



The First *Annual Report of the* *National Eye Database* **2007**

Includes reports on:

Cataract Surgery Registry 2002,2003,2004 and 2007

Diabetic Eye Registry 2007

Contact Lens Related Corneal Ulcer Surveillance 2007

Glaucoma Registry, 2007

MOH Ophthalmology Service Census 2002 - 2007

Edited by:

Goh Pik Pin

Elias Hussein

Zuraidah Mustari

Mariam Ismail



With contributions from:

Goh Pik Pin, Zuraidah Mustari, Shamala Retnasabapathy, Ong Poh Yan,
Nor Fariza Ngah, Chandramalar T. Santhirathelagan, Loh Swee Seng,
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Dr. Hjh Siti Zaleha Mohd Salleh, director and Madam Lee Sak Wah, head of Information Technology department of Selayang Hospital.

Many others whose names may not be listed here for their help in many ways.

The future of NED is challenging. The continuity of NED will certainly need every stakeholder's perseverance, enthusiasm, courage and hard work. We hope for your continuous support.

Thank you.

Members of NED Steering Committee

NED STEERING COMMITTEE MEMBERS 2007-2008

Advisor	Dr. Mariam Ismail Head, Ophthalmology Service, MOH & Head, Ophthalmology Department, Hospital Selayang
Chairperson	Dr. Goh Pik Pin Public Health Ophthalmologist/ Consultant Ophthalmologist Ophthalmology Department, Hospital Selayang Principal Investigator for Cataract Surgery Registry
Members	Dr. Elias Hussein Consultant Ophthalmologist, Primary Eye Care Service Ophthalmology Department, Hospital Selayang National Coordinator for Key Performance Indicators
	Dr. Radzlian Othman Head & Consultant Ophthalmologist, Oculoplasty Service Ophthalmology Department, Hospital Serdang National Coordinator for Monthly Ophthalmology Service Census, MOH
	Dr. Shamala Retnasabapathy Consultant Ophthalmologist, Corneal Service Ophthalmology Department, Hospital Sungai Buloh Principal Investigator for Contact Lens-related Corneal Ulcer Surveillance
	Dr. Ong Poh Yan Consultant Ophthalmologist, Glaucoma Service Ophthalmology Department, Hospital Selayang Principal Investigator for Glaucoma Registry
	Dr. Nor Fariza Ngah Consultant Ophthalmologist, Medical Retina Service Ophthalmology Department, Hospital Selayang Principal Investigator for Diabetic Eye Registry
	Dr. Zuraidah Mustari Head & Consultant Ophthalmologist Ophthalmology Department, Hospital Sultanah Nur Zahirah Kuala Terengganu Principal Investigator for Tele-Diabetic Retinopathy
Secretariat	Teng Kam Yoke Ophthalmic trained staff nurse NED Clinical Registry Manager

Technical Support Personnel

Statisticians	Dr. Hoo Ling Ping Ms. Wahidah Tumijan
Database Administrator	Ms. Lim Jie Ying
Clinical Data Manager	Ms. Teo Jau Shya
Web Application Developer	Ms. Amy Porle
Clinical Data Management Assistant	Ms. Huziana Fauzi
Desktop Publisher & Website Designer	Ms. Azizah Alimat
Clinical Registry Assistant	Puan Tuan Junaidah Bt Tuan Jusoh

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 sectors only, but will expand to university and private sectors. Information collected, both clinical and epidemiological, will be 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

Accessible eye health information.

General Objectives of the National Eye Database

1. To establish and maintain a web based eye health information system on natural history of visually 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 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 eye disease. This contributes to continuous quality initiatives.
4. To evaluate the accessibility and equity in health care provision. This information enhances accountability.
5. To provide means of prompt and wide dissemination of epidemiological and clinical information such as real-time registry reports and notification of epidemic of contact lens-related corneal ulcer through the web. This is essential for advocating public health.
6. To stimulate and facilitate research on eye diseases.

Specific Objectives of Individual Registry and Census

Cataract Surgery Registry

The Cataract Surgery Registry (CSR) 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. The CSR is a continuation of the National Cataract Surgery Registry (NCSR), which was operational from 2002 to 2004. Annual NCSR reports for the year 2002, 2003, and 2004 are available at the publication section at www.acrm.org.my/ned.

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 the 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

ABOUT NATIONAL EYE DATABASE (CONT.)

Diabetic Eye Registry

Diabetes mellitus (DM) is becoming an epidemic in Malaysia. Based on the National Health and Morbidity Survey, the prevalence of known and newly diagnosed diabetes among adults above 30 years old has risen from 8.3% in 1996 to 14.9% in 2006. With the increasing prevalence of diabetes, it is also expected that complications related to DM to be on the rise. Diabetic retinopathy (DR), a microvascular complication of diabetes, may lead to blindness. However it is preventable if detected and intervened early.

The Diabetic Eye Registry (DER) aims to observe the status of diabetic retinopathy among diabetics referred to the ophthalmology clinics. The information is useful in the planning and evaluation of diabetic eye screening and provision of treatment for patients who have DR. With evidence-based public health program, we hope DR does not become the major cause of visual impairment and blindness in this country.

Specific Objective

1. To evaluate the status of diabetic retinopathy at the first diabetic eye screening at ophthalmology clinics

Contact Lens-related Corneal Ulcer Surveillance

Contact lens wear is one of the ways to correct refractive errors. However, it is associated with complications such as allergic conjunctivitis, corneal abrasion and corneal ulcer. Among these, corneal ulcer or infective keratitis is the most serious as it can lead to devastating visual outcomes such as blindness and even loss of eyeball through evisceration.

Monitoring of contact lens-related corneal ulcer, as a mean to evaluate contact lens practice, has been part of the ophthalmology service census since 2002. Subsequent to the global outbreak of *fusarium* keratitis related to contact lens cleaning solution in 2006, the monitoring is now done on-line through web application. Reports of cases notified can be viewed on-line. This has made monitoring and dissemination of information more efficient.

Doctors who diagnose patients with suspected contact lens-related corneal ulcer are encouraged to notify cases to the NED surveillance. Data collected include demography, types of contact lens and cleaning solution used, wearing pattern, causative organism, vision and treatment outcome after 1 month.

Specific Objectives

1. To detect outbreak of contact lens-related corneal ulcer
2. To determine pattern of causative organism of contact lens-related corneal ulcer
3. To study the characteristics of patients in terms of demography, risk factors and contact lens type and wearing patterns
4. To monitor the outcome of patients with contact lens-related corneal ulcer

Glaucoma Registry

Glaucoma is a chronic progressive optic neuropathy characterized by atrophy of optic nerve and loss of retinal ganglion cells and their axons. It is sight threatening and is one of the major causes of blindness globally. Findings from the National Eye Survey 1996 showed that 1.8% of those who were blind and 1.8% of those with low vision was due to glaucoma. Glaucoma is related to aging and with increasing life expectancy, more people will be affected with glaucoma. Patients with glaucoma need long term treatment and regular follow-up and this consume substantial human and economic resources. Hence there is a need to establish a glaucoma registry to capture data on patient demography, types of glaucoma, risk factors and mode of management. Both new and follow-up glaucoma patients, including ocular hypertension and glaucoma suspects who are seen at ophthalmology clinics are to be included in this registry.

ABOUT NATIONAL EYE DATABASE (CONT.)

Specific Objectives

1. To study the demographic characteristics of glaucoma patients, glaucoma suspects and patients with ocular hypertension
2. To determine the types of glaucoma
3. To access risk factors associated with glaucoma, glaucoma suspects and patients with ocular hypertension
4. To evaluate the pattern of management among glaucoma patients

Retinoblastoma Registry

Retinoblastoma (RB) is the most common intraocular malignant tumour encountered in children. Without early diagnosis and proper treatment, RB results in visual impairment or blindness. Untreated, the disease is fatal. With early diagnosis, eyes and lives of those affected can be saved.

Globally, RB affects between 1 in 14,000 and 1 in 20,000 live births. Currently, there are no data available on the incidence, prevalence and disease characteristics of RB in Malaysia. This registry is developed as database on the magnitude and pattern, as well as mode of treatment and outcome of RB in Malaysia.

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 retinoblastoma patients in terms of clinical presentation and disease stages based on the 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) is one of the leading causes of blindness in individuals over the age of 50 years. The prevalence of early and late AMD among Singaporean Malays is 3.5% and 0.3% respectively, affecting more men than women.

In the past, AMD was perceived to be more prevalent in Caucasians than Asians. However, recent studies have shown that although this is true of late AMD, the prevalence of early AMD among Caucasians and Asians is similar.

To date, there is no data on AMD among Malaysians. This registry aims to establish a database on demographics, risk factors, clinical features and methods of treatment used in patients newly diagnosed with AMD.

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 treatment given to AMD patients

ABOUT NATIONAL EYE DATABASE (CONT.)

Ministry of Health 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 (KPI) for ophthalmology service. There are 13 sections in the census return. They consist of section on out-patients, in-patients, major eye operations, cataract service, diabetic service, glaucoma service, optometry service and subspecialty services such as vitreoretinal, corneal, paediatric ophthalmology, oculoplasty, medical retinal, and a public health ophthalmology section with data on training and prevention of blindness activities. These data are very useful in the planning of ophthalmology service in MOH. With the monthly on-line data entry, heads of each ophthalmology department can now view the real-time census.

Specific Objectives

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

National Eye Database Methodology

NED 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 has been approved by the Medical Research Ethics Committee of MOH on 2nd September 2008 (NMRR 08-552-1707). The protocol is accessible at the NED website.

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

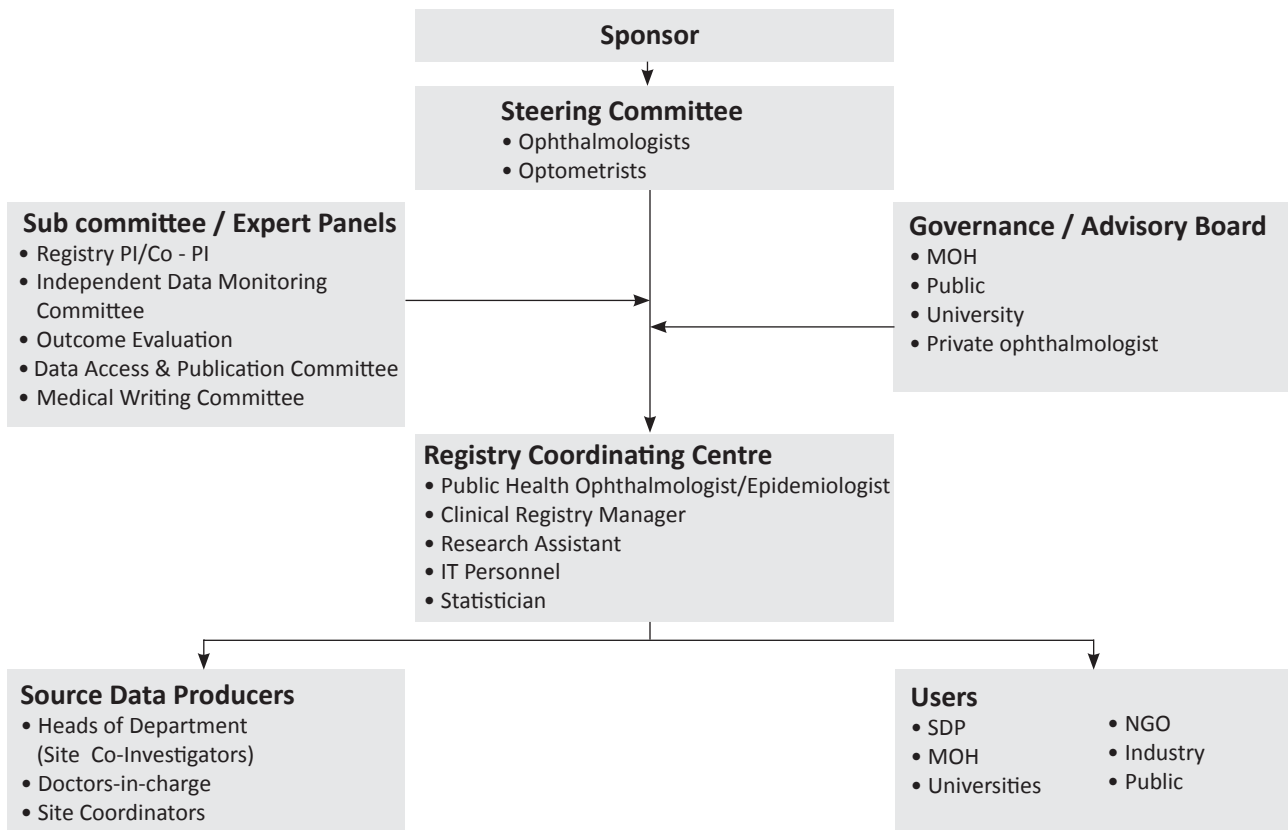
Data management using data query are set in the web application to reduce inconsistency, out of range or missing values. Authorized staff at each SDP are given passwords to perform data entry. Individual SDP reports and aggregated reports based on cumulative data of all SDPs are available real-time at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

The NED has a high level of security for protection of its data. Data protection is ensured at all time 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.

ABOUT NATIONAL EYE DATABASE (CONT.)

NED Organization

Organization Chart



Sponsors

The NED is sponsored by a registry grant from the MOH, via Clinical Research Center, one of the MOH National Institutes of Health.

The CRC shall:

1. Be responsible to the Deputy Director General (Research and Technical Support) of the MOH for the effective, efficient and proper conduct of the registry
2. Provide oversight for the operations of the registry
3. Appoint the Principal Investigator (PI) of the registry after due consultation with the participating clinical sites and other relevant experts. The appointed PI shall then appoint members of the Governance Board and Steering Committee, with due consultation with the participating clinical sites and other relevant experts.
4. Provide financial, human and other resources required

Steering Committee

The steering committee oversees the operation of NED. The operation is carried out by the clinical registry manager and registry assistant. The current steering committee members are ophthalmologists from the public sector. Some of them are also principal investigator (PI) of the specific eye disease registries.

The Steering Committee shall:

1. Establish policy and procedures for the registry's conduct
2. Review recommendations of the Governance Board and Independent Data Monitoring Committee on patients' safety and interim results.
3. Motivate SDPs to continue participation in the registry
4. Disseminate information about the registry

ABOUT NATIONAL EYE DATABASE (CONT.)

5. Communicate results locally and internationally
6. Approve, and if necessary validate, the statistical analysis plan
7. Determines policy and procedures for the operations of the database
8. Establish the Registry Coordinating Centre (RCC) and appoint its project team members
9. Direct the activities of the RCC
10. Oversee matters related to research such as:
 - 10.1. Collaborate research activities with all ophthalmology departments at MOH, universities, private eye centres and international organizations
 - 10.2. Coordinate collaborated research activities in ophthalmology
 - 10.3. Assist ophthalmologists in developing research protocol for the MOH Research and Ethical Committee (MREC) and grant application
 - 10.4. Organize training related to research

Governance Board

NED is yet to set up a governance board. The members of the board will consist of those with experience in research and clinical practice and should represent all identified stakeholders.

The Board shall

- Provide leadership and direction for the NED
- Communicate NED vision, strategic direction, policies and decisions to all interested parties.
- Determine the objectives of the NED
- Provide expertise for the NED
- Oversee the progress of the NED to ensure its continuing relevance
- Assist in enlisting SDPs for the NED and facilitate access to source data
- Provide avenues for users input to the NED, and to convey their needs and concerns
- Secure ongoing funding support for the NED
- Galvanize commitment of all interested parties to the NED
- Conduct the annual review of the NED and the performance of the project team

Sub-committees or expert panels

From time to time, the Steering Committee may appoint sub-committee or expert panels to assist in some specific aspects of the registry work. These may include the following:

1. Principal Investigator and Co-investigators in Sub-registries under NED
This is an expert panel responsible for the development and maintenance of eye disease registries under NED.
The responsibilities of Principal Investigators for the respective registries in NED are:
 - a. To publicize and encourage others to participate in the registry
 - b. To review and improve registry web reports
 - c. To prepare annual statistical report based on aggregated data
 - d. To present findings on registry at local and international meetings
 - e. To publish registry findings in peer reviewed journals
 - f. To use and encourage others to use registry data for improving eye care services and in the training of eye care professionals, including doctors, optometrists, orthoptics and mid level eye care personnel.
2. Independent Data Monitoring Committee
This is an independent committee responsible for reviewing data on safety of therapeutic products such as drugs or devices, which are of interest to the registry.
3. Outcome Evaluation Committee
The committee is responsible for evaluating the registry outcome data, and adjudicating on disease diagnosis and causes of death.

ABOUT NATIONAL EYE DATABASE (CONT.)

4. **Data Access and Publication Committee**
The committee is responsible for reviewing and approving application to access registry data for research and publications based on registry data.
5. **Medical Writing Committee**
A committee constituted to prepare the registry regular or interim registry reports, and to prepare manuscripts on registry data for journal submission.

Registry Coordinating Centre

The Registry Coordinating Centre (RCC) is located at CRC Hospital Selayang. It is headed by a clinical registry manager (CRM) and assisted by a clinical registry assistant (CRA). They manage, coordinate and monitor the progress of the registry as follows:

1. Manage the activities for setting-up and initiating the registry
2. Design and prepare protocol and CRF
3. Prepare document submission for ethics approval, and subsequent liaison with ethics committee and regulatory authority concerned
4. Develop and validate registry database, and undertake data management such as data clarification and data entry
5. Help SDPs which do not have on-line facilities for data entry
6. Assist SDP sites in initiating and conducting the registry, in enrolling patients into the registry and in promoting the registry using various media
7. Undertake safety surveillance of the therapeutic products of interest to the registry
8. Communicate with staff-in-charge at SDP to monitor the registry conduct and visit SDP sites when necessary
9. Communicate with designated statistician appointed by the RCC, who will be responsible for statistical analysis of the registry data
10. Assist Steering Committee and PIs with drafting of the registry reports, manuscripts and abstracts

Source Data Producers

SDP are centers who participate in the NED. They provide data essential for each registry and service census. At each participating SDP, personnel involved in the operation of NED are the heads of department (HOD), who are also NED site-co-investigators, doctors in charge and sitecoordinators, who are mostly optometrists. (Refer to the list of current SDPs and personnel in charge at each SDP in pages xi and xii in this report).

Personnel involve at each SDP are given the rights to manage their own center data, including data edit, data download and to view real time web reports. They must ensure complete data ascertainment, good quality data and up to date data entry. Data collection and data entry should as much as possible be done at the course of clinical work. HODs appoint staff for data entry and approve their applications to get user names and passwords. Staff involved are advised to refer to the user instruction manual, which is posted on the web.

Responsibilities of heads of department

1. Ensure that authorized staff adhere to security policy of NED web application
2. Ensure data ascertainment is as complete as possible
3. Review centre reports at regular intervals
4. Use centre reports to help in the management of department, wherever relevant
5. Encourage department staff to use NED data for research and publication

ABOUT NATIONAL EYE DATABASE (CONT.)

Responsibilities of doctors-in-charge

1. Create awareness among department staff on the objectives and patients to be included in the registries
2. Provide training to new staff in data definition and CRF completion
3. Coordinate with RCC in the application of usernames and passwords for staff
4. Periodically review completed CRF and centre web reports to check for inconsistency, out of range or missing values
5. Communicate with RCC on any arising problems

Responsibilities of site-coordinators

1. Provide training in data entry to new staff
2. Perform data entry
3. Review patient listing for outcome not yet submitted, gather and enter outcome data
4. Feedback to HOD and doctor-in-charge on any problems arising from data collection and data entry
5. Communicate with RCC on any arising problem

Users

The users of NED data include

1. Eye care providers such as ophthalmologists, optometrists, opticians and orthoptics
2. MOH agencies, department and division
3. Academic institutions including ophthalmology and optometry departments at universities, nursing colleges etc
4. NGO providing eye care services or involved in the blindness prevention activities
5. Industry
6. Public

NED SOURCE DATA PRODUCERS 2007/2008

(SDP are arranged in alphabetical order)

	Site	Heads of Dept	Doctors In charge	Site coordinators
1.	Hospital Alor Star	Dr. Ahmad Mat Saad	Dr. Zaharidah Abdul Kadir	Noor Suriani bt Mohamad
2.	Hospital Ampang	Dr. Siti Haida Mad Isa	Dr. Zalifa Zakiah bt Asnir	Norah bt Abdullah
3.	Hospital Batu Pahat	Dr. Jawiah bt Hassan	Dr. Jawiah bt Hassan	Afifah bt Kamaruddin
4.	Hospital Bintulu	Dr. K.M. Reddy	Dr. K.M. Reddy	Nurulain Mat Zain
5.	Hospital Bukit Mertajam	Dr. Rohana Taharin	Dr. Wong Chi Lun	Tengku Azlina bt Tengku Loding
6.	Hospital Duchess of Kent, Sandakan	Dr. Adarsh Bharwaj	Dr. Adarsh Bharwaj	Norhafizah Abd Razik
7.	Hospital Ipoh	Dato' Dr. P. Balaravi	Dr Poh Eu Ping	Najihah Muhammad Sharif
8.	Hospital Kangar	Dr. Mohd Nazri Sulaiman	Dr. Noram Azian bin Ramli	Roslinda bt Rahman
9.	Hospital Keningau	Dr. P.S.P. Ravindran	Dr. Christina Lee Lai Ling	Hr Shredznear Yabi
10.	Hospital Kota Bharu	Dr. Zulkifli Abd Ghani	Dr. Azma Azalina bt Ahmad Alwi	Rossaidah bt Mustapa
11.	Hospital Kuala Krai	Dr. Tg Norina Tuan Jaafar	Dr. Salazahrin Salleh	Farawahida Fakaruddin
12.	Hospital Kuala Lumpur	Dr. Joseph Alagaratnam	Dr. Jelina Mohd Noor	Intan Khusiah Abd Rahman
13.	Hospital Kuala Pilah	Dr. Khairul Husnaini bt Mohd Khalid	Dr. Khairul Husnaini bt Mohd Khalid	Suzana bt Ahmad
14.	Hospital Sultanah Nur Zahirah Kuala Terengganu	Dr. Zuraidah Mustari	Dr. Nor Anita bt Che Omar	Farah Wahidah Hashim
15.	Hospital Melaka	Dr. S Anusiah Selvathurai	Dr. Juliana Jalaruddin	Diana Bt Mohamed
16.	Hospital Miri	Dr. Chieng Lee Ling	Dr. Chieng Lee Ling	Noor Asmah Md Azmi
17.	Hospital Pulau Pinang	Dr. Elizabeth John	Dr. Ang Ee Ling	Hafaezah Nor Amiruddin
18.	Hospital Putrajaya	Dr. Salmah Othman	Dr. Salmah Othman	Naqibah Ghazali
19.	Hospital Queen Elizabeth	Dr. Abdul Mutalib bin Othman	Dr. Shuaibah Ab Ghani	Iramayanah Ambo Mase
20.	Hospital Selayang	Dr. Mariam Ismail	Dr. Shelina Oli Mohamed	Azlin Azira Ahmad
21.	Hospital Serdang	Dr. Radzlian bin Othman	Dr. Rusnah Hussain	Puteri Nurhidayah Nordin

NED SOURCE DATA PRODUCERS 2007/2008 (CONT.)

22.	Hospital Sibu	Dr. H. A. Faisal	Dr. Jakiyah Daud	Suzzana Abdul Karim
23.	Hospital Sri Manjung	Dr. Yushaniza Yaacob	Dr. Yushaniza Yaacob	Juhaida bt Zahri
24.	Hospital Sultan Ismail, Pandan	Dr. Hooi SiewTong	Dr.Hooi SiewTong	Nursalinah bt Adam
25.	Hospital Sultanah Aminah Johor Bahru	Dr. Loh Swee Seng	Dr. Kevin Ong	Nurazilah Ismail
26.	Hospital Sultanah Fatimah, Muar	Dr. Faeizah bt Abu Samah	Dr. Faeizah bt Abu Samah	Roziana Sumardi
27.	Hospital Sungai Buloh	Dr. Mohamad Sharif Fehrudin	Dr. Shamala Retnasabapathy	Majidah Zainal Abidin
28.	Hospital Sungei Petani	Dr. Rosnita bt Alias	Dr. Rosnita bt Alias	Naseha Hussain
29.	Hospital Taiping	Dr. Ng Sok Lin	Dr. Rosilah bt Mohamad	Rohaiza bt Abdul Hamid
30.	Hospital Tawau	Dr. Ajit Majumder	Dr. Ajit Majumder	Nurliyana bt Ishak
31.	Hospital Teluk Intan	Dr. Noram Bt Mat Saad	Dr. Noram bt Mat Saad	Norina Abdul Gafor
32.	Hospital Temerloh	Dr. Nor Higrayati bt Ahmad Kasah	Dr. Nor Higrayati bt Ahmad Kasah	Nor Hanim Ahmad Adnan
33.	Hospital Tengku Ampuan Afzan, Kuantan	Dato' Dr. Vasantha Kumar	Dr. Aidila Jesmin Jabbari	Noor Azhari bin Ahmad
34.	Hospital Tengku Ampuan Rahimah, Klang	Dr. Yogan Kanagasabai	Dr. Thayanithi Sandragasu	Rahmi bt Mukhtar
35.	Hospital Tuanku Jaafar, Seremban	Dr. Bethel Indira Livingstone	Dr. Norlelawati Abu	Normalisa Muhammad Som
36.	Hospital Umum Sarawak Kuching	Dr. Intan Gudom	Dr. Mohd Aziz Salowi	Nazirin bin Arshad
37.	Hospital Kulim	-	En Ku Hazemie, Optometrist	-

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FOREWORD

The National Eye Database (NED) was established to provide a system to collect data required for service and monitoring of sight-threatening eye diseases. It is an expansion of the already existing paper-based National Cataract Surgery Registry (NCSR) and the annual ophthalmology service census established in 2002 with the addition of five other eye disease registries namely diabetic eye registry, contact lens-related corneal ulcer surveillance, glaucoma registry, age-related macular degeneration and retinoblastoma registry. Its web application form was launched on the 1st January 2007 and is hosted at www.acrm.org.my/ned.

The source data producers are 36 MOH ophthalmology departments. In addition, Hospital Kulim, a district hospital with resident optometry service contributed data for the diabetic eye registry. Currently, data are being collected from MOH hospitals only.

The first NED annual report 2007 includes findings on cataract surgery registry (CSR) from 2002 to 2004, and 2007, diabetic eye registry (DER) 2007, and contact lens-related corneal ulcer surveillance 2007, glaucoma registry preliminary report 2007, and the ophthalmology service census 2002 to 2007. Data collected in the age related macular degeneration and retinoblastoma registry, are in the pilot phase and are not reported. Data from a medical device survey and listing of MOH health clinics which have fundus cameras for diabetic eye screening, are included in the appendix of this report.

The findings for the four-year cumulative data on 66,431 cataract surgeries showed that 67.5% of the patients had systemic co-morbidity and 32.4% had ocular co-morbidity. There is a change in the type of cataract surgery performed, from predominantly extracapsular cataract extraction (at 54.0% in 2002) to phacoemulsification (phaco at 65.1% in 2007). Besides, there is an increasing trend of subtenon and topical anaesthesia used during cataract surgery. The visual outcome was best following phacoemulsification, with cumulative rate of 89.4% achieving refracted vision of 6/12 or better, followed by ECCE, 80.8%. The rate of posterior capsular rupture, an intra-operative complication was 5.4%, higher than the standard of less than 5%, set by the MOH. SDPs can evaluate their cataract surgery service performance based on CSR data as part of their department's continuous quality improvement initiatives. Individual surgeons can now review cataract surgery outcome data on patients they operated on and apply CUSUM, a statistical process control method to audit their performance in order to improve outcome. The CUSUM application is made easier via automated data mining from CSR to eCUSUM. (<https://app.acrm.org.my/eCUSUM>).

The DER data on 10,856 diabetic patients who were seen for the first time for an eye assessment at MOH ophthalmology clinics showed that majority, 60.4% had no apparent diabetic retinopathy (DR) and 38.2% had some form of DR. These results further emphasized that diabetic eye screening should be done at the primary care level and only patients who require further management be referred to the ophthalmology clinics. By doing so, doctors at ophthalmology clinics can focus on patients who need specialized care. A coordinated diabetic eye screening program using fundus photography would be the most logical approach to screen and detect DR so as to prevent blindness from diabetes mellitus.

The contact lens-related corneal ulcer surveillance was initiated as part of the ophthalmology service census to monitor incidence of contact lens-related corneal ulcer. Its rate would reflect the standard of contact lens practice. Subsequent to the outbreak of *fusarium* keratitis related to contact lens cleaning solution in United Kingdom, Hong Kong and Singapore in 2006, the surveillance was further extended to capture further detail on contact lens wear. A total of 103 patients (109 eyes) were notified to the surveillance throughout 2007. The occurrence did not indicate any epidemic. *Pseudomonas* was the commonest causative agent (79.5%).

This annual report has data on MOH ophthalmology service census for the last 6 years. The number of ophthalmology departments at MOH has increased from 29 in 2002 to 36 in 2007. The service output has increased in all aspects. The 2007 aggregated incidence rate of post-intraocular surgery infectious endophthalmitis for all SDPs was 0.2%, but 12 departments had rates higher than 0.2%. The importance of systematic and regular review of census data to improve performance cannot be further emphasized.

FOREWORD (CONT.)

The 2007 NED annual report contains important information useful for evaluation and planning of ophthalmology service in MOH in general, and quality improvement for individual SDP in particular. We hope users find this report resourceful and will translate the findings for advocating action in improving standard of eye care.

Dr. Mariam Ismail
NED Advisor

Dr. Goh Pik Pin
NED Chairperson

ABBREVIATIONS

ADED	Advanced Diabetic Eye Disease
CAI	Carbonic Anhydrase Inhibitor
CF	Counting Fingers
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 Cataract Extraction
FU	Follow-up
HM	Hand Movement
HPT	Hypertension
ICCE	Intracapsular Cataract Extraction
IOL	Intraocular Lens
KPI	Key Performance Indicator
MOH	Ministry Of Health
NED	National Eye Database
NHMS	National Health and Morbidity Survey
NPDR	Non Proliferative Diabetic Retinopathy
NPL	No Perception Of Light
OT	Operating Theater
PCO	Posterior Capsule Opacification
PCR	Posterior Capsular Rapture
PDR	Proliferative Diabetic Retinopathy
Phaco	Phacoemulsification
PL	Perception Of Light
PI	Principal Investigator
PMMA	Polymethyl Methacrylate
RCC	Registry Coordinating Center
SD	Standard Deviation
SDP	Source Data Producers
VA	Visual Acuity
VR	Vitreoretinal Surgery
ZD	Zonular Dialysis

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REPORT SUMMARY

CATARACT SURGERY REGISTRY 2002 TO 2004 AND 2007

1. Stock and Flow

- 1.1. The number of SDP has increased from 25 in 2002 to 32 in 2007. For 2007, all the SDPs are ophthalmology departments from MOH hospitals. From 2009 onwards universities and private eye care centres will be invited to participate.
- 1.2. The total number of cataract surgery registered to CSR was 66,431 and it has increased over the years (12,552 in 2002, 16,039 in 2003, 17,536 in 2004, and 18,426 in 2007).
- 1.3. The ascertainment rates for MOH SDP, calculated based on census returns on the total number of cataract surgeries performed were satisfactory over the years (87.6% in 2002, 97.2% in 2003, 92.9% in 2004, 83.6% in 2007). With the launch of web application in 2007, where data entry is done by staff at SDP site, there is a decline in ascertainment rate.
- 1.4. Except for the year 2003, more than 80% of cataract surgeries registered have outcome data.

2. Characteristics of Patients and Eyes to be Operated

- 2.1. The demographic features of patients who had cataract surgery at public hospitals over the 6 years were consistent, with a mean age of 64 years and slight female preponderance. However, there was a marked increase in patients older than 64 years in 2007 (54.2%), indicating a rise in the aging population and thus higher demand for cataract surgery.
- 2.2. Proportion of patients with systemic co-morbidity increased from 56.8% in 2002 to 67.5% in 2007. The commonest was hypertension (about half), followed by DM (about a third). Cataract surgeons need to take a holistic approach in assessing patients pre-operatively to ensure patients are fit for surgery to avoid intra-operative and post-operative adverse events.
- 2.3. Most common cause of cataract was primary senile cataract (> 95% in all the years). Trauma was the most common cause for secondary cataract.
- 2.4. Over the years, only one third of patients returned for cataract surgery for the fellow eye. As senile cataract usually affect both eyes, patients should be encouraged to have second eye cataract surgery as binocular vision has better visual function.
- 2.5. Over the years, more than 95% of the eyes operated were not operated on before. In 2007, among eyes which had eye operation before, the commonest was vitreoretinal surgery (1.4%).
- 2.6. One third of the eyes to be operated have ocular co-morbidity, commonest were diabetic retinopathy and glaucoma. This pattern was consistent throughout the years.
- 2.7. The 4-year cumulative data showed that 58% of the eyes to be operated had unaided vision of worse than 3/60 which is classified as blind. Refraction was not done in 84.5% of the eyes, probably due to dense cataract. Among eyes refracted, 30% were still in blindness category. This finding may indicate that patients seek treatment when their vision are really bad, or surgeons decide to operate at a lower vision category, or patients' vision get worse while waiting to have their surgery done. Public should be made aware that cataract surgery can be done whenever patients' visual function is affected, especially when they are unable to perform activities of daily living, and old people should not accept poor vision as part of aging but should seek treatment early. With improved technology, doctors can now offer surgery based on patients' impaired visual function rather than visual acuity measurement.
- 2.8. There was a consistent bimodal pattern of pre-operative vision over the years with one peak at the range between 6/18 to 6/36 and another peak at VA worse than 3/60. This may be due to the manner of vision taking. The worst vision that can be recorded at Snellen vision chart is 6/60. To get record of 5/60 to 1/60, patients have to be made to walk towards the vision charts and this may not be performed as it takes longer time. Staff who take VA should be advised to adhere to proper procedure.
- 2.9. There was no gender difference in terms of pre-operative vision, indicating equal access to cataract surgery for both genders.
- 2.10 The 2007 findings showed that the mean planned refractive power was -0.5D (SD 0.4.D). Majority (87.4%) of eyes have values between -1.0 to plano. These findings indicated that MOH cataract surgeons aimed for an emmetropic or slightly myopic final refraction as the target visual outcome.

REPORT SUMMARY (CONT.)

3. Cataract Surgery Practice Patterns

- 3.1. The number of cataract surgeries done by SDPs varies greatly. In 2007, 48.3% of the SDPs performed less than 500 surgeries and 24.1% performed more than 1,000 cataract surgeries.
- 3.2. The average number of cataract surgery performed by all SDPs per month was about 1,500 cases in the year 2004 and 2007. However the number of surgery performed in January, February, October to December in each year was less than average. This pattern was consistent through the years. Evaluation on number of surgery and use of OT time should be done to optimize output.
- 3.3. More surgeries were done in states with more than one SDP and with denser population such as Selangor, Johor, Sarawak, Penang and Kedah.
- 3.4. Specialists performed the most surgeries (2/3), followed by gazetted specialists and medical officers.
- 3.5. The average time taken to perform phaco and ECCE was 36.8 and 45.3 minutes respectively. Time taken can be shortened with improved skill and with newer phaco machine allowing surgeon to have better control.
- 3.6. Proportion of surgery performed as day care was less than 50%. As day care is certainly more cost effective than in-patient, and with more ambulatory care centers being established in public hospitals, more surgery should be done as day care.
- 3.7. Over the last 6 years, we observed a transition from conventional large incision ECCE to the small incision phacoemulsification technique. Percentage of phaco increased from 39.7% in 2002 to 65.1% in 2007 and this proportion although encouraging, is small. Phaco is a safer surgery with lesser complication, has better outcome, and faster visual recovery. All cataract surgeons should master this skill so that it can be done in most cases.
- 3.8. The proportion of combined cataract surgery increased from 2.9% in 2002 to 4.8% in 2007. The commonest combination surgery was with vitreoretinal surgery. There is a marked decrease in combined filtering glaucoma surgeries over the years.
- 3.9. Over the years, more than 90% of cases were done under local anaesthesia, with subtenon injection (>50%) being the commonest approach. There was an increase in the use of topical anaesthesia from 2003 (11.7%) to 2007(28.3%). There was a decline in the use of sedation, although some SDPs employed it consistently.
- 3.10. For the year 2007, majority of the eyes (98%) had IOL implantation, with 97% PCIOL. Foldable IOL (68.1%), particularly made from acrylic, increased over the years and was the commonest IOL implanted (67.5%).

4. Intra-operative Complications

- 4.1 The four-year cumulative rate of intra-operative complication was 10.1%. The commonest was posterior capsular rupture (5.4%) and vitreous loss (4.9%).
- 4.2 Intra-operative complications rates were higher in phaco conversion, ICCE and combined cataract surgery, especially with filtering surgery.
- 4.3 In 2007, 24 SDPs achieved the KPI standard set for PCR of below 5%.

5. Cataract Surgery Outcome

- 5.1. The rate of post-operative endophthalmitis was 0.2%, higher than the national KPI standard (set at < 0.2%). The rate for unplanned return to OT within 12 weeks following surgery was 0.45%. Common reasons were iris prolapse, wound dehiscence and infective endophthalmitis.
- 5.2. In order to have accurate results for surgical outcome performance, a high proportion of outcome data in patient registered was desired. Of the 18,426 eyes operated in 2007, 85.7% had unaided vision and 78.6% had refracted vision. The common reason for patients with no vision outcome record was lost to follow-up.
- 5.3. The four-year cumulative data showed that aggregated post-operative VA 6/12 or better for all the eyes, with and without ocular co-morbidity was 39.2% for unaided VA and 81.1% for refracted VA.
- 5.4 Excluding eyes with pre-existing ocular co-morbidity, 41.6% had unaided VA and 84.8% had refracted VA 6/12 or better. Eyes with phaco had the best outcome (89.4%), followed by ECCE (80.8%). The rate for phaco conversion reduced to 75.5%. For the year 2007, 17 SDPs achieved the standard for KPI on patients with post-operative refracted VA 6/12 or better at 85% or better. Post-operative VA was worse with increasing age.

REPORT SUMMARY (CONT.)

- 5.5. The mean final refractive power for eyes which had phaco was -0.8D (SD1.1D) and for ECCE, it was -1.1D (SD 1.4D). ECCE eyes showed a more myopic shift than phaco eyes. The mean difference between final and planned refractive power was -0.38D (SD 1.15D). Majority of eyes (71.1%) had difference between planned and final refractive power of within -1.0D to +1.0D.
- 5.6. The main contributing factor for eyes with post-operative refracted VA worse than 6/12 was pre-existing ocular co-morbidity, ranging from 47.2% in 2004 to 28.5% in 2007. The second common cause was high astigmatism.

DIABETIC EYE REGISTRY 2007

1. Stock and Fow

- 1.1. A total of 10,856 diabetic patients who were seen for the first time at MOH ophthalmology clinics and optometry clinics from January to December 2007 were registered to DER. The number of diabetic patients registered by SDP varied widely.

2. Characteristic of Diabetic Patients

- 2.1. The mean age of patients registered was 57.2 years. About half (52.8%) were of working age group of between 30 and 60 years. There were slightly more female (54.6%) and Malay (54.0%) patients.
- 2.2. Patients' mean age was similar for those with DR (56.7 years) and without DR (56.8 years). The percentage of DR among males was 39.2% and females was 37.3%. The proportion of those with DR was similar in the different ethnicities, 39.7% among Malay, 38.4% among Chinese and 36.5% among Indians.
- 2.3. Government hospitals and primary care providers (91.7%) were the main source of referral and only 2% were referred from private care providers.

3. Medical History and Practice Pattern

- 3.1. Majority of cases (92%) had type II DM.
- 3.2. Sixty-four percent of patients had diabetes for 10 years or less and 3.1% had diabetes for more than 20 years.
- 3.3. Eighty-two percent of the patients were on oral medication whilst 11.8% were on insulin.
- 3.4. Systemic co-morbidity - Hypertension (63.9%) was one of the commonest systemic co-morbidity among DM patients followed by hypercholesterolaemia (18.3%), ischaemic heart disease (11.1%), and 5.8% of diabetic patients who were first seen at ophthalmology clinics have renal impairment.
- 3.5. Of those screened, 9% were smokers.
- 3.6. For ocular co-morbidity – 44.2% was found to have cataract and 3.1% had glaucoma.
- 3.7. For pregnancy and eye examinations – 148 female (2.5%) patients were pregnant. Although clinical practice guideline recommends that pregnant diabetics should be assessed during the first trimester, only 41.2 % pregnant diabetics registered to DER had eye examinations during that time.
- 3.8. For previous eye examinations - 70.9% of patients never had their fundus examined before. Among those examined, 71.9% had it done one year ago.

4. Eye Status

- 4.1. About 40% of the eyes had presenting visual acuity worse than 6/12, and 9% had vision at blindness category. Among eyes with DR, 8% had vision in blindness category.
- 4.2. Among patients screened, 60.4% had no apparent DR in both their eyes. Up to 38.2% patients had some form of DR in either eye and 11.9% of them had maculopathy.
- 4.3. Among eyes examined, 23.1% had mild to moderate NPDR, 3.0% had severe NPDR, 6.2 % had PDR, 2.0% had advanced diabetic eye disease (ADED) and 4.1 % had clinically significant macular edema (CSMO). Hence, 10.3% of the eyes had vision threatening DR (i.e. eyes with PDR and CSMO).

5. Treatment Plan

- 5.1 Majority (83.3%) of patients seen at the first time for eye clinics did not need treatment.
- 5.2 Ten percent of the patients required laser photocoagulation, 3.1% needed diabetic vitrectomy and 0.5% needed fundal fluorescein angiogram to assess extent of retinal ischaemia or maculopathy.

REPORT SUMMARY (CONT.)

CONTACT LENS-RELATED CORNEAL ULCER SURVEILLANCE 2007

1. Stock and Flow

- 1.1 A total of 103 patients were found to have contact lens-related corneal ulcer (CLRCU) in 2007. Six patients had it in both their eyes (a total of 109 eyes).
- 1.2 The highest number reported was in January (19 cases) and lowest number was in the month of October (one case). The average number per month was eight cases. The distribution of cases in 2007 did not reveal any outbreak of contact lens-related corneal ulcer seen at the MOH Hospitals.

2. Characteristic of Patients and Contact Lens Wearing Practice

- 2.1 The mean age of affected patients was 26.7 years and 71.8% was female.
- 2.2 All the patients wore soft contact lens. Majority wore the monthly disposable types (83.5%) and 5.5% wore daily disposable types. Among them, 62.4% removed their lens before sleep but 30.3% wore them overnight.
- 2.3 Bausch & Lomb and Allergan was the commonly reported brands of cleaning solution. There were three patients (2.8%) who used tap water to clean their contact lens and 24 patients (22.0%) could not recall type of cleaning solutions used. As the types and proportion of cleaning solutions sold in Malaysia were not known, we could not determine which cleaning solution was associated with CLRCU.

3. Eye Status and Causative Organism

- 3.1 Bacteria was the most common presumptive organism (79.8% of cases) and it was confirmed to be the causative organism in 37.4% of the corneal scraping samples.
- 3.2 Corneal scrapings of 91 eyes (83.5%) were sent for microbiology investigations, of which half (49.5%) had no yield. Among 34 culture proven cases, 33 were bacteria, one fungus and one *acanthamoeba*. Among bacteria cultured, *pseudomonas* (79.5%) was the commonest, followed by *enterobacter* (8.9%).

4. Treatment Outcome

- 4.1 Eighteen patients had presenting vision with glasses of worse than 3/60 (legally blind). One month post-onset, 56.6% of the eyes had best corrected vision better than 3/60 but four eyes (3.7%) were legally blind.
- 4.2. None of the affected eyes had perforation or required any surgical intervention such as penetrating keratoplasty, evisceration or surgical glue.

GLAUCOMA REGISTRY - PRELIMINARY REPORT 2007

1. The preliminary report had 1,155 patients registered to the glaucoma registry.
2. Eighty-eight percent of the eyes had primary glaucoma, mainly primary open angle glaucoma (55%).
3. About 80% of the patients were on medical treatment. Among the eyes treated with anti-glaucoma drug, 75% were treated with prostaglandin analogs, 71% beta blockers and 32% topical carbonic anhydrase inhibitors. More than half of the eyes were treated with two or more anti-glaucoma drugs.

MOH OPHTHALMOLOGY SERVICE CENSUS 2002 TO 2007

1. The number of MOH ophthalmology department increased from 29 in 2002 to 36 in 2007
2. The 6-year service census showed an increase in almost all the service output particularly in the number of out-patients, operation performed, and number of prematured babies screened for retinopathy of prematurity.
3. There is a 8% increase in the number of diabetic patients referred for eye screening over the last 6 years.
4. The number of ocular surgery performed had increased by 3,000 cases per year except for 2005.
5. The number of cataract surgery performed increased by 2,000 each year except for 2005. There is a changing trend from predominantly ECCE before 2003 to predominantly phacoemulsification after 2003.
6. The aggregated incidence rate of post-intraocular surgery infectious endophthalmitis for all MOH ophthalmology departments was 0.2%, but 12 departments have rates higher than 0.2% in 2007.

CHAPTER 1

CATARACT SURGERY REGISTRY 2002-2004 AND 2007

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1.1 STOCK AND FLOW

The number of CSR source data producers increases from 25 in 2002 to 32 in 2007. Majority were MOH ophthalmology departments. For the year 2002 to 2004, SDPs included Klinik Mata Azman, Angkatan Tentera Kem Hospital Terendak and Hospital Universiti Sains Malaysia and for the year 2004, Hospital Universiti Kebangsaan Malaysia also participated. In 2007, as CSR was piloting its on-line registry using web application, data were collected in MOH ophthalmology departments only. From 2009 onwards, universities, army hospitals and private eye care centers will be invited to participate.

The total number of cataract surgery registered to CSR over the years was 66,431. It increased from 12,768 in 2002 to 18,426 in 2007. As one of the objectives of CSR is to monitor cataract surgery outcome, the proportion of patients registered with outcome data were satisfactory, above 85% in all the years except for the year 2003 (33.9%).

Using MOH cataract surgery census as denominator, the proportion of cataract surgeries performed at MOH hospitals that were registered to CSR was more than 90% in 2003 and 2004, while it reduced to 83.6% in 2007. The reduced ascertainment rate in 2007 may be due to the change from paper-based to web-based CSR. Evaluation was done and strategies to improve ascertainment such as provision of computers, internet lines and data entry personal in some SDPs are being implemented.

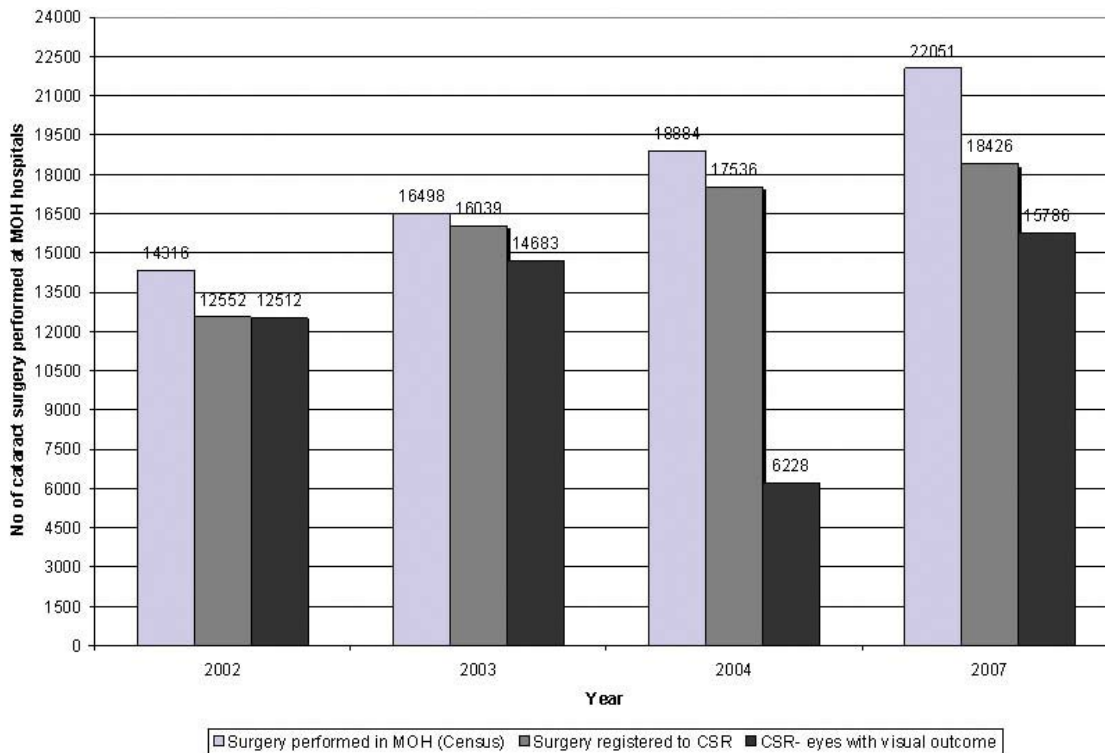
Table 1.1 (a): Stock and flow of cataract surgery

	2002	2003	2004	2007	All
Number of SDP	25	32	33	32	
Total number of cataract surgery registered to CSR	12798	16815	18392	18426	66431
Number of patients with post-operative vision recorded in CSR	12512	14683	6228	15786	49209
% Patient with post-operative vision recorded in CSR	97.7%	87.3%	33.9%	85.7%	74.1%

Table 1.1 (b): Ascertainment rate for MOH SDPs

	2002	2003	2004	2007	All
Total number of cataract surgery performed at MOH hospitals (Source: MOH census returns)	14316	16498	18884	22051	71749
Total number of cataract surgery performed at MOH hospitals and registered to CSR	12552	16039	17536	18426	64553
Ascertainment rate %	87.6%	97.2%	92.9%	83.6%	90.0%

Figure 1.1: Stock and flow of cataract surgery



1.2 CHARACTERISTICS OF PATIENTS

1.2.1 Patient demography

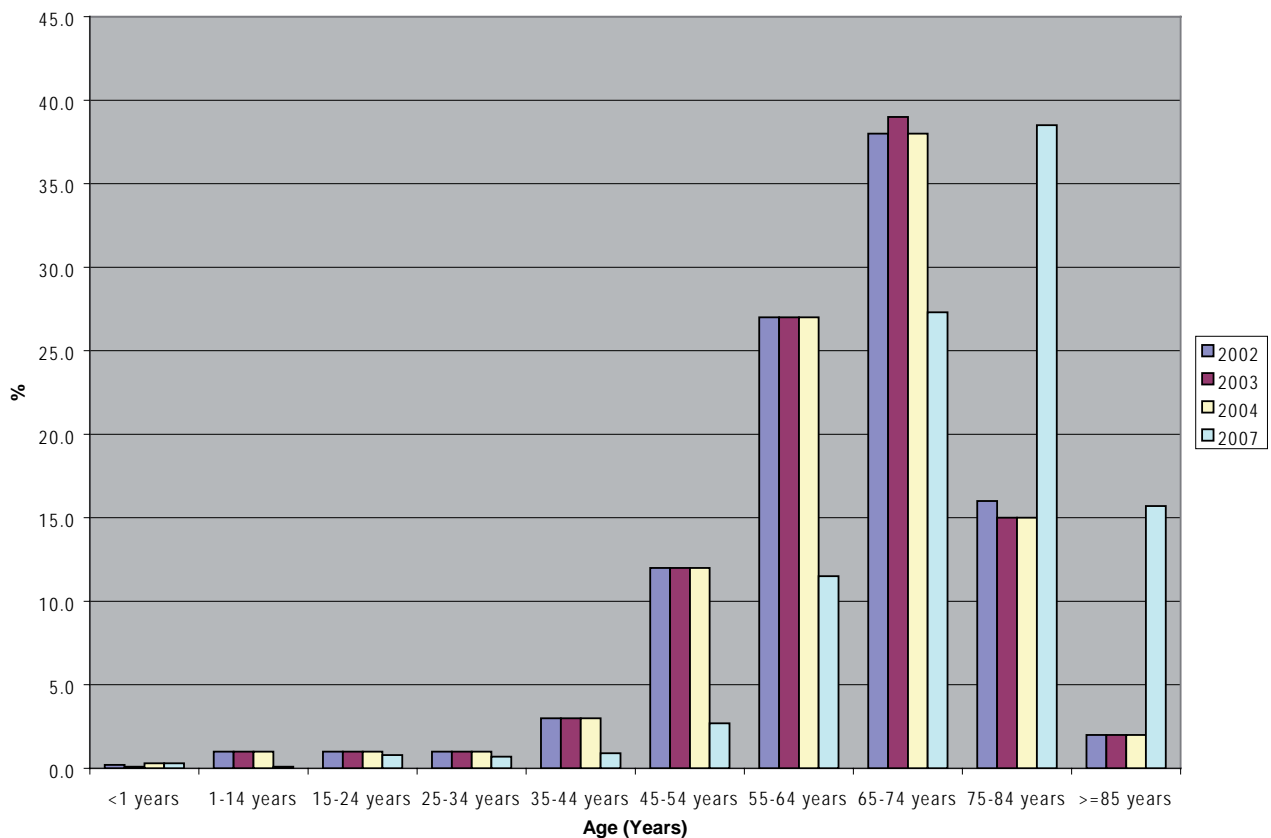
The mean age for patients who had cataract surgery was 64 years. The youngest was about one month and the oldest was 104 years old. Patients who were older than 54 years ranged from 82 % in 2003 to 93% in 2007. The percentage of patients older than 74 years rose markedly from 18.0% in 2002 to 54.2% in 2007. This may either be due to delay in patients' seeking surgical treatment or an increase in the proportion of older population. With this demographic change, eye care providers must be prepared to face the increasing demand for cataract surgery.

There was no marked gender difference in terms of patients who had cataract surgery over the last 6 years. The slight female preponderance reflects higher female ratio in the aging population.

Table 1.2.1: Age and gender distributions

Year	2002	2003	2004	2007
No. of patients (N)	12798	16815	18392	18426
Age				
Mean (years)	64.0	63.7	63.5	64.3
Median (years)	66	66	66	66
Minimum (month)	1 month	1 month	1 month	1 month
Maximum (years)	97	100	104	97
% Distributions of age group, years				
<1 years	0.2	0.1	0.3	0.3
1-14 years	1.0	1.0	1.0	0.1
15-24 years	1.0	1.0	1.0	0.8
25-34 years	1.0	1.0	1.0	0.7
35-44 years	3.0	3.0	3.0	0.9
45-54 years	12.0	12.0	12.0	2.7
55-64 years	27.0	27.0	27.0	11.5
65-74 years	38.0	39.0	38.0	27.3
75-84 years	16.0	15.0	15.0	38.5
>=85 years	2.0	2.0	2.0	15.7
Missing	na	na	na	1.5
% 65 years and older	18	17	17	54.2
Gender				
% Female	51.0	50.0	51.0	52.1
Gender ratio for Malaysian population more than 60 years old (F:M)	1:0.9	1:1.1	1:0.9	1:0.9

Figure 1.2.1: Percent distribution of age among patients who had cataract surgery



1.2.2 Medical history

1.2.2.1 Systemic co-morbidity

Majority of the patients who came for cataract surgery had systemic co-morbidity. The proportion increased from 56.8% in 2002 to 67.5% in 2007, a linear increment of 10.7% over the last 6 years. This trend was in tandem with the increase in chronic diseases prevalence as shown in the National Health and Morbidity Survey (Prevalence of hypertension among those age >30 years was 32.9% in 1996, 42.6% in 2006; prevalence of DM among those age >30 years was 8.3% in 1996, and increased to 14.9% in 2006). The proportion of patients with ischaemic heart disease was consistent at 9% over last 6 years.

The commonest systemic co-morbidity was hypertension (HPT) (involving almost half of total patients) followed by diabetes mellitus (about one third). The increments over the last 6 years was 11.4% for HPT and 8.4% for DM respectively. As co-existence of hypertension may lead to higher risk of intra-operative complications such as expulsive haemorrhage and diabetic patients are at a higher risk of post-operative infection and cystoid macular oedema, these patients need to have proper pre-operative assessment and closer post-operative monitoring.

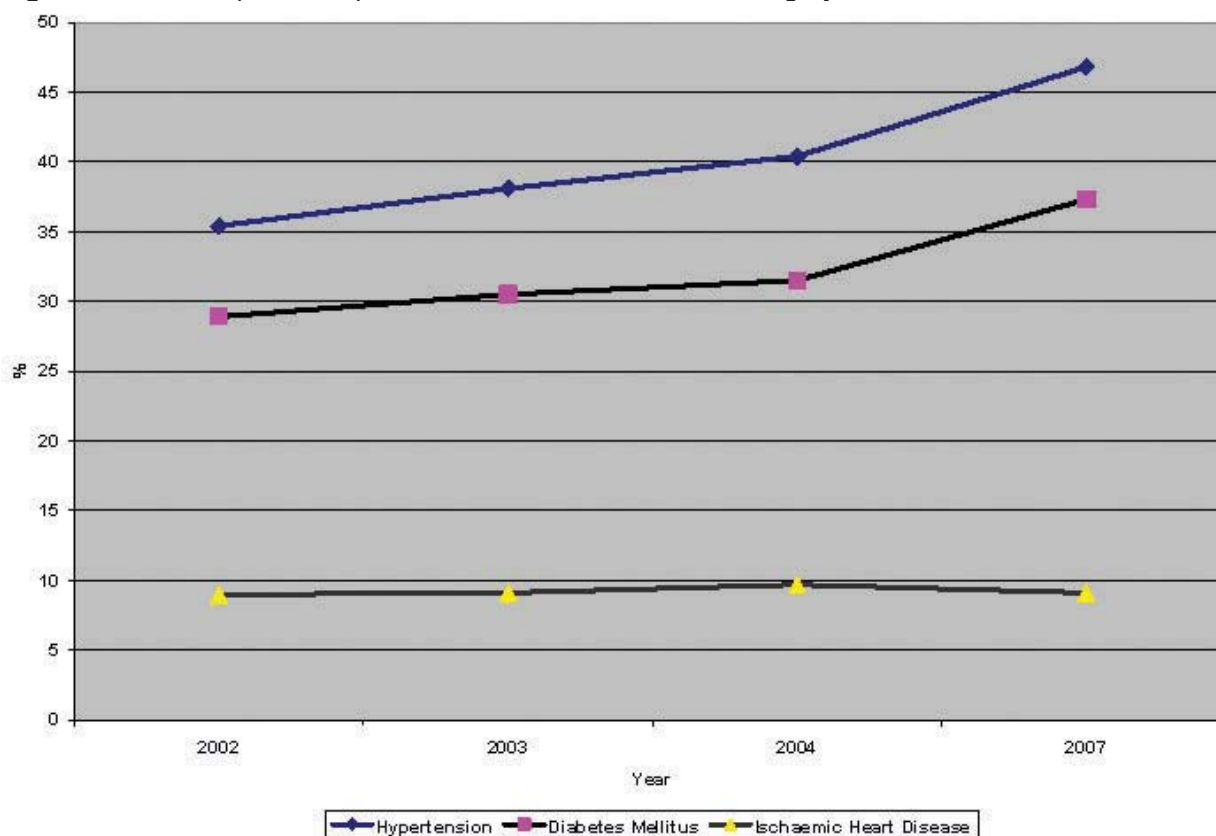
Table 1.2.2.1: Percent distribution of systemic co-morbidity

Year	2002	2003	2004	2007
No. of patients (N)	12798	16815	18392	18426
Percentage of patients with any systemic co-morbidity	56.8	59.1	59.9	67.5
Percentage of patients with specific systemic co-morbidity*				
% Hypertension	35.4	38.1	40.4	46.8
% Diabetes Mellitus	28.9	30.5	31.5	37.3
% COAD**/Asthma	5.2	5.4	5.2	4.3
% Ischaemic Heart Disease	9.0	9.1	9.7	9.1
% Renal Failure	1.6	1.8	1.9	2.5
% Cerebrovascular accident	0.8	1.0	0.9	0
% Others	7.3	7.2	4.7	7.6

Note: *Patients may have more than one type of systemic co-morbidity

**COAD = Chronic Obstructive Airway Disease

Figure 1.2.2.1: Proportion of patients who underwent cataract surgery and have HPT, DM and IHD



1.2.2.2 Causes of cataract

Majority (more than 95%) had primary cataract. Among eyes with primary cataract, senile- or age-related cataract was the commonest. Among the secondary cataract, trauma was the commonest cause followed by those induced by surgery.

Table 1.2.2.2: Causes of cataract

Causes Of Cataract	2002	2003	2004	2007
No. of patients (N)	12793	16815	18392	18426
Primary Cataract (%)	96.1	96.1	96.2	94.4
Secondary Cataract (%)	3.9	3.9	3.8	3.0
Missing value (%)	-	-	-	2.5
<hr/>				
Primary Cataract (n)	12294	15623	17697	17410
Senile/age related (%)	97.3	96.7	97.7	98.1
Development (%)	1.3	2.0	1.2	1
Congenital (%)	1.1	1.1	1	0.7
Others (%)	0.4	0.3	0.1	0.2
<hr/>				
Secondary Cataract (n)	499	654	695	557
Trauma (%)	65.1	61.0	63.3	63.7
Surgery induced (%)	4.6	10.2	8.1	14.7
Drug induced (%)	10.6	12.4	12.1	9.9
Others (%)	19.6	16.4	16.5	11.7

1.2.2.3 First or second eye cataract surgery

More than 2/3 of patients came for first eye cataract surgery. In 2007, those who came back for cataract surgery in the fellow eye or second eye surgery waited for about 23 months to have it done.

Table 1.2.2.3: First or second eye cataract surgery

	2002	2003	2004	2007
No. of patients (N)	12798	16815	18392	18426
First eye surgery (%)	70	70.5	70.2	69.5
Second eye surgery (%)	30	29.5	29.8	30.2
<hr/>				
Period of time between first and second eye surgery (Months)	N=2716	N=3322	N=3673	N=4860
Mean	16.73	16.27	16.88	23.4
SD	17.97	17.1	18.84	24.3
Median	10.3	10.12	10.48	13.3
<hr/>				
Percentage of eyes with intra-operative complications during surgery in the first eye	NA	NA	NA	1.5

1.2.2.4 Past ocular surgery in the eye to be operated

Most eyes to be operated have never had other ocular surgery. Among those eyes with past surgery, the commonest was vitreoretinal (VR) surgery. This may indicate cataract formation following VR surgery.

Table 1.2.2.4: Past ocular surgery of the eye to be operated

Year	2002	2003	2004	2007
No. of patients (N)	12798	16815	18392	18426
No. of patients who had data on past ocular surgery	n=12798	n=16782	n=18372	n=17379
Did not have any past ocular surgery (%)	97.0	96.4	96.4	95.2
Vitreoretinal surgery (%)	0.7	0.9	0.9	1.4
Penetrating keratoplasty (%)	0.1	0.1	0.1	0.1
Filtering surgery (%)	0.6	0.6	0.6	0.4
Pterygium excision (%)	0.6	0.7	0.5	0.5
Others (%)	1.1	1.4	1.5	2.4

1.2.2.5 Pre-existing ocular co-morbidity

One third of the eyes to be operated had some form of ocular co-morbidities, mostly diabetic retinopathy (around 10%) and glaucoma (around 6%). There were still a significant number of patients who presented late and had lens-induced glaucoma such as phacomorphic and phacolytic glaucoma.

Table 1.2.2.5: Distribution of pre-existing ocular co-morbidity

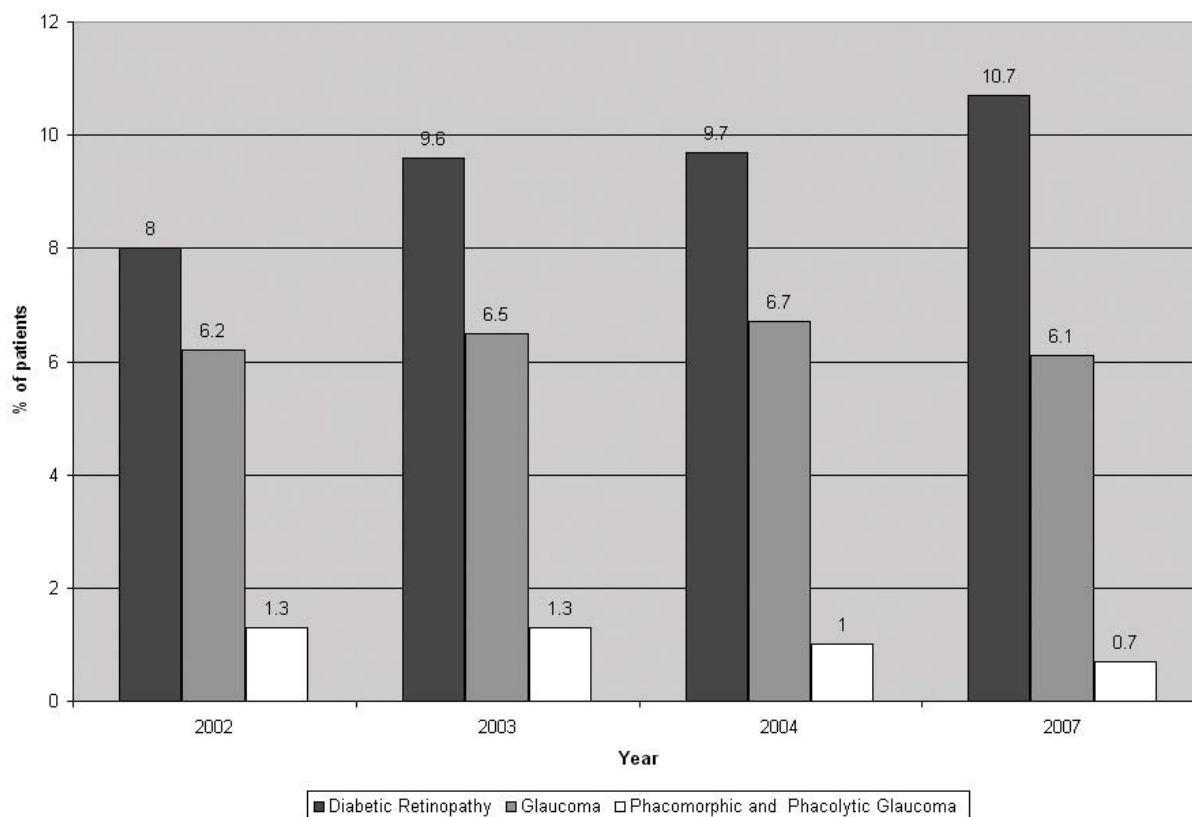
Year	2002	2003	2004	2007
No. of patients (N)	12798	16815	18392	18426
Patients with any ocular co-morbidity (%)	28.8	36.1	38.0	32.4
Percentage of patients with specific ocular co-morbidity	(%)	(%)	(%)	(%)
Anterior segment				
1. Pterygium involving the cornea	2.7	2.3	1.9	1.6
2. Corneal opacity	1.4	1.2	1.0	1
3. Glaucoma	6.2	6.5	6.7	6.1
4. Chronic uveitis	0.4	0.3	0.4	0.4
5. Pseudoexfoliation	1.4	1.5	1.1	1.2
Lens-related complication				
1. Phacomorphic	0.8	0.9	0.6	0.5
2. Phacolytic	0.5	0.4	0.4	0.2
3. Subluxated/Dislocated	0.7	0.7	0.5	0.5

Table 1.2.2.5: Distribution of pre-existing ocular co-morbidity (cont.)

Posterior segment				
1.Diabetic Retinopathy: Non Proliferative	5.0	5.7	5.2	6.1
2.Diabetic Retinopathy: Proliferative	1.7	2.2	2.8	2.5
3.Diabetic Retinopathy: Macular Oedema	0.8	1.1	0.9	1.1
4.Diabetic Retinopathy: Vitreous haemorrhage	0.5	0.6	0.8	1
5.Age-related Macular Degeneration	1.1	1.3	1.7	1.3
6.Other macular disease (includes hole or scar)	0.6	0.6	0.8	0.6
7.Optic nerve disease, any type	0.3	0.5	0.4	0.4
8.Retinal detachment	0.5	1.1	1.3	1.2
9.Cannot be assessed	6.9	11.7	12.5	7.4
Miscellaneous				
1.Amblyopia	0.5	0.4	0.4	0.4
2.Significant previous eye trauma	0.4	0.5	0.5	0.2
3.Pre-existing non glaucoma field defect	0.0	0.0	0.0	0
Others	3.0	4.9	6.3	3.6

Note: Percentage may be more than 100% as one patient may have more than one type of ocular co-morbidities

Figure 1.2.2.5: Proportion of patients who had diabetic retinopathy, glaucoma and lens-induced glaucoma



1.2.2.6 Pre-operative vision

Based on cumulative data on unaided vision, 58.0% of the eyes to be operated had unaided vision of 2/60 to NPL (blindness category). With refraction, 33.1% of the eyes were still in blindness category.

As a whole, 84.5% did not have refraction. This may be due to dense cataract which makes refraction impossible.

Fifty-eight percent of the eyes had unaided vision and 33.1% of eyes has refracted vision in blindness category, and this distribution indicated either late presentation or delay in decision for cataract surgery. Although over the years, the proportion of eyes with vision at blindness category has slightly decreased, patients should be encouraged to have surgery done when their visual functions are affected. This finding may also indicate a huge backlog of cataract patients in the community who have poor vision but yet to have cataract surgery.

Figure 1.2.2.6 (a) showed the bimodal pattern of pre-operative vision for all 4 years. The first peak at 6/18 vision and second peak at counting fingers and hand movements vision. The proportion of patients with vision between 5/60 and 1/60 was low. These trends were persistent throughout the years. The possible reason may be due to the way vision was taken. When patient's vision is worse than 6/60, it is the highest level recordable by Snellen vision chart. After that, patients have to walk forward to get the vision recorded either as 5/60, 4/60 and so on till 1/60. This may take longer time to do. Thus when patients are unable to read chart at 6/60 level, staff may directly check CF, HM, and PL vision, by passing 5/60 to 1/60 vision. Staff should be advised to adhere to proper procedure when taking VA, as VA between 5/60 to 1/60 is essential to classify patients into low vision (6/18 to 3/60) and blindness (2/60 to NPL) categories.

Figure 1.2.2.6 (b) compared the distributions of pre-operative unaided and refracted vision between male and female for 2007 data. The patterns of distribution were similar. These findings showed that both genders present themselves at the same level of visual impairment for cataract surgery.

Table 1.2.2.6: Pre-operative vision among eyes operated in 2002-2004 and 2007

Year	With Unaided VA	With Refracted VA (% refracted)	Unaided VA 6/5 to 6/12	Refracted VA 6/5 to 6/12	Unaided VA 6/18 to 3/60	Refracted VA 6/18 to 3/60	Unaided VA 2/60 to NPL	Refracted VA 2/60 to NPL
2002	12691	700 (5.5%)	281 (2.2%)	155 (22.1%)	4465 (35.2%)	374 (53.4%)	7945 (62.6%)	171 (24.4%)
2003	16723	2104 (12.6%)	396 (2.4%)	327 (15.5%)	6440 (38.5%)	1198 (56.9%)	9887 (59.1%)	579 (27.5%)
2004	18222	2319 (12.7%)	523 (2.9%)	396 (17.1%)	7235 (39.7%)	1315 (56.7%)	10464 (57.4%)	608 (26.2%)
2007	18256	5071 (27.8%)	602 (3.3%)	678 (13.3%)	7734 (42.4%)	2375 (46.9%)	9920 (54.3%)	2018 (39.8%)
Cumulative	65892	10194 (15.5%)	1802 (2.7%)	1556 (15.3%)	25874 (39.3%)	5262 (51.6%)	38216 (58.0%)	3376 (33.1%)

Figure 1.2.2.6 (a): Distribution of pre-operative visual acuity for patients operated in 2002, 2003, 2004, 2007

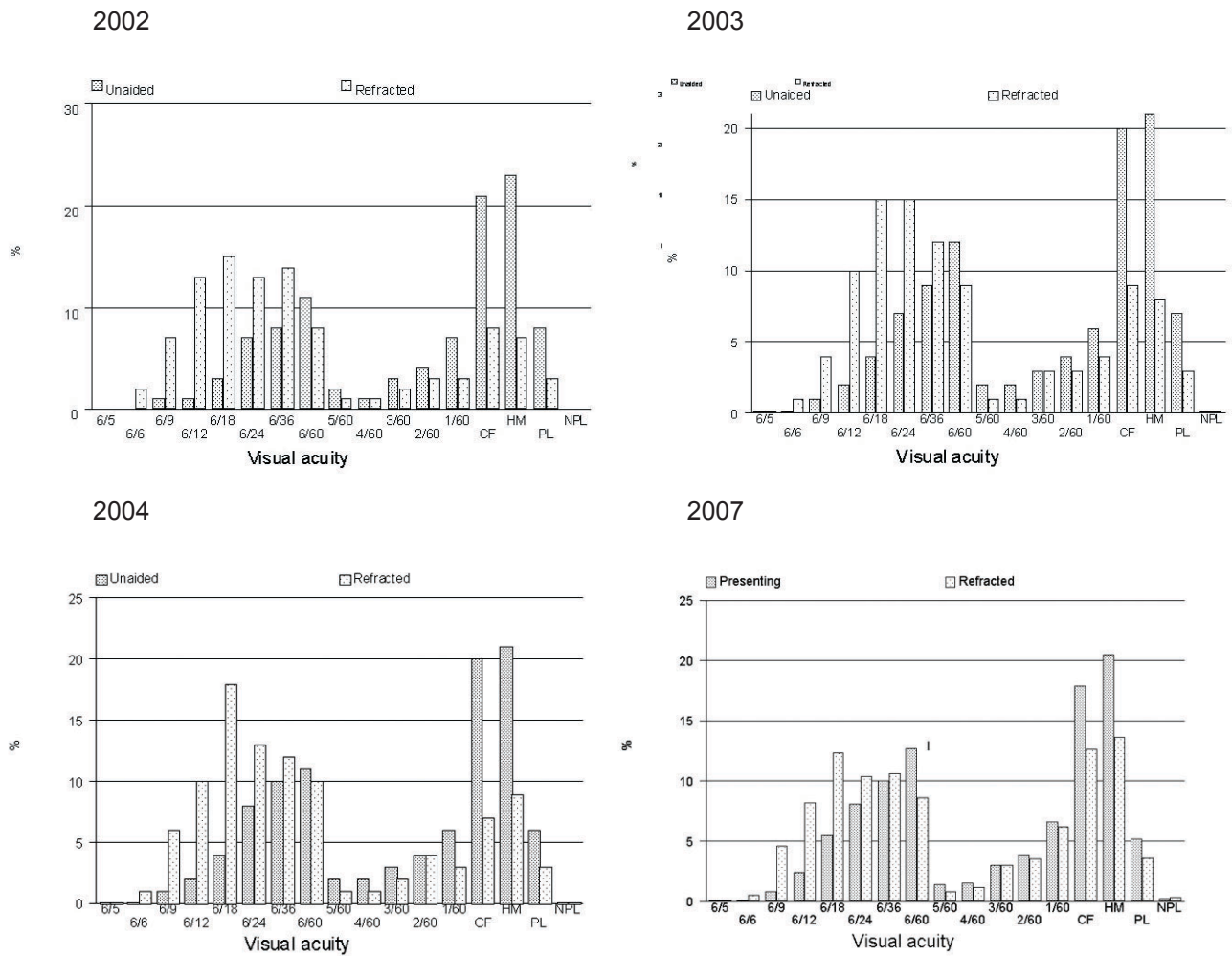
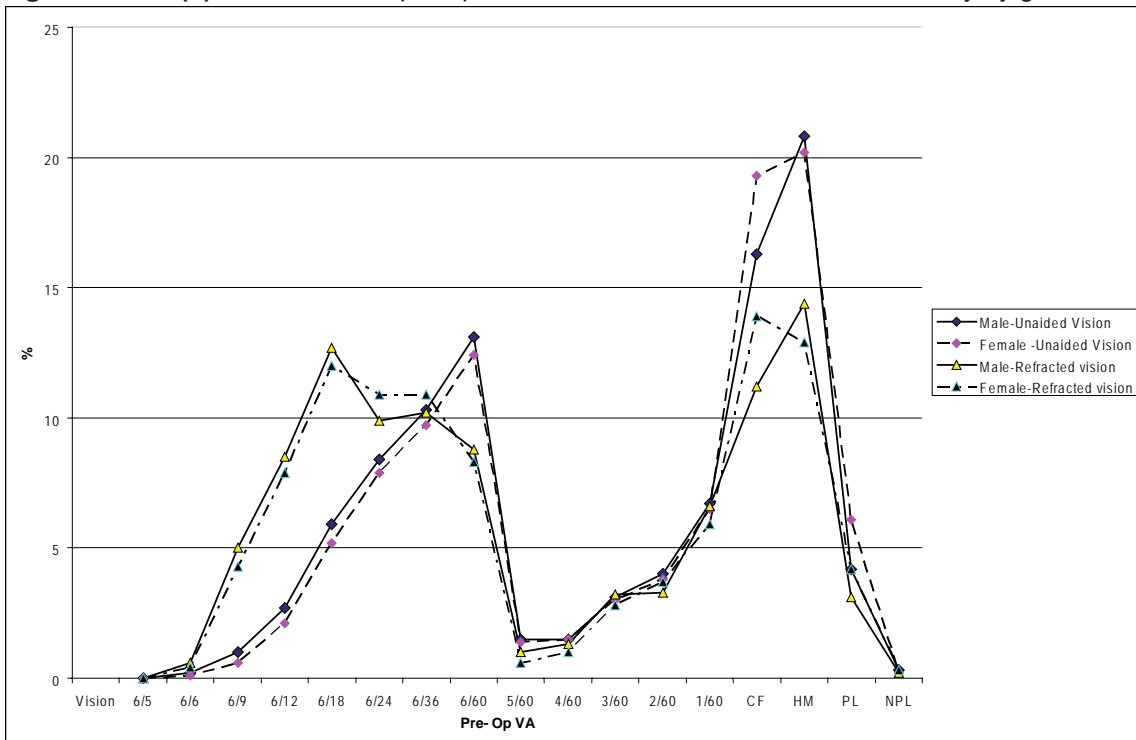


Figure 1.2.2.6 (b): Distribution of pre-operative unaided and refracted visual acuity by gender, 2007



1.2.2.7 Planned refractive power

Planned or targeted refractive power is defined as the refractive error that surgeons aim to achieve after cataract surgery. Based on this value, surgeons then decide on the power of intraocular lens to be implanted. When a surgeon aims to achieve near emmetropia post-operatively, the value he/she aims for is usually between 0 to -0.5D. Besides the intended post-operative refractive power, individual surgeon's intrinsic factors should also be considered when deciding on IOL power.

The mean planned refractive power among the 11,876 eyes in 2007 was -0.5D (SD 0.4), with highest value at -9.0D (most probably for myopic eyes), and +5.5D. Majority (87.4%) of them had values between -1.0 to plano (0). These findings indicated that most cataract surgeons participated in CSR aimed to give patients either emmetropic (plano or 0D) or slight myopic post-operative refraction.

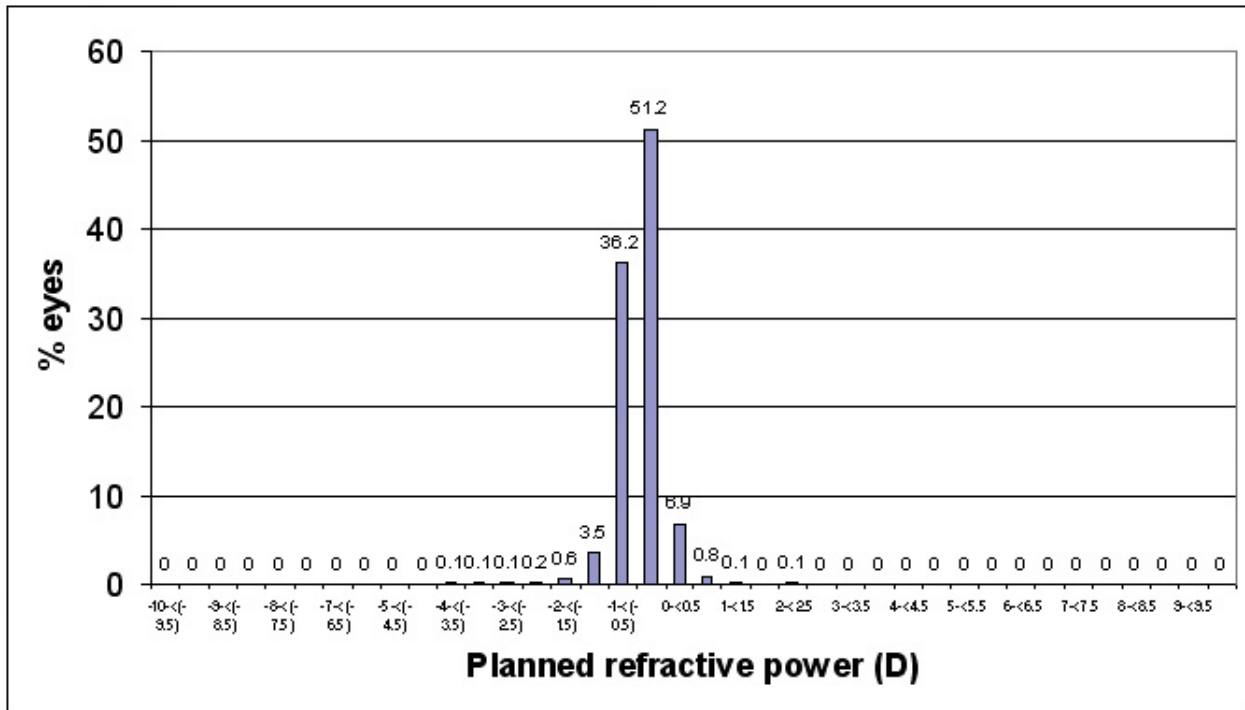
Table 1.2.2.7 (a): Distribution of planned refractive power, 2007

	Diopters
Mean	-0.5
SD	0.4
Median	-0.5
Minimum	-9
Maximum	5

Table 1.2.2.7 (b): Distribution of planned refractive power, 2007

Planned refractive power (Diopters)	Operated eye N=11876	
	No.	%
<=(-5)	10	0.00
-5-<=(-4.5)	3	0.00
-4.5-<=(-4)	1	0.00
-4-<=(-3.5)	7	0.10
-3.5-<=(-3)	6	0.10
-3-<=(-2.5)	12	0.10
-2.5-<=(-2)	26	0.20
-2-<=(-1.5)	77	0.60
-1.5-<=(-1)	414	3.50
-1-<=(-0.5)	4299	36.20
-0.5-<=0	6077	51.20
0-<=0.5	821	6.90
0.5-<=1	91	0.80
1-<=1.5	8	0.10
1.5-<=2	5	0.00
2-<=2.5	13	0.10
2.5-<=3	1	0.00
3-<=3.5	1	0.00
3.5-<=4	0	0.00
4-<=4.5	2	0.00
4.5-<=5	1	0.00
>5	1	0.00

Figure 1.2.2.7: Percent distribution of planned refractive power, 2007



1.3 CATARACT SURGERY PRACTICE PATTERN

1.3.1 Number of cataract surgeries performed by SDP

The number of cataract surgeries done by SDP varies greatly. In 2007, 48.3% performed less than 500 cataract surgeries in that year or an average of 10 cases a week. Twenty four percent performed more than 1000 surgeries a year.

Table 1.3.1: Distribution of number of cataract surgery performed by SDP in a year

	2002	2003	2004	2007
Number of SDP*	24	27	29	29
Number of cataract surgeries performed per year				
100 to 500 surgeries	15 (62.5%)	10 (37.0)	15 (51.7%)	14 (48.3%)
501 to 1000 surgeries	5 (20.8%)	14 (51.9%)	9 (31.0%)	8 (27.6%)
>1000 surgeries	4 (16.7%)	3 (11.1%)	5 (17.2%)	7 (24.1%)

Note: *SDPs which reported less than 100 surgeries per year were excluded from analysis as the small number is due to low ascertainment

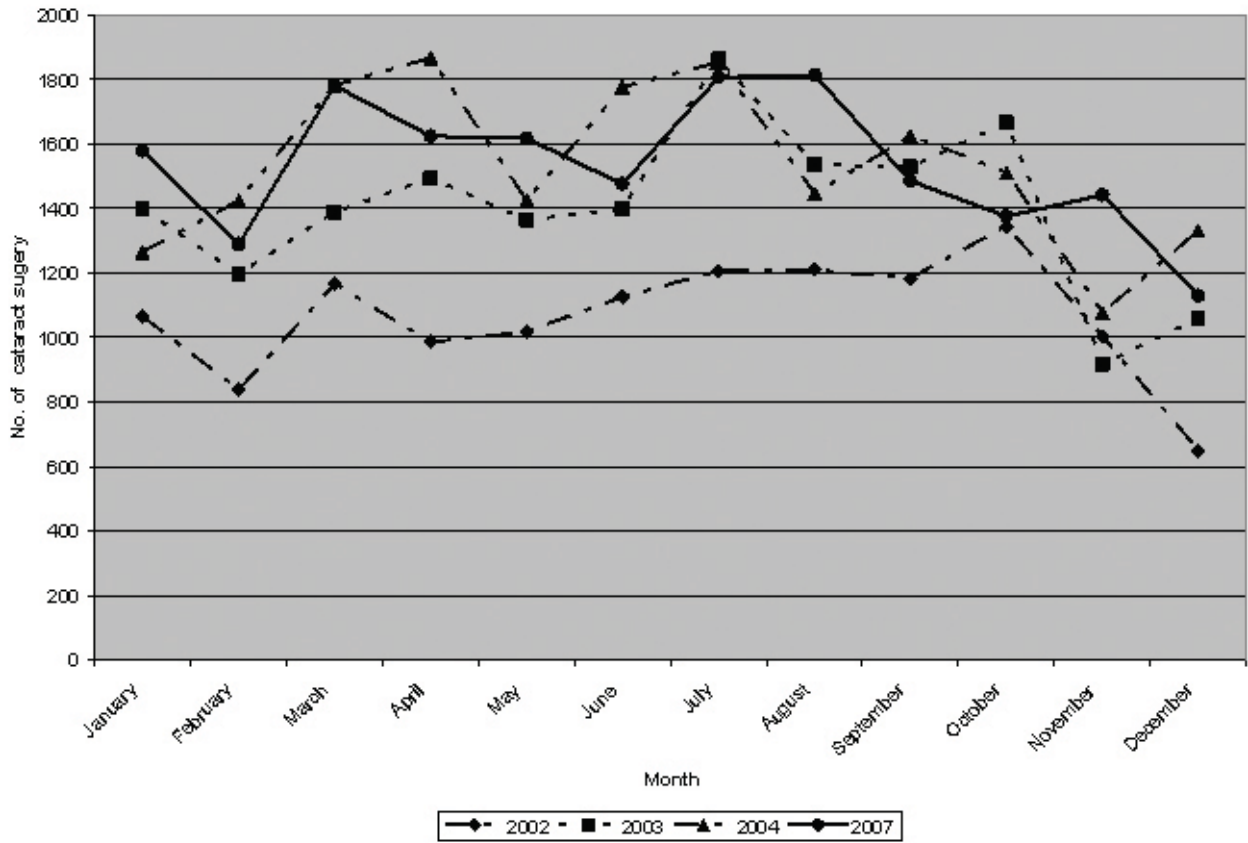
1.3.2 Number of cataract surgeries performed by month

The average number of cataract surgeries performed in a month was about 1,500 in 2004 and 2007. Over the years, there was a consistent pattern where number of surgery performed was lower than average in January, February and October to December of each year. (see figure 1.3.2). These months seem to coincide with school holidays, festive seasons and fasting month. The lower number at year-end may also be due to the closure of operating theaters (OT) in MOH hospitals. SDPs should optimize OT time so as to increase the number of cataract surgeries performed.

Table 1.3.2: Number of cataract surgeries performed by month

	2002		2003		2004		2007	
	No.	%	No.	%	No.	%	No.	%
No. of patients (N)	12798		16815		18392		18426	
Month	No.	%	No.	%	No.	%	No.	%
January	1064	8.3	1399	8.3	1265	6.9	1579	8.6
February	838	6.5	1197	7.1	1424	7.7	1290	7.0
March	1166	9.1	1389	8.3	1782	9.7	1782	9.7
April	986	7.7	1495	8.9	1868	10.2	1625	8.8
May	1018	8.0	1364	8.1	1426	7.8	1618	8.8
June	1127	8.8	1400	8.3	1778	9.7	1476	8.0
July	1207	9.4	1862	11.1	1854	10.1	1808	9.8
August	1210	9.5	1538	9.1	1447	7.9	1814	9.8
September	1184	9.3	1530	9.1	1626	8.8	1486	8.1
October	1346	10.5	1666	9.9	1513	8.2	1376	7.5
November	1003	7.8	917	5.5	1077	5.9	1443	7.8
December	649	5.1	1058	6.3	1332	7.2	1129	6.1
Average per month	1066.5		1401.3		1532.7		1535.5	

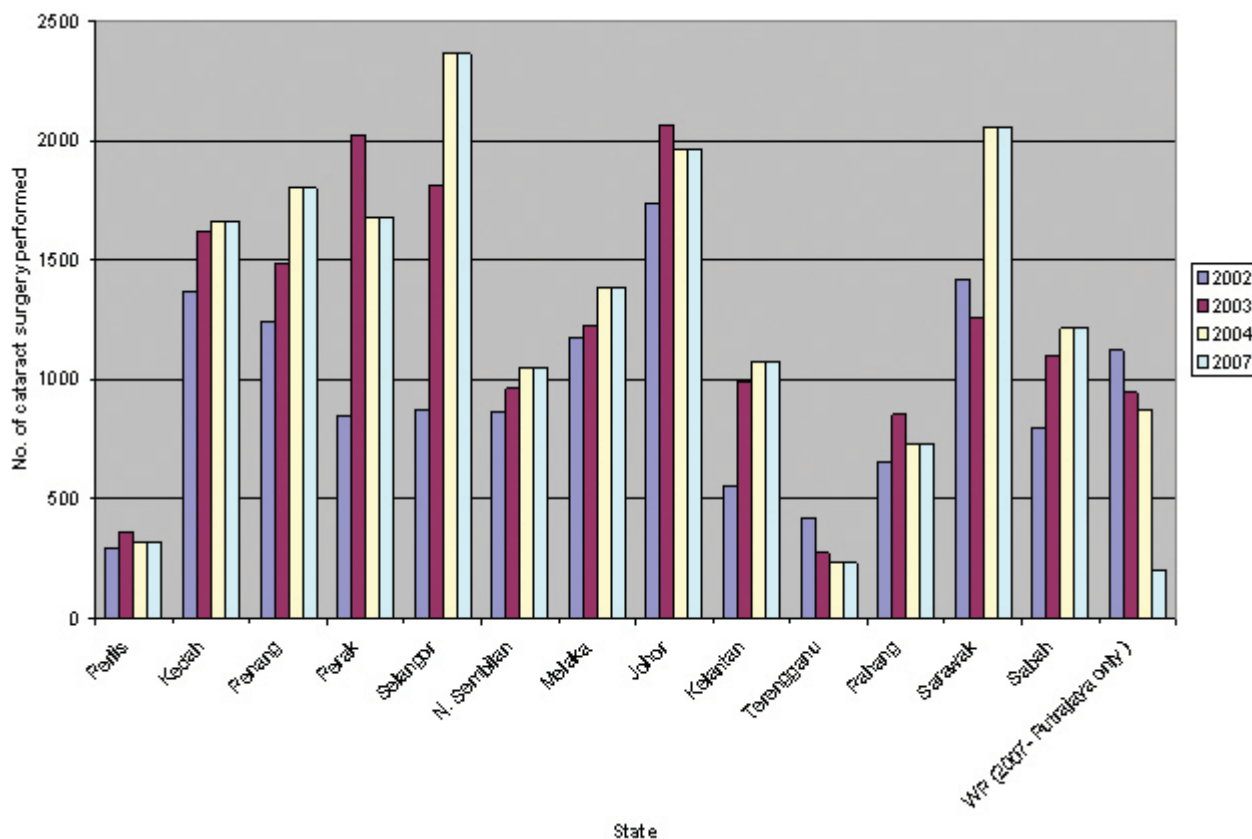
Figure 1.3.2: Number of surgeries done by month



1.3.3 Number of cataract surgeries performed by states

The states which performed higher number of cataract surgeries were Selangor (4 SDPs), Johor (4 SDPs), Sarawak (2 SDPs), Penang (2 SDPs), Perak (4 SDPs) and Kedah (2 SDPs). Understandably, states with more SDPs have higher number of cataract surgeries. Density of population in the state may also affect the number of cataract surgeries performed.

Table 1.3.3: Number of cataract surgeries registered to NED by state



1.3.4 Surgeon status

Although ophthalmology service is a specialist service, cataract surgery is performed by doctors of all levels. Specialists performed the highest number, followed by gazetted specialists and medical officers.

Table 1.3.3: Surgeon status

	2002	2003	2004	2007
Surgeons status	%	%	%	%
Specialists	68.5	71.8	71.6	77.8
Gazetting specialists	13.7	9	9.6	6.9
Medical officers	17.8	19.2	18.8	14.6

1.3.5 Duration of cataract surgery

Duration of cataract surgery is recorded from the time incision was made to the time it is closed, either by sealing the corneal wound as in phacoemulsification or suturing of wound in other cataract surgeries. Data for 2007 showed that the mean duration for all surgeries was 40.2 minutes (SD 20.6). Average time taken for phacoemulsification of 36.8 min was significantly different ($p < 0.001$) than for ECCE, which was 45.3 min.

Phacoemulsification which has to be converted to ECCE (phaco convert, 57.8 min) took longer time to complete as compared to phaco (36.8min). The time taken for phaco convert and ICCE were significantly longer than for phaco and ECCE.

The time taken by specialists to perform phaco and ECCE was significantly shorter ($p < 0.001$) as compared to surgery done by gazetted specialist and medical officers.

As a whole, the time taken for surgery can be further improved, especially for phaco. Each surgeon should review and look for means to shorten surgical time, especially employing functions available in phaco machine to cut down time without compromising surgical performance.

Table 1.3.5 (a): Duration of surgery in minutes, 2007

Duration (min)	Mean (SD)	Median	Mode	Minimum	Maximum
All Surgeries	40.2 (20.6)	35	30	15	180
Phaco	36.8 (19.7)	30	30	15	180
ECCE	45.3 (19.7)	40	30	15	180
Phaco convert	57.8 (20.6)	56	30	15	150
ICCE	57.6 (23.7)	55	60	15	160
Lens aspiration	47.8 (27.4)	40	30	15	175

Table 1.3.5 (b): Duration of surgery by surgeon status, 2007

	Summary	Duration of surgery (min)	
		Phaco	ECCE
Specialists	Mean	36	40.2
	SD	19.8	17.6
	Median	30	35
	Minimum	15	15
	Maximum	180	180
Gazetting specialists	Mean	40.2	45.9
	SD	18	17.8
	Median	36	40
	Minimum	15	20
	Maximum	145	166
Medical officer	Mean	42.2	53.9
	SD	18.2	20.3
	Median	40	50
	Minimum	15	20
	Maximum	170	170
Significant test		(P value)	(P value)
Specialists compared to gazetted specialists		< 0.001	< 0.001
Specialists compared to medical officers		< 0.001	< 0.001

1.3.6 Distribution of cataract surgeries performed under day care setting

With the advancement in cataract surgery, particularly phaco with small incision, most surgeries can be performed safely as day care. Besides, the study on cost effectiveness of cataract surgery in MOH, conducted in 2000, has shown that performing cataract surgery as day care was much more cost effective than admitting patients to the ward. (Reference : Loo CY, Kandiah M, Arumugam G, Goh PP Lim TO et al. Cost efficiency and cost effectiveness of cataract surgery at the Malaysian Ministry of Health ophthalmic service. *International Ophthalmology* 2004; 25:81-87)

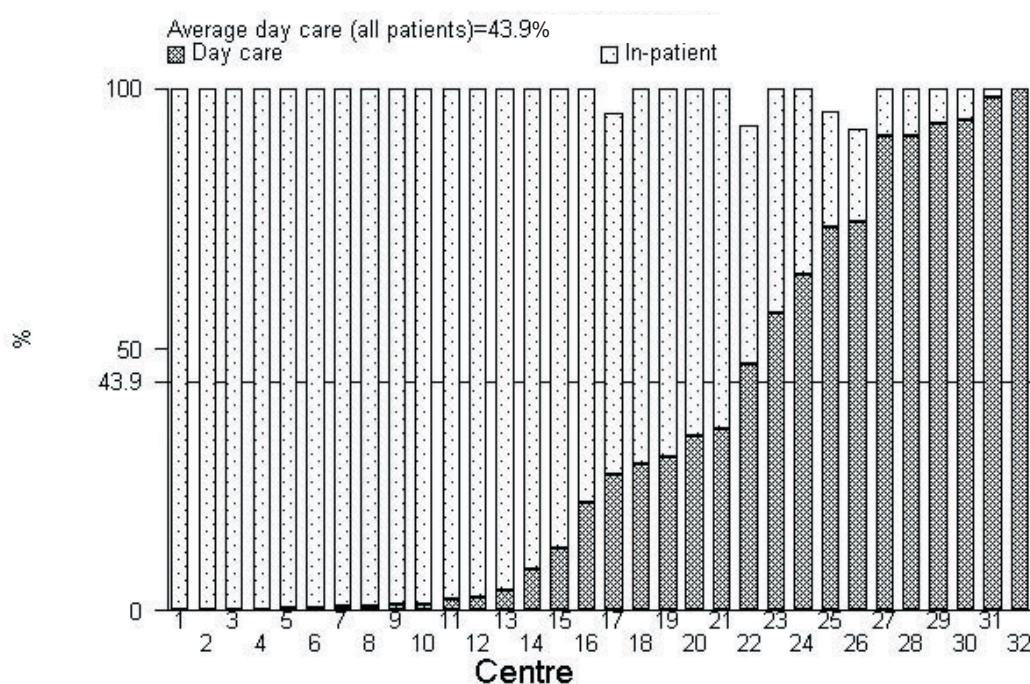
Cataract surgery performed in children and combined surgery (e.g. with vitreoretinal surgery) were excluded from the day care surgery rate calculation. This is because these specific groups of patients would require general anaesthesia, thus needing in-patient care. Although there is slight increment in the proportion of day care cataract surgery in 2007, the rate was still small, at 43.9%. Four SDPs did not do any surgeries as day care. For SDPs who performed day care surgery in 2007, more than two-third did less than half of their cataract surgeries as day care.

With economic downturn and a tighter budget, a review on current work process and effort to make day care surgery acceptable to both surgeons and patients should be initiated. Besides, with establishment of more ambulatory care at MOH hospitals, there should be an increase in the number of day care surgeries.

Table 1.3.6: Distribution of cataract surgeries performed as day care setting

	2003	2004	2007
No. of cataract surgery performed excluding children and combined surgery	15981	17336	11777
Number of SDPs	32	33	32
Percent surgery done as day care (%)	38.1%	40.0%	43.9%
Number of SDPs with no day care surgery	3	2	4
Number (%) of SDPs with <50% surgery done as day care	22 (68.8%)	25 (75.8%)	19 (65.5%)

Figure 1.3.6: Distribution of day care and in-patient for patients with cataract surgery by centre (exclude children and those with combined surgery) in 2007



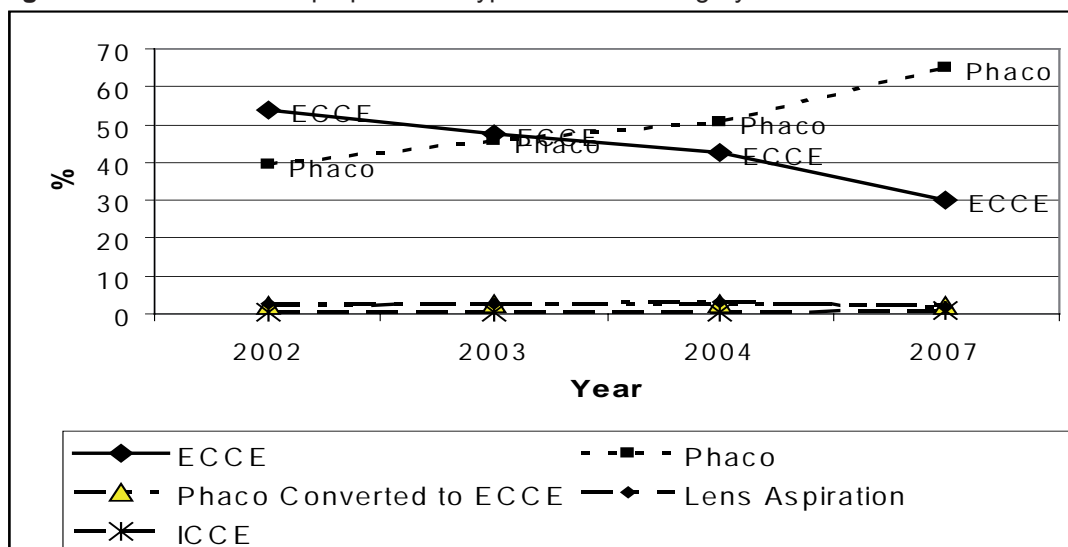
1.3.7 Distribution of types of cataract surgery

Phaco is a preferred cataract surgery technique with better outcome and faster visual recovery. There was a change in the trend of type of surgery, from predominantly ECCE (54.0%) in 2002 to phaco (65.1%) in 2007. Although the increasing trend is encouraging, the increment is gradual at 4% per year. The rate of phaco converted to ECCE, a proxy indicator for competency in performing phaco, has stayed constant at 2.4 to 2.8% (i.e. 3 in every 100 cases of phaco).

Table 1.3.7: Distribution of types of cataract surgery

No. of patients (N)	2002		2003		2004		2007	
	No.	%	No.	%	No.	%	No.	%
ECCE	6914	54.0	8012	47.6	7830	42.6	5524	30.1
Phacoemulsification	5085	39.7	7674	45.6	9282	50.5	11960	65.1
Phaco Converted to ECCE	311	2.4	469	2.8	454	2.5	432	2.4
Lens Aspiration	372	2.9	435	2.6	550	3.0	323	1.8
ICCE	81	0.6	94	0.6	103	0.6	141	0.8

Figure 1.3.7: Trend in the proportion of type of cataract surgery from 2002 to 2007



1.3.8 Distribution of combined surgery

The proportion of combined cataract surgery with other ocular surgery increased from 2.9% to 4.8%. The increment was more in combination with vitreoretinal surgery. There was a marked decrease in combined filtering glaucoma surgery and penetrating keratoplasty.

Table 1.3.8: Distribution of combined surgery

No. of patients (N)	2002		2003		2004		2007	
	No.	%	No.	%	No.	%	No.	%
All combined surgery	375	2.9	581	3.4	733	4.9	891	4.8
Pterygium Surgery	86	0.7	120	0.7	147	0.8	135	0.7
Filtering Glaucoma Surgery	148	1.2	210	1.2	235	1.3	131	0.7
Vitreoretinal Surgery	26	0.2	100	0.6	186	1	435	2.4
Penetrating Keratoplasty	1	0.007	0	0	3	0.02	0	0
Others	124	1.0	170	1.0	149	0.8	190	1.0

1.3.9 Anaesthesia in cataract surgery

Local anaesthesia (LA) has always been the main form of anaesthesia used in cataract surgery (over 90%). A consistent 6 to 7% of patients required general anaesthesia over the years. This may be for surgery done in children and those who had combined surgery.

Among the mode of LA, the frequently given was subtenon injection. Since 2003, there was an increase in the use of topical anaesthesia, either in the form of eye drops or gel, from 11.7 % in 2002 to 28.3 % in 2007. There was a decrease in retrobulbar, subconjunctival and facial block injections. Intracameral injection of non preservative lignocaine was used in 1.5% of patients in 2007.

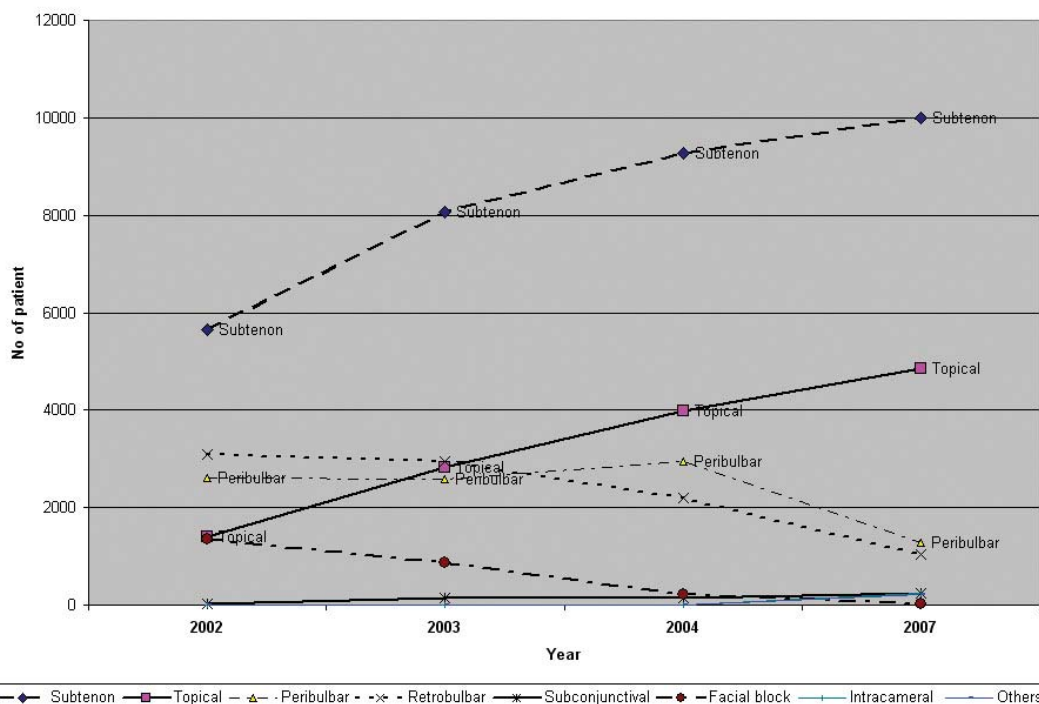
Most surgeons employed only one type of LA. The use of oral and intravenous sedation has declined over the years. The use of sedation was seen consistently in certain SDPs, reflecting individual surgeon's preferences.

Table 1.3.9: Types of anaesthesia

No. of patients (N)	2002		2003		2004		2007	
	12798		16815		18392		18426	
	No.	%	No.	%	No.	%	No.	%
General anaesthesia(GA)	818	6.4	1136	7	1379	7.3	1207	6.6
Local anaesthesia (LA)	11980	93.6	15679	93.2	17013	92.5	17143	93.4
Type of local anaesthesia								
Subtenon	5647	47.1	8076	51.5	9260	54.4	9990	58.3
Topical	1406	11.7	2819	18.0	3978	23.4	4853	28.3
Peribulbar	2601	21.7	2575	16.4	2940	17.3	1282	7.5
Retrobulbar	3100	25.9	2952	18.8	2186	12.8	1031	6.0
Subconjunctival	28	0.2	141	0.9	139	0.8	232	1.4
Facial block	1348	11.3	865	5.5	226	1.3	20	0.1
Intracameral	na	na	na	na	na	na	249	1.5
Others	12	0.1	0	0.0	1	0.0	223	1.3
Single mode of LA	9997	83.4	13994	89.3	15335	90.1	16414	97.1
Multiple mode of LA	1983	16.6	1685	10.7	1678	9.9	497	2.9
Sedation for those under LA								
No sedation	7507	62.7	12021	76.7	14031	82.5	9668	56.4*
Oral sedation	3995	33.3	3354	21.4	2729	16.0	2387	13.9
Intravenous alone	108	0.9	91	0.6	144	0.8	72	0.4
Intravenous plus oral	83	0.7	53	0.3	15	0.1	0	0
Intra-muscular	426	3.6	261	1.7	104	0.6	3	0.02

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

Figure 1.3.9: Types of local anaesthesia



1.3.10 Intraocular lens implantation

Majority of patients had IOL implantation. The proportion was consistently at 98% over the years. Most of the patients (97%) had posterior chamber IOL, which was the gold standard of IOL placement.

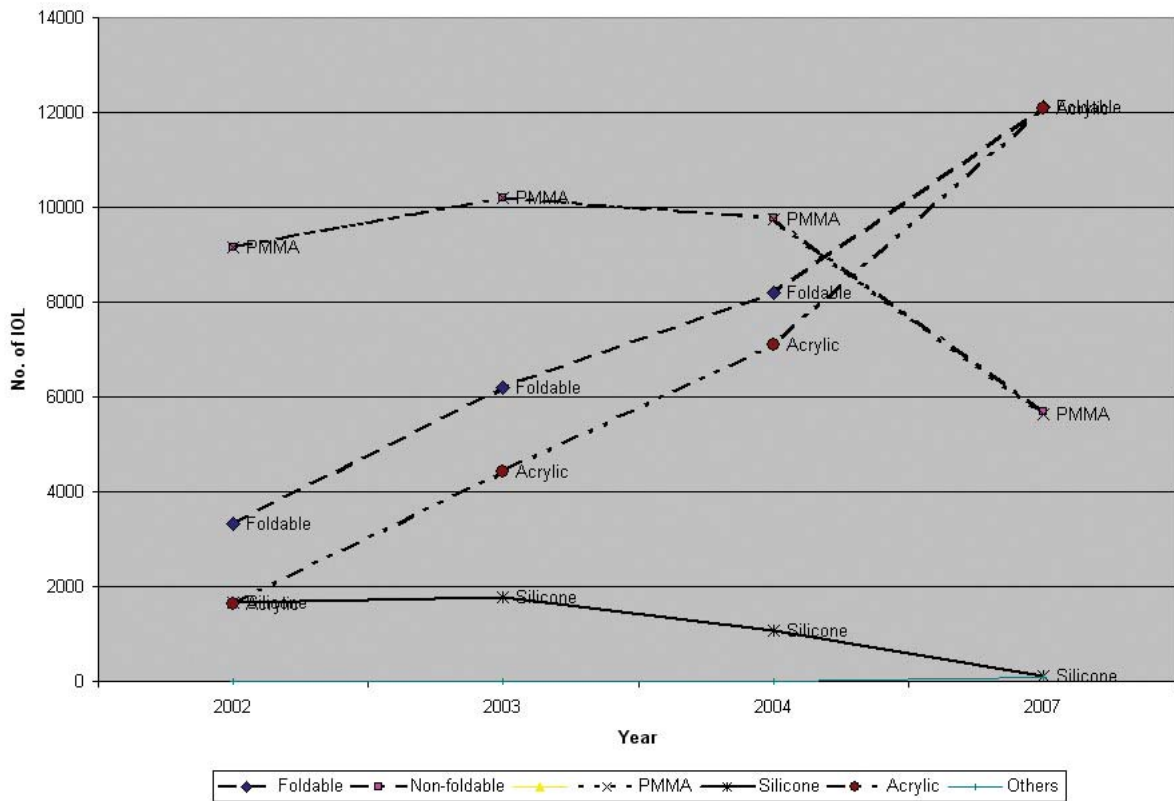
With the change in cataract surgery from ECCE to phaco, there was a similar change from non-foldable (usually rigid IOL implanted during ECCE) towards foldable IOL (usually implanted during phaco).

Rigid IOL is made of PMMA material while foldable IOL is made of either silicone or acrylic. The 2007 CSR findings showed that foldable IOL (68.1%) made of acrylic material (67.5%) was preferred over silicone IOL (0.6%).

Table 1.3.10: Intraocular lens

No. of patients (N)	2002		2003		2004		2007	
	No.	%	No.	%	No.	%	No.	%
With IOL	12471	97.4	16395	97.5	17941	97.5	17867	98.3
Without IOL	327	2.6	419	2.5	448	2.4	309	1.7
IOL Placement								
PCIOL	12074	96.8	15957	97.3	17410	97.0	17350	97.1
ACIOL	386	3.1	404	2.5	497	2.8	482	2.7
Scleral Fixated IOL	11	0.1	34	0.2	34	0.2	35	0.2
IOL Materials								
No. of IOL	12472		16401		17953		17790	
Types								
Foldable	3311	26.5	6197	37.8	8188	45.6	12112	68.1
Non-foldable(rigid)	9161	73.5	10204	62.2	9762	54.4	5678	31.9
Materials of IOL								
Acrylic	1641	13.2	4418	26.9	7105	39.6	12087	67.5
PMMA	9161	73.5	10203	62.2	9758	54.4	5644	31.5
Silicone	1670	13.4	1776	10.8	1078	6.0	99	0.6
Other	0	0.0	4	0.0	12	0.1	75	0.4

Figure 1.3.10: IOL types



1.4 INTRA-OPERATIVE COMPLICATIONS

1.4.1 Intra-operative complications

The four-year cumulative rate of intra-operative complications was 10.1%. The rate was consistent over the years, (i.e. one case in every ten cataract surgeries). Posterior capsular rupture (5.4%) and vitreous loss (4.9%) were among the common complications. Over the years, there was a decline in the rates of PCR and vitreous loss. The more serious complications such as drop nucleus and suprachoroidal haemorrhage were not frequent.

Table 1.4.1: Intra-operative complication by patient and by types of complications

No. of patients (N)	2002		2003		2004		2007		Cumulative	
	12798		16815		18391		18380		66384	
	No.	%	No.	%	No.	%	No.	%	No.	%
Patient with intra-op complication	1328	10.4	1673	9.9	1730	9.4	1999	10.9	6730	10.1
Types of complications										
PCR	773	6.0	1036	6.2	1025	5.6	764	4.2	3598	5.4
Vitreous loss	734	5.7	979	5.8	994	5.4	569	3.1	3276	4.9
Zonular dehiscence	246	1.9	327	1.9	380	2.1	275	1.5	1228	1.8
Drop nucleus	13	0.1	27	0.2	34	0.2	21	0.1	95	0.1
Suprachoroidal haemorrhage	5	0.0	8	0.0	10	0.1	9	0.0	32	0.0
Central corneal oedema	56	0.4	73	0.4	78	0.4	58	0.3	265	0.4
Others	274	2.1	266	1.6	235	1.3	350	1.9	1125	1.7

Note: Patient may have more than one type of complications

1.4.2 Intra-operative complication by type of surgery

Phacoemulsification has the lowest rate of intra-operative complication (8%), followed by ECCE (10%).

Phaco conversion is defined as a surgery when the surgeon began with the aim to do phaco and have to extend the small incision for other approach at any stage of the surgery. This includes extension of wound to implant non- foldable IOL following PCR. Understandably, due to the nature of phaco conversion, it has the highest rate of intra-operative complication.

ICCE is indicated when there is subluxation or dislocation of lens thus making vitreous loss a common complication during this surgery. It thus had high intra-operative complication rates for all the years.

Table 1.4.2: Intra-operative complication by types of cataract surgery

Year	Rate of any form of Intra-operative complication (%)				
	Lens Aspiration (%)	ECCE (%)	Phaco (%)	Phaco Conversion (%)	ICCE (%)
2002	13.7	9.9	8.6	41.2	33.3
2003	11.5	8.7	8.7	43.9	41.5
2004	10.5	8.7	8.0	39.0	48.5
2007	15.8	12.5	8.1	52.1	44.7

1.4.3 Intra-operative complications by combined surgery

Complication rate was higher in combined surgery (16.2%) when compared to cataract surgery alone (10.1%). The common complications encountered were also PCR and vitreous loss.

Table 1.4.3: Intra-operative complications by combined surgery

	2002		2003		2004		2007		Cumulative	
	No.	%	No.	%	No.	%	No.	%	No.	%
Number of combined surgery	375	100	581	100	733	100	891	100	2580	100
Any intra-op complication	64	17.1	105	18.1	120	16.4	131	14.7	419	16.2
Posterior capsule rupture	35	9.3	60	10.3	77	10.5	56	6.3	228	8.8
Vitreous loss	46	12.3	66	11.4	72	9.8	41	4.6	225	8.7
Zonular dehiscence	18	4.8	22	3.8	23	3.1	21	2.4	84	3.3
Drop nucleus	3	0.8	5	0.9	5	0.7	4	0.4	17	0.7
Suprachoroidal haemorrhage	0	0.0	0	0.0	4	0.5	0	0	4	0.2
Central corneal oedema	1	0.3	10	1.7	4	0.5	7	0.8	22	0.9
Other	12	3.2	18	3.1	16	2.2	30	3.4	76	2.9

1.4.4 Distribution of intra-operative complications by type of combined surgery

From the 2007 findings, 14.7% of combined surgery had intra-operative complications. The higher complication rates were noted when combined with filtering surgery (18.3%) followed by pterygium surgery (10.4%) and vitreoretinal surgery (10.3%).

Table 1.4.4: Distribution of Intra-operative complications by type of combined surgery, 2007

Intra-operative complications	Combined Surgery													
	All Surgeries		Any Combined Surgery		Pterygium Surgery		Filtering Surgery		Vitreoretinal Surgery		Penetrating Keratoplasty		Others	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N	18380	100	891	100	135	100	131	100	435	100	0	0	190	100
Any intra-op complication	1999	10.9	131	14.7	14	10.4	24	18.3	45	10.3	0	0	48	25.3
Posterior capsule rupture	764	4.2	56	6.3	4	3	9	6.9	18	4.1	0	0	25	13.2
Vitreous loss	569	3.1	41	4.6	3	2.2	7	5.3	11	2.5	0	0	20	10.5
Zonular dehiscence	275	1.5	21	2.4	1	0.7	4	3.1	6	1.4	0	0	10	5.3
Drop nucleus	21	0.1	4	0.4	0	0	0	0	3	0.7	0	0	1	0.5
Suprachoroidal haemorrhage	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Central corneal oedema	58	0.3	7	0.8	0	0	3	2.3	3	0.7	0	0	1	0.5
Others	350	1.9	30	3.4	2	1.5	5	3.8	12	2.8	0	0	11	5.8

1.4.5 Intra-operative complications by surgeon status

Intra-operative complication was highest in surgeries done by gazetted specialists (13.7%), mainly PCR.

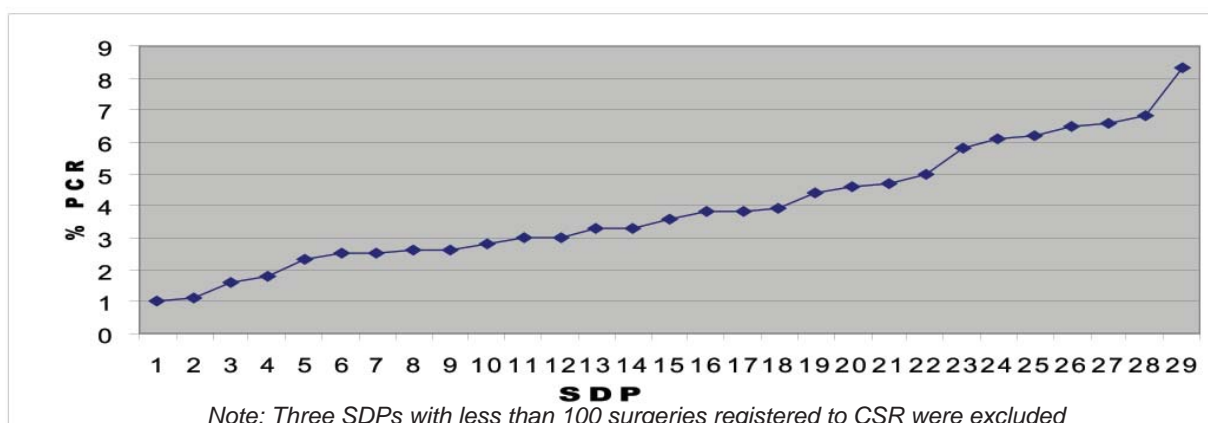
Table 1.4.5: Intra-operative complications by surgeon status, 2007

Intra-operative complications	Surgeon Status							
	All Patients		Surgery done by Specialist		Surgery done by Gazetting Specialist		Surgery done by Medical Officer	
	No.	%	No.	%	No.	%	No.	%
N	18294	100	14328	100	1276	100	2690	100
Any intra-op complication	1990	10.9	1485	10.4	175	13.7	330	12.3
Posterior capsule rupture	757	4.1	546	3.8	85	6.7	126	4.7
Vitreous loss	564	3.1	405	2.8	54	4.2	105	3.9
Zonular dehiscence	271	1.5	204	1.4	24	1.9	43	1.6
Drop nucleus	21	0.1	20	0.1	0	0	1	0
Suprachoroidal haemorrhage	9	0	5	0	1	0.1	3	0.1
Central corneal oedema	57	0.3	50	0.3	5	0.4	2	0.1
Others	350	1.9	262	1.8	37	2.9	51	1.9

1.4.6 Rate of posterior capsular rupture by SDP

Rate of PCR is one of the key performance indicators for ophthalmology service. The national standard is less than 5%. For the year 2007, the cumulative rate for 29 SDPs was 4.2%. The rate varies widely among SDPs, from 1.0% to 8.3%. Eight SDPs had PCR rate higher than 5%.

Figure 1.4.6: Rate of PCR by SDP in 2007



1.5 CATARACT SURGERY OUTCOME

Cataract surgery outcome was recorded by 12 weeks after surgery. These included post-operative complications for infectious endophthalmitis and unplanned return to operating theater; post-operative unaided vision and refracted vision, and possible factors for post-operative refracted vision of worse than 6/12.

1.5.1 Post-operative complications

1.5.1.1 Post-operative infectious endophthalmitis

The rate of post-operative infectious endophthalmitis is one of the eight key performance indicators set for MOH ophthalmology service. The national standard is set at less than 0.2%. Based on the 4-year-data, the average rate was 0.20% (two cases per 1000 cataract surgeries). There was no significant reduction of the rate over the last 6 years.

For the year 2007, 37 patients, from 14 SDPs had post-operative infectious endophthalmitis. The rates of these SDPs ranged from 0.1% to 0.7%. Thirteen SDPs had rates higher than 0.2%. The period of onset of post-operative endophthalmitis after cataract surgery was available for 26 patients. The mean duration was 21.6 days or 3 weeks.

Table 1.5.1.1 (a): Rate of post-operative infectious endophthalmitis

	2002	2003	2004	2007	Total
Patients with post-operative complication records (N)	12798	16815	15996	17604	63103
Patients with post-operative infectious endophthalmitis (n)	25	41	25	37	128
Percentage with post-operative infectious endophthalmitis (%)	0.20	0.24	0.16	0.21	0.20

Figure 1.5.1.1: Rate of post-operative infectious endophthalmitis in 2007, by SDP

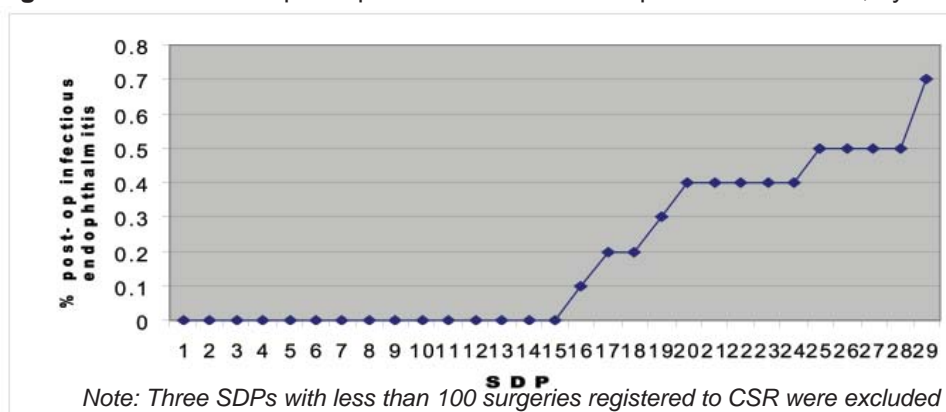


Table 1.5.1.1 (b): Period of onset of infectious endophthalmitis after cataract surgery, 2007

Post-operative duration (days)	Day (s)
Shortest	1
Longest	92
Mean	21.6

	No. of patient
<3 days	2
3-5 days	4
6-14 days	8
>14 days	12

1.5.1.2 Unplanned return to operating theatre

Data on unplanned return to OT within 12 weeks following surgery were available for June to December 2004 and January to December 2007. The average was 0.45% or 4.5 cases per 1000 cataract surgeries. The rate varied by center and ranged from 0 to 2.4% or from no case to 13 cases in 2007. For the year 2007, nine SDPs were without any case for unplanned return to OT. The common reasons were iris prolapse, wound dehiscence and infectious endophthalmitis.

Table 1.5.1.2 (a): Rate of unplanned return to OT

	2004	2007	Total
Patients with outcome records (N)	9039	17604	26643
Patients with unplanned return to OT (n)	31	88	119
Percentage of patients with unplanned return to OT (%)	0.34	0.50	0.45

Figure 1.5.1.2: Rate for unplanned return to OT by SDP, 2007

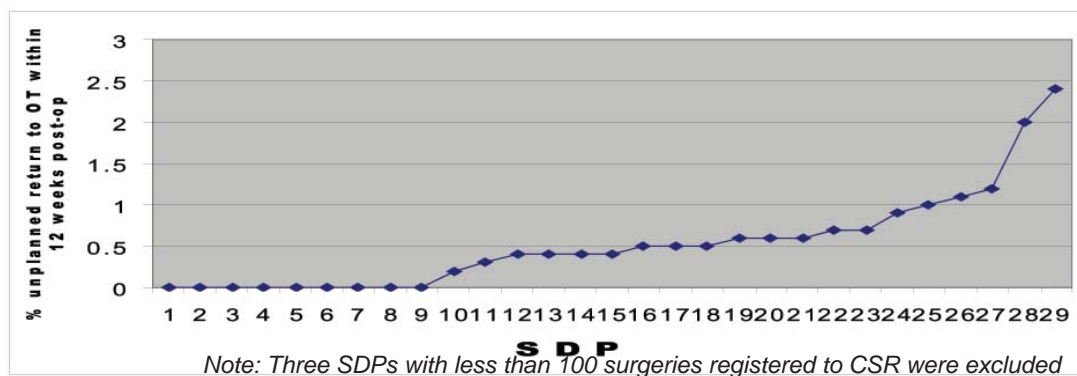


Table 1.5.1.2 (b): Reasons for unplanned return to OT

Reasons	2004		2007	
	No.	%	No.	%
All eyes	31	100	87	100
Iris prolapse	10	32.3	20	23
Wound dehiscence	7	22.6	13	14.9
High IOP	4	12.9	5	5.7
IOL related	2	6.5	10	11.5
Infective endophthalmitis	7	22.6	12	13.8
Others	9	29	38	43.7

1.5.2 Ascertainment rate for post-operative visual acuity and reasons for no post-operative vision records

1.5.2.1 Ascertainment rate

As post-operative visual acuity is an important outcome measure, a good ascertainment rate of post-operative vision will reflect the actual outcome of cataract surgery. Out of the 18,426 eyes operated in 2007, 15,786 eyes (85.7%) had post-operative unaided vision and 14,476 (78.6%) had refracted vision. Of the 32 SDPs for 2007, 20 SDPs have ascertainment rate lower than average for unaided vision and 21 SDPs lower than average for refracted vision.

The possible reasons for lower ascertainment rate for refracted vision was either patients' unaided vision was good thus not requiring refraction to improve their vision further, patients had ocular co-morbidities and poor visual prognosis rendering refraction unnecessary, or patients with combined surgery such as vitreoretinal surgery, who require refraction at much later post-operative period (longer than 12 weeks).

In order to have better data for outcome analysis, SDPs with low ascertainment rates should review the work process in order to capture post-operative data.

1.5.2.2 Reasons for no records of visual acuity

Of the 2,640 eyes which did not have visual acuity record, reasons for no data were available in 1,458 patients (55.2%). The commonest reason was lost to follow-up. It could be possible that patients had good visual outcome thus did not bother to come for post-operative follow-up.

Table 1.5.2.2: Reasons for no records of visual acuity

Reasons	No.	%
All cases	1458	100
Lost to follow-up	1078	73.9
Discharged by doctor	32	2.2
Unable to take vision	49	3.4
Others	299	20.5

1.5.3 Post-operative visual acuity

1.5.3.1 Post-operative visual acuity for all patients

When compared to vision before surgery, where unaided VA 6/12 or better was 2.7% and refracted VA 6/12 or better was 15.3% before operation, the post-operative VA 6/12 or better among patients with or without ocular co-morbidity showed an improvement, with unaided VA at 39.2% and refracted VA at 81.1%. The outcome performance for refracted vision was satisfactory though can be improved. Following surgery, 5.6% of eyes with unaided VA and 2.8% of eyes with refracted VA were still in the blindness category.

Table 1.5.3.1: Post-operative VA for all patients with or without ocular co-morbidity

Post-op Vision	2002		2003		2004		2007		Cumulative	
	Unaided (%)	Refracted (%)	Unaided (%)	Refracted (%)	Unaided (%)	Refracted (%)	Unaided (%)	Refracted (%)	Unaided (%)	Refracted (%)
No. of patients	12512	10385 (83.0)	14683	12830 (87.4)	6228	5477 (87.9)	15786	14476 (91.7)	49209	43168 (87.7)
6/5 to 6/12	4869 (38.9)	8376 (80.7)	5549 (37.8)	10569 (82.4)	2452 (39.4)	4554 (83.1)	6404 (40.6)	11505 (79.5)	19274 (39.2)	35004 (81.1)
6/18 to 3/60	6850 (54.7)	1659 (14.0)	8418 (57.3)	1962 (15.3)	3512 (56.4)	815 (14.9)	8407 (53.3)	2476 (17.2)	27187 (55.2)	6912 (16.0)
2/60 to NPL	793 (6.3)	350 (3.4)	716 (4.9)	299 (2.3)	264 (4.2)	108 (2.0)	975 (6.2)	465 (3.1)	2747 (5.6)	1222 (2.8)

1.5.3.2 Post-operative VA 6/12 or better for patients without ocular co-morbidity

1.5.3.2.1 Post-operative unaided VA 6/12 or better among patients without ocular co-morbidity

The cumulative 4-years-data for all surgeries showed that post-operative unaided VA 6/12 or better in patients without ocular co-morbidity was 41.6%. The findings for eyes with phaco was 50.2%, ECCE was 33.1%, phaco conversion was 28.5%, lens aspiration was 33.8% and ICCE was 15.5%.

Visual outcome after phaco was the best (50.2%). Phaco conversion reduced the percentage of good outcome to 28.5%.

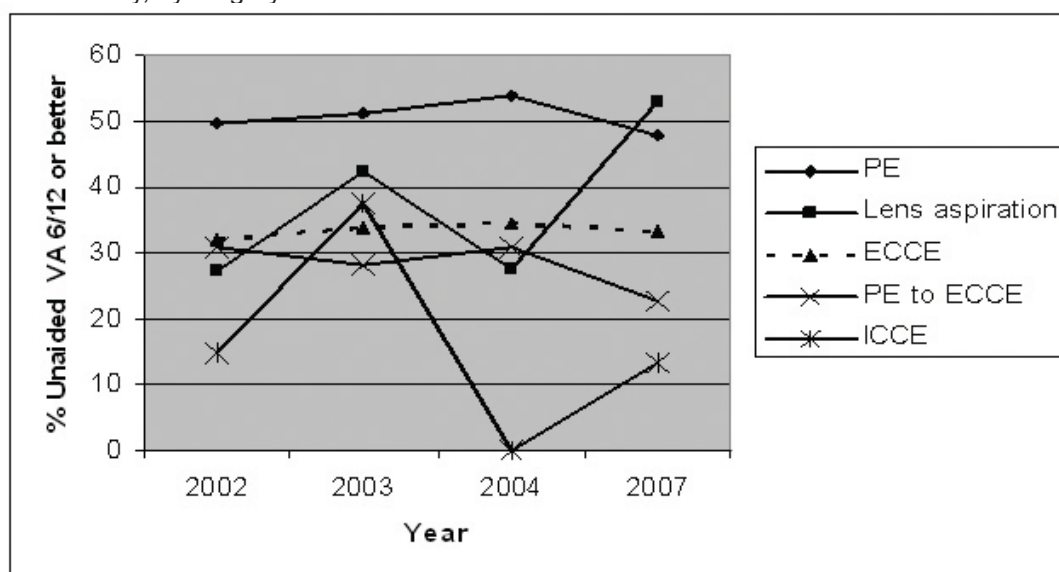
Surgeons should aim for better unaided visual outcome. This is because most patients are not keen to wear spectacles post-operatively. In order to achieve this, more eyes should be operated using phaco technique. Therefore all surgeons, even medical officers should learn and master phaco to reduce the rate of phaco conversion.

Table 1.5.3.2.1: Percent distribution post-operative unaided VA 6/12 or better among patients without ocular co-morbidity, by surgery

	2002	2003	2004	2007	Cumulative
All surgeries (%)	38.9	42.4	44.8	43.2	41.6
Phaco (%)	49.7	51.2	53.8	47.9	50.2
ECCE (%)	32.2	33.9	34.4	33.2	33.1
Phaco conversion (%)	30.8	28.3	30.8	22.8	28.5
Lens aspiration (%)	27.3	42.3	27.5	53.0	33.8
ICCE (%)	15.0	37.5	0	13.3	15.5
Secondary IOL* (%)	30.3	16.7	22.7	NA	22.7

* Note: Secondary IOL was excluded from CSR from the year 2007

Figure 1.5.3.2.1: Percent distribution post-operative unaided VA 6/12 or better among patients without ocular co-morbidity, by surgery



1.5.3.2.2 Post-operative refracted VA 6/12 or better among patients without ocular co-morbidity

Post-operative refracted vision among patients without ocular co-morbidity is one of the key performance indicators for ophthalmic service. The national standard is set at 85% or better.

The cumulative percentage for all surgeries for the last 4 years was 84.8%. The highest was for eyes with phaco (89.4%), followed by ECCE (80.8%). The worst was ICCE (49.4%). The outcome results for phaco and ECCE for the year 2007 were less satisfactory than the previous years.

In 2007, 17 of the 29 SDPs (58.6%) achieved the KPI standard. Six SDPs have rates higher than 90% (20.7%).

Table 1.5.3.2.2: Percentage of post-operative refracted VA 6/12 or better for patients without ocular co-morbidity, by surgery

	2002	2003	2004	2007	Cumulative
	% Refracted VA 6/12 or better				
All surgeries (%)	80.6	88.6	89.5	83.7	84.8
Phaco (%)	86.9	93.2	93.8	86.3	89.4
ECCE (%)	77.5	84.5	85	79.6	80.8
Phaco conversion (%)	75.3	81.7	79.4	62.4	75.7
Lens aspiration (%)	54.4	75	74.2	78.3	64.0
ICCE (%)	50.0	66.7	50.0	38.5	49.4
Secondary IOL* (%)	80.8	61.1	78.9	NA	71.6

*Note: Secondary IOL was excluded from CSR from the year 2007

Figure 1.5.3.2.2 (a): Percentage of post-operative refracted VA 6/12 or better among patients without ocular co-morbidity, by surgery

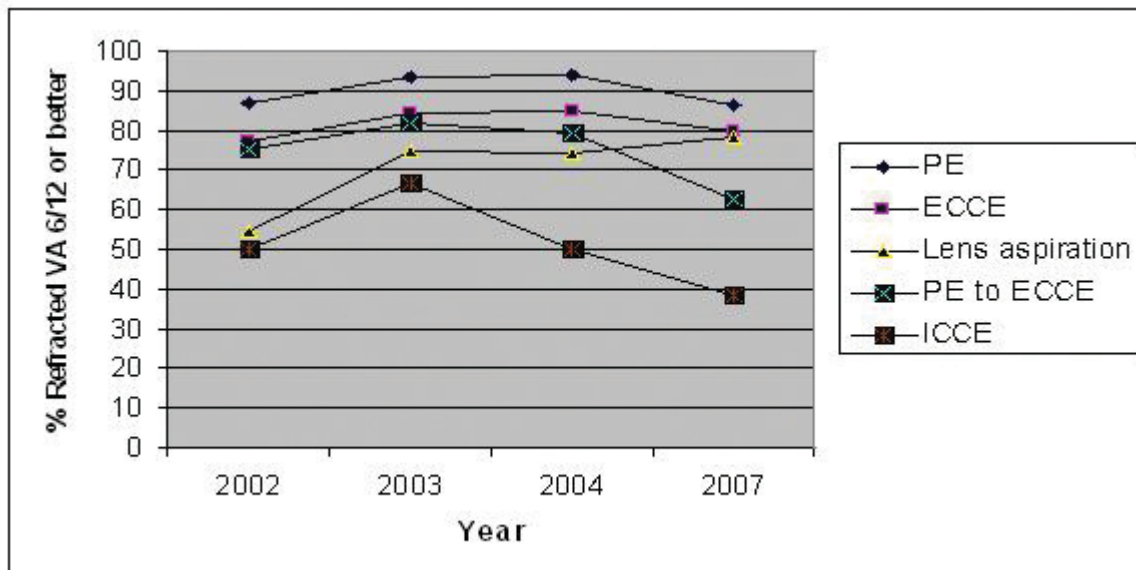
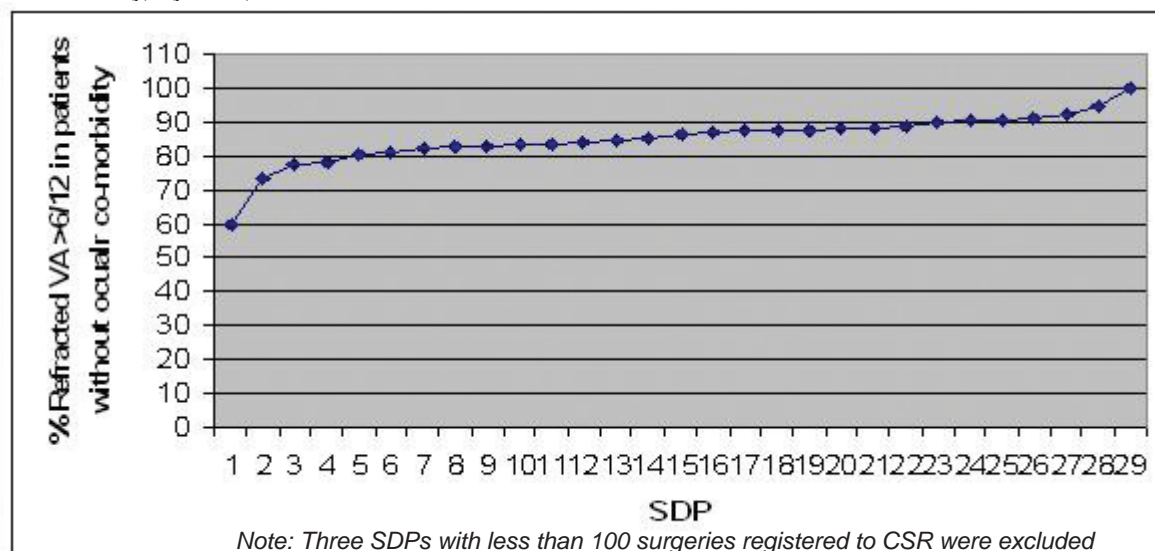


Figure 1.5.3.2.2 (b): Percentage of post-operative refracted VA 6/12 or better among patients without ocular co-morbidity, by SDP, 2007



1.5.3.2.3 Post-operative refracted VA 6/12 or better in relation to age of patients

Data for the year 2007 showed that outcome for ECCE, phaco and phaco conversion were worse if the age of the patients were older than 64. The same observations were noted for the year 2002, 2003 and 2004.

Table 1.5.3.2.3: Post-operative refracted VA 6/12 or better in relation to age and types of surgery for patients without ocular co-morbidity, 2007

Age Factor	Percentage of eyes with post-operative refracted VA 6/12 or better											
	Types of Cataract Surgery											
	All Surgeries			Phaco			ECCE			Phaco conversion		
	N	No.	%	N	No.	%	N	No.	%	N	No.	%
N	6785	5680	83.7	4621	3989	86.3	1942	1546	79.6	149	93	62.4
<1	2	2	100	2	2	100	0	0	0	0	0	0
1-14	31	24	77.4	1	1	100	2	2	100	0	0	0
15-24	24	19	79.2	10	7	70	0	0	0	0	0	0
25-34	29	22	75.9	12	9	75	3	2	66.7	0	0	0
35-44	111	96	86.5	78	70	89.7	28	22	78.6	0	0	0
45-54	734	650	88.6	507	462	91.1	210	176	83.8	17	12	70.6
55-64	1858	1636	88.1	1299	1164	89.6	527	450	85.4	30	22	73.3
65-74	2753	2316	84.1	1927	1668	86.6	744	598	80.4	76	47	61.8
75-84	1135	850	74.9	728	567	77.9	380	271	71.3	23	11	47.8
>=85	108	65	60.2	57	39	68.4	48	25	52.1	3	1	33.3

Note: N = Total number of eyes which had post-operative refracted vision
No. = Number of eyes with post-operative refracted vision 6/12 or better

1.5.3.2.4 Post-operative refracted VA 6/12 or better in relation to occurrence of intra-operative complications

In all type of surgeries except lens aspiration, occurrence of intra-operative complications reduced the percentage of patients with post-operative refracted vision of 6/12 or better. Data for 2007 showed that the difference was higher for eyes with phaco conversion (34.1%). Thus, all surgeons must master phaco and reduce phaco conversion.

Table 1.5.3.2.4: Percentage of eyes with post-operative refracted VA 6/12 or better in relation to occurrence of intra-operative complications and types of surgery, 2007

	Percentage of eyes with post-operative refracted VA 6/12 or better		
	Without Intra-op Complications	With Intra-op Complications	Difference
All surgeries	85.0%	67.8%	17.2%
Phaco	86.9%	76.2%	10.7%
ECCE	80.8%	66.0%	14.8%
Phaco conversion	80.3%	46.2%	34.1%
Lens aspiration	77.2%	100%*	-22.8%
ICCE	42.9%	33.3%	9.6%

Note: *There were only three cases of lens aspiration with intra-operative complication and all had VA 6/12 or better

1.5.3.2.5 Post-operative refracted VA 6/12 or better in relation to intraocular lens

Obviously, proportion of eyes with post-operative VA 6/12 or better was higher in eyes with IOL implantation. Better visual outcomes were noted in foldable IOLs than non-foldable IOLs. In terms of lens material, acrylic gave better visual outcomes. However, better outcome was noted in acrylic was partly contributed to small incision phaco surgery as acrylic IOL is the commonest foldable IOL implanted during phaco while PMMA IOLs were usually implanted during ECCE.

Table 1.5.3.2.5: Percentage of eyes with post-operative refracted VA 6/12 or better in relation to IOL and type of surgery, 2007

	Percentage of eyes with post-operative refracted VA 6/12 or better					
	With IOL	Without IOL	Foldable IOL	Non Foldable IOL	Acrylic	PMMA
All surgeries	84.0	38.5	85.7	79.5	85.8	79
Phaco	86.4	64.3	86.8	76.8	86.9	74.1
ECCE	80.0	26.7	NA	81.2	NA	80.8
Phaco conversion	65.2	12.5	68.6	60.9	69.1	59.4
Lens aspiration	78.3	0	83.3	66.7	80	73.3
ICCE	36.4	50.0	NA	36.4	100	33.3

1.5.3.2.6 Post-operative refracted VA 6/12 or better in relation to surgeon status

As a whole, better visual outcomes were noted in eyes operated by specialists, especially in phaco and phaco conversion. Visual outcome for ECCE was better when performed by gazetted specialists.

Table 1.5.3.2.6: Percentage of post-operative refracted VA 6/12 or better in relation to surgeon status and types of surgery, 2007

Surgeon Status	Type of surgery											
	All Surgeries			Phaco			ECCE			Phaco conversion		
	N	No.	%	N	No.	%	N	No.	%	N	No.	%
Specialist	5142	4356	84.7	3884	3378	87	1076	858	79.7	121	76	62.8
Gazetting specialist	634	522	82.3	436	362	83	169	142	84	20	12	60
Medical officer	990	783	79.1	293	241	82.3	686	535	78	8	5	62.5

Note: N = total number of surgeries performed,
No. = number of eyes with post-op refracted vision 6/12 or better

1.5.3.2.7 Factors contributing to post-operative refracted VA of worse than 6/12

The main contributing factor for eyes with post-operative refracted VA worse than 6/12 was pre-existing ocular co-morbidity (28.5% in 2007, 47.2% in 2004). The second common factor was high astigmatism (15.8% in 2007, 39.8% in 2003). The percentage for posterior capsular opacification (PCO), cystoid macular oedema and corneal decompensation have declined over the years. However, there was an increase in percentage of retinal detachment in the year 2007.

Based on 2007 data, after excluding patients who had pre-existing ocular co-morbidity noted before surgery, it was found that poor outcome were caused by high astigmatism (19.7%) followed by ocular co-morbidity noted post-operatively (17.6%). The rate of PCO causing poor visual outcome was 5%. There was high percentage of unavailable data either due to undetermined causes for poor visual outcome or missing values.

Table 1.5.3.2.7 (a): Factors contributing to post-operative refracted VA of worse than 6/12

Factor	2002	2003	2004	2007
Preexisting ocular co-morbidity (%)	40.7	39.1	47.2	28.5
High astigmatism (%)	24.3	39.8	30.1	15.8
Posterior capsular opacity (%)	9.9	15.4	5.0	4.4
Cystoid macular oedema (%)	4.6	6.0	3.1	3.1
Corneal decompensation (%)	1.8	1.9	0.6	0.9
Retinal detachment (%)	1.3	0.8	0.7	2.4
Endophthalmitis (%)	0.8	1.0	0.6	0.4
Decentered IOL (%)	0.7	0.1	0.3	0.2
Others (%)	15.0	20.5	12.6	20.7
Unavailable /Missing (%)	0.7	5.0	0	23.7

Table 1.5.3.2.7 (b): Factors contributing to post-operative refracted VA of worse than 6/12 after excluding patients with pre-existing ocular co-morbidity, noted before surgery 2007

Factors	No.	%
High astigmatism	303	19.7
Preexisting ocular co-morbidity (noted after surgery)	271	17.6
Posterior capsular opacity	83	5.4
Cystoid macular oedema	52	3.4
Retinal detachment	18	1.2
Corneal decompensation	15	1
Endophthalmitis	9	0.6
Decentered IOL	4	0.3
Others	320	20.8
Missing	461	30

1.5.4 Final refractive power

1.5.4.1 Final refractive power for ECCE and phaco

Final refractive power is actually the spherical equivalent (SE) of the operated eyes. It is based on refraction findings. The formula is as follows: SE= spherical power – [cylinder power/2]. Planned refractive power is usually decided by surgeon and the same value is used for both phaco and ECCE surgery most of the time.

Of the 14,476 eyes with post-operative refraction in year 2007, 11,967 (82.7%) data were analysed for final refractive power. The remaining 2,509(17.3%) eyes were excluded as they had extreme spherical equivalent values of less than -10D, or more than +10D which if included, would skew the results.

Table 1.5.4.1 (a) showed the planned and final refractive power. The mean final refractive power achieved for eyes which had phaco was -0.8D (SD1.1D) and ECCE was -1.1D (SD 0.4D).

Based on the mean planned refractive power for all eyes, the final refractive power for phaco eyes (-0.8D) were closer to the planned refractive power (-0.5D) than for ECCE eyes (-1.1D).

ECCE eyes had more negative final refractive power than phaco eyes, which indicated more myopic shift. This could be partly due to surgery-induced astigmatism as a result of large incision or more anterior placement of IOL from posterior capsule in ECCE eyes.

Table 1.5.4.1 (a): Distribution of planned and final refractive power in ECCE and phaco eyes, 2007

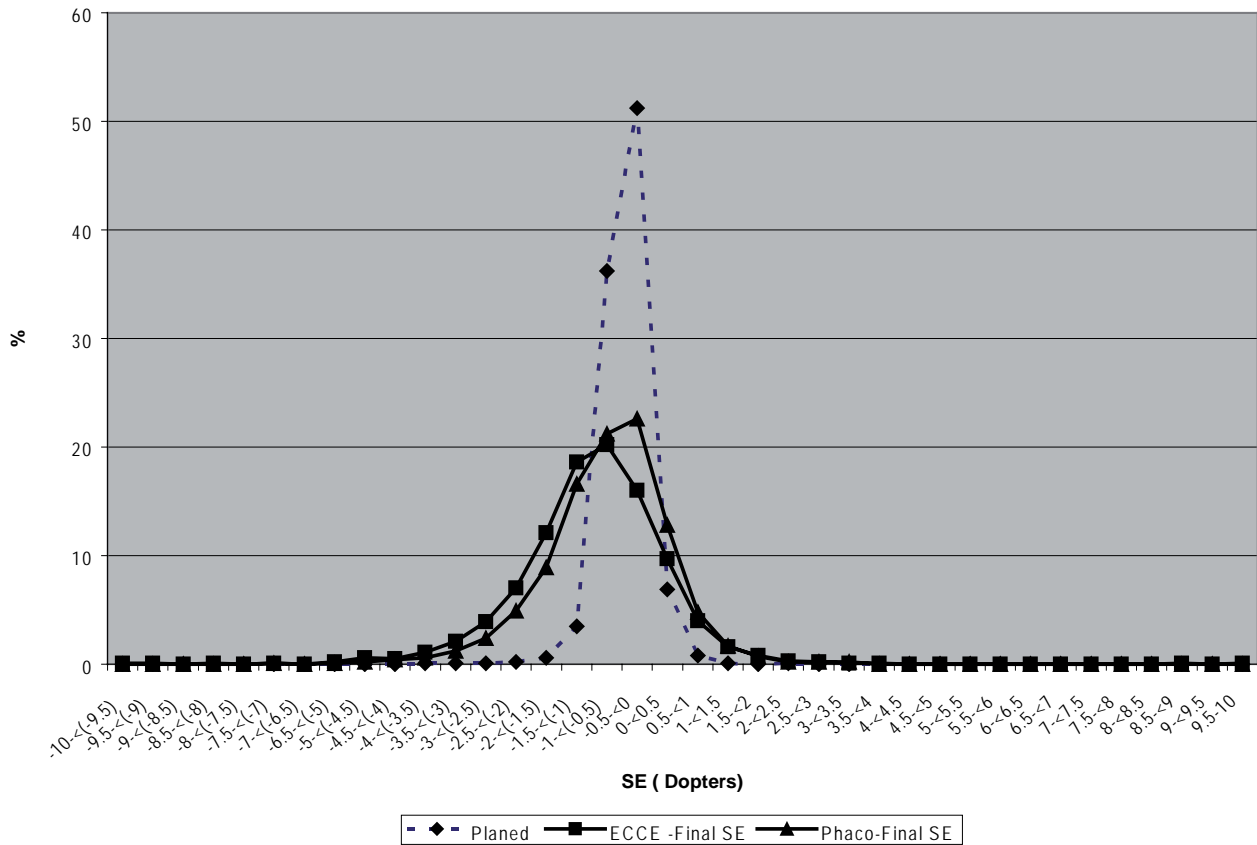
	Planned refractive power	Final refractive power (SE)*	
	All patients	ECCE	Phaco
	N=11876	N=3624	N=8343
Mean	-0.5	-1.1	-0.8
SD	0.4	1.4	1.1
Median	-0.5	-1	-0.7
Minimum	-9	-10	-10
Maximum	5	9.8	10

Note: Eyes with final refractive power (SE) of more than +10D and -10D were excluded from the analysis

Table 1.5.4.1 (b): Distribution of planned and final refractive power or spherical equivalent for eyes with ECCE and Phaco, 2007

Diopter (D)	Planned refractive power (All eyes)		Final refractive power (ECCE)		Final refractive power (Phaco)	
	No.	%	No.	%	No.	%
<=(-5)	10	0	21	0.6	34	0.2
-5-<=(-4.5)	3	0	22	0.6	15	0.2
-4.5-<=(-4)	1	0	18	0.5	30	0.4
-4-<=(-3.5)	7	0.1	40	1.1	49	0.6
-3.5-<=(-3)	6	0.1	76	2.1	97	1.2
-3-<=(-2.5)	12	0.1	142	3.9	200	2.4
-2.5-<=(-2)	26	0.2	255	7	405	4.9
-2-<=(-1.5)	77	0.6	440	12.1	746	8.9
-1.5-<=(-1)	414	3.5	674	18.6	1382	16.6
-1-<=(-0.5)	4299	36.2	733	20.2	1771	21.2
-0.5-<=0	6077	51.2	581	16	1884	22.6
0-<=0.5	821	6.9	352	9.7	1069	12.8
0.5-<=1	91	0.8	146	4	399	4.8
1-<=1.5	8	0.1	58	1.6	142	1.7
1.5-<=2	5	0	28	0.8	55	0.7
2-<=2.5	13	0.1	10	0.3	14	0.2
2.5-<=3	1	0	8	0.2	15	0.2
3-<=3.5	1	0	2	0.1	13	0.2
3.5-<=4	0	0	2	0.1	4	0
4-<=4.5	2	0	1	0	3	0
4.5-<=5	1	0	1	0	4	0
<=(-5)	1	0	14	0.2	11	0
	11876	100	3624	100	8342	100

Figure 1.5.4.1 (a): Percent distribution of planned and final refractive power or spherical equivalent for eyes with ECCE and phaco, 2007



1.5.4.2 Difference between planned and final refractive power for patients who had phacoemulsification

The difference between planned and final refractive power (SE) was calculated to determine the closeness between the intended or planned refractive power and the final ones. It was only calculated for phaco eyes as induced astigmatism in eyes with ECCE could be a confounding factor. Only 5,782 eyes had data on both the planned and final refractive power for this analysis.

Disregarding factors such as induced astigmatism and intrinsic surgeons' factors, the mean difference between planned and final refractive power in phaco eyes was -0.38D, signifying a myopic shift. The postulation of myopic shift was due to indentation of eyeballs during axial length measurement causing a shorter than actual axial length. Besides, planned refractive power in CSR data showed that there was a tendency for surgeons to aim at a more minus value, rather than aiming at emmetropia.

About one quarter (23.6%) of the eyes had difference between planned and final refractive power range within -1.0D to 0D, an ideal outcome. Majority of eyes (71.1%) had difference between -1.0D to +1.0D, an acceptable range. However, 1.5 % of eyes had differences between planned and final SE of more than + 2.0D and 6.6% with difference of higher than - 2.0D. In short, 8.1% eyes had an unacceptable range of more than 2 diopters difference between final and planned SE.

It is vital to evaluate the accuracy of IOL power being implanted and this is determined through measuring the difference between planned and final refractive power. Each surgeon should review his/her own operative outcomes by evaluating the difference between planned and final refractive power. The values obtained from eyes without operative complications can then be customized as individual surgeon factor to be incorporated when deciding on the power of IOL to be implanted.

Individual surgeons and SDPs should evaluate this outcome, especially with unacceptable or 'surprise' values, for example a difference of more than 2D from planned. When this is done as departmental audit, it should involve the surgeons who performed the surgery, the medical officers who did the pre-operative assessment and decided on IOL power, and the optometrists who performed the biometry. By involving all relevant personnel who were involved in the process of IOL power calculation, remedial actions can be taken to reduce unaccepted cataract surgery outcome.

Table 1.5.4.2 (a): Distribution of the difference between final and planned refractive power for patients who had phaco, 2007

Final - planned refraction power (N=5782)	Diopter (D)
Mean	-0.38
SD	1.15
Median	-0.28
Minimum	-9.9
Maximum	+9.3

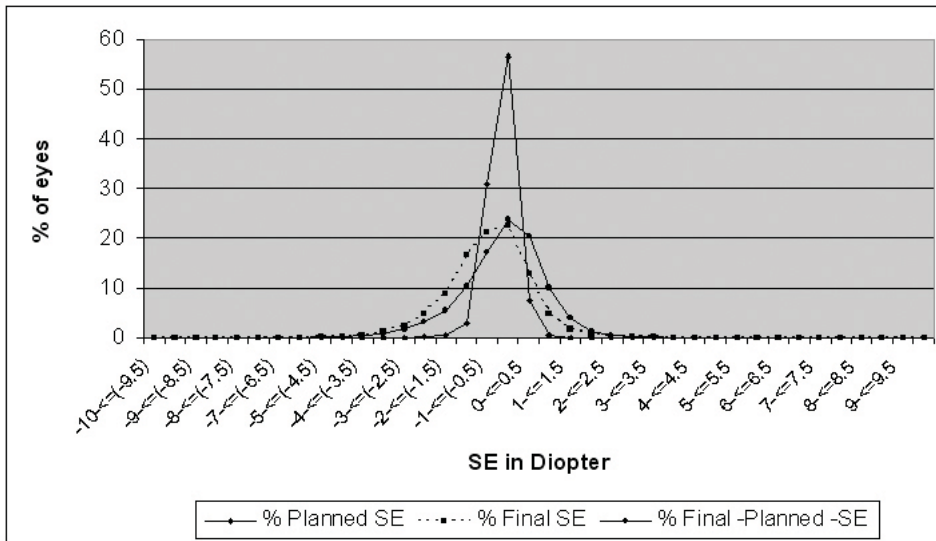
Table 1.5.4.2 (b): Distribution of the differences between final and planned refractive power for patients who had phaco, 2007

Diopter (D)	Planned refractive power (No. of eyes)	%	Final refractive power (No. of eyes)	%	Final – planned refractive power (No. of eyes)	%
>=5	9	0	34	0.2	17	0.28
-5-<=(-4.5)	2	0	15	0.2	12	0.21
-4.5-<=(-4)	1	0	30	0.4	14	0.24
-4-<=(-3.5)	5	0.1	49	0.6	28	0.48
-3.5-<=(-3)	5	0.1	97	1.2	43	0.74
-3-<=(-2.5)	10	0.1	200	2.4	93	1.61
-2.5-<=(-2)	18	0.2	405	4.9	176	3.04
-2-<=(-1.5)	51	0.6	746	8.9	311	5.38
-1.5-<=(-1)	239	3	1382	16.6	595	10.29
-1-<=(-0.5)	2473	31	1771	21.2	994	17.19
-0.5-<=0	4512	56.6	1884	22.6	1367	23.64
0-<=0.5	583	7.3	1069	12.8	1179	20.39
0.5-<=1	45	0.6	399	4.8	573	9.91
1-<=1.5	6	0.1	142	1.7	225	3.89
1.5-<=2	2	0	55	0.7	73	1.26
2-<=2.5	9	0.1	14	0.2	32	0.55
2.5-<=3	1	0	15	0.2	14	0.24
3-<=3.5	1	0	13	0.2	13	0.22
3.5-<=4	0	0	4	0	8	0.14
4-<=4.5	2	0	3	0	3	0.05
4.5-<=5	0	0	4	0	3	0.05
> 5	1	0	11	0	9	0.16
	7975	100	8342	100	5782	100

Table 1.5.4.2 (c): Range of difference between planned and final refractive power (D)

Range of difference in SE	%
Ideal outcome - within 0 to -0.5D from target	23.6
Acceptable outcome - within -1 to +1D from target	71.1
Out of target - more than 1D from target	28.9
- more than 2D from target	8.1

Figure 1.5.4.2 (a): Percent distribution of the differences between planned and final refractive power for patients who had phaco, 2007



CHAPTER 2

DIABETIC EYE REGISTRY 2007

Contributing Editors

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2.1 STOCK AND FLOW

2.1.1 Number of cases registered by states

In 2007, 32 SDPs, consisting of 31 MOH ophthalmology departments and one district hospital with optometry service took part in DER. A total of 10,856 diabetic patients who were seen for the first time by eye care providers were registered. When compared to the total number of new diabetic patients seen at MOH ophthalmology clinics in 2007 (N= 15,564), the ascertainment rate was 69.8%.

Table 2.1.1: Number of cases of diabetic patients registered to DER

No.	States in Malaysia (Number of SDP)	N=10856	
		No.	%
1	Kedah (3)	1075	9.9
2	Pulau Pinang(2)	394	3.6
3	Perak (4)	1344	12.4
4	Selangor (5)	2519	23.2
5	Negeri Sembilan (2)	791	7.3
6	Melaka (1)	84	0.8
7	Johor (4)	1668	15.4
8	Kelantan (2)	621	5.7
9	Terengganu (1)	291	2.7
10	Pahang (1)	640	5.9
11	Sabah (2)	677	6.2
12	Sarawak (2)	169	1.6
13	Wilayah Persekutuan (2)	583	5.4
	All	10856	100%

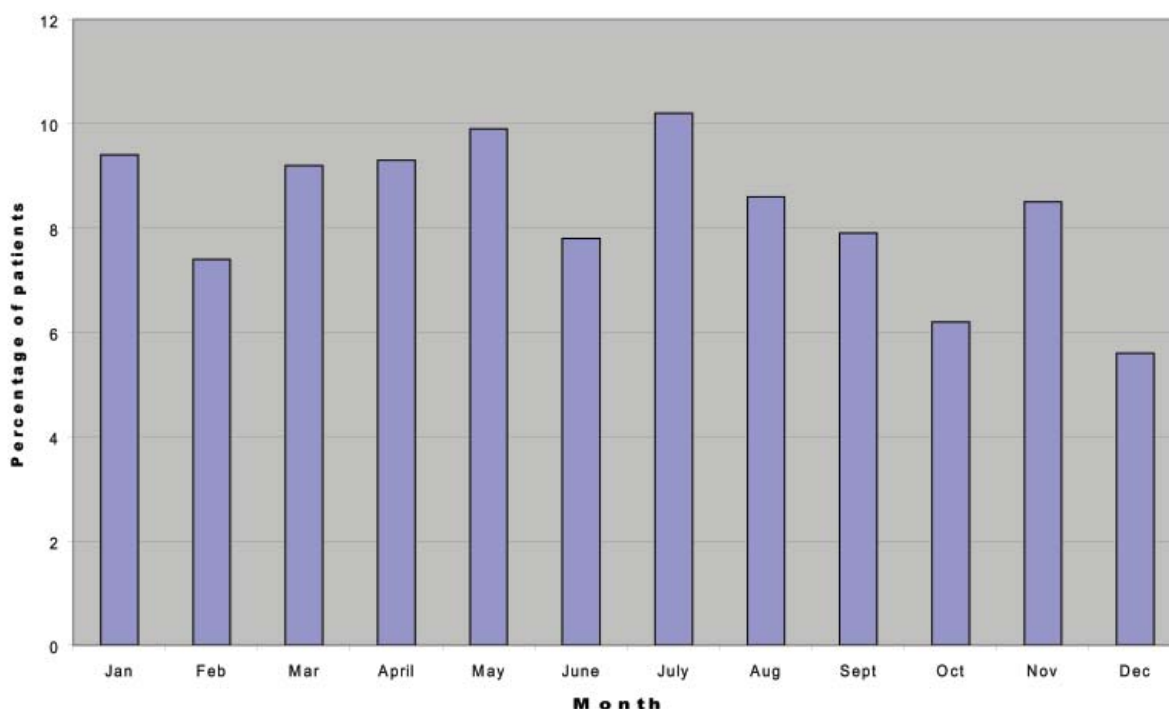
2.1.2 Number of cases registered by month

The average number of cases registered per month was 905. Lower ascertainment rate was noted in December 2007.

Table 2.1.2: Number of cases registered by month, 2007

Month	N=10856	
	No.	%
January	1021	9.4
February	800	7.4
March	1002	9.2
April	1006	9.3
May	1073	9.9
June	849	7.8
July	1110	10.2
August	939	8.6
September	861	7.9
October	672	6.2
November	918	8.5
December	605	5.6
All	10856	100%

Figure 2.1.2: Percentage of patients registered by month, 2007



2.2 CHARACTERISTICS OF PATIENTS

2.2.1 Patient demography

The majority of patients registered were between 30 and 60 years old, with a mean age of 57.3 years. The age was similar for those with and without diabetic retinopathy (DR). More female diabetic patients (54.9%) were screened, and the proportion of female diabetics who had DR at the time of first examination was 37.3%. The proportion for males (39.2%) was slightly higher.

The proportion of patients screened and registered was similar to national ethnic distributions, i.e. highest in Malay (54.0%), followed by Chinese (23.2%), Indians (18.4%) and others (3.6%). The proportion of those with DR were 39.7% among Malays, 38.4% among Chinese, 36.5% among Indians, 25.1% among indigenous group and 23.5% in others.

Table 2.2.1: Demographics of diabetic patients

	All N=10856		Without DR N=5558		With DR N=4145		
Age, years							
Mean	57.3		56.9		56.8		
SD	11.4		12.4		9.8		
Median	58		57.9		57.0		
	No.	%	No.	%	No.	%	
Age group, years							
<30	211	1.9	170	3.2	33	0.8	
30 - <60	6047	55.7	3101	57.8	2583	63.2	
≥ 60	4541	41.9	2263	42.2	1506	36.8	
Gender							
Male	4898	45.1	2490	44.8	1922	46.4	
Female	5955	54.9	3070	55.2	2221	53.6	
Missing	3	0	0	0	0	0	
Ethnic group							
Malay	5858	54	2879	51.8	2324	56.1	
Chinese	2523	23.2	1310	23.6	970	23.4	
Indian	1996	18.4	1101	19.7	729	17.6	
Orang Asli	1	0	1	0	0	0	
Melanau	106	1	71	1.3	20	0.5	
Kadazan/Murut/Bajau	88	0.8	45	0.8	29	0.7	
Iban	0	0	0	0	0	0	
Bidayuh	0	0	0	0	0	0	
Other	200	1.8	115	2.1	47	1.1	
Missing	84	0.8	39	0.7	26	0.6	

2.2.2 Source of referral

Government primary health care clinics and hospitals were the main sources of referrals accounting for 91.7% of the referrals. On the contrary, only 2.0% were referred from the private health care providers. From the NHMS data, 20.3% diabetics were being treated by private health care providers. The reasons for low proportion of referral by general practitioners need to be evaluated.

Table 2.2.2: Sources of referral for diabetic patients

No.	Sources of referral	N=10856	
		No.	%
1	Government primary health care clinics	6577	60.6
2	Government hospital - MO or physician	3377	31.1
3	General practitioner	133	1.2
4	Private hospital-MO or specialist	82	0.8
5	Optometrist	14	0.1
6	Others	38	0.4

2.3 MEDICAL HISTORY AND PRACTICE PATTERN

2.3.1 Type of diabetes

Majority of patients screened in ophthalmology clinics had type II DM. This reflects the pattern of diabetic prevalence in Malaysia as shown in NHMS findings where prevalence of DM was 2.4% among those 18 to less than 30 years old, and 14.9% among those 30 years and older.

2.3.2 Duration of diabetes

Most of the patients screened (68.8%) had diabetes for more than 5 years. As the risk of DR is higher in patients with longer duration of DM, these patients should have their eyes screened at the recommended schedule of at least once a year.

2.3.3 Types of treatment

Eighty-two percent of the patients were on oral medication as most were type II DM patients. Twelve percent were on insulin.

2.3.4 Systemic co-morbidities

Hypertension (63.9%), hypercholesterolaemia (18.3%) and ischaemic heart disease (11.1%) were the main systemic co-morbidities found among the registered diabetic patients. Renal impairment was noted in 5.8% of patients. Only 22.7% diabetics did not have any form of systemic co-morbidity.

2.3.5 Risk factors

Nine percent of patients were current smokers.

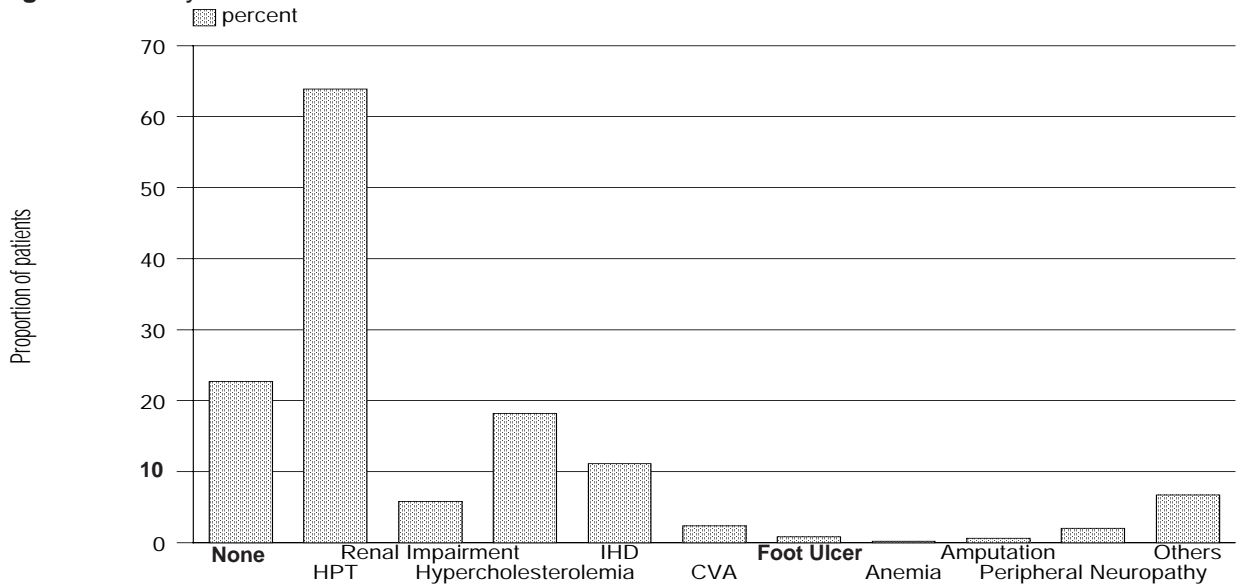
2.3.6 Ocular co-morbidities

Of the 10,856 patients registered, 44.2% were found to have cataract and 3.1% had glaucoma.

Table 2.3: Past medical and ocular history

		No.	%
Types of DM			
	Type II	9995	92.0
	Type I	571	5.3
	Missing	290	2.7
Duration of DM, years			
	<5	3612	33.3
	5-10	3355	30.8
	>10-20	1625	15.0
	>20	333	3.1
	Missing	1931	17.8
Types of treatment			
	Oral medication	8958	82.0
	Insulin	1393	11.8
	Other	727	6.2
Systematic Co-morbidity			
	None	2463	22.7
	Hypertension	6935	63.9
	Hypercholesterolemia	1981	18.2
	Ischaemic Heart Disease	1203	11.1
	Renal Impairment	632	5.8
	Cerebrovascular Accident	260	2.4
	Amputation	70	0.6
	Others	1064	9.7
Smoking			
	Current smokers	991	9.1
Ocular co-morbidity			
	None	4435	40.9
	Cataract	4799	44.2
	Glaucoma	337	3.1
	Rubeosis irides	58	0.5
	Others	445	4.1

Figure 2.3.1: Systemic co-morbidities



Note: Patients may have more than 1 type of systemic co-morbidities

2.3.7 Pregnancy and eye examinations

Among 5927 female patients, 148 (2.5%) were pregnant at the time of first eye examination. Most of them (41.2%) were seen during the second trimester. Although clinical practice guideline recommends pregnant diabetics to have their diabetic eye screening at the first trimester, only 36.5% had it done during that time.

Table 2.3.7: Female diabetic patients who were pregnant

Pregnant status	No. of female=5927	
	No.	% among female
Pregnant	148	2.5% among female
• 1st Trimester	54	36.5
• 2nd Trimester	61	41.2
• 3rd Trimester	26	17.6
• Missing	7	4.7

2.3.8 Previous eye examinations

More than 2/3 (70.9%) never had an eye examination. Among those examined, 71.8% had their eye examined in the last year. The proportion of patients who had never had an eye examination was higher than that noted in NHMS 2006, where 55% never had eye examination and of the 45% who had eye examination 32.9% had it done in last 1 year, 49.7% last 1 to 2 years and 17.4% in more than 2 years .

Table 2.3.8: Distribution of previous eye examination

Eye examination	N=10856	
	No.	%
Never had eye examination before	7700	70.9
Had eye examination before	1869	17.2
• Last 1 year	1342	71.8
• Last 1-2 years	77	4.1
• > 2 years	1	0.1
• Missing	449	24
Missing	1287	11.8

2.4 STATUS OF THE EYES

2.4.1 Status of visual acuity

About 9% of eyes screened were blind with unaided and presenting VA of worse than 3/60. Eyes with DR had worse vision when compared with eyes without DR .

Table 2.4.1 (a): Distribution of unaided visual acuity by eyes

Unaided VA	Right Eye N=10856		Left Eye N=10856	
	No.	%	No.	%
6/5	4	0	5	0
6/6	1009	9.3	1072	9.9
6/9	1860	17.1	1960	18.1
6/12	1333	12.3	1316	12.1
6/5 to 6/12 (normal)	4206	38.7	4353	40.1
6/18	1297	11.9	1263	11.6
6/24	1176	10.8	1162	10.7
6/36	840	7.7	754	6.9
6/60	612	5.6	566	5.2
5/60	61	0.6	72	0.7
4/60	66	0.6	73	0.7
3/60	122	1.1	110	1
6/18 to 3/60 (low vision)	4174	38.4	4000	36.8
2/60	144	1.3	142	1.3
1/60	168	1.5	153	1.4
CF	302	2.8	297	2.7
HM	257	2.4	273	2.5
PL	76	0.7	82	0.8
NPL	40	0.4	37	0.3
2/60 to NPL (blind)	987	9.1	984	9.0

Table 2.4.1 (b): Distribution of presenting visual acuity by eyes

Presenting VA(with or without glasses)	Right Eye N=10856		Left Eye N=10856	
	No.	%	No.	%
6/5	16	0.1	15	0.1
6/6	1636	15.1	1679	15.5
6/9	2942	27.1	2856	26.3
6/12	1433	13.2	1555	14.3
6/5 to 6/12 (normal)	6027	55.5	6105	56.2
6/18	1207	11.1	1155	10.6
6/24	950	8.8	926	8.5
6/36	633	5.8	565	5.2
6/60	412	3.8	417	3.8
5/60	48	0.4	62	0.6
4/60	57	0.5	62	0.6
3/60	94	0.9	88	0.8
6/18 to 3/60 (low vision)	3401	31.3	3275	30.2
2/60	111	1	117	1.1
1/60	144	1.3	136	1.3
CF	292	2.7	302	2.8
HM	256	2.4	283	2.6
PL	76	0.7	82	0.8
NPL	45	0.4	38	0.4
2/60 to NPL (blind)	924	8.5	958	8.8

Table 2.4.1 (c): Status of visual acuity among diabetic patients with and without DR

Presenting VA(with or without glasses)	Normal eye				With diabetic retinopathy or maculopathy			
	Right eye N=6060		Left eye N=6054		Right eye N=3735		Left eye N=3743	
	No.	%	No.	%	No.	%	No.	%
6/5	15	0.2	11	0.2	1	0	4	0.1
6/6	1212	20	1227	20.3	385	10.3	411	11
6/9	1920	31.7	1881	31.1	975	26.2	932	24.9
6/12	846	14	933	15.4	551	14.8	583	15.6
6/5 to 6/12 (normal)	3993	65.9	4052	67.0	1912	51.2	1930	51.6
6/18	668	11	664	11	503	13.5	461	12.3
6/24	506	8.3	485	8	416	11.1	402	10.7
6/36	316	5.2	268	4.4	272	7.3	271	7.2
6/60	180	3	191	3.2	191	5.1	190	5.1
5/60	20	0.3	24	0.4	22	0.6	30	0.8
4/60	22	0.4	29	0.5	24	0.6	26	0.7
3/60	36	0.6	33	0.5	45	1.2	44	1.2
6/18 to 3/60 (low vision)	1748	28.8	1694	28.0	1473	39.4	1424	38.0
2/60	48	0.8	49	0.8	45	1.2	41	1.1
1/60	60	1	48	0.8	42	1.1	49	1.3
CF	74	1.2	65	1.1	113	3	122	3.3
HM	36	0.6	42	0.7	70	1.9	83	2.2
PL	12	0.2	7	0.1	14	0.4	21	0.6
NPL	9	0.1	11	0.2	13	0.3	6	0.2
2/60 to NPL (blind)	239	3.9	222	3.7	297	7.9	322	8.7

2.4.2 Status of diabetic retinopathy and maculopathy

Among 10,856 patients screened, 60.4% had no apparent DR in both their eyes. Up to 38.2% patients had some form of DR in either eye and 11.9% of them had maculopathy.

Among 21,712 eyes examined, 12,114 eyes (55.8%) had no apparent DR, 7,478 eyes (34.4%) had some form of DR, and 2,031 eyes (9.4%) had maculopathy. Up to 4.1% of eyes could not be examined due to poor view of fundus.

The level of severity of DR among eyes examined showed that 23.1% had mild to moderate NPDR, 3.0% had severe NPDR, and 6.2% had PDR, of which 2.0% was at advanced diabetic eye disease state. Among 2,031 eyes noted with maculopathy, 890 (4.1%) had clinically-significant macular oedema (CSMO) (Table 2.4.2 (b)). The proportion of eyes with non-CSMO and CSMO was similar (Table 2.4.2 (c)). As a whole, 10.3% of eyes had vision threatening DR (include eyes with PDR and CSMO).

Table 2.4.2 (a): Status of diabetic retinopathy, by persons

No.	Diabetic retinopathy types	N=10856	
		No.	%
1	No diabetic retinopathy	6553	60.4
2	Diabetic retinopathy*	4145	38.2
3	Maculopathy**	1287	11.9
4	No view	689	6.3

*Diabetic retinopathy: patients who have any type of diabetic retinopathy including maculopathy

**Maculopathy: patients with maculopathy may also have other types of diabetic retinopathy

The percentage add up to be more than 100% as patient with maculopathy may have other types of diabetic retinopathy

Table 2.4.2 (b): Status of diabetic retinopathy, by eyes

Diabetic retinopathy types	Right Eye		Left Eye		All Eyes	
	N=10856		N=10856		N= 21712	
	No.	%	No.	%	No.	%
No diabetic retinopathy	6060	55.8	6054	55.8	12114	55.8
Diabetic Retinopathy*	3735	34.4	3743	34.5	7478	34.4
Maculopathy**	1031	9.5	1000	9.2	2031	9.4
No view	474	4.4	427	3.9	901	4.1
Total	11300	104.1	11224	103.4	22524	103.7

*Diabetic retinopathy: patients who have any type of diabetic retinopathy including maculopathy

**Maculopathy: patients with maculopathy may also have other types of diabetic retinopathy

The percentage add up to be more than 100% as patient with maculopathy may have other types of diabetic retinopathy

Table 2.4.2 (c): Level of severity of diabetic retinopathy by eyes

Diabetic retinopathy types	Right Eye N=10856		Left Eye N=10856		All Eyes N=21712	
	No.	%	No.	%	No.	%
No diabetic retinopathy	6060	55.8	6054	55.8	12114	55.8
Any diabetic retinopathy	3735	34.4	3743	34.5	7478	34.4
Mild non-proliferative diabetic retinopathy	1579	14.5	1573	14.5	3152	14.5
Moderate non-proliferative diabetic retinopathy	931	8.6	943	8.7	1874	8.6
Severe non-proliferative diabetic retinopathy	336	3.1	308	2.8	644	3.0
Proliferative diabetic retinopathy	672	6.2	681	6.3	1353	6.2
Maculopathy	1031	9.5	1000	9.2	2031	9.4
Clinically significant macular oedema	459	4.2	431	4.0	890	4.1
Sight threatening retinopathy (PDR and CSMO)	1131	10.4	1112	10.3	2243	10.3
Advance diabetic eye disease (a severe form of PDR)	228	2.1	216	2.0	444	2.0

Table 2.4.2 (d): Level of severity of maculopathy, by eyes

Maculopathy	Right Eye N=1031		Left Eye N=1000	
	No.	%	No.	%
Non-CSMO	470	45.6	467	46.7
CSMO	459	44.5	431	43.1
Missing	102	9.9	102	10.2

2.5 TREATMENT PLAN

Majority of patients did not require any intervention and were given follow-up appointment. However, 10.2% of the patients required laser and 3.1% required vitrectomy during their first visit to ophthalmology clinics.

Table 2.5: Treatment plans

Treatment plans	N=10856	
	No.	%
Follow-up only	9038	83.3
Need laser	1103	10.2
Need vitrectomy	332	3.1
Need further assessment such as FFA	49	0.5
Missing	631	5.8

CHAPTER 3

CONTACT LENS-RELATED CORNEAL ULCER SURVEILLANCE 2007

Contributing editors

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3.1 STOCK AND FLOW

A total of 103 patients with contact lens-related corneal ulcer were reported in the year 2007. The highest number reported was in January, (19 cases), and lowest number was one in the month of October. The average cases per month were eight cases. The distribution of cases by month did not reveal any outbreak of contact lens-related corneal ulcer at MOH Hospitals during 2007. Hospital Melaka (12 cases), Kuala Lumpur (10 cases), Kuala Terengganu (9 cases), Hospital Sultanah Aminah Johor Bahru (8 cases), and Batu Pahat (7 cases) reported more cases than other SDPs.

Table 3.1 (a): Number of contact lens-related corneal ulcer cases

Month	No. of patients = 103	
	No.	%
January	19	18.4
February	10	9.7
March	11	10.7
April	17	16.5
May	7	6.8
June	3	2.9
July	11	10.7
August	6	5.8
September	6	5.8
October	1	1
November	8	7.8
December	4	3.9

Figure 3.1: Epidemiological curve for incidence of contact lens-related corneal ulcer, by week

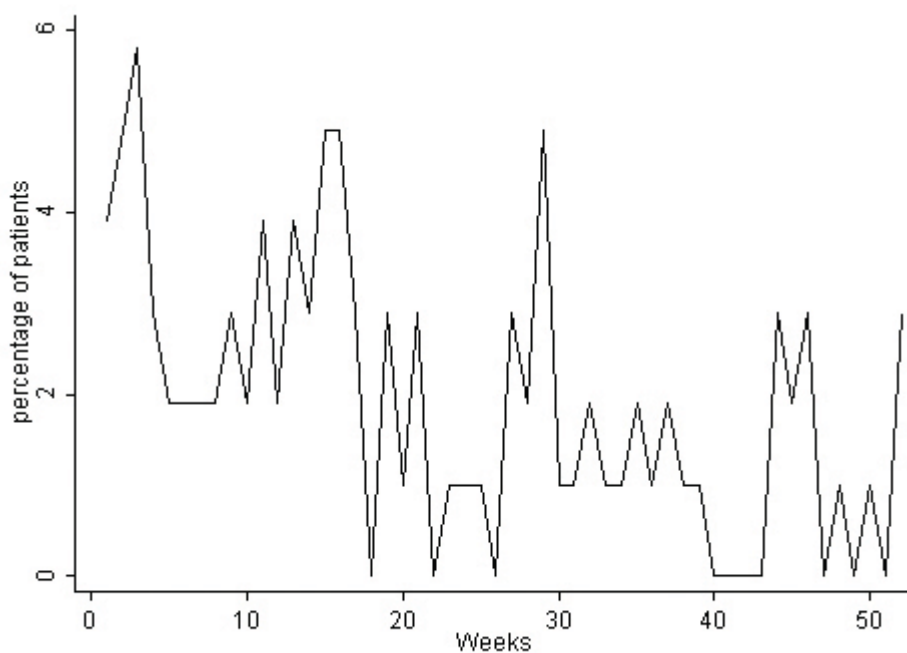


Table 3.1 (b): Distribution of cases by centre

No.	Centre	No. of patients = 103	
		No.	%
1	Hospital Ipoh	6	5.8
2	Hospital Batu Pahat	7	6.8
3	Hospital Bukit Mertajam	1	1
4	Hospital Kota Bharu	5	4.8
5	Hospital Kuala Lumpur	10	9.7
6	Hospital Kuala Terengganu	9	8.7
7	Hospital Melaka	12	11.7
8	Hospital Pulau Pinang	2	1.9
9	Hospital Putrajaya	7	6.8
10	Hospital Queen Elizabeth Kota Kinabalu	1	1
11	Hospital Selayang	7	6.8
12	Hospital Serdang	5	4.9
13	Hospital Sri Manjung	4	3.8
14	Hospital Sultanah Aminah Johor Bahru	8	7.8
15	Hospital Sultanah Fatimah	2	1.9
16	Hospital Sungai Buloh	3	2.9
17	Hospital Sungai Petani	1	1
18	Hospital Taiping	2	1.9
19	Hospital Teluk Intan	1	1
20	Hospital Temerloh	1	1
21	Hospital Tuanku Jaafar, Seremban	3	2.9
22	Hospital Umum Sarawak, Kuching	1	1
23	Hospital Universiti Kebangsaan Malaysia	5	4.9

3.2 CHARACTERISTICS OF PATIENTS

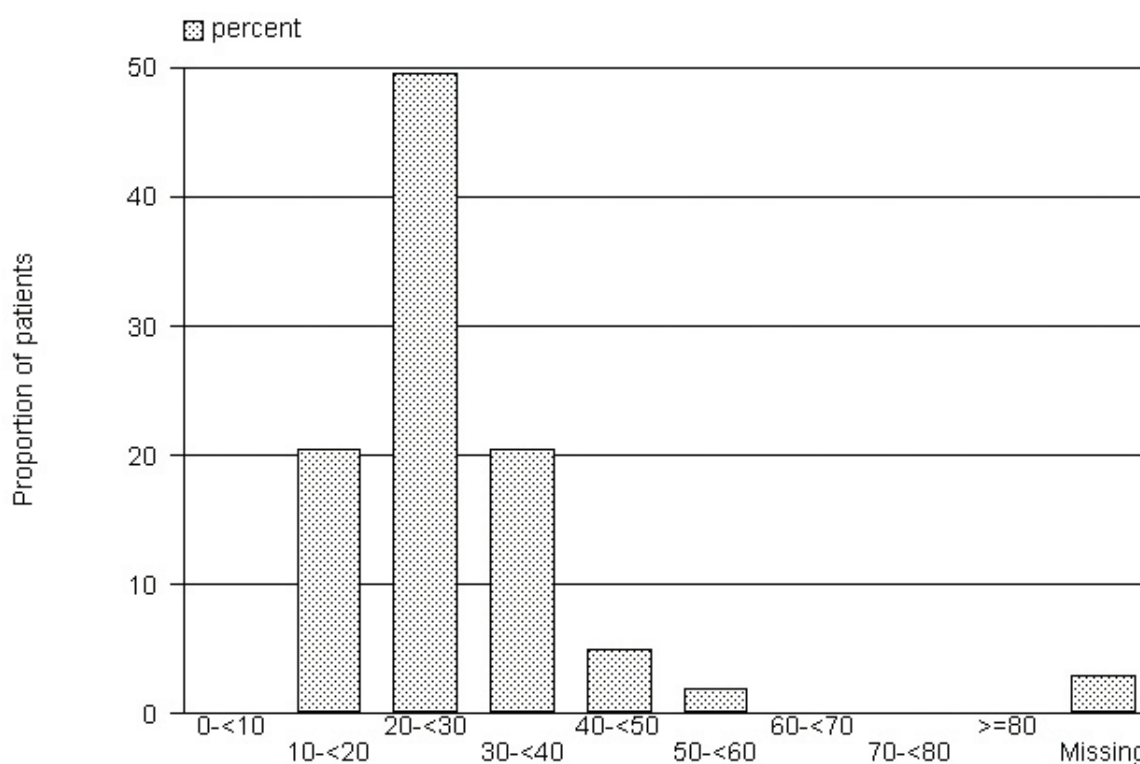
3.2.1 Patient demography

The median age of patients reported was 25.1 (the youngest was 10 years old and the oldest 51 years). Half of the cases were between the ages of 20-30 years. More than two-third was females. The ethnic distributions reflect the ethnic distributions in the country. This distribution may also reflect the ethnic distributions of patients attending MOH hospitals.

Table 3.2.1: Patient demography

Demography	No. of patients = 103		
Age, years	Mean	26.7	
	sd	8.2	
	Median	25.1	
	Min	10.4	
	Max	51.2	
Distribution of age group, years	No.	%	
	0-<10	0	0
	10-<20	21	20.4
	20-<30	51	49.5
	30-<40	21	20.4
	40-<50	5	4.9
	50-<60	2	1.9
	60-<70	0	0
	70-<80	0	0
	≥80	0	0
Missing	3	2.9	
Gender	Male	29	28.2
	Female	74	71.8
Ethnic	Malay	74	71.8
	Chinese	17	16.5
	Indian	9	8.7
	Orang Asli	0	0
	Melanau	1	1
	Kadazan/Murut/Bajau	1	1
	Iban	0	0
	Bidayuh	0	0
	Others	1	1

Figure 3.2.1: Age distribution



3.2.2 Source of referral

One-third of the patients with contact lens-related corneal ulcer were initially presented to the government primary health care clinics before being referred to MOH hospitals for further management. The other main sources of referral of patients were general practitioner (26.2%) and optometrists / opticians (24.3%).

Table 3.2.2: Sources of referral of the patients

No.	Sources of referral	No. of patients = 103	
		No.	%
1	Government primary health care clinics	36	35.0
2	Government hospitals	10	9.7
3	Optometrists / Opticians	25	24.3
4	General Practitioners (GP)	27	26.2
5	Private hospitals	0	0
6	Others	2	1.9
7	Missing	3	2.9

3.3 MEDICAL HISTORY AND CONTACT LENS WEARING PRACTICE

3.3.1 Eyes affected

Of the 103 cases reported in 2007, six cases had bilateral eye involvement, hence a total of 109 eyes were affected with contact lens-related corneal ulcer. Similar proportion of right and left eyes were affected.

Table 3.3.1: Affected eyes

Eyes affected	No. of eyes = 109	
	No.	%
Right eyes	57	52.2
Left eyes	49	45.0
Missing	3	2.8

Note: 6 patients had both eyes involvement

3.3.2 Duration of symptoms

Most cases were referred to ophthalmology department, MOH hospitals within a week of the onset of symptoms.

Table 3.3.2: Duration of symptoms

Duration of symptoms (days)	No. of patients = 103
Mean	5.9
SD	10
Median	3
Minimum	1
Maximum	60

3.3.3 History of ocular trauma as predisposing factor

Most eyes had no history of ocular trauma before being contracting with contact lens-related corneal ulcer.

Table 3.3.3: History of trauma

History of trauma	No. of eyes = 109	
	No.	%
Yes	4	3.7
No	103	94.5
Missing	2	1.8

3.3.4 Types of contact lens, wearing pattern and cleaning solution used

The majority of patients (83.5%) with contact lens-related corneal ulcers used monthly disposable contact lens. However, 5.5% of the patients who used daily disposable contact lens also contracted corneal ulcer. Although majority (62.4%) removes their contact lens before sleep, 30.3% slept with contact lens on.

The commonest type of cleaning solution used was manufactured by Bausch and Lomb followed by Allergan (AMO). Twenty-four patients (22.0%) were unable to recall the type of cleaning solution used. As no information on proportion of sale of different types of cleaning solutions in the market were available, no conclusion can be made on the types of solution associated with higher number of contact lens-related corneal ulcer.

Table 3.3.4 (a): Types of contact lens worn at diagnosis

No.	Types of contact lens	No. of patients = 103	
		No.	%
1	Daily disposable	6	5.5
2	Weekly disposable	1	0.9
3	2 weekly disposable	3	2.8
4	Monthly disposable	91	83.5
5	Extended wear	3	2.8
6	Rigid gas permeable	0	0
7	Others	5	4.6
8	Missing	2	1.8

Note: Patients might wear more than one type of contact lens

Table 3.3.4 (b): Contact lens wearing pattern at diagnosis

Wearing pattern	No. of eyes = 109	
	No.	%
Removes lenses before sleep	68	62.4
Sleeps with lenses	33	30.3
Missing	8	7.3

Table 3.3.4 (c): Types of cleaning solution used at diagnosis

Types of cleaning solution	No. of patients = 103	
	No	%
Bausch and Lomb	24	22.0
Allergan (AMO)	13	11.9
Normal Saline	4	3.7
I-Gel	4	3.7
Alcon	4	3.7
Tap water	3	2.8
Pharmasafe Multipurpose solution	3	2.8
Freskon	3	2.8
Sauflon	2	1.8
Multisoft	1	0.9
Multimate	1	0.9
Do not use because of daily wear	1	0.9
Simvue	0	0
Opto-medic	0	0
Medivue	0	0
Ciba Vision	0	0
Others	24	22.0
Not known	24	22.0
Missing	4	3.7

Note: Patients might use more than one type of cleaning solution

3.4 Eye Status

About 1/3 (30.0%) of cases had unaided vision of worse than 3/60 at the time of presentation and with glasses, the proportion improved to 16.9%.

Table 3.4.1: Vision at presentation

Presenting visual acuity	Unaided No. of eyes =109		With glasses No. of eyes =109	
	No.	%	No.	%
6/5	0	0	0	0
6/6	4	3.8	13	12.3
6/9	7	6.6	13	12.3
6/12	7	6.6	17	16
6/5 to 6/12 (normal)	18	17	43	40.6
6/18	11	10.4	10	9.4
6/24	16	15.1	7	6.6
6/36	6	5.7	2	1.9
6/60	7	6.6	2	1.9
5/60	1	0.9	0	0
4/60	3	2.8	1	0.9
3/60	3	2.8	1	0.9
6/18 to 3/60 (low vision)	47	44.3	23	21.6
2/60	1	0.9	0	0
1/60	3	2.8	3	2.8
CF	10	9.4	5	4.7
HM	17	16	9	8.5
PL	1	0.9	1	0.9
NPL	0	0	0	0
Worse than 3/60 (blind)	32	30	18	16.9
Missing	9	8.5	22	20.8

Figure 3.4.1 (a): Distribution of unaided vision at presentation

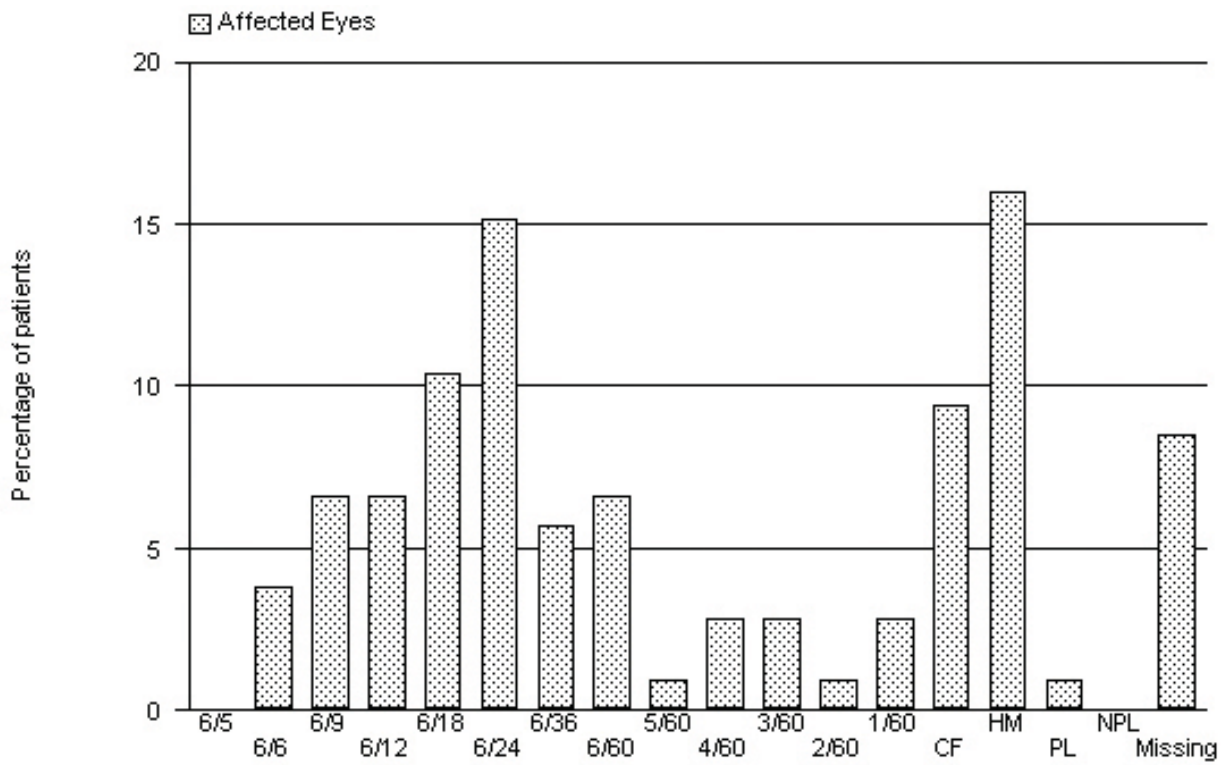
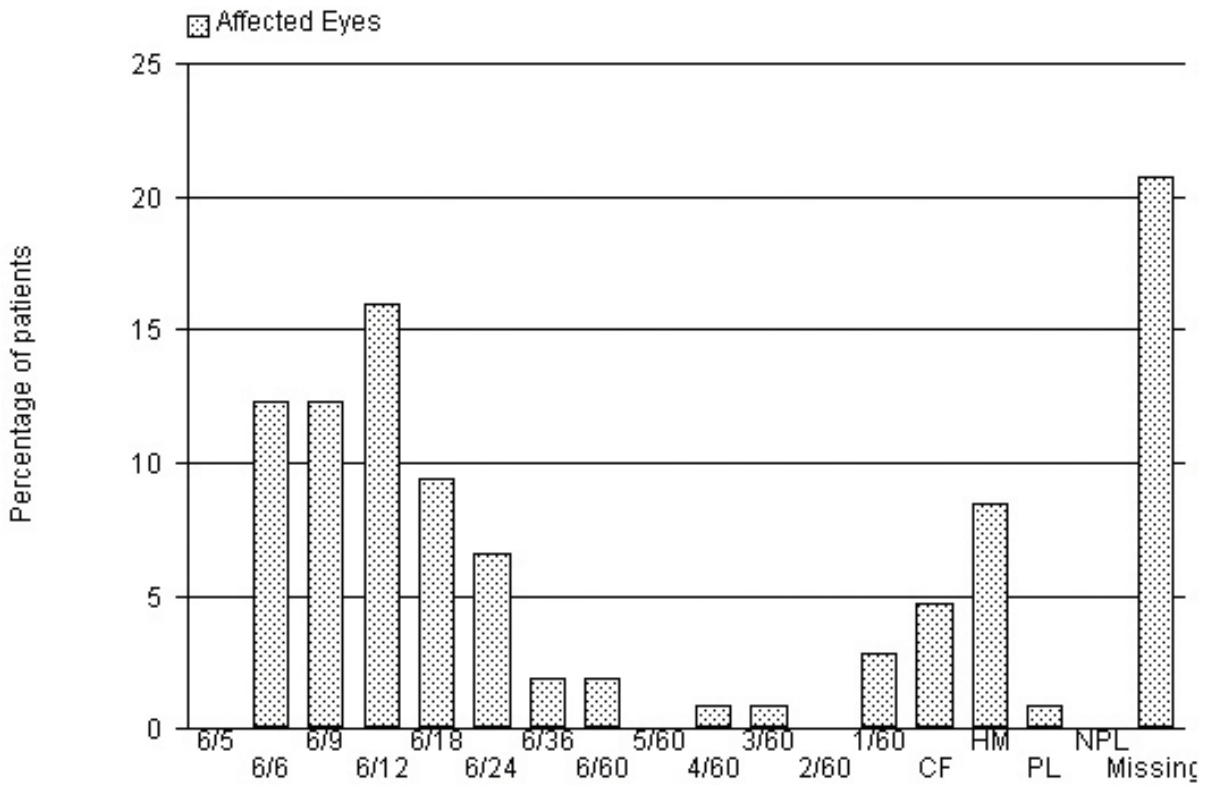


Figure 3.4.1 (b): Distribution of vision with glasses at presentation



3.4.2 Presumptive causative organism

The presumptive causative organism was determined by doctors who made the initial clinical impression at the time of presentation. Most of the attending doctors identified bacteria as the commonest presumptive organism (79.8%) and treated patients accordingly as bacterial corneal ulcer.

Table 3.4.2: Presumptive causative organisms

Presumptive causative organism	No. of eyes = 109	
	No.	%
Bacteria	87	79.8
Fungus	2	1.8
Acanthamoeba	5	4.6
Others	4	3.7
Missing	13	11.9

Note: Eyes might have more than one type of presumptive causative organism

3.4.3 Microbiological results

3.4.3.1 Types of laboratory investigations performed

Cornea scraping was performed in 83% of the eyes. The contact lens and contact lens cleaning solution were also sent for microbiological examination in 44.0% of the cases. PCR for fungus was performed in three cases.

Table 3.4.3.1: Types of laboratory investigations performed

Types of laboratory investigation	No. of eyes = 109	
	No.	%
Corneal scraping	91	83.5
Contact lens	48	44.0
Contact lens solution	48	44.0
PCR for fungus	3	2.8
Not sent	5	4.6
Missing	7	6.4

Note: The total percentage was more than 100% as patients might have more than one type of laboratory investigations.

3.4.3.2 Results of laboratory investigations

Forty percent of cultures were positive for corneal scraping. Bacteria was isolated from 37.4% of corneal scraping, 56.3% of contact lens and 33.3% of contact lens solution. One eye was infected by *acanthamoeba* and one was with fungus. Based on results from corneal scraping, *Pseudomonas* was the commonest bacteria isolated (79.4%).

Table 3.4.3.2 (a): Culture results

	Corneal scraping		Contact lens		Contact lens solution	
	No.	%	No.	%	No.	%
Bacteria	34	37.4	27	56.3	16	33.3
Acanthamoeba	1	1.1	0	0	0	0
Fungal	1	1.1	1	2.1	0	0
Others	0	0	1	2.1	3	6.3
Negative/No growth	45	49.5	12	25	16	33.3
Missing data	1	1.1	0	0	1	2.1
Not available	11	12.1	8	16.7	13	27.1

Table 3.4.3.2 (b): Bacteria cultured from each type of laboratory investigation

Bacteria	No.	%
Corneal scraping	34	100
• <i>Pseudomonas</i>	27	79.5
• <i>Enterobacter</i>	3	8.9
• <i>Staph. epidermidis</i>	1	2.9
• <i>Acinetobacter</i>	1	2.9
• <i>Serratia Marcescens</i>	1	2.9
• Missing	1	2.9
Contact lens	27	100
• <i>Pseudomonas</i>	21	77.8
• <i>Enterobacter</i>	3	11.1
• <i>Klebsiella</i>	1	3.7
• <i>Burkholdenia cepacia</i>	1	3.7
• <i>Serratia Marcescens</i>	1	3.7
Contact lens solution`	16	100
• <i>Pseudomonas</i>	13	81.1
• <i>Enterobacter</i>	1	6.3
• <i>Klebsiella</i>	1	6.3
• <i>Coagulase negative Staphylococcal</i>	1	6.3
• <i>Serratia Marcescens</i>	0	0

3.5 TREATMENT OUTCOME

3.5.1 Outcome by one month

Seventeen percent of the eyes had normal unaided vision and 40% had normal vision with glasses by one month after presentation. Four eyes (3.7%) were blind with refracted vision worse than 3/60

Table 3.5.1: Vision by one month by one month

Vision by one month	Unaided No. of eyes = 109		With glasses No. of eyes = 109	
	No.	%	No.	
• 6/5	1	0.9	0	0
• 6/6	4	3.8	22	20.8
• 6/9	4	3.8	12	11.3
• 6/12	9	8.5	9	8.5
6/5 to 6/12 (normal)	18	17	43	40.6
• 6/18	8	7.5	9	8.5
• 6/24	10	9.4	6	5.7
• 6/36	9	8.5	1	0.9
• 6/60	15	14.2	1	0.9
• 5/60	2	1.9	0	0
• 4/60	0	0	0	0
• 3/60	1	0.9	1	0.9
6/18 to 3/60 (low vision)	45	42.4	18	16.9
• 2/60	1	0.9	0	0
• 1/60	0	0	0	0
• CF	3	2.8	1	0.9
• HM	2	1.9	2	1.9
• PL	0	0	1	0.9
• NPL	0	0	0	0
Worse than 3/60 (blind)	6	5.6	4	3.7
Missing	40	36.7	44	40.4

Figure 3.5.1 (a): Distribution of unaided vision by one month

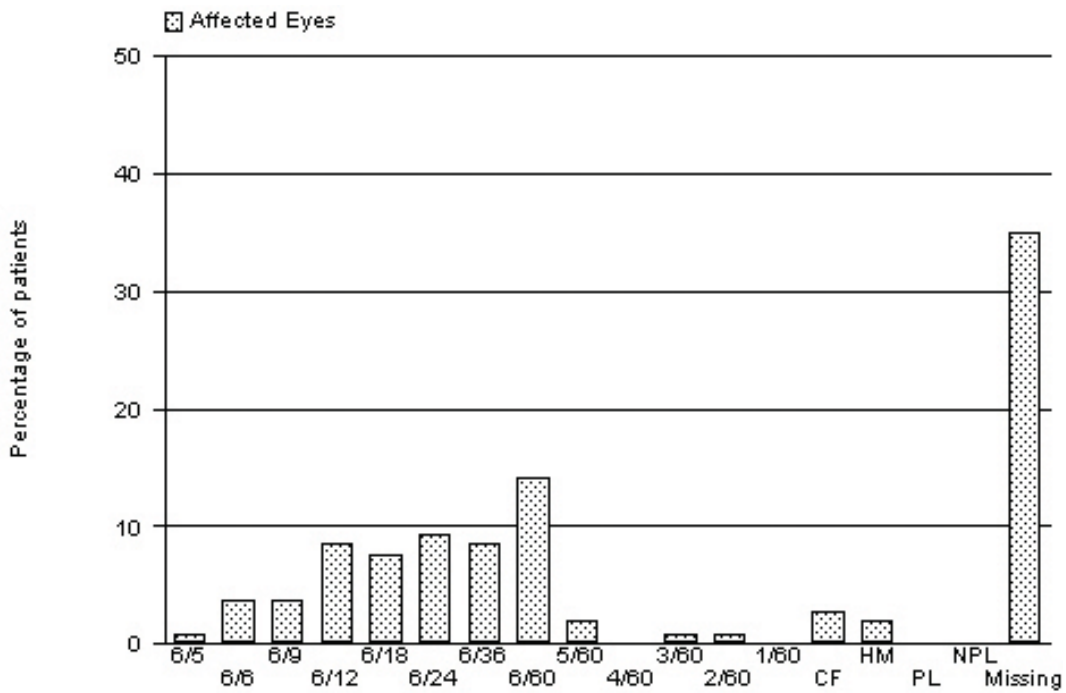
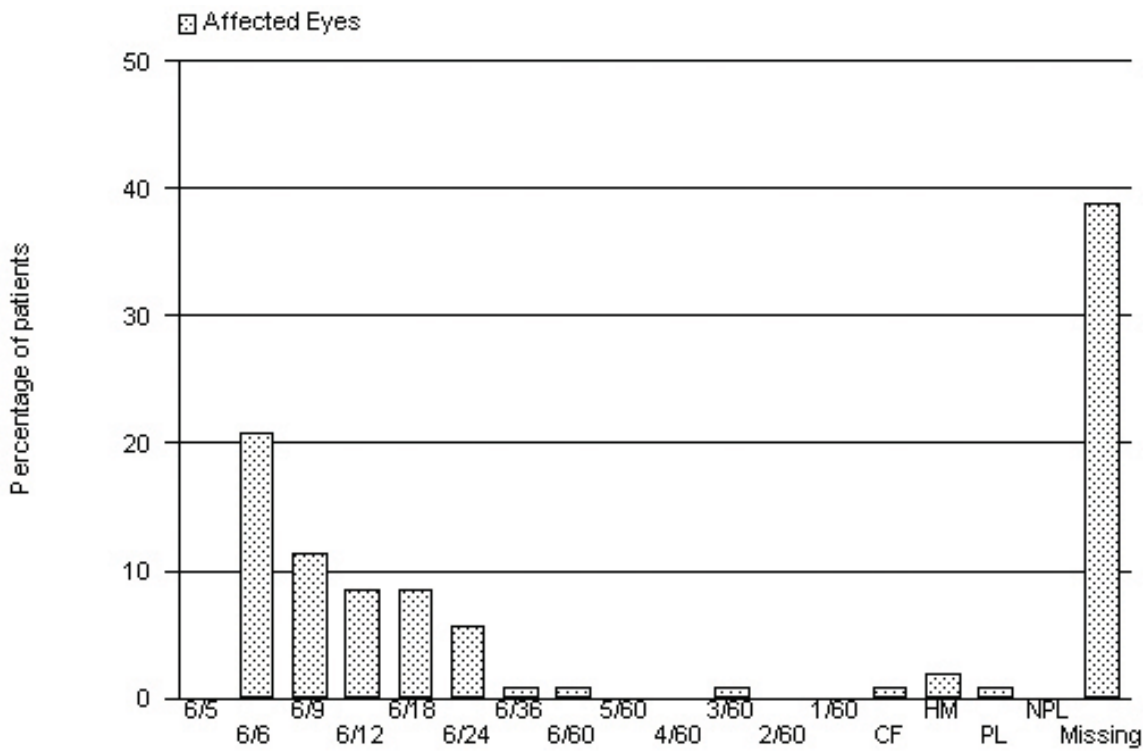


Figure 3.5.1 (b): Distribution of vision with glasses by one month



3.5.2 Status of vision

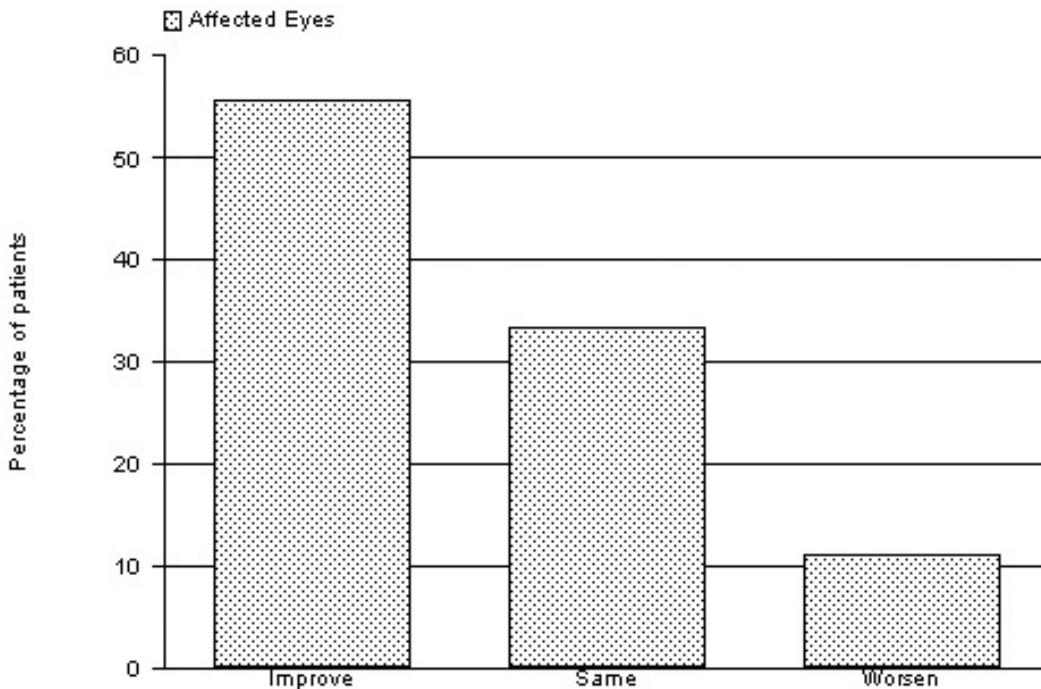
Fifty-four eyes had records on both the vision at presentation and vision at one month. Vision improved in 55% of affected eyes. Six eyes (11.1%) had vision at one month worst than vision at presentation.

Table 3.5.2: Status of vision from presentation to one month after presentation

Vision status from presentation to reporting	Affected eyes No. of eyes = 54	
	No.	%
Improve	30	55.6
Same	18	33.3
Worsen	6	11.1

Note: 55 eyes did not have record on vision at presentation or vision at one month

Figure 3.5.2: Status of vision from presentation to one month after presentation



3.5.3 Status of eye

None of the affected eyes had perforation or required any surgical intervention such as penetrating keratoplasty, evisceration or surgical glue.

CHAPTER 4

GLAUCOMA REGISTRY - PRELIMINARY REPORT 2007

Contributing editors

Dr. Ong Poh Yan

Dr. Gong VHM

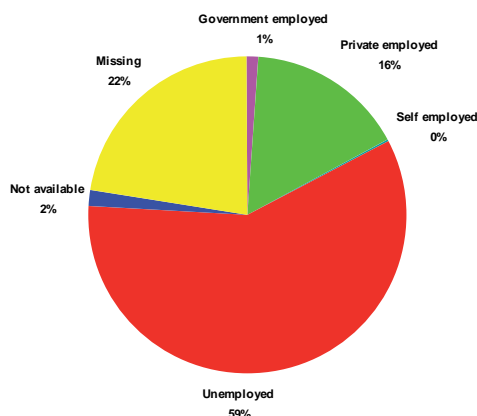
INTRODUCTION

Glaucoma registry was piloted in 2007 at several MOH ophthalmology clinics. There were 1,155 patients registered, consisting of 47 new (4.1%) and 1103 at follow-ups (95.5%).

4.1 CHARACTERISTICS OF PATIENTS

The average age of patients was 62 years, with 54.8% male and 44.6% female. Most of the patients were unemployed or currently not working (58.4%).

Figure 4.1: Distribution of occupation



4.2 MEDICAL HISTORY

Of the 1155 patients, 748 (64.8%) have systemic co-morbidity. Hypertension (39.1%) and diabetes mellitus (35.2%) were among the most common. Seventy-six patients (6.5%) had family history of glaucoma and 41 patients (3.6%) had history of steroid therapy.

Table 4.1: Distribution of medical co-morbidity

Diabetes	35.2%
Hypertension	39.1%
Hypercholestromiaemia	3.6%
Cardiac disease	0%
Stroke	2.0%
Vasospastic disease	0.2%

4.3 CLINICAL FEATURES

4.3.1 Visual acuity

Up to 36% of eyes had no record of visual acuity. Therefore the results did not reflect the actual visual status of the overall patients. However, among eyes with records, 41.3% and 65.9% of right eyes had unaided vision and with glasses vision of 6/12 or better respectively and 44.1% and 67.8% of left eye had unaided and with glasses vision 6/12 or better respectively.

4.3.2 Cup disc ratio

More than 80% of eyes had cup disc ratio (CDR) of 0.5 or larger and 29.4% of right eyes and 28.2% of left eyes had CDR of 0.9 and 1.0, (an advanced stage of glaucomatous optic neuropathy) respectively.

4.4 TYPES OF GLAUCOMA

Majority of the patients (88%) had primary type of glaucoma and 10% had secondary glaucoma. Among patients registered, primary open angle glaucoma was the most common(55%) followed by primary angle closure glaucoma (12.4%), ocular hypertension (4.9%) pseudoexfoliation glaucoma (3%), post-surgery (2%), steroid-induced (2%), congenital glaucoma (1.5%) and rubeotic glaucoma (1%).

4.5 MANAGEMENT OF GLAUCOMA

Most eyes (80%) were treated medically either with eye drops, oral carbonic anhydrase inhibitor (CAI) or hyperosmotic agents, either alone or in combination. The common eye drops prescribed were prostaglandin analog (75% of eyes), followed by beta blockers (71% of eyes) and topical CAI (32% of eyes). Among eyes treated medically, up to 40.8% of right eyes and 46.5% of left eyes had monotherapy. Therefore, more than half of the patients had two or more types of eye drops. Ten percent of eyes (120 right eyes and 125 left eyes) had laser therapy. The most common laser performed was laser iridotomy (92.2%). A total of 547 surgical procedures were performed. The most common surgery was trabeculectomy (286 eyes, 52.3%). More than 90% of the trabeculectomy performed was augmented with antimetabolic agents (90.9%).

Table 4.2: Types of antiglaucoma agents prescribed

	Right eye (n=915 eyes)		Left eye (n= 895 eyes)	
	No.	%	No.	%
Prostaglandin analog	690	75.1	666	74.4
Beta blockers	655	71.3	639	71.4
Topical CAI	296	32.2	285	31.8
Alpha adrenergic	108	11.8	108	12.1
Cholinergics	16	1.7	22	2.5

Table 4.3: Number of eye drops prescribed per eye

	Right eye (n=915 eyes)		Left eye (n= 895 eyes)	
	No.	%	No.	%
One type	377	40.8	449	46.5
Two types	314	33.9	301	31.2
Three types	154	16.6	154	15.9
Four types	73	7.9	59	6.1
Five or more types	7	0.8	3	0.3

CHAPTER 5

OPHTHALMOLOGY SERVