.1	6404	40.6	11505	79.6	7526	39.4	14414	83.5	8596	41.7	15913	84.3
6/18	2308	18.5	735	7.1	3046	19.4	970	7.1	1244	18.5	414	7.1	2893	18.3	1055	7.3	3792	19.9	1012	5.9	4052	19.7	1050	5.6
6/24	1954	15.6	410	4.0	2484	15.8	540	4.0	1130	16.8	205	3.5	2315	14.7	573	4	2978	15.6	607	3.5	2958	14.4	616	3.3
6/36	1452	11.6	279	2.7	1935	12.3	359	2.6	761	11.3	169	2.9	1687	10.7	444	3.1	2018	10.6	421	2.4	2095	10.2	416	2.2
6/60	868	6.9	166	1.6	1097	7.0	240	1.8	489	7.3	77	1.3	1126	7.1	266	1.9	1300	6.8	261	1.5	1323	6.4	276	1.5
5/60	77	0.6	13	0.1	124	0.8	15	0.1	56	0.8	7	0.1	92	0.6	23	0.2	116	0.6	37	0.2	93	0.5	27	0.1
4/60	64	0.5	13	0.1	114	0.7	29	0.2	40	0.6	6	0.1	87	0.6	35	0.2	97	0.5	30	0.2	103	0.5	31	0.2
3/60	127	1.0	43	0.4	173	1.1	56	0.4	73	1.1	27	0.5	207	1.3	80	0.6	266	1.4	112	0.6	331	1.6	118	0.6
6/18-3/60	6850	54.8	1659	16.0	8973	57.0	2209	16.2	3793	56.3	905	15.6	8407	53.3	2476	17.3	10567	55.4	2480	14.3	10955	53.2	2534	13.4
2/60	128	1.0	59	0.6	154	1.0	43	0.3	50	0.7	26	0.5	158	1.0	73	0.5	186	1	70	0.4	199	1	77	0.4
1/60	146	1.2	54	0.5	116	0.7	45	0.3	76	1.1	23	0.4	155	1.0	76	0.5	159	0.8	60	0.3	168	0.8	66	0.3
CF	231	1.9	86	0.8	345	2.2	134	1.0	132	2.0	35	0.6	300	1.9	121	0.8	295	1.5	85	0.5	315	1.5	127	0.7
HM	203	1.6	105	1.0	219	1.4	115	0.8	87	1.3	40	0.7	253	1.6	149	1	230	1.2	84	0.5	269	1.3	126	0.7
PL	54	0.4	27	0.3	77	0.5	33	0.2	25	0.4	6	0.1	75	0.5	46	0.3	53	0.3	22	0.1	58	0.3	31	0.2
NPL	31	0.3	19	0.2	49	0.3	20	0.2	15	0.2	6	0.1	34	0.2	0	0	32	0.2	0	0	30	0.1	12	0.1
2/60-NPL	793	6.3	350	3.4	960	6.1	390	2.9	385	5.7	136	2.3	975	6.2	465	3.1	955	5	321	1.8	1039	5	439	2.3
TOTAL	**12512**		**10385**		**15741**		**13645**		**6739**		**5807**		**15786**		**14446**		**19048**		**17215**		**20590**	**100**	**18886**	**100**

Figure 1.5.2.1(a): Percent Distribution of Post-operative Unaided and Refracted Visual Acuity, CSR 2002-2009

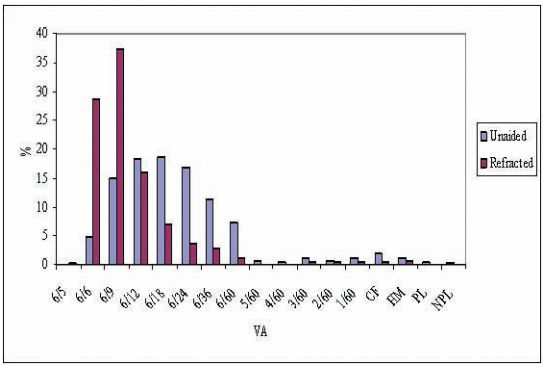
2002



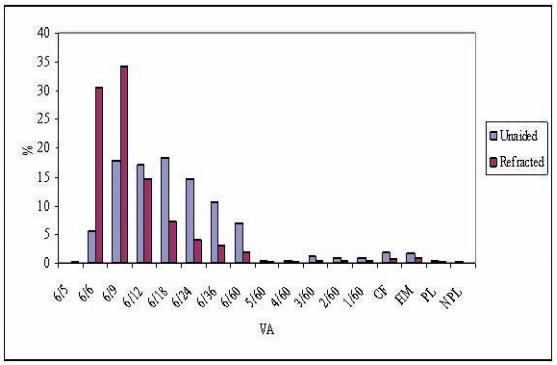
2003



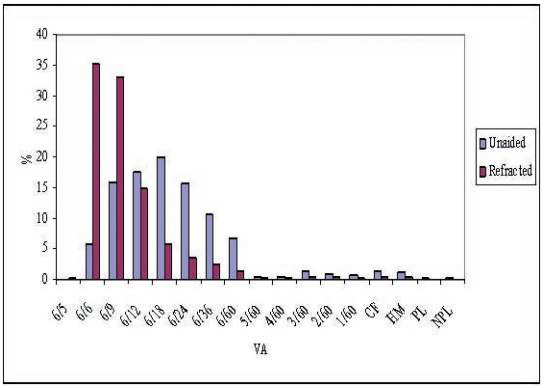
2004



2007



2008



2009

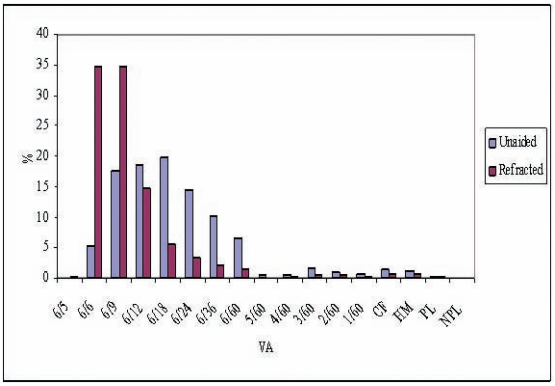
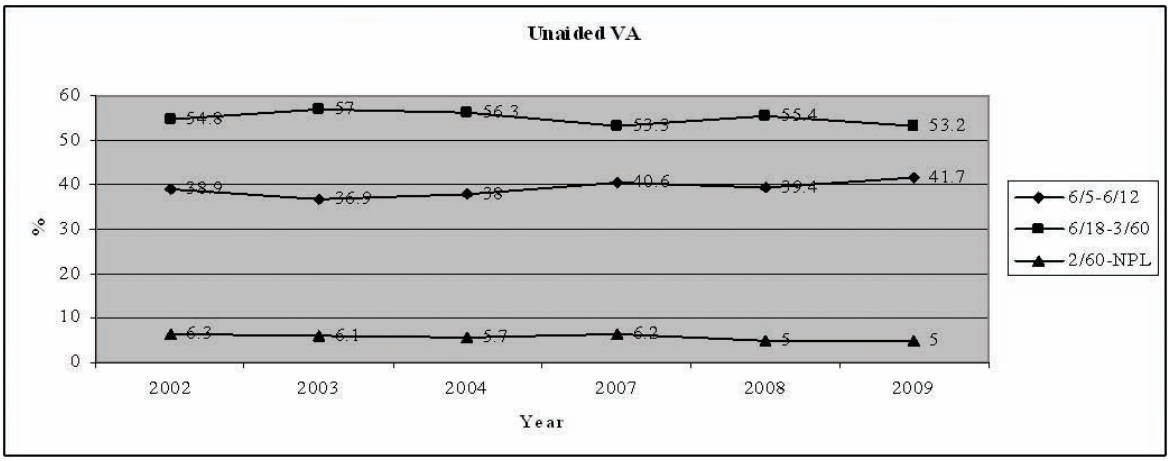
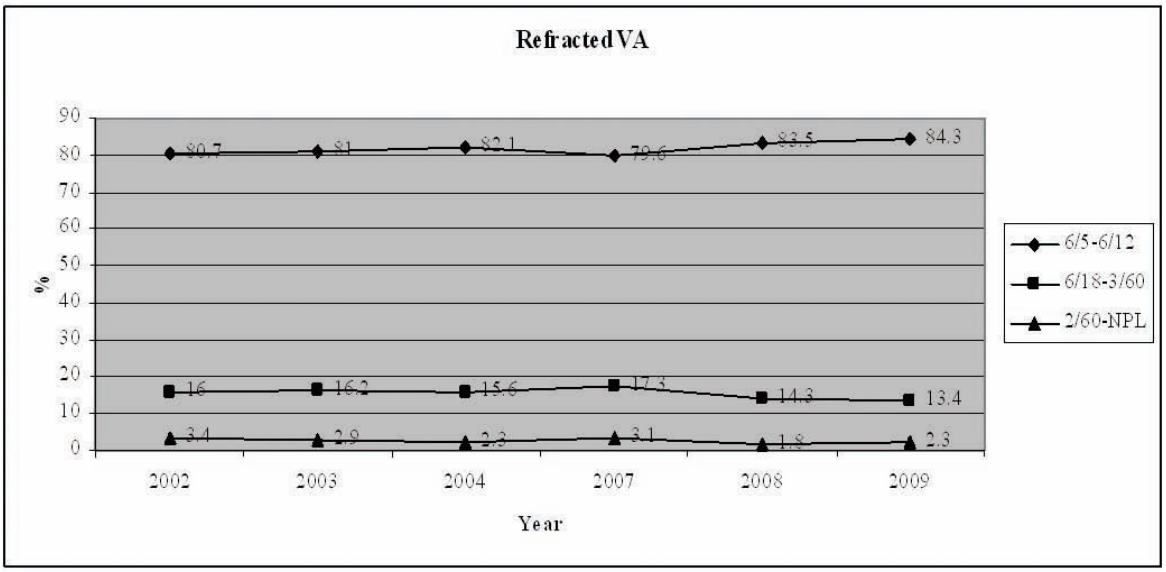


Figure 1.5.2.1(b): Post-operative Unaided and Refracted Visual Acuity by Visual Category for All Eyes, CSR 2002-2009





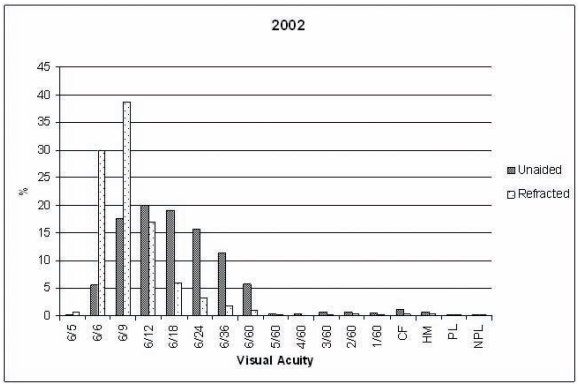
1.5.2.2 Post-operative Visual Acuity (Eyes without Ocular Co-morbidity)

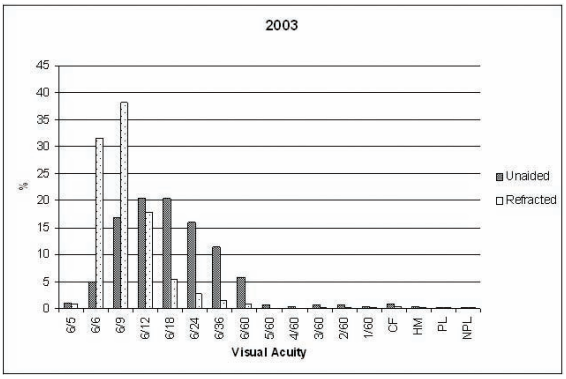
The percentage of eyes with unaided VA 6/12 or better slightly increased but similar to eyes with ocular co-morbidity; this percentage increased double folds following refraction. This trend remained unchanged throughout the years.

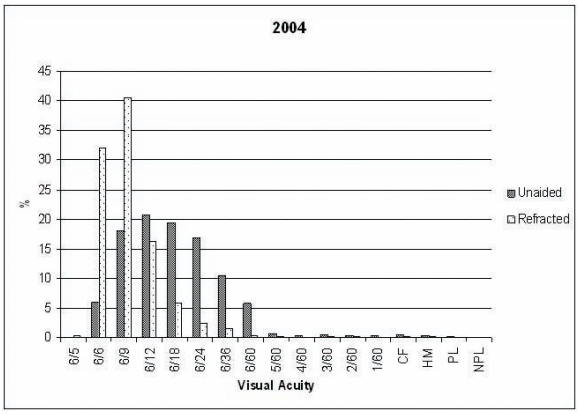
Table 1.5.2.2: Post-Operative Visual Acuity for Eyes without Ocular Co-morbidity, CSR 2002-2009

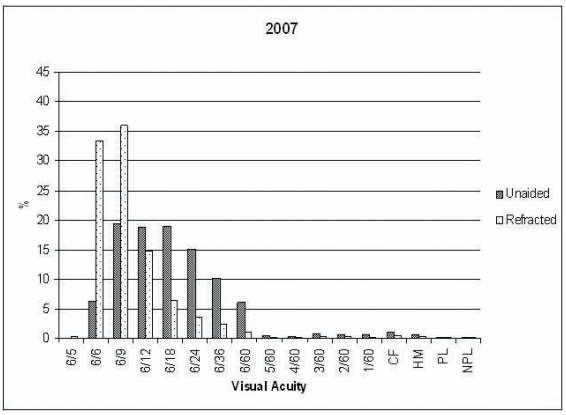
Year	2002				2003				2004				2007				2008				2009			
	Unaided		Refracted		Unaided		Refracted		Unaided		Refracted		Unaided		Refracted		Unaided		Refracted		Unaided		Refracted	
VA	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
6/5	7	0.1	44	0.6	9	1.0	70	0.8	1	0.0	14	0.4	3	0.0	25	0.3	2	0	23	0.3	8	0.1	37	0.3
6/6	501	5.6	2229	29.9	511	5.0	2826	31.6	247	5.9	1196	32.1	667	6.2	3326	33.5	561	6.2	3061	36.4	802	6.4	4717	40
6/9	1568	17.6	2892	38.7	1710	16.8	3421	38.2	758	18.0	1505	40.5	2061	19.3	3574	36	1477	16.4	2939	35	2595	20.6	4348	36.9
6/12	1780	20.0	1260	16.9	2074	20.4	1595	17.8	871	20.7	608	16.3	2021	18.9	1473	14.8	1683	18.7	1377	16.4	2585	20.5	1602	13.6
6/5-6/12	3856	43.4	6425	86.1	4304	42.2	7912	88.4	1877	44.6	3323	89.3	4752	44.4	8398	84.6	3723	41.3	7400	88.1	5990	47.5	10704	90.9
6/18	1698	19.1	444	6.0	2072	20.3	485	5.4	813	19.3	216	5.8	2037	19.1	634	6.4	1882	20.9	411	4.9	2599	20.6	479	4.1
6/24	1403	15.8	240	3.2	1634	16.0	242	2.7	709	16.8	90	2.4	1619	15.1	351	3.5	1518	16.9	254	3	1772	14	251	2.1
6/36	1001	11.3	136	1.8	1162	11.4	140	1.6	443	10.5	55	1.5	1087	10.2	234	2.4	975	10.8	151	1.8	1170	9.3	152	1.3
6/60	514	5.8	74	1.0	593	5.8	74	0.8	240	5.7	12	0.3	650	6.1	113	1.1	536	6	71	0.8	651	5.2	61	0.5
5/60	39	0.4	6	0.1	61	0.6	3	0.0	26	0.6	2	0.1	52	0.5	8	0.1	52	0.6	10	0.1	38	0.3	8	0.1
4/60	30	0.3	3	0.0	45	0.4	4	0.0	13	0.3	1	0.0	48	0.4	13	0.1	25	0.3	7	0.1	33	0.3	5	0
3/60	64	0.7	18	0.2	71	0.7	14	0.2	20	0.5	5	0.1	94	0.9	26	0.3	79	0.9	29	0.3	114	0.9	37	0.3
6/18-3/60	4749	53.4	921	12.3	5638	55.3	962	10.7	2264	53.8	381	10.2	5587	52.3	1379	13.9	5067	56.4	933	11	6377	50.5	993	8.4
2/60	60	0.7	22	0.3	65	0.6	10	0.1	18	0.4	6	0.2	62	0.6	25	0.3	54	0.6	16	0.2	60	0.5	15	0.1
1/60	43	0.5	18	0.2	28	0.3	8	0.1	14	0.3	1	0.0	68	0.6	23	0.2	33	0.4	8	0.1	46	0.4	16	0.1
CF	94	1.1	30	0.4	95	0.9	36	0.4	22	0.5	4	0.1	120	1.1	47	0.5	73	0.8	23	0.3	87	0.7	27	0.2
HM	64	0.7	30	0.4	37	0.4	14	0.2	11	0.3	5	0.1	69	0.6	42	0.4	31	0.3	12	0.1	46	0.4	20	0.2
PL	13	0.2	10	0.1	13	0.1	8	0.1	5	0.1	1	0.0	23	0.2	13	0.1	7	0.1	4	0	9	0.1	6	0.1
NPL	11	0.1	9	0.1	10	0.1	5	0.1	1	0.0	0	0.0	8	0.1	7	0.1	7	0.1	0	0	3	0	1	0
2/60-NPL	285	3.2	119	1.6	248	2.4	81	0.9	71	1.7	17	0.5	350	3.2	157	1.6	205	2.3	63	0.7	251	2	85	0.7
TOTAL	**8890**	**100**	**7465**	**100**	**10190**	**100**	**8955**	**100**	**4212**	**100**	**3721**	**100**	**10689**	**100**	**9934**	**100**	**8995**	**100**	**8396**	**100**	**12618**	**100**	**11782**	**100**

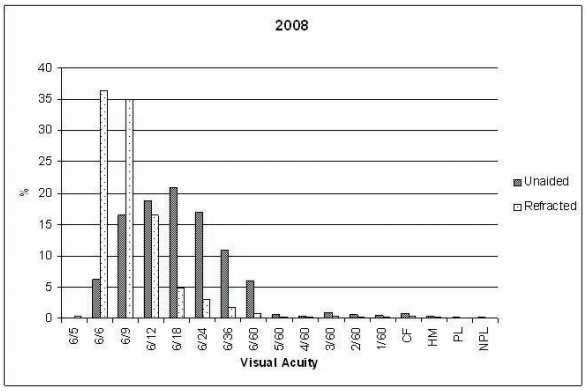
Figure 1.5.2.2(a): Post-Operative Visual Acuity for Eyes without Ocular Co-morbidity, CSR 2002-2009











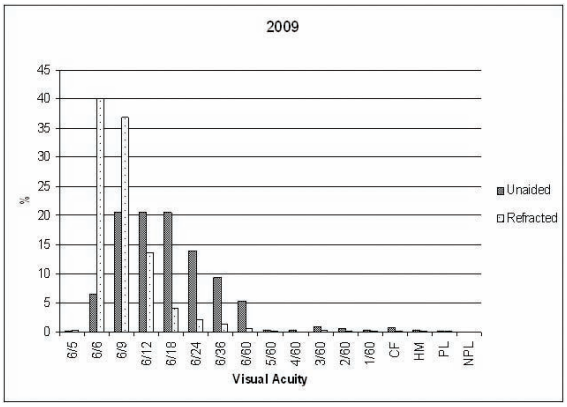
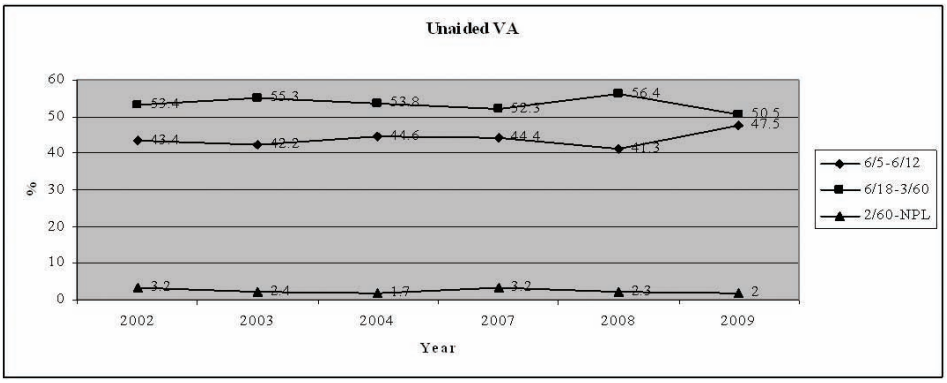
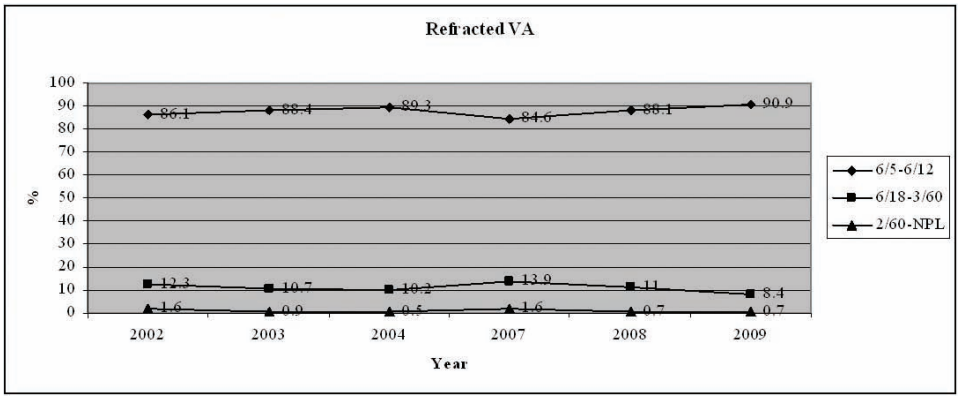


Figure 1.5.2.2(b): Post-operative Visual Acuity by Visual Category for Eyes without Ocular Co-morbidity, CSR 2002-2009





1.5.2.3 Post-operative Visual Acuity 6/12 or Better Among Eyes without Ocular Co-morbidity

The patients who had undergone phacoemulsification showed the highest proportion of achieving good visual outcome when compared with other surgeries. The percentage demonstrated an increasing trend (from 87.0% in 2002 to 93.3% in 2009). When complication occurred in phacoemulsification which necessitated conversion to ECCE, the visual outcome became less favorable.
The proportion of eyes with unaided VA 6/12 or better was poor in almost all types of surgery throughout the years. This percentage increased double folds following refraction. These findings indicated that a large number of patients required some forms of visual rehabilitation or correction post-operatively.

Table 1.5.2.3(a): Post-operative Visual Acuity 6/12 or Better for Eyes without Ocular Co-morbidities by Types of Surgery, CSR 2002-2009

Year	2002						2003						2004					
	Unaided			Refracted			Unaided			Refracted			Unaided			Refracted		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
All Surgeries	12517	4869	38.9	10392	8376	81.0	9861	4181	42.0	8683	7693	89.0	4058	1818	44.8	3604	3226	90.0
Phaco	5010	2490	49.7	4311	3746	87.0	4930	2524	51.0	4411	4111	93.0	4138	2226	53.8	1974	1852	94.0
ECCE	6761	2177	32.2	5490	4255	78.0	4445	1507	34.0	3840	3245	85.0	4823	1659	34.4	1479	1257	85.0
Phaco ECCE	305	94	30.8	255	192	75.0	311	88	28.0	289	236	82.0	347	107	30.8	91	72	79.0
Lens Aspiration	315	86	27.3	237	129	54.0	123	52	42.0	100	75	75.0	145	40	27.5	31	23	74.0
ICCE	80	12	15.0	66	33	50.0	8	3	38.0	6	4	67.0	-	7	0.0	4	2	50.0
Secondary IOL	33	10	30.3	26	21	81.0	42	7	17.0	36	22	61.0	97	22	22.7	19	15	79.0

Year	2007						2008						2009					
	Unaided			Refracted			Unaided			Refracted			Unaided			Refracted		
	N	No	%	N	No	%	N	No	%	N	No	%	N	No	%	N	No	%
All Surgeries	7130	3080	43.0	6632	5551	84.0	8983	3719	41.0	8390	7392	88.0	12618	5990	47.5	11782	10704	90.9
Phaco	4868	2332	48.0	4508	3890	86.0	6419	3017	47.0	5958	5440	91.0	9511	5038	53.0	9001	8397	93.3
ECCE	2033	675	33.0	1910	1520	80.0	2263	629	28.0	2158	1744	81.0	2607	816	31.3	2329	1967	84.5
Phaco ECCE	158	36	23.0	143	89	62.0	201	40	20.0	184	140	76.0	270	53	19.6	259	200	77.2
Lens Aspiration	62	33	53.0	59	46	78.0	74	29	39.0	66	54	82.0	160	57	35.6	128	89	69.5
ICCE	15	2	13.0	10	4	39.0	24	4	17.0	19	11	58.0	29	7	24.1	25	15	60.0
Secondary IOL	-	NA	-	-	NA	-	-	NA	-	-	NA	-	-	NA	-	-	NA	-

Figure 1.5.2.3(a): Post-operative Visual Acuity 6/12 or Better for Eyes without Ocular Co-morbidities by ECCE and Phaco, CSR 2002-2009

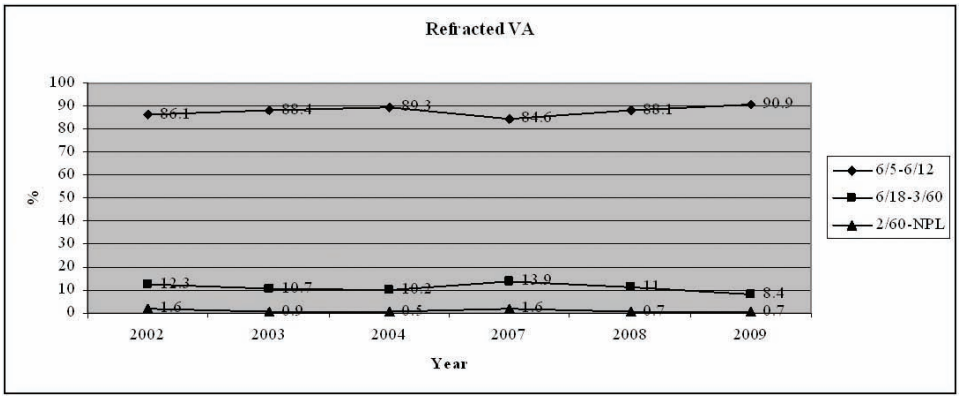


Table 1.5.2.3(b): Post-operative Refracted Visual Acuity 6/12 or Better in Eyes without Ocular Co-morbidities by Complications and Types of Surgery, CSR 2009

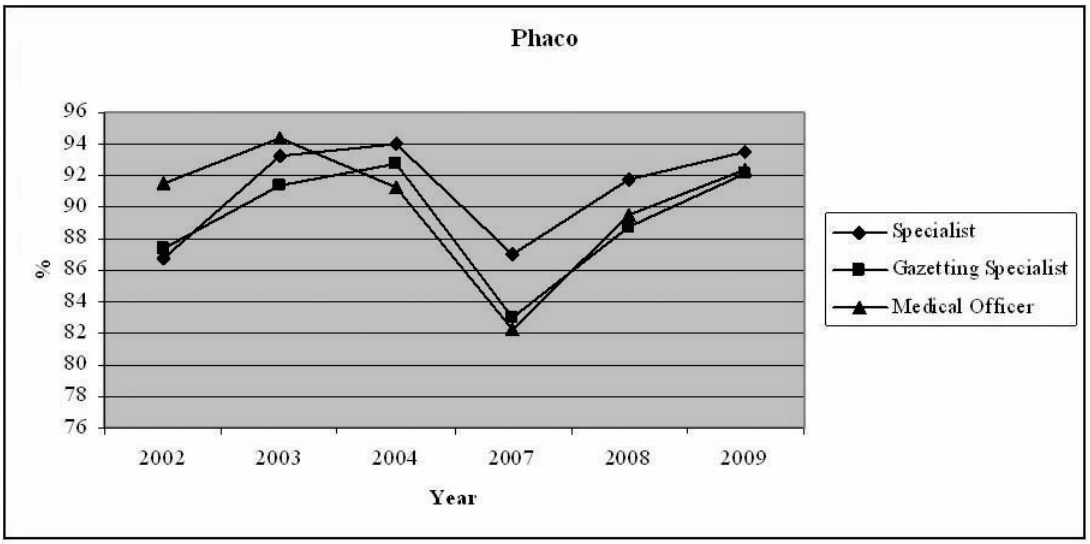
	Types of Cataract Surgery																	
	All Surgeries			Lens Aspiration			ECCE			Phaco			Phaco ECCE			ICCE		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
	11763	10687	90.9	128	89	69.5	2329	1967	84.5	9001	8397	93.3	259	200	77.2	25	15	60
With intra-op complications	654	484	74.0	7	5	71.4	182	118	64.8	343	275	80.2	109	76	69.7	12	9	75.0
No intra-op complications	11109	10203	91.8	121	84	69.4	2147	1849	86.1	8658	8122	93.8	150	124	82.7	13	6	46.2

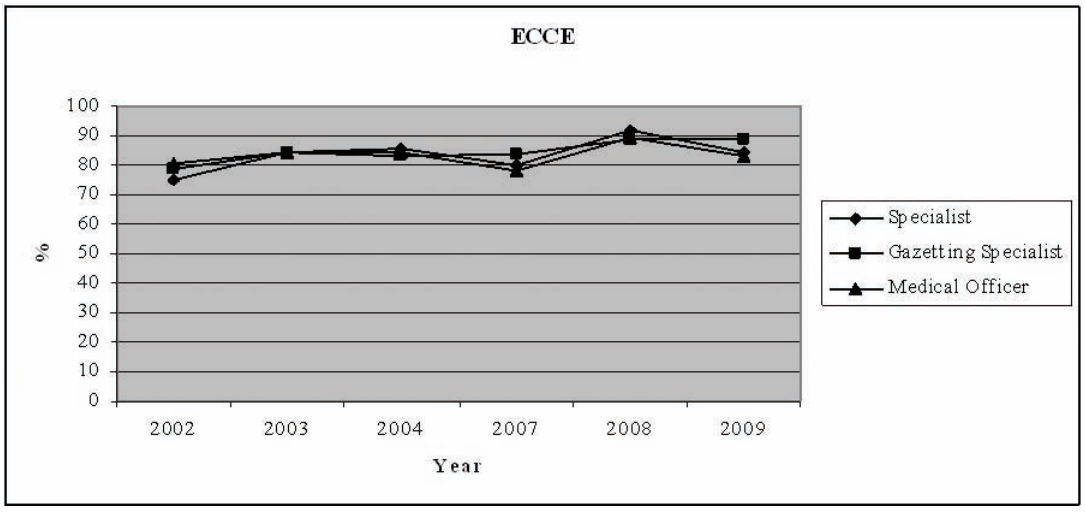
Table 1.5.2.3(c): Post-operative Refracted Visual Acuity 6/12 or Better in Eyes without Ocular Co-morbidities by Surgeon Status and Types of Surgery, CSR 2009

	Types of Cataract Surgery																	
	All Surgeries			Lens Aspiration			ECCE			Phaco			Phaco ECCE			ICCE		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
N	11782	10704	90.9	128	89	69.5	2329	1967	84.5	9001	8397	93.3	259	200	77.2	25	15	60.0
Surgeon Status																		
Specialist	9422	8617	91.5	119	84	70.6	1328	1118	84.2	7720	7216	93.5	203	156	76.8	19	13	68.4
Gazetting Specialist	1099	993	90.4	5	2	40.0	247	219	88.7	802	739	92.1	40	30	75.0	3	1	33.3
Medical Officer	1187	1026	86.4	3	2	66.7	741	618	83.4	421	389	92.4	16	14	87.5	3	1	33.3

In phacoemulsification, the proportion of patients who could achieve post-operative VA better than 6/12 was initially increasing among all surgeons. However, it declined in the year 2007 before rising again from 2008 onwards. In general, better visual outcomes were observed in phaco and phaco converted to ECCE performed by the specialists. In ECCE, the visual outcomes were comparable between all surgeons and the percentage appeared to be increasing.

Figure 1.5.2.3(b): Post-operative Refracted Visual Acuity 6/12 or Better in Eyes without Ocular Co-morbidities by Surgeon Status and Types of Surgery, CSR 2002-2009





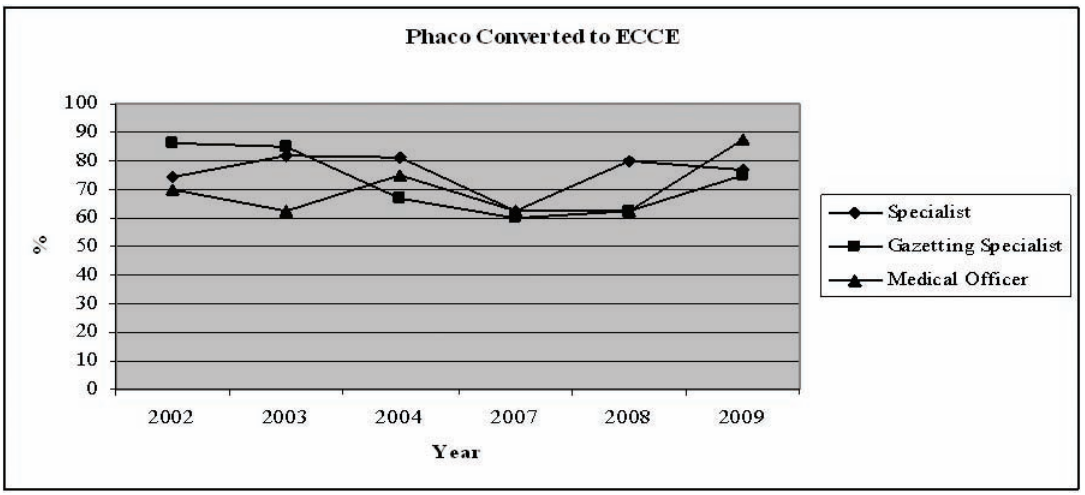


Table 1.5.2.3(d): Post-operative Refracted Visual Acuity 6/12 or Better for Patients without Ocular Co-morbidities by SDP and Types of Surgery, CSR 2009

	Type of Cataract Surgery																		
	All Patients	All Surgeries			Lens Aspiration			ECCE			Phaco			Phaco -->ECCE			ICCE		
	N	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
All Centres	11782	11763	10687	90.9	128	89	69.5	2329	1967	84.5	9001	8397	93.3	259	200	77.2	25	15	60.0
A	364	364	330	90.7	8	5	62.5	85	69	81.2	259	246	95.0	12	10	83.3	0	0	0.0
B	269	269	230	85.5	4	3	75.0	60	44	73.3	200	180	90.0	4	2	50.0	1	1	100
C	321	321	281	87.5	5	4	80.0	68	55	80.9	242	217	89.7	6	5	83.3	0	0	0.0
D	60	60	52	86.7	2	0	0.0	14	13	92.9	40	35	87.5	4	4	100	0	0	0.0
E	327	327	310	94.8	0	0	0.0	79	72	91.1	244	234	95.9	2	2	100	2	2	100
F	68	68	65	95.6	0	0	0.0	68	65	95.6	0	0	0.0	0	0	0.0	0	0	0.0
G	485	477	445	93.3	1	1	100	54	47	87.0	420	395	94.0	2	2	100	0	0	0.0
H	300	300	275	91.7	5	4	80.0	15	11	73.3	278	258	92.8	1	1	100	0	0	0.0
I	23	23	20	87.0	2	2	100	21	18	85.7	0	0	0.0	0	0	0	0	0	0.0
J	330	330	289	87.6	13	8	61.5	96	80	83.3	210	193	91.9	9	7	77.8	2	1	50.0
K	84	84	70	83.3	2	0	0.0	29	22	75.9	50	47	94.0	2	0	0.0	1	1	100
L	567	567	523	92.2	3	2	66.7	148	130	87.8	394	375	95.2	18	14	77.8	2	0	0.0
M	186	186	158	84.9	2	2	100	107	91	85.0	50	44	88.0	22	18	81.8	0	0	0.0
N	493	493	437	88.6	12	6	50.0	156	130	83.3	318	296	93.1	4	3	75.0	3	2	66.7
O	646	643	586	91.1	7	6	85.7	51	43	84.3	566	522	92.2	16	13	81.3	1	0	0.0
P	350	350	316	90.3	0	0	0.0	6	5	83.3	343	311	90.7	1	0	0.0	0	0	0.0
Q	304	304	262	86.2	0	0	0.0	19	13	68.4	275	244	88.7	8	4	50.0	2	1	50.0
R	640	640	597	93.3	1	1	100	32	26	81.3	597	563	94.3	9	7	77.8	1	0	0.0
S	112	112	108	96.4	1	1	100	11	9	81.8	96	94	97.9	4	4	100	0	0	0.0
T	230	230	208	90.4	5	5	100	22	19	86.4	190	175	92.1	11	7	63.6	0	0	0.0
U	587	587	523	89.1	4	1	25.0	48	29	60.4	530	490	92.5	5	3	60.0	0	0	0.0
V	333	333	301	90.4	7	5	71.4	29	21	72.4	287	267	93.0	9	7	77.8	0	0	0.0
W	290	290	258	89	0	0	0.0	185	161	87.0	102	95	93.1	3	2	66.7	0	0	0.0
X	260	260	233	89.6	0	0	0.0	93	80	86.0	166	152	91.6	1	1	100	0	0	0.0
Y	97	97	97	100	0	0	0.0	21	21	100	75	75	100	1	1	100	0	0	0.0
Z	597	591	504	85.3	12	10	83.3	23	18	78.3	542	470	86.7	13	5	38.5	1	1	100

AA	260	260	237	91.2	2	2	100	53	45	84.9	190	178	93.7	14	11	78.6	1	1	100
AB	337	337	311	92.3	6	4	66.7	21	13	61.9	297	283	95.3	12	10	83.3	0	0	0.0
AC	292	292	288	98.6	1	1	100	39	37	94.9	248	246	99.2	4	4	100	0	0	0.0
AD	129	129	108	83.7	0	0	0.0	128	107	83.6	0	0	0.0	0	0	0.0	0	0	0.0
AE	320	320	305	95.3	2	2	100	37	31	83.8	273	265	97.1	8	7	87.5	0	0	0.0
AF	374	374	335	89.6	4	1	25.0	108	87	80.6	245	233	95.1	13	12	92.3	4	2	50.0
AG	106	106	102	96.2	3	2	66.7	13	13	100	84	81	96.4	2	2	100	0	0	0.0
AH	577	577	541	93.8	3	2	66.7	213	190	89.2	347	339	97.7	11	7	63.6	1	1	100
AI	612	610	565	92.6	3	3	100	109	96	88.1	477	447	93.7	18	17	94.4	3	2	66.7
AJ	451	451	416	92.2	8	6	75.0	68	56	82.4	365	346	94.8	10	8	80.0	0	0	0.0

Figure 1.5.2.3(c): Post-operative Refracted Visual Acuity 6/12 or Better for Patients without Ocular Co-morbidities by SDP and All Surgeries, CSR 2009

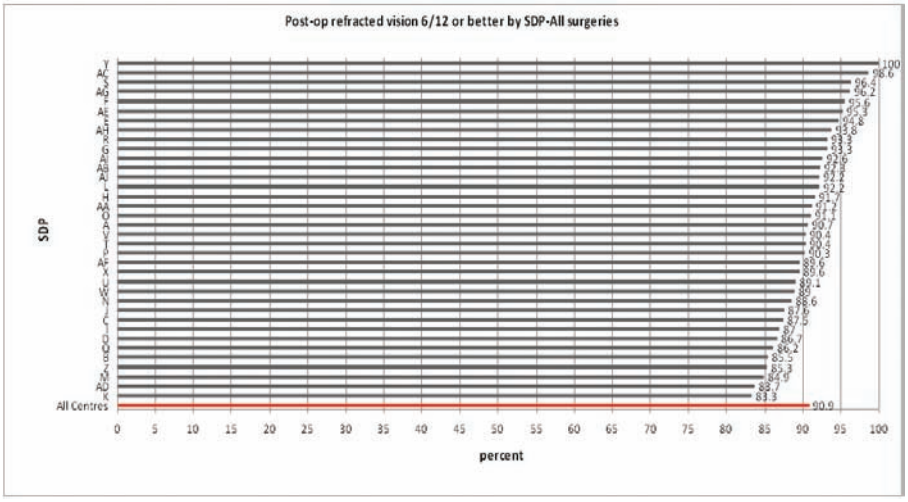


Figure 1.5.2.3(d): Post-operative Refracted Visual Acuity 6/12 or Better for Patients without Ocular Co-morbidities by SDP for Phacoemulsification, CSR 2009

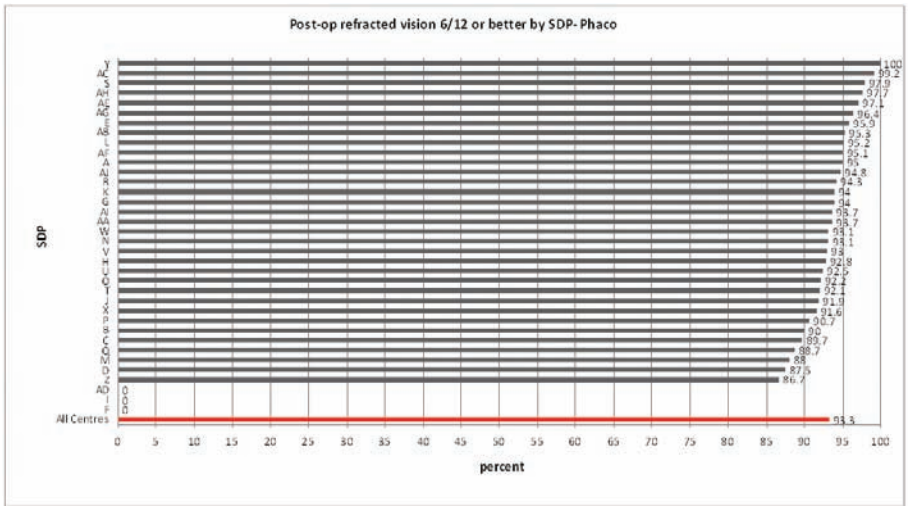
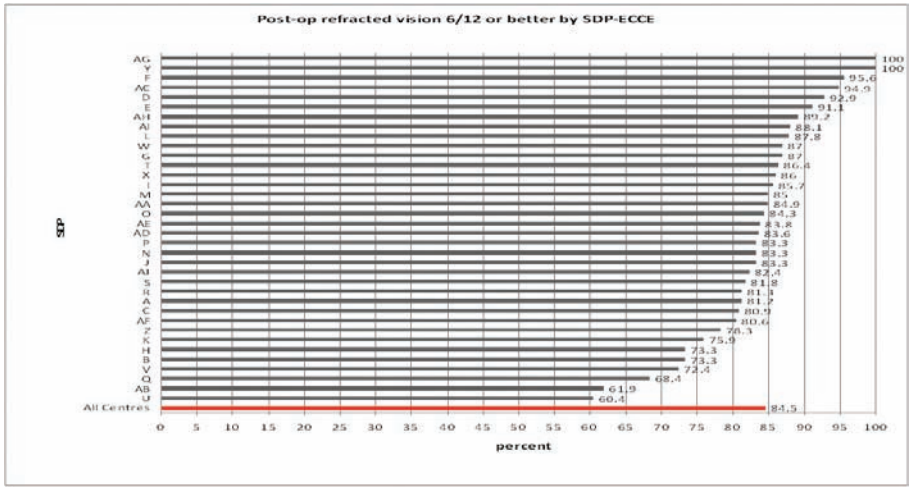


Figure 1.5.2.3(e): Post-operative Refracted Visual Acuity 6/12 or Better for Patients without Ocular Co-morbidities by SDP for ECCE, CSR 2009



1.5.3 Reasons for No Record of Visual Acuity

Of the 24438 eyes operated in 2009, 1557 eyes did not have record of visual acuity. The main reason for no record of VA was loss to follow up.

Table 1.5.3: Reasons for No Records of Visual Acuity, CSR 2002-2009

Years	2002		2003		2004		2007		2008		2009	
Reasons	n	%	n	%	n	%	n	%	n	%	n	%
All cases	1940	100	1331	100	1872	100	1458	100	1463	100	1557	100
Loss to follow-up	1331	68.1	876	65.8	1177	62.9	1078	73.9	1230	84.1	1261	81.0
Discharged by doctor	396	20.4	212	15.9	306	1.6	32	2.2	13	0.9	44	2.8
Unable to take vision	69	3.6	33	40.3	108	5.8	49	3.4	26	1.8	30	1.9
Others	144	7.4	210	15.8	281	15.0	299	20.5	194	13.3	222	14.3

1.5.4 Factors Contributing to Post-operative Refracted Visual Acuity of Worse than 6/12

The main contributing factors for eyes with post-operative refracted VA worse than 6/12 were pre-existing ocular co-morbidity followed by high astigmatism and PCO. High astigmatism, PCO and CMO in particular showed a decreasing trend consistent with the shift towards phacoemulsification and improvement in other aspect of cataract surgery technique over the years. Although infrequent, retinal detachment as the cause for refracted VA worse than 6/12 appeared to be in increasing trend. This was consistent with the increasing number of VR combined surgery performed over the years.

When eyes with preexisting ocular co-morbidity were excluded from analysis from the year 2004 onwards, high astigmatism contributed the highest number followed by preexisting ocular co-morbidity (not detected preoperatively).

Table 1.5.4(a): Factors Contributing to Post-operative Refracted VA of Worse than 6/12 in All Eyes, CSR 2002-2009

Years	2002		2003		2004		2007		2008		2009	
Factors	n	%	n	%	n	%	n	%	n	%	n	%
Preexisting ocular co-morbidity	818	40.7	386	39.1	503	47.2	904	28.8	802	28.4	1016	34.2
High astigmatism	489	24.3	392	39.8	321	31.1	478	15.2	460	16.3	395	13.3
Posterior capsular opacity	198	9.9	152	15.4	53	5.0	140	4.5	112	4.0	136	4.6
Cystoid macular oedema	93	4.6	59	6.0	33	3.1	101	3.2	64	2.3	82	2.8
Endophthalmitis	16	0.8	10	1.0	6	0.6	14	0.4	6	0.2	6	0.2
Corneal decompensation	37	1.8	19	1.9	6	0.6	28	0.9	31	1.1	61	2.1
Decentered IOL	14	0.7	1	0.1	3	0.3	4	0.1	6	0.2	5	0.2
Retinal detachment	27	1.3	8	0.8	7	0.7	67	2.1	50	1.8	56	1.9
Others	302	15.0	202	20.5	134	12.6	620	19.8	603	21.3	794	26.7
Missing/Unavailable	14	0.7	49	5.0	0	0.0	-	-	NA	NA	NA	NA

Figure 1.5.4: Factors Contributing to Post-operative Refracted VA of Worse than 6/12 in All Eyes, CSR 2002-2009

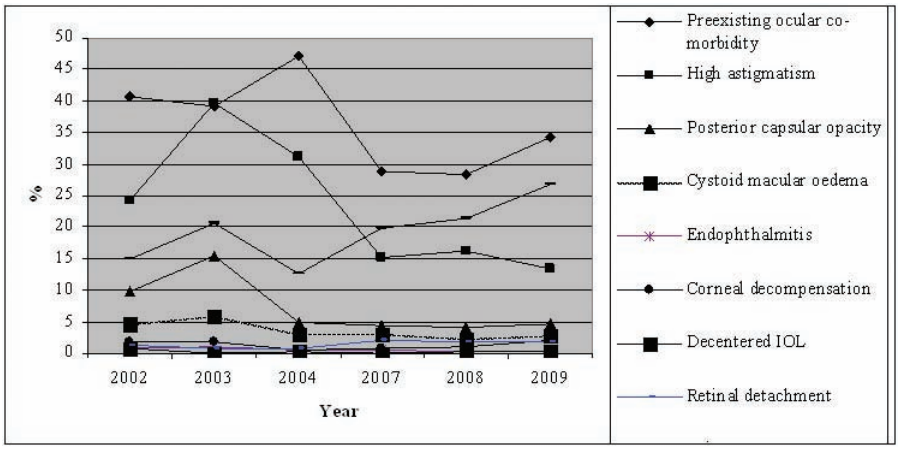


Table 1.5.4(b) Factors Contributing to Post-operative Refracted VA of Worse than 6/12 in Eyes without Preexisting Ocular co-morbidity, CSR 2004-2009

Years	2004		2007		2008		2009	
Factors	n	%	n	%	n	%	n	%
High astigmatism	197	52.0	303	19.7	286	20.6	178	16.5
Preexisting ocular co-morbidity (not detected pre-operatively)	23	6.1	271	17.6	229	16.5	121	11.2
Posterior capsular opacity	20	5.3	83	5.4	61	4.4	87	8.1
Cystoid macular oedema	20	5.3	52	3.4	26	1.9	32	3.0
Endophthalmitis	4	1.0	9	0.6	4	0.3	4	0.4
Corneal decompensation	3	0.8	15	1.0	13	0.9	36	3.3
Decentered IOL	2	0.5	4	0.3	2	0.1	1	0.1
Retinal detachment	1	0.3	18	1.2	11	0.8	11	1.0
Others	76	20.0	320	20.8	323	23.3	368	34.1
Missing/Unavailable	NA	-	461	30.0	NA	-	NA	-

1.5.5 Actual or Residual Refractive Power (Spherical Equivalent)

Target refractive power is the refractive power aimed by the surgeon for a patient while the actual or residual refractive power or spherical equivalent (SE) is the postoperative refraction results for the same eye. Myopic shift is the shift of the refraction status (actual refraction) towards more negative value as compared to the targeted refraction pre-operatively. It can be the results of surgery induced astigmatism or more anterior placement of IOL in the bag. It can also be due to indentation of eyeball during biometry resulting in shorter axial length.
Data from 2007 to 2009 demonstrated that ECCE produced more myopic shift as compared to phaco. The difference between the target and actual refraction remained a broad-based distribution curve indicating that a large percentage of eyes did not achieve the target refraction status post-operatively.

Table 1.5.5(a): Distribution of Target and Actual Refractive Power in ECCE and Phaco, CSR 2007-2009

	Target Refraction			Actual Refraction						Actual-Target Refraction		
	All Patient			ECCE			Phaco			All Patient		
Years	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009
N	11876	15083	20279	3624	4400	4013	8343	12085	12891	8738	12295	14670
Mean	-0.5	-0.1	-0.4	-1.1	-0.2	-1.0	-0.8	0.0	-0.7	-0.5	-0.4	-0.4
SD	+0.4	+0.4	+0.4	+1.4	+1.2	+1.4	+1.1	1.03	1.0	+1.1	+1.2	+1.1
Median	-0.5	-0.5	-0.5	-1.0	-0.2	-1.0	-0.7	0.0	-0.7	-0.4	-0.4	-0.3
Minimum	-9.0	-9.9	-9.9	-10.0	-8.4	-10	-10.0	-10.0	-9.0	-9.5	-9.9	-8.8
Maximum	+5.0	+9.5	+5.9	+9.8	+10.0	+10	+10.0	+10.0	10.0	+5.0	+9.0	+10.7

Note; Eyes with actual refractive power (SE) of more than +10.0D and -10.0D were excluded from analysis

Table 1.5.5(b): Percentage Distribution of Target and Actual Refractive Power in ECCE and Phaco, CSR 2007-2009

	Target Refraction						Actual Refraction											
	All Patients						ECCE						Phaco					
Years	2007		2008		2009		2007		2008		2009		2007		2008		2009	
Dioptre (D)	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
-10-<(-9.5)	0	0.0	1	0.0	2	0.0	0	0.0	0	0.0	1	0.0	0	0.0	1	0.0	0	0.0
-9.5-<(-9)	4	0.0	1	0.0	1	0.0	0	0.0	1	0.0	1	0.0	0	0.0	7	0.1	0	0.0
-9-<(-8.5)	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0	2	0.0
-8.5-<(-8)	1	0.0	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0	0	0.0
-8-<(-7.5)	2	0.0	3	0.0	1	0.0	0	0.0	0	0.0	3	0.1	0	0.0	3	0.0	0	0.0
-7.5-<(-7)	1	0.0	0	0.0	1	0.0	0	0.0	1	0.0	1	0.0	1	0.0	11	0.1	0	0.0
-7-<(-6.5)	3	0.0	1	0.0	0	0.0	0	0.0	1	0.0	1	0.0	0	0.0	6	0.0	3	0.0
-6.5-<(-5)	1	0.0	2	0.0	7	0.0	0	0.0	3	0.1	10	0.2	1	0.0	16	0.1	24	0.2
-5-<(-4.5)	3	0.0	4	0.0	7	0.0	1	0.0	1	0.0	12	0.3	1	0.0	15	0.1	14	0.1
-4.5-<(-4)	2	0.0	3	0.0	5	0.0	3	0.1	5	0.1	15	0.4	3	0.0	15	0.1	14	0.1
-4-<(-3.5)	7	0.1	8	0.1	11	0.1	8	0.2	7	0.2	52	1.3	5	0.1	19	0.2	42	0.3
-3.5-<(-3)	6	0.0	7	0.0	11	0.1	19	0.5	15	0.3	74	1.8	2	0.0	29	0.2	81	0.6
-3-<(-2.5)	13	0.1	22	0.1	18	0.1	26	0.6	41	0.9	183	4.6	7	0.1	58	0.5	208	1.6
-2.5-<(-2)	29	0.2	21	0.1	29	0.1	65	1.6	76	1.7	318	7.9	27	0.3	80	0.7	443	3.4
-2-<(-1.5)	77	0.6	48	0.3	58	0.3	149	3.6	203	4.6	509	12.7	88	1.0	147	1.2	1045	8.1
-1.5-<(-1)	429	3.5	373	2.5	260	1.3	360	8.7	431	9.7	713	17.8	277	3.1	393	3.2	2093	16.2
-1-<(-0.5)	4670	37.7	6155	40.9	7972	39.3	722	17.5	763	17.2	765	19.1	1022	11.4	1370	11.3	3206	24.9
-0.5-<0	6631	53.5	7481	49.7	10604	52.3	956	23.2	956	21.6	654	16.3	2602	29.1	3152	26.0	3143	24.4
0-<0.5	406	3.3	719	4.8	977	4.8	860	20.8	983	22.2	397	9.9	2551	28.5	3568	29.5	1697	13.2
0.5-<1	77	0.6	145	1.0	182	0.9	444	10.8	460	10.4	151	3.8	1273	14.2	1738	14.3	535	4.2
1-<1.5	12	0.1	28	0.2	17	0.1	236	5.7	228	5.1	60	1.5	546	6.1	780	6.4	179	1.4
1.5-<2	5	0.0	14	0.1	22	0.1	129	3.1	98	2.2	35	0.9	268	3.0	367	3.0	79	0.6
2-<2.5	15	0.1	10	0.1	85	0.4	50	1.2	48	1.1	20	0.5	117	1.3	160	1.3	26	0.2
2.5-<3	0	0.0	6	0.0	4	0.0	24	0.6	22	0.5	5	0.1	59	0.7	56	0.5	14	0.1
3-<3.5	1	0.0	2	0.0	2	0.0	15	0.4	16	0.4	3	0.1	28	0.3	32	0.3	11	0.1
3.5-<4	1	0.0	2	0.0	0	0.0	10	0.2	8	0.2	6	0.1	17	0.2	23	0.2	5	0.0

4-<4.5	0	0.0	0	0.0	0	0.0	3	0.1	3	0.1	0	0.0	12	0.1	12	0.1	5	0.0
4.5-<5	1	0.0	1	0.0	1	0.0	3	0.1	2	0.0	3	0.1	11	0.1	4	0.0	2	0.0
5-<5.5	0	0.0	0	0.0	0	0.0	3	0.1	2	0.0	1	0.0	3	0.0	1	0.0	3	0.0
5.5-<6	0	0.0	0	0.0	2	0.0	2	0.0	1	0.0	1	0.0	1	0.0	3	0.0	2	0.0
6-<6.5	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	4	0.0	2	0.0	2	0.0
6.5-<7	0	0.0	0	0.0	0	0.0	2	0.0	1	0.0	0	0.0	4	0.0	1	0.0	2	0.0
7-<7.5	0	0.0	0	0.0	0	0.0	1	0.0	3	0.1	1	0.0	0	0.0	1	0.0	0	0.0
7.5-<8	0	0.0	0	0.0	0	0.0	2	0.0	1	0.0	3	0.1	2	0.0	3	0.0	0	0.0
8-<8.5	0	0.0	0	0.0	0	0.0	1	0.0	3	0.1	2	0.0	3	0.0	1	0.0	1	0.0
8.5-<9	0	0.0	0	0.0	0	0.0	5	0.1	1	0.0	0	0.0	0	0.0	0	0.0	2	0.0
9-<9.5	0	0.0	0	0.0	0	0.0	1	0.0	8	0.2	3	0.1	0	0.0	0	0.0	2	0.0
9.5-<10	0	0.0	1	0.0	0	0.0	5	0.1	2	0.0	10	0.2	4	0.0	6	0.0	6	0.0

Eyes with actual refractive power (SE) of more than +10.0D and -10.0D were excluded from analysis

Figure 1.5.5(a): Percentage Distribution of Actual Refractive Power in ECCE and Phaco, CSR 2007-2009

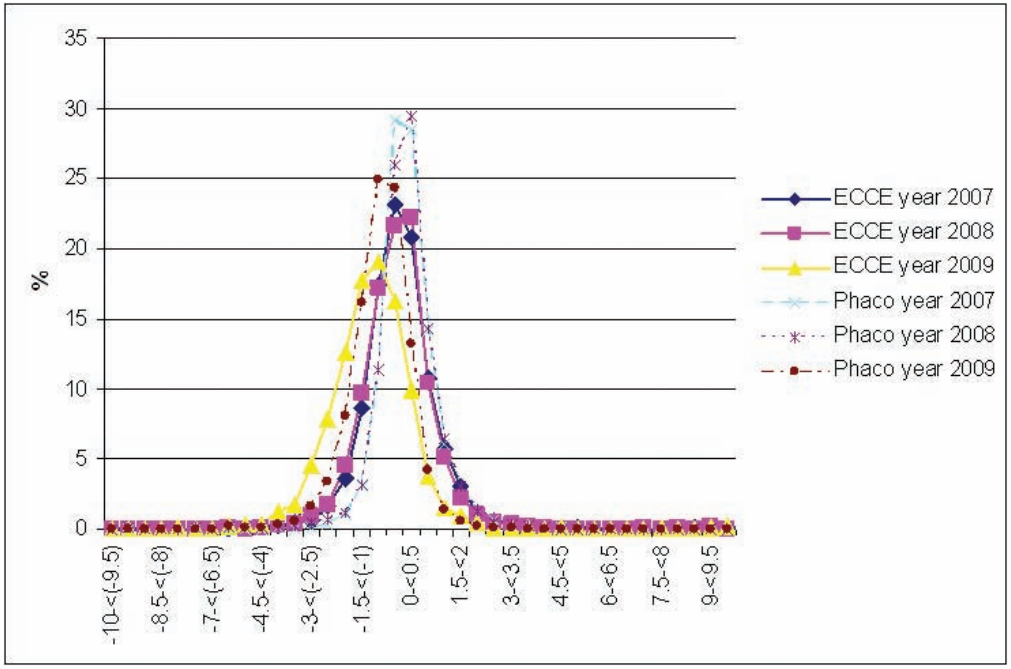
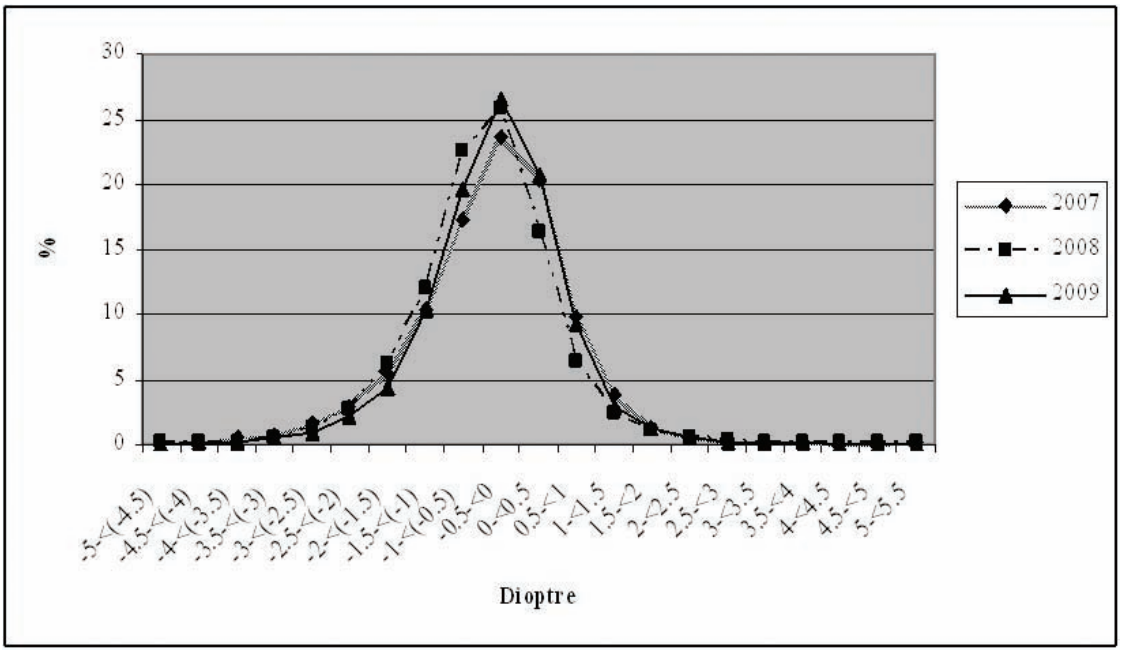


Table 1.5.5(c): Difference in Target and Actual Refractive Power for Patients who had Phacoemulsification Only, CSR 2007-2009

	Target Refraction						Actual Refraction						Difference between Target and Actual Refraction					
Years	2007		2008		2009		2007		2008		2009		2007		2008		2009	
Power (D)	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
N	7975	100	10660	100	10837	100	8342	100.0	12154	100.0	12845	100	5782	100	8803	100	10812	100
-5-<(-4.5)	2	0.0	4	0.0	3	0.0	15	0.2	13	0.1	14	0.1	12	0.2	12	0.1	5	0.0
-4.5-<(-4)	1	0.0	3	0.0	2	0.0	30	0.4	19	0.2	14	0.1	14	0.2	19	0.2	8	0.1
-4-<(-3.5)	5	0.1	7	0.1	5	0.0	49	0.6	17	0.1	42	0.3	28	0.5	18	0.2	23	0.2
-3.5-<(-3)	5	0.1	6	0.1	4	0.0	97	1.2	20	0.2	81	0.6	43	0.7	51	0.6	52	0.5
-3-<(-2.5)	10	0.1	20	0.2	6	0.1	200	2.4	55	0.5	208	1.6	93	1.6	103	1.2	94	0.9
-2.5-<(-2)	18	0.2	16	0.2	12	0.1	405	4.9	85	0.7	443	3.4	176	3.0	245	2.8	238	2.2
-2-<(-1.5)	51	0.6	35	0.3	32	0.3	746	8.9	164	1.3	1045	8.1	311	5.4	541	6.1	473	4.4
-1.5-<(-1)	239	3.0	288	2.7	115	1.1	1382	16.6	423	3.5	2093	16.3	595	10.3	1052	12.0	1129	10.4
-1-<(-0.5)	2473	31.0	4065	38.1	3699	34.1	1771	21.2	1408	11.6	3206	25.0	994	17.2	1984	22.5	2126	19.7
-0.5-<0	4512	56.6	5498	51.6	6282	58.0	1884	22.6	3167	26.1	3143	24.5	1367	23.6	2278	25.9	2862	26.5
0-<0.5	583	7.3	563	5.3	494	4.6	1069	12.8	3534	29.1	1697	13.2	1179	20.4	1434	16.3	2245	20.8
0.5-<1	45	0.6	107	1.0	115	1.1	399	4.8	1740	14.3	535	4.2	573	9.9	558	6.3	994	9.2
1-<1.5	6	0.1	23	0.2	6	0.1	142	1.7	786	6.5	179	1.4	225	3.9	214	2.4	329	3.0
1.5-<2	2	0.0	7	0.1	8	0.1	55	0.7	365	3.0	79	0.6	73	1.3	97	1.1	132	1.2
2-<2.5	9	0.1	6	0.1	52	0.5	14	0.2	156	1.3	26	0.2	32	0.6	46	0.5	55	0.5
2.5-<3	1	0.0	4	0.0	2	0.0	15	0.2	55	0.5	14	0.1	14	0.2	26	0.3	18	0.2
3-<3.5	1	0.0	0	0.0	0	0.0	13	0.2	30	0.2	11	0.1	13	0.2	15	0.2	8	0.1
3.5-<4	0	0.0	1	0.0	0	0.0	4	0.0	22	0.2	5	0.0	8	0.1	15	0.2	11	0.1
4-<4.5	2	0.0	0	0.0	0	0.0	3	0.0	10	0.1	5	0.0	3	0.0	12	0.1	4	0.0
4.5-<5	0	0.0	1	0.0	0	0.0	4	0.0	4	0.0	2	0.0	3	0.0	12	0.1	3	0.0
5-<5.5	1	0.0	0	0.0	0	0.0	1	0.0	1	0.0	3	0.0	9	0.2	9	0.1	3	0.0

NOTE: Formula of SE= SP+ (CY/2)

Figure 1.5.5(b): Difference in Target and Actual Refractive Power for Patients who had Phacoemulsification Only, CSR 2007-2009



CHAPTER 2

AGE-RELATED MACULAR DEGENERATION REGISTRY

Contributing Editor

Dr Tara Mary George

CHAPTER 2: AGE-RELATED MACULAR DEGENERATION REGISTRY

1.1 INTRODUCTION

Age-Related Macular Degeneration (AMD) is a degenerative disease of the macula resulting in loss of central vision. The prevalence of AMD increases with age, especially after the age of 65. AMD adversely affects quality of life in the elderly, increasing the risk of falls and fractures and limits their ability to drive safely. Furthermore, rising prevalence rates are expected with the growing number and proportion of the ageing population.
Increasing age and cigarette smoking are the two most consistently significant risk factors for AMD. Other risk factors for developing AMD include a family history for AMD, history of stroke or coronary artery disease and heavy alcohol use. Smokers have a two to fourfold increased risk of developing AMD and quicker disease progression as compared to nonsmokers which persists for up to 20 years after smoking cessation. Studies have also identified a dose-responsive relationship between pack years of smoking and AMD. This risk is further increased in smokers who are homozygous for the CFH Y402H polymorphism. Those who give a positive family history tend to present earlier with increased severity at onset.
AMD can be broadly classified as dry (atrophic) and wet (neovascular or exudative). Subretinal drusen deposits, focal or widespread geographic atrophy of the retinal pigment epithelium (RPE), and subretinal pigment epithelial clumping are features of dry AMD. Larger drusens are associated with visual loss. Disease progression is related to the size and number of soft drusen. Around 7.1% of those with dry AMD develop wet AMD in five years. The risk of developing wet AMD in people with bilateral early dry AMD was one to 4.7 percent at one year and 13 to 18 percent at three years. The wet form is more common among patients with advanced AMD. It is characterized by growth of abnormal blood vessels into the subretinal space, usually from the choroidal or retinal circulation. The leakage from these vessels leads to formation of subretinal fluid or causes blood collection.

Thus far, there is no proven treatment for dry AMD. However, it has been suggested that daily oral supplements containing vitamin C, Vitamin E, zinc and copper may be beneficial in both forms of AMD. The AREDS study recommends treatment with the antioxidant vitamins A, C, and beta carotene, plus zinc, for nonsmokers with extensive intermediate size drusen, at least one large drusen, or non-central geographic atrophy in one or both eyes. Some prefer treatment with zinc alone or the AREDS formula without beta-carotene, in smokers, due to the increased risk of lung cancer with beta-carotene.

The past decade has seen an emergence of new expensive therapies for exudative AMD. There has been an increase in therapeutic options with strategies to target neovascularisation without damaging the neural retina or other equally important tissues. This registry was developed in 2008 in view of the emerging new expensive therapies for exudative Age-Related macular Degeneration and the need to monitor the treatment.

The objectives of the Registry are:
1. To determine patients' characteristics, risk factors and clinical presentation of AMD
2. To study types of AMD based on clinical and investigative examinations
3. To evaluate quality of life among AMD patients
4. To evaluate types of treatments given to patients

The National Eye Database Age-Related Macular Degeneration Registry consists of new cases of age-related macular degeneration seen at the tertiary referral medical retina unit (the ophthalmology department of the Selayang Hospital). The period of study was from October 2008 to December 2009. All new patients with Age-Related Macular Degeneration who were referred and seen at the medical retina clinic were eligible. The data was recorded in the case report form. Data was entered into a software application with inbuilt analysis and tracking systems.

1.2 CHARACTERISTIC OF PATIENTS AND TREATMENT

There were 70 patient enrolled with 112 affected eyes. The patient characteristics are reported in Table 2.2.

Table 2.2(a): Characteristics of Patients

Characteristics	N (%)
Gender	
Male	38(54.3)
Female	32 (45.7)
Mean age in years	64.4 (35 -86)
Ethnic origin	
Malay	26(38.6)
Chinese	33 (47.1)
Indian	8 (11.4)
Others	2 (2.8)
Laterality	
Unilateral	28(40.0)
Bilateral	42 (60.0)
Associated factors	
Diabetes mellitus	15(21.4)
Hypertension	29 (41.4)
Past stroke	1(1.4)
Ischemic Heart disease	8(11.4)
Hypercholesterolemia	7(10.0)
Smoking - Current	5(7.1)
- Past	12(17.1)
Mean duration of symptoms	12.9 months (2 weeks to 120 months)

Table 2.2(b): Quality of Life

Activity	N (%)
Currently not driving	29(41.4)
Difficulty reading ordinary print in newspaper	32(45.7)

Figure 2.2(a): Presenting Visual Acuity

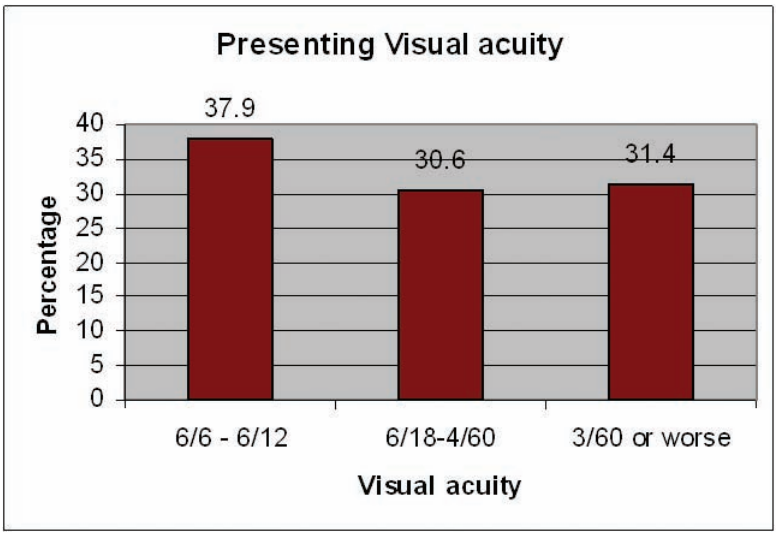


Figure 2.2(b): Staging of AMD

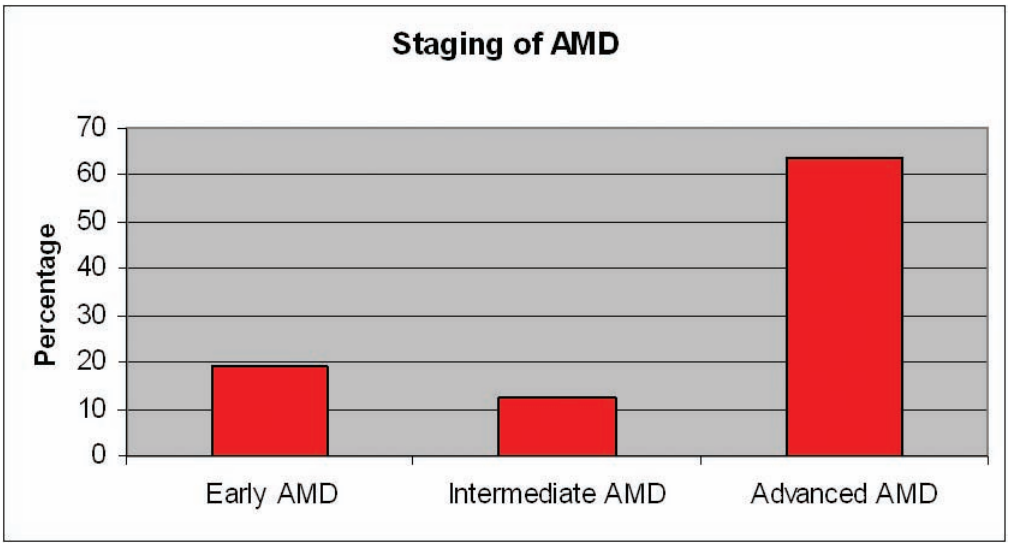


Figure 2.2(c): Distribution of Advanced AMD

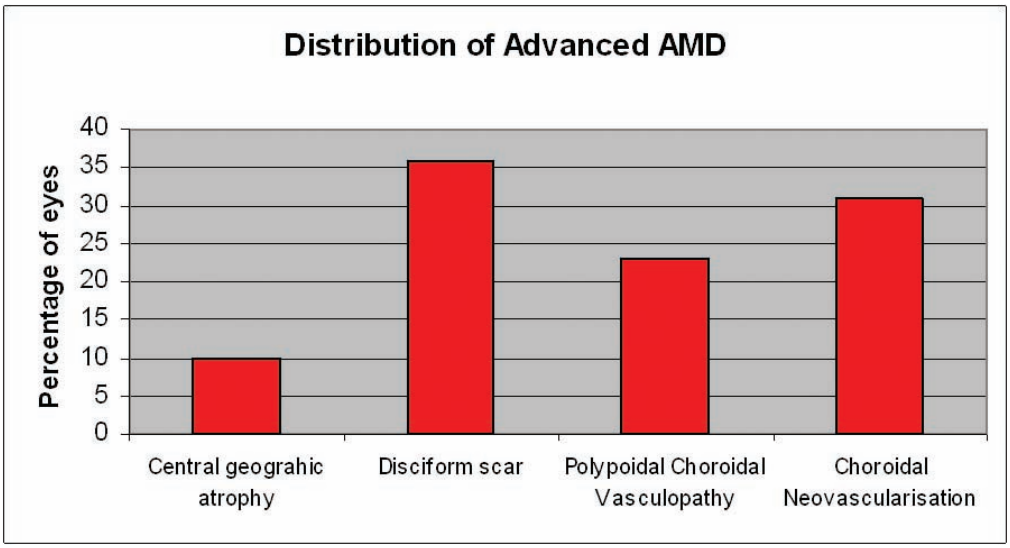


Table 2.2(c): Type of Treatment Offered

Treatment	N (%)
None	70(62.5)
Photodynamic therapy	8 (19.0)
Anti VEGF	19 (45.2)
Photodynamic therapy and anti VEGF	3(7.1)
Argon laser	4 (9.5)
Others	8(19)

Age-related macular degeneration is a disease that has social and economic implications as it is a potentially treatable disease in the stage of exudative AMD if detected early. However our data at a local tertiary centre shows that majority of cases present late with a mean duration of symptoms of 12 months and 30% of the affected eyes had visual acuity of 3/60 or worse. This late presentation could be due to lack of awareness of symptoms as the other eye is still seeing well. Almost 60 % of patients were still driving and able to read ordinary print in newspapers despite having AMD.

Approximately 13% of patients had past history of ischemic heart disease and stroke which shows that majority of patients do not have contraindications to anti VEGF therapy.

Majority of eyes (60%) had advanced AMD of which approximately 1/3 was attributed to a disciform scar. Only 50% of cases were treatable of which 20% were polypoidal choroidal vasculopathy and 30 % were choroidal neovascularisation. Anti VEGF therapy was the main form of therapy in 45% of cases followed by photodynamic therapy. Only a small number of patients received combination therapy with PDT and anti VEGF in view of the financial constraints.

AMD is a potentially blinding disorder and majority of patients in this registry presented late. Despite advances in pharmacological treatment with Anti VEGF therapy there are still cases that are futile to treat. These include cases with central geographic atrophy, fibrosis at the fovea and RPE rip through the centre of the fovea. Increased awareness needs to be disseminated to the public regarding the symptoms so that cases may be detected and treated earlier before it deemed untreatable

CHAPTER 3

RETINOBLASTOMA REGISTRY

Contributing Editor

Dr Jamalia Rahmat

CHAPTER 3: RETINOBLASTOMA REGISTRY

Retinoblastoma is the most common intraocular childhood malignancy in children, with a reported incidence ranging from 1 in 15,000 to 1 in 18,000 live births.
The retinoblastoma (RB) registry tracks all the patients diagnosed with Retinoblastoma since 2004 that were seen by the Paediatric Ophthalmology Services, Hospital Kuala Lumpur.

3.1 INTRODUCTION

There are 72 patients registered, of which 11 patient were diagnosed in 2009.

Table 3.1: Stock and Flow

Year	No. of cases
2004	8
2005	10
2006	12
2007	19
2008	12
2009	11

3.2 PATIENT DEMOGRAPHY

The mean age at presentation was 2.2 years. The youngest age was 3 weeks and the oldest was 10.2 years. About a third (34.7%) of these patients was in the age group of 13 to 24 months and 23.6% were less than 12 months at presentation.

Table 3.2(a): Distribution of Patients by Age

Age, years	N=72
Mean	2.2
SD	1.7
Median	1.8
Minimum	0.1
Maximum	10.2

Age group	**No**	**%**
< 12 months	17	23.6
13 - 24months	25	34.7
25 - 36months	14	19.4
37 - 48months	8	11.1
49 - 60months	3	4.2
> 60 months	5	6.9
Total	**72**	**100**

There were more boys (61.1%) than girls affected, and the majority were of Malay ethnicity (62.5%), followed by Chinese (13.9%) and Indians (9.7%).

Table 3.2(b): Distribution of Patients by Gender

Gender	No	%
Male	44	61.1
Female	28	38.9

Table 3.2(c): Distribution of Patients by Ethnics

Ethnicity	No	%
Malay	45	62.5
Chinese	10	13.9
Indian	7	9.7
Orang Asli	1	1.4
Melanau	1	1.4
Kadazan/ Murut/Bajau	1	1.4
Bidayuh	0	0
Iban	1	1.4
Other	5	6.9
Not available/ Missing	1	1.4

3.3 OCULAR HISTORY AND PRESENTATION

The most common presentation was leukocoria.

Table 3.3(a): Clinical Presentation

Presentation	Number	%
Leukocoria	65	90.3
Strabismus	13	18.1
Proptosis	7	9.7
Others	8	11.1

The mean duration of disease from onset of symptoms to presentation was 4.1 months with the majority (82.9%) within 1 to 6 months.

Table 3.3(b): Duration of Disease at the Time of Presentation

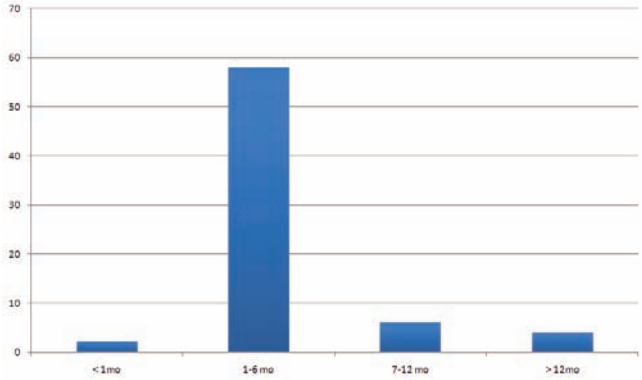
	Months (N=70)	
Minimum	0	
Maximum	34	
Mean	4.1	
	No	**%**
Less than 1 month	2	2.9
1 to 6 months	58	82.9
7 to 12 months	6	8.6
More than 12 months	4	5.7

Of the 72 patients, 48(66.6%) had unilateral disease whereas 30 patients (33.4%) had both eyes affected. A total of 96 eyes were affected. Only 1 patient had positive family history of retinoblastoma.

Table 3.3(c): Eyes Affected

	No of patients	% of eyes
Right eye affected only	17	17.7
Left eye affected only	31	32.3
Both eyes affected	24	50
Total eyes	**96**	**100**

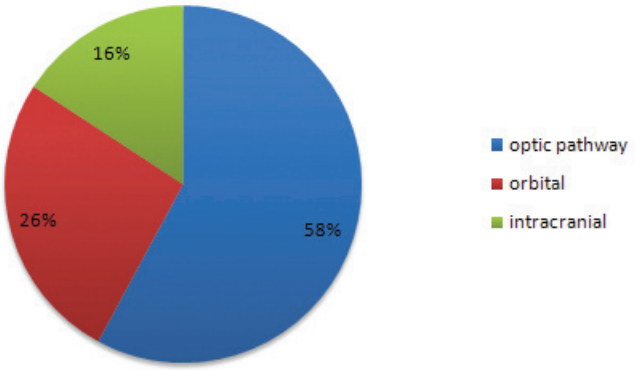
Figure 3.3: Onset of Disease



3.4 INVESTIGATION AND CLASSIFICATION

All patients except one had imaging studies (either CT scan or MRI) done at diagnosis. In 100% of the studies, there was presence of mass. Among those who had CT scan studies, 94.2% had calcifications. 19.8% of the eyes showed evidence of extraocular extension through CT scan, of which the majority involved the optic pathway.

Figure 3.4(a): Extraocular Extension

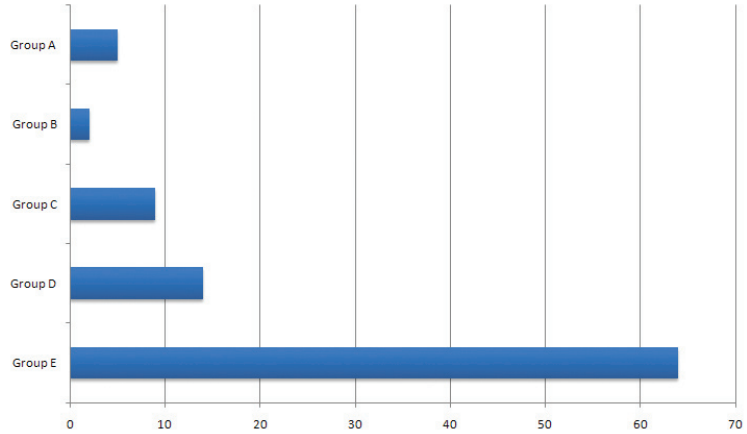


About two-thirds (62.4%) of the patients presented with Group E Retinoblastoma (based on International Intraocular Retinoblastoma Classification- IIRC)

Table 3.4: Classification of Retinoblastoma

	Total					
	Right eye		Left eye		Total	
	No	%	No	%	No	%
Group A	3	7.32	2	3.64	5	5.21
Group B	0	0	2	3.64	2	2.08
Group C	7	17.07	2	3.64	9	9.38
Group D	10	24.39	4	7.27	14	14.58
Group E	20	48.78	44	80	64	66.67
Not available/Missing	1	2.44	1	1.82	2	2.08
Total eyes	**41**	**100**	**55**	**100**	**96**	**100**

Figure 3.4(b): Disease Staging (IIRC)



3.5 MANAGEMENT AND OUTCOME

55.6% of patients had systemic chemotherapy with a mean of 8 cycles (maximum 15 chemotherapy cycles). 5 patients had subtenon injection of chemotherapy together with the systemic chemotherapy. Focal therapy was given together with chemoreduction. 63 affected eyes (65.6%) were enucleated. 24 eyes (32.2%) of the enucleated eyes showed histopathological extension outside the eyeball. 5 (6.9%) patients had external beam radiotherapy.

Table 3.5: Chemotherapy by Patient

	Overall	
	No of patient	%
Had Chemotherapy	40	55.56
Did not have Chemotherapy	27	37.5
Total Patients registered	72	100
• Mean cycles given	7.7	
• Minimum cycle	2	
• Maximum cycle	15	

77.8% of eyes which were treated with chemoreduction had good response with complete regression of tumour. 5 eyes had progressive disease or recurrence within a year of diagnosis.
14 patients defaulted treatment and were lost to follow-up. Death was reported in 3 patients.

Comment
Data from the RB registry showed that the spectrum of presenting symptoms were similar to those reported elsewhere, in which leukocoria was the most common presentation followed by strabismus. The disease was bilateral in one third of patients.
Late presentation was still a problem. Majority of patients presented with advanced stage Group E which necessitate enucleation. About 20% of eyes showed extraocular extension on imaging and 32% had histopathological evidence of extension.
As with other cancers, early detection of retinoblastoma and appropriate treatment can improve outcome. There is a need for an awareness programme for early detection to decrease the number of patients with advanced extraocular disease.

CHAPTER 4

OPHTHALMOLOGY SERVICE CENSUS

Contributing Editors

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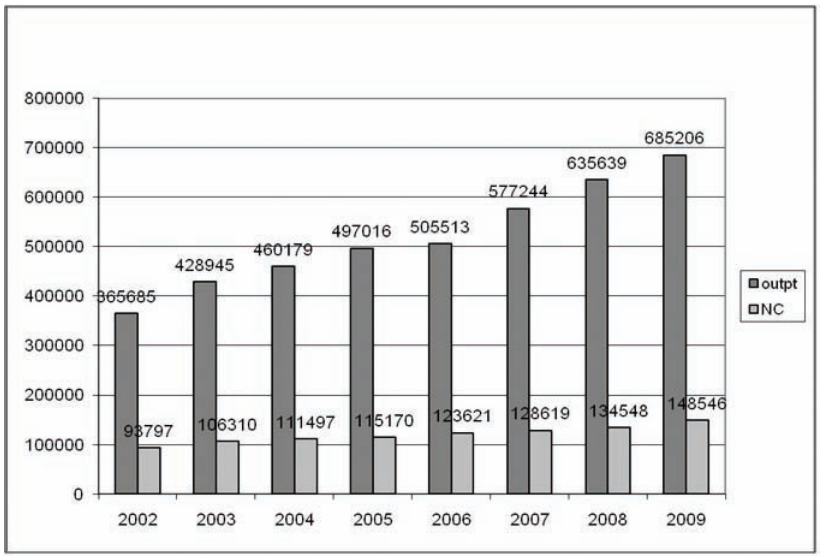
CHAPTER 4: OPHTHALMOLOGY SERVICE CENSUS

The census was returned by hard copy form at the end of each year from 2002 to 2006. For 2007 and 2008, census data were entered monthly by the hospitals. Real time online reports both aggregated and by hospitals are available from 2007 onwards.

Table 4.1: Number of ophthalmology departments which have census return

Year	2002	2003	2004	2005	2006	2007	2008	2009
Number of Ophthalmology departments	29	32	32	32	34	36	36	36

Figure 4.1: Number of out-patients visits at Ophthalmology clinics, 2002-2008



Note: NC=new cases

Figure 4.2: Number of in- patients admitted to eye wards, 2002-2008

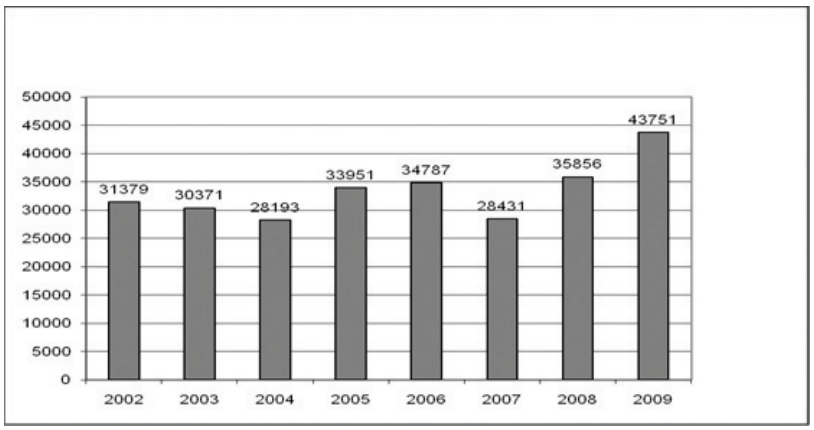
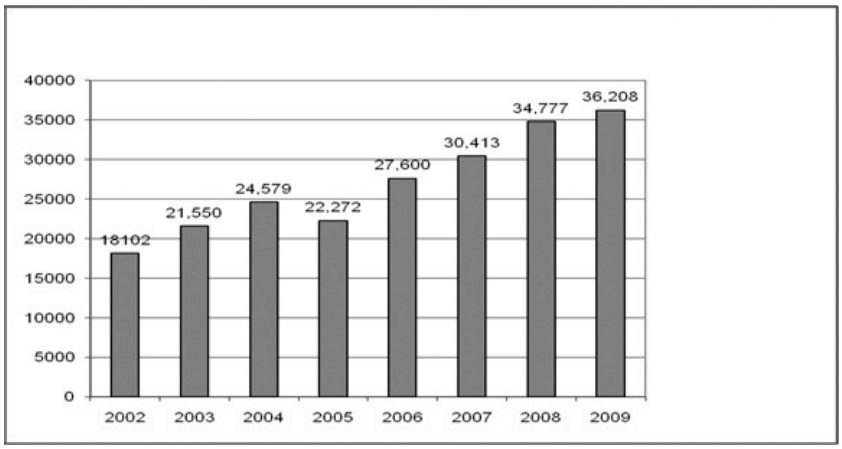


Figure 4.3: Number of ocular operation* performed, 2002-2008



**Ocular operations include surgery performed in operating theatre with grade B and C as classified in Fee Acts 1951.*

Figure 4.4 Number of cataract surgeries, ECCE and phacoemulsification performed, 2002-2008

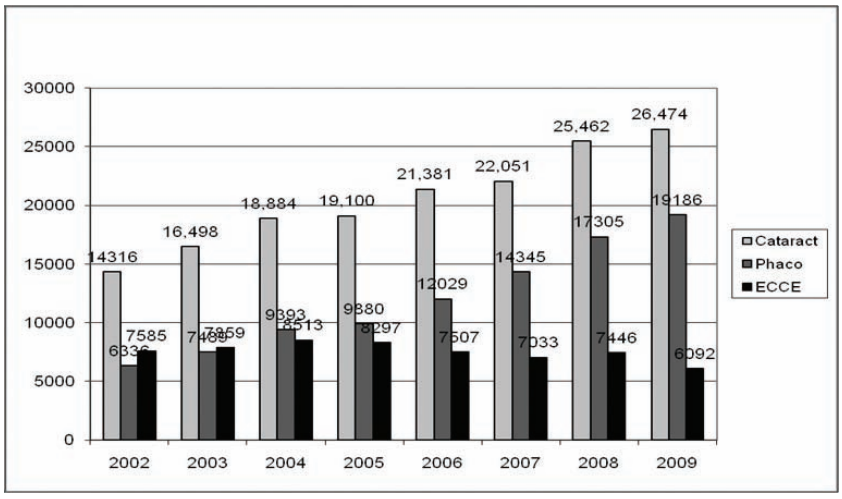


Figure 4.5: Trend of cataract surgeries performed by ECCE and phacoemulsification, 2002 to 2008

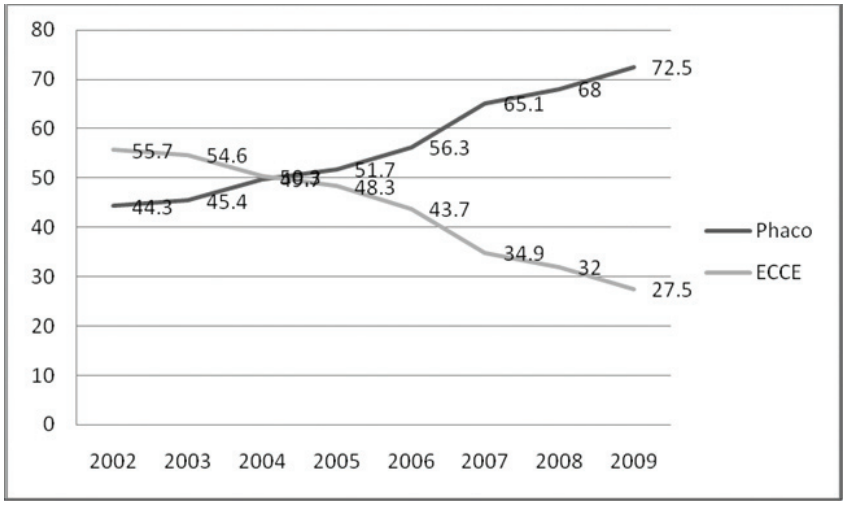


Figure 4.6: Diabetic patients seen at ophthalmology clinics, 2002-2008

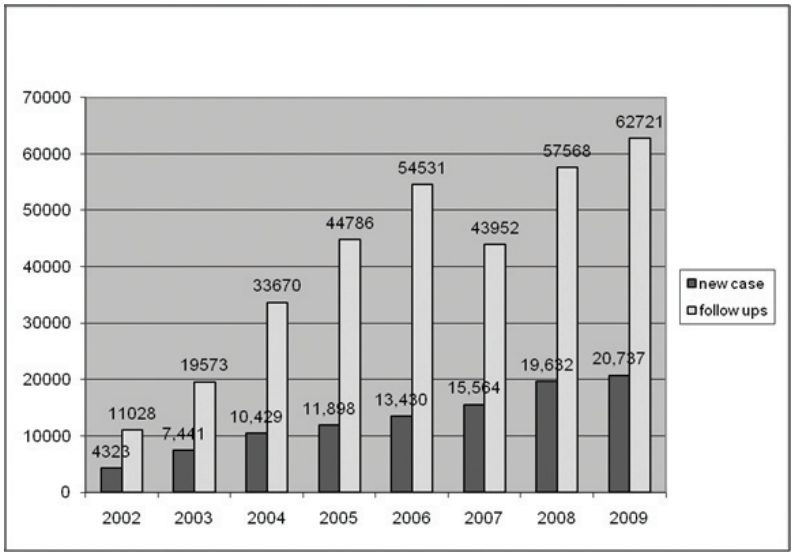


Figure 4.7: Proportion of new patients at eye clinics who came for diabetic eye screening, 2002-2008

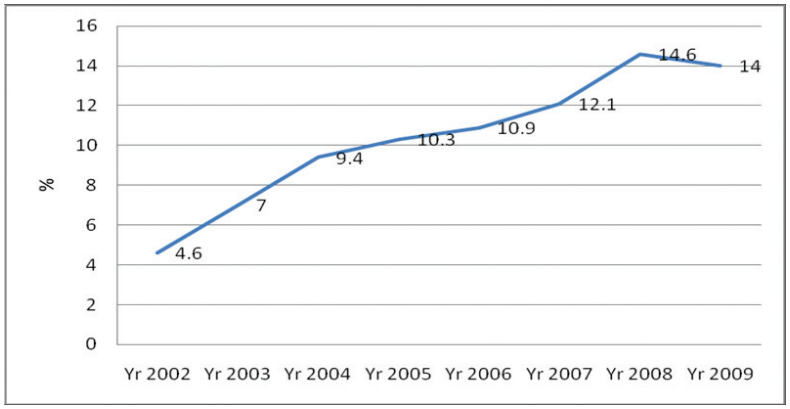


Figure 4.8: Number of vitreo-retinal surgery performed at hospitals with vitreoretinal surgeons, 2002-2008

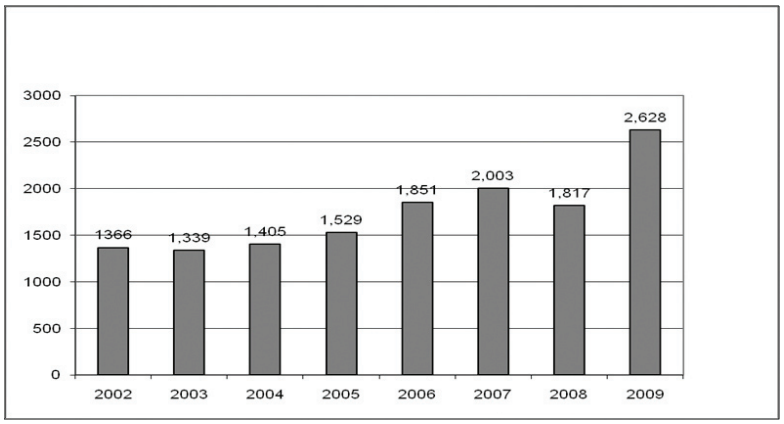


Figure 4.9: Number of refractions performed at ophthalmology clinics, 2002-2008

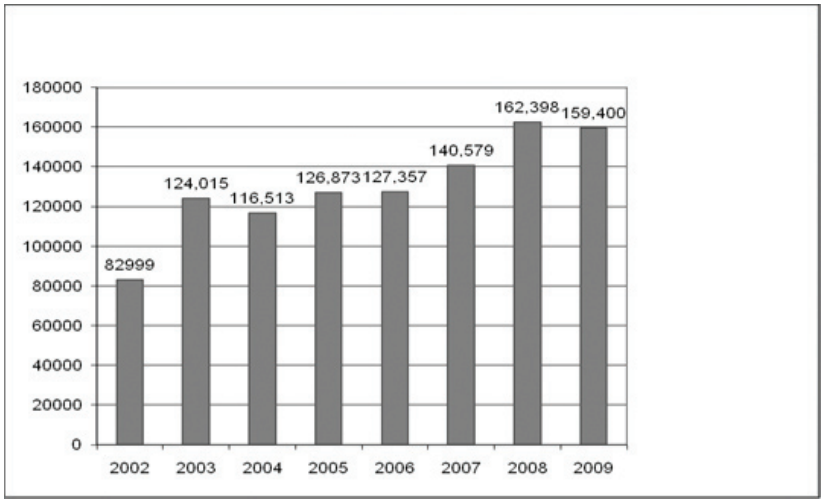


Figure 4.10: Number of patients with low vision assessments, 2002-2007

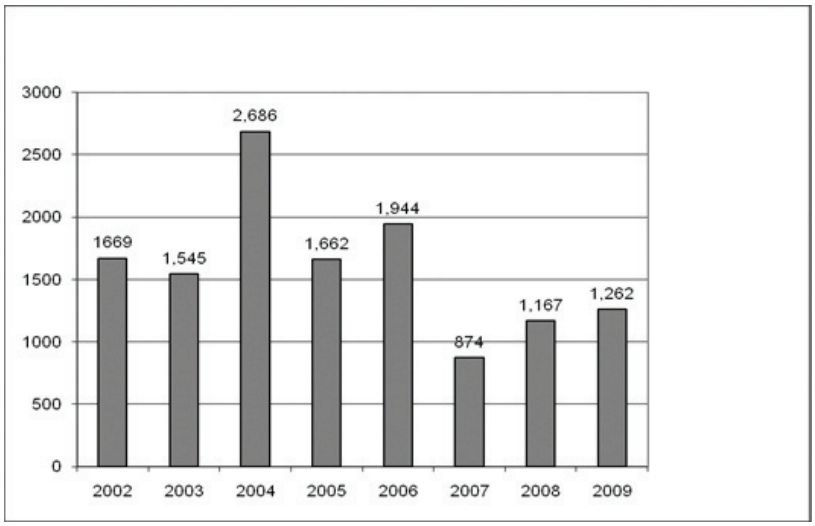


Figure 4.11: Number of premature infants screened for retinopathy of prematurity screening, 2002-2008

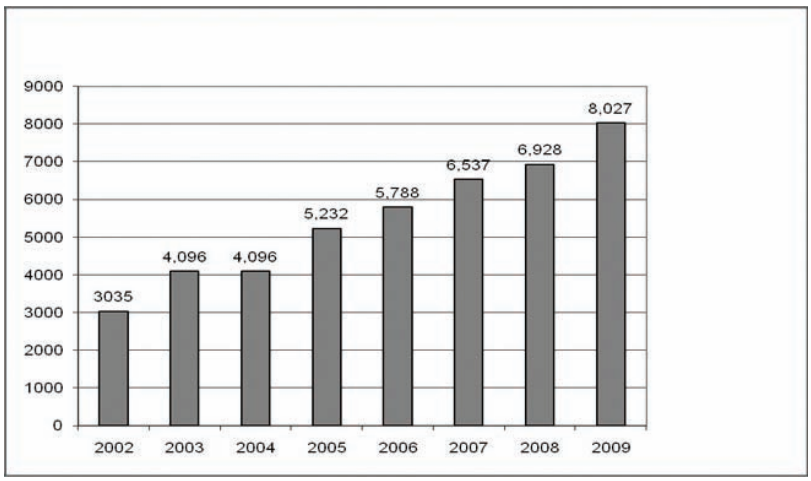
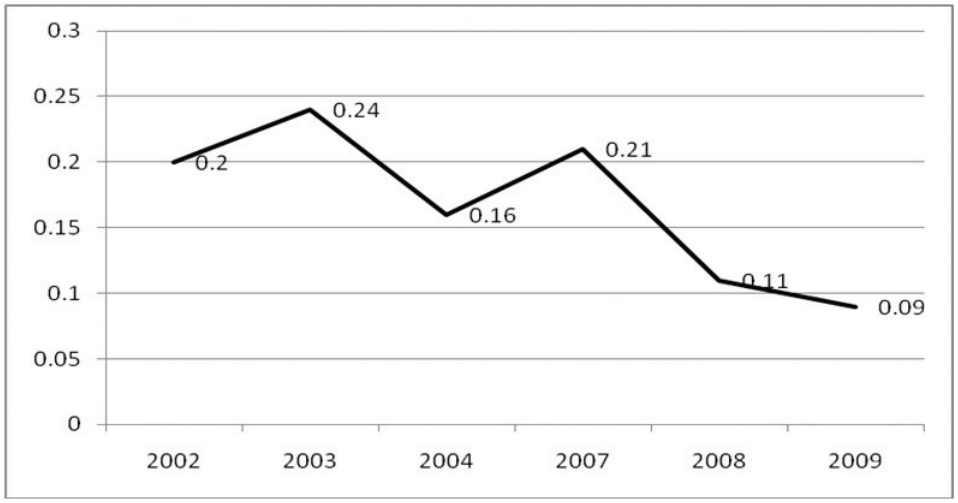


Figure 4.12: Rate (%) of post- cataract surgery endophthalmitis, 2003-2008



APPENDIX

APPENDIX I: OPHTHALMOLOGY DEVICES IN MALAYSIAN HOSPITALS

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Summary: A total of 12 devices utilised by ophthalmology departments in Malaysia were described and analysed. There were inequities in device distribution with more devices being concentrated in the Klang Valley. There were also differences in device availability between public and private sectors as exemplified by the Optical Coherence Tomography machines (2 in public sector, 10 in the private sector.) For future surveys, there is a need to also analyse the availability of trained personnel to operate these devices.

Ophthalmology services have evolved through the years giving rise to a need for various ophthalmic devices which are crucial in diagnosing and treating anterior and posterior segment diseases of the eye. There were 120 hospitals in the public and private sectors in Malaysia offering ophthalmology services. However, only 101 hospitals, out of which 38 public hospitals (95%) and 63 private hospitals (78.75%), responded with data regarding ophthalmic medical devices available in their respective institutions (response rate of 84.17%).

The **slit lamp** is a microscope which can magnify the eye to facilitate the detection of various ocular pathologies. It is one of the most important devices required in an ophthalmic practice as demonstrated by the presence of 236 slit lamps in the public and 104 slit lamps in the private sector, majority of which is found in Selangor and Federal Territory.

The ultrasound principles are utilised in **A scan** which measures the axial length of structures in the globe (mainly used for intraocular calculation for cataract surgery) and B scan which can be used to visualise the structures of the posterior segment of the eye. The A scan machine was available in 45 public hospitals and 53 private hospitals mainly in Selangor and Federal Territory. There were 53 B scan machines almost equally distributed between both sectors with 35.8% of the machines concentrated in Selangor, Putrajaya and WP Kuala Lumpur.

The **Optical Coherence Tomography (OCT) machine** is able to visualise the various layers of the retina and the optic disc which is especially crucial in the diagnosis of glaucoma and retinal pathologies. However, due to the high costs, only two machines were in the public sector and these were located in Terengganu and Selayang. The private sector was fortunate to be able to afford 10 machines with the majority located in Selangor, Putrajaya and WP Kuala Lumpur.

The **automated visual field** is a useful device which helps to measure and monitor the visual field loss in glaucoma patients. There were 68 machines in Malaysia equally distributed between the public and private sectors with 32.4% located in Selangor, Putrajaya and WP Kuala Lumpur.
The autorefractometer is used to estimate the amount of the refractive error of the patients and about 74% of the machines were located in the private sector.

The ophthalmic laser systems encompass both the use of **argon and diode laser**. Argon lasers are utilised in photocoagulation in the event of proliferative diabetic retinopathy and retinal pathologies like retinal breaks whereas diode lasers can be used to create peripheral iridectomy or capsulotomy in treatment of angle closure glaucoma and posterior capsule opacification post cataract surgery. The data indicates that there were slightly more argon lasers in the private sector (56%) whereas the public sector has more diode lasers (55.6%). It is important to note that the states of Perlis, Kedah, Terengganu, Kelantan and Sarawak did not possess diode lasers at all.

Ophthalmic surgery is a very crucial component of an ophthalmic practice which requires the use of an **operating microscope** and other equipment like **phacoemulsification machines and posterior vitrectomy machines**. Ophthalmologists in Malaysia have progressed to phacoemulsification as the preferred method for cataract surgery which offers faster rehabilitation and reduced astigmatism. The phacoemulsification and posterior vitrectomy machines can exist individually or be combined together in a single machine. There were 137 operating microscopes in Malaysia equally distributed between both sectors with almost 1/3 of machines located in Selangor, Putrajaya and WP Kuala Lumpur. The private sector possessed 57.8% of the phacoemulsification machines which were mainly located in Selangor, Putrajaya and WP Kuala Lumpur. There were a total of 15 posterior vitrectomy machines in the country which were equally distributed between the public and private sectors. Centres which do not have a posterior vitrectomy machine actually have a machine which is incorporated together with the phacoemulsification machine as seen in Perak, Melaka and Terengganu. Most of the centres prefer to have a posterior vitrectomy machine combined with the phacoemusification machine as evidenced by the data.

The ophthalmic devices described are crucial to ensure the quality of care of patients with ophthalmic conditions; thus the devices should be maintained and upgraded as needed by both the public and private hospitals. The medical personnel handling the devices should be taught to handle and maintain the machines besides optimising the usage to the full capacity of the machine. It may be necessary to ensure equal distribution of the devices to each centre depending on the workload handled by each centre and to ensure the upgrading of any programs in the devices.

Limitations

The data provided may not be truly reflective of the actual number of devices available or its distribution in individual states. Many of the hospitals have not provided accurate data and some have failed to respond especially, the private sector, which eventually affects the true situation. It is also not evident if the instruments were utilised to its full capacity or if the personnel were trained to utilise and maintain the devices or if the devices were in working condition.

Table i: Number & Density of Slit lamps, A Scans, B Scans and Optical Coherence Tomography in Malaysian Hospitals by States & Sectors, 2009

State	Sector	Slit lamp		A Scan		B Scan		Optical Coherence Tomography (OCT)	
		No	pmp	No	pmp	No	pmp	No	pmp
Malaysia	Public	236		45		27		2	
Malaysia	Private	104		53		26		10	
Malaysia	Total	340	12.19	98	3.51	53	1.9	12	0.43
Perlis	Public	7		2		2		0	
Perlis	Private	0		0		0		0	
Perlis	Total	7	29.54	2	8.44	2	8.44	0	0
Kedah	Public	6		1		1		0	
Kedah	Private	3		2		1		0	
Kedah	Total	9	4.63	3	1.54	2	1.03	0	0
Perlis & Kedah	Public	13		3		3		0	
Perlis & Kedah	Private	3		2		1		0	
Perlis & Kedah	Total	16	7.34	5	2.29	4	1.84	0	0
Pulau Pinang	Public	18		1		0		0	
Pulau Pinang	Private	21		10		5		0	
Pulau Pinang	Total	39	24.68	11	6.96	5	3.16	0	0
Perak	Public	21		5		3		0	
Perak	Private	2		2		1		0	
Perak	Total	23	9.47	7	2.88	4	1.65	0	0
Selangor & WP Putrajaya	Public	24		7		5		1	
Selangor & WP Putrajaya	Private	39		12		6		2	
Selangor & WP Putrajaya	Total	63	12.52	19	3.77	11	2.19	3	0.6
WP KL	Public	0		0		0		0	
WP KL	Private	22		14		8		3	
WP KL	Total	22	12.92	14	8.22	8	4.7	3	1.76
Selangor & WP Putrajaya & WP KL	Public	24		7		5		1	
Selangor & WP Putrajaya & WP KL	Private	61		26		14		5	
Selangor & WP Putrajaya & WP KL	Total	85	12.62	33	4.9	19	2.82	6	0.89

Negeri Sembilan	Public	18		2		1		0	
Negeri Sembilan	Private	3		3		3		0	
Negeri Sembilan	Total	21	20.99	5	5	4	4	0	0
Melaka	Public	13		1		1		0	
Melaka	Private	3		2		1		0	
Melaka	Total	16	21.01	3	3.94	2	2.63	0	0
Johor	Public	39		6		4		0	
Johor	Private	4		4		1		2	
Johor	Total	43	13.15	10	3.06	5	1.53	2	0.61
Pahang	Public	23		4		4		0	
Pahang	Private	0		0		0		0	
Pahang	Total	23	15.16	4	2.64	4	2.64	0	0
Terengganu	Public	15		2		1		1	
Terengganu	Private	0		0		0		0	
Terengganu	Total	15	14.48	2	1.93	1	0.97	1	0.97
Kelantan	Public	19		2		2		0	
Kelantan	Private	2		1		0		0	
Kelantan	Total	21	12.81	3	1.83	2	1.22	0	0
Sabah & WP Labuan	Public	20		6		1		0	
Sabah & WP Labuan	Private	0		0		0		0	
Sabah & WP Labuan	Total	20	6.1	6	1.83	1	0.31	0	0
Sarawak	Public	13		6		2		0	
Sarawak	Private	5		3		0		3	
Sarawak	Total	18	7.29	9	3.64	2	0.81	3	1.21

Table ii: Number and Density of Automated Visual Fields, Opthalmic Laser Systems (Argon and Diode) and Autorefractometers in Malaysian Hospitals by States and Sectors, 2009

State	Sector	Automated visual field		Opthalmic laser systems: Argon laser		Opthalmic laser systems: Diode laser		Autorefractometer	
		No	pmp	No	pmp	No	pmp	No	pmp
Malaysia	Public	34		29		15		26	
Malaysia	Private	34		37		12		47	
Malaysia	Total	68	2.44	66	2.37	27	0.97	73	2.62
Perlis	Public	1		1		1		1	
Perlis	Private	0		0		0		0	
Perlis	Total	1	4.22	1	4.22	1	4.22	1	4.22
Kedah	Public	1		2		0		2	
Kedah	Private	1		2		0		3	
Kedah	Total	2	1.03	4	2.06	0	0	5	2.57
Perlis & Kedah	Public	2		3		1		3	
Perlis & Kedah	Private	1		2		0		3	
Perlis & Kedah	Total	3	1.38	5	2.29	1	0.46	6	2.75
Pulau Pinang	Public	1		1		2		3	
Pulau Pinang	Private	7		6		1		13	
Pulau Pinang	Total	8	5.06	7	4.43	3	1.9	16	10.13
Perak	Public	3		2		2		3	
Perak	Private	1		1		0		1	
Perak	Total	4	1.65	3	1.24	2	0.82	4	1.65
Selangor & WP Putrajaya	Public	7		4		2		3	
Selangor & WP Putrajaya	Private	8		6		6		8	
Selangor & WP Putrajaya	Total	15	2.98	10	1.99	8	1.59	11	2.19
WP KL	Public	0		0		0		0	
WP KL	Private	7		10		4		9	
WP KL	Total	7	4.11	10	5.87	4	2.35	9	5.28

Selangor & WP Putrajaya & WP KL	Public	7		4		2		3	
Selangor & WP Putrajaya & WP KL	Private	15		16		10		17	
Selangor & WP Putrajaya & WP KL	Total	22	3.27	20	2.97	12	1.78	20	2.97
Negeri Sembilan	Public	2		1		1		2	
Negeri Sembilan	Private	1		3		0		3	
Negeri Sembilan	Total	3	3	4	4	1	1	5	5
Melaka	Public	1		1		1		0	
Melaka	Private	2		2		0		3	
Melaka	Total	3	3.94	3	3.94	1	1.31	3	3.94
Johor	Public	4		2		1		3	
Johor	Private	4		4		1		4	
Johor	Total	8	2.45	6	1.84	2	0.61	7	2.14
Pahang	Public	1		3		2		2	
Pahang	Private	0		0		0		0	
Pahang	Total	1	0.66	3	1.98	2	1.32	2	1.32
Terengganu	Public	2		1		0		1	
Terengganu	Private	0		0		0		0	
Terengganu	Total	2	1.93	1	0.97	0	0	1	0.97
Kelantan	Public	3		3		0		3	
Kelantan	Private	0		0		0		0	
Kelantan	Total	3	1.83	3	1.83	0	0	3	1.83
Sabah & WP Labuan	Public	5		3		3		1	
Sabah & WP Labuan	Private	0		0		0		0	
Sabah & WP Labuan	Total	5	1.53	3	0.92	3	0.92	1	0.31
Sarawak	Public	3		5		0		2	
Sarawak	Private	3		3		0		3	
Sarawak	Total	6	2.43	8	3.24	0	0	5	2.02

Table iii: Number and Density of Operating Microscopes, Phacoemulsification Machines and Posterior Vitrectomy Machines (stand alone and combined) in Malaysian Hospitals by States and Sectors, 2009

State	Sector	Operating microscope		Phacoemulsification machine (stand alone)		Posterior vitrectomy machine: Stand alone		Posterior vitrectomy machine: Combined with phacoemulsification	
		No	pmp	No	pmp	No	pmp	No	pmp
Malaysia	Public	64		37		8		12	
Malaysia	Private	73		50		7		21	
Malaysia	Total	137	4.91	87	3.12	15	0.54	33	1.18
Perlis	Public	3		1		1		0	
Perlis	Private	0		0		0		0	
Perlis	Total	3	12.66	1	4.22	1	4.22	0	0
Kedah	Public	2		0		0		1	
Kedah	Private	2		2		0		1	
Kedah	Total	4	2.06	2	1.03	0	0	2	1.03
Perlis & Kedah	Public	5		1		1		1	
Perlis & Kedah	Private	2		2		0		1	
Perlis & Kedah	Total	7	3.21	3	1.38	1	0.46	2	0.92
Pulau Pinang	Public	3		1		0		0	
Pulau Pinang	Private	9		5		0		5	
Pulau Pinang	Total	12	7.59	6	3.8	0	0	5	3.16
Perak	Public	6		2		0		0	
Perak	Private	8		6		0		2	
Perak	Total	14	5.77	8	3.3	0	0	2	0.82
Selangor & WP Putrajaya	Public	12		8		1		1	
Selangor & WP Putrajaya	Private	25		12		3		5	
Selangor & WP Putrajaya	Total	37	7.35	20	3.97	4	0.79	6	1.19
WP KL	Public	0		0		0		0	
WP KL	Private	10		9		1		1	
WP KL	Total	10	5.87	9	5.28	1	0.59	1	0.59
Selangor & WP Putrajaya & WP KL	Public	12		8		1		1	
Selangor & WP Putrajaya & WP KL	Private	35		21		4		6	
Selangor & WP Putrajaya & WP KL	Total	47	6.98	29	4.3	5	0.74	7	1.04

Negeri Sembilan	Public	6		2		1		1	
Negeri Sembilan	Private	3		3		2		0	
Negeri Sembilan	Total	9	9	5	5	3	3	1	1
Melaka	Public	3		2		0		1	
Melaka	Private	4		1		0		1	
Melaka	Total	7	9.19	3	3.94	0	0	2	2.63
Johor	Public	8		8		1		1	
Johor	Private	5		5		1		3	
Johor	Total	13	3.98	13	3.98	2	0.61	4	1.22
Pahang	Public	6		5		1		2	
Pahang	Private	0		0		0		0	
Pahang	Total	6	3.96	5	3.3	1	0.66	2	1.32
Terengganu	Public	2		1		0		1	
Terengganu	Private	0		0		0		0	
Terengganu	Total	2	1.93	1	0.97	0	0	1	0.97
Kelantan	Public	2		2		1		1	
Kelantan	Private	1		0		0		0	
Kelantan	Total	3	1.83	2	1.22	1	0.61	1	0.61
Sabah & WP Labuan	Public	8		3		1		0	
Sabah & WP Labuan	Private	0		0		0		0	
Sabah & WP Labuan	Total	8	2.44	3	0.92	1	0.31	0	0
Sarawak	Public	3		2		1		3	
Sarawak	Private	6		7		0		3	
Sarawak	Total	9	3.64	9	3.64	1	0.4	6	2.43

APPENDIX II: OPHTHALMOLOGY SERVICES IN MALAYSIAN HOSPITALS

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Summary: This chapter analyses hospitals with ophthalmology services (80 in private, 40 in government), its facilities (availability of laser rooms), distribution of ophthalmologists (52.2% in public service versus 47.8% in private sector), and numbers of cataract surgeries performed. There is a need to analyse procedures and services provided by ambulatory care ophthalmology services in the private sector. Further analysis of subspecialties should be included in future surveys.

There were a total of 341 hospitals in Malaysia. Ophthalmology services were available in 120 (35.2%) of these hospitals. The response rate to this survey was 90.83% (109 hospitals).

The number of hospitals providing Ophthalmology services were 37 in MOH hospitals, 3 in University hospitals and 80 in the private sector. The state with the highest number hospitals providing ophthalmology services was Selangor that is 6 public and 17 private. However, the state with the lowest number of hospitals with ophthalmology services was Perlis and Terengganu; both of which had only one public hospital each. Sabah had 6 hospitals (4 public and 2 private) and Sarawak had a total of 11 hospitals (4 public and 7 private).

There were a total of 385 ophthalmologists; 201 (52.2%) were in public service and 184 (47.8%) in the private sector. The distribution of specialist was almost equal in both sectors. Most of the ophthalmologists were working in Selangor, WP Kuala Lumpur and WP Putrajaya.

The ratio of ophthalmologist per 10000 population was 0.14. The ratio of ophthalmologists to 10000 population in Selangor, WP Kuala Lumpur and WP Putrajaya was 0.24. The state with the lowest ratio was Terengganu (0.05 per 10000 population) followed by Sabah and Sarawak (both had a ratio of 0.06 per 10000 population) (Table iv).

Laser services were provided by 55 (45.8%) of the 120 hospitals. The proportion of public hospitals equipped with laser machines was 70% (28 out of 40) compared with 33.75% in private hospitals (27 out of 80). Overall, there was at least one centre providing laser services in each state (Table v).

All 40 public hospitals provided cataract surgery services. (Table vi) shows the number of cataract surgery performed in the public sector in 2009.

Table iv: Number and Density of Hospitals Providing Ophthalmology Services in Malaysia by State and Sector, 2000 to 2009

State	Sector	Year 2000		Year 2005		Year 2009	
		Number	Per 10000 population	Number	Per 10000 population	Number	Per 10000 population
Malaysia	Public	33		34		40	
Malaysia	Private	58		72		80	
Malaysia	Total	91	0.04	106	0.04	120	0.04
Perlis	Public	1		1		1	
Perlis	Private	0		0		0	
Perlis	Total	1	0.05	1	0.04	1	0.04
Kedah	Public	1		1		3	
Kedah	Private	4		4		4	
Kedah	Total	5	0.03	5	0.03	7	0.04
Kedah & Perlis	Public	2		2		4	
Kedah & Perlis	Private	4		4		4	
Kedah & Perlis	Total	6	0.03	6	0.03	8	0.04
Pulau Pinang	Public	2		2		2	
Pulau Pinang	Private	7		8		9	
Pulau Pinang	Total	9	0.07	10	0.07	11	0.07
Perak	Public	4		4		4	
Perak	Private	7		7		8	
Perak	Total	11	0.05	11	0.05	12	0.05
Selangor & WP Putrajaya	Public	3		3		6	
Selangor & WP Putrajaya	Private	11		14		17	
Selangor & WP Putrajaya	Total	14	0.03	17	0.04	23	0.05
WP Kuala Lumpur	Public	3		3		3	
WP Kuala Lumpur	Private	11		14		15	
WP Kuala Lumpur	Total	14	0.1	17	0.11	18	0.11
Selangor & WP Putrajaya & WP KL	Public	6		6		9	
Selangor & WP Putrajaya & WP KL	Private	22		28		32	
Selangor & WP Putrajaya & WP KL	Total	28	0.05	34	0.05	41	0.06

Negeri Sembilan	Public	2		2		2	
Negeri Sembilan	Private	3		4		4	
Negeri Sembilan	Total	5	0.06	6	0.06	6	0.06
Melaka	Public	1		1		1	
Melaka	Private	3		3		3	
Melaka	Total	4	0.07	4	0.06	4	0.05
Johor	Public	3		3		4	
Johor	Private	6		7		8	
Johor	Total	9	0.03	10	0.03	12	0.04
Pahang	Public	1		2		2	
Pahang	Private	0		1		1	
Pahang	Total	1	0.01	3	0.02	3	0.02
Terengganu	Public	1		1		1	
Terengganu	Private	0		0		0	
Terengganu	Total	1	0.01	1	0.01	1	0.01
Kelantan	Public	3		3		3	
Kelantan	Private	1		2		2	
Kelantan	Total	4	0.03	5	0.03	5	0.03
Sabah & WP Labuan	Public	4		4		4	
Sabah & WP Labuan	Private	1		2		2	
Sabah & WP Labuan	Total	5	0.02	6	0.02	6	0.02
Sarawak	Public	4		4		4	
Sarawak	Private	4		6		7	
Sarawak	Total	8	0.04	10	0.04	11	0.04

Table v: Number and Density of *Ophthalmologists in Malaysia by State and Sector, 2009

State	Sector	Year 2000	Year 2005	Year 2009	
		Number	Number	Number	Per 10000 population
Malaysia	Public	ND	ND	201	-
Malaysia	Private	ND	ND	184	-
Malaysia	Total	ND	ND	385	0.14
Perlis	Public	ND	ND	3	-
Perlis	Private	ND	ND	0	-
Perlis	Total	ND	ND	3	0.12
Kedah	Public	ND	ND	12	-
Kedah	Private	ND	ND	6	-
Kedah	Total	ND	ND	18	0.09
Kedah & Perlis	Public	ND	ND	15	-
Kedah & Perlis	Private	ND	ND	6	-
Kedah & Perlis	Total	ND	ND	21	0.09
Pulau Pinang	Public	ND	ND	9	-
Pulau Pinang	Private	ND	ND	22	-
Pulau Pinang	Total	ND	ND	31	0.2
Perak	Public	ND	ND	14	-
Perak	Private	ND	ND	14	-
Perak	Total	ND	ND	28	0.12
Selangor & WP Putrajaya	Public	ND	ND	42	-
Selangor & WP Putrajaya	Private	ND	ND	60	-
Selangor & WP Putrajaya	Total	ND	ND	102	0.2
WP Kuala Lumpur	Public	ND	ND	40	-
WP Kuala Lumpur	Private	ND	ND	25	-
WP Kuala Lumpur	Total	ND	ND	65	0.39
Selangor & WP Putrajaya & WP KL	Public	ND	ND	82	-
Selangor & WP Putrajaya & WP KL	Private	ND	ND	85	-
Selangor & WP Putrajaya & WP KL	Total	ND	ND	167	0.24
Negeri Sembilan	Public	ND	ND	9	-
Negeri Sembilan	Private	ND	ND	9	-
Negeri Sembilan	Total	ND	ND	18	0.18
Melaka	Public	ND	ND	6	-
Melaka	Private	ND	ND	12	-
Melaka	Total	ND	ND	18	0.23
Johor	Public	ND	ND	13	-
Johor	Private	ND	ND	14	-
Johor	Total	ND	ND	27	0.08
Pahang	Public	ND	ND	13	-
Pahang	Private	ND	ND	4	-
Pahang	Total	ND	ND	17	0.11
Terengganu	Public	ND	ND	6	-
Terengganu	Private	ND	ND	0	-
Terengganu	Total	ND	ND	6	0.05
Kelantan	Public	ND	ND	16	-
Kelantan	Private	ND	ND	1	-
Kelantan	Total	ND	ND	17	0.1
Sabah & WP Labuan	Public	ND	ND	9	-
Sabah & WP Labuan	Private	ND	ND	10	-
Sabah & WP Labuan	Total	ND	ND	19	0.06
Sarawak	Public	ND	ND	9	-
Sarawak	Private	ND	ND	7	-
Sarawak	Total	ND	ND	16	0.06

Table vi: Number and Density of Laser Room for Ophthalmic Procedures in Malaysia by State and Sector, 2009

State	Sector	Year 2009	
		Number	Per 10000 population
Malaysia	Public	28	
Malaysia	Private	27	
Malaysia	Total	55	0.02
Perlis	Public	1	
Perlis	Private	0	
Perlis	Total	1	0.04
Kedah	Public	2	
Kedah	Private	1	
Kedah	Total	3	0.02
Kedah & Perlis	Public	3	
Kedah & Perlis	Private	1	
Kedah & Perlis	Total	4	0.02
Pulau Pinang	Public	2	
Pulau Pinang	Private	9	
Pulau Pinang	Total	11	0.07
Perak	Public	3	
Perak	Private	1	
Perak	Total	4	0.02
Selangor & WP Putrajaya	Public	3	
Selangor & WP Putrajaya	Private	4	
Selangor & WP Putrajaya	Total	7	0.01
WP Kuala Lumpur	Public	2	
WP Kuala Lumpur	Private	7	
WP Kuala Lumpur	Total	9	0.05
Selangor & WP Putrajaya & WP KL	Public	5	
Selangor & WP Putrajaya & WP KL	Private	11	
Selangor & WP Putrajaya & WP KL	Total	16	0.02
Negeri Sembilan	Public	1	
Negeri Sembilan	Private	1	
Negeri Sembilan	Total	2	0.02
Melaka	Public	1	
Melaka	Private	1	
Melaka	Total	2	0.03
Johor	Public	6	
Johor	Private	1	
Johor	Total	7	0.02
Pahang	Public	1	
Pahang	Private	2	
Pahang	Total	3	0.02
Terengganu	Public	1	
Terengganu	Private	0	
Terengganu	Total	1	0.01
Kelantan	Public	3	
Kelantan	Private	0	
Kelantan	Total	3	0.02
Sabah & WP Labuan	Public	3	
Sabah & WP Labuan	Private	3	
Sabah & WP Labuan	Total	5	0.01
Sarawak	Public	1	
Sarawak	Private	2	
Sarawak	Total	3	0.01

Table vii: Number and Density of Cataract Surgeries in Public Hospitals of Malaysia by State and Sector, 2009*

State	Sector	Year 2009	
		Number	CSR per million population
Malaysia	Public	29061	1042
Perlis	Public	359	1515
Kedah	Public	1858	956
Kedah & Perlis	Public	2217	1017
Pulau Pinang	Public	2363	1496
Perak	Public	3731	1537
Selangor & WP Putrajaya	Public	4077	810
WP Kuala Lumpur	Public	4175	2451
Selangor & WP Putrajaya & WP KL	Public	8252	1225
Negeri Sembilan	Public	1544	1544
Melaka	Public	1308	1717
Johor	Public	2790	853
Pahang	Public	1330	877
Terengganu	Public	700	676
Kelantan	Public	1507	919
Sabah & WP Labuan	Public	1185	362
Sarawak	Public	2134	864

**Data from National Eye Database (NED) for Ministry of Health Hospitals, with additional data from the 3 university hospitals namely Pusat Perubatan Universiti Malaya (PPUM),*
Pusat Perubatan Universiti Kebangsaan Malaysia and Hospital Universiti Sains Malaysia (HUSM).
***CSR-cataract surgery rate per million population*

Limitations

1. Several public hospitals reported having Ophthalmology services. This was because hospitals without ophthalmology service identified themselves as having ophthalmic services based on sessions provided by visiting ophthalmologists.

2. A large volume of cataract surgery was done in the ambulatory care setting in the private centres which do not fall under the definition of "hospital". In order for the work force database to be reflective of Ophthalmology services, these centres with ambulatory care facilities should be included in future surveys.

3. The survey focused on collecting data on the number of laser rooms. However, this was not reflective of services provided as more than one laser machine may be placed in one room (at times up to 3). Additionally the laser machines could have been of different models. The survey should have focused on the number and types of cataract surgery done (i.e. anterior and posterior segment).

4. Future surveys should include more parameters namely:
   i. Availability of Optometrist services
   ii. Cataract surgery which is the commonest surgery performed by an Ophthalmologist
   iii. Subspecialty services and procedures.


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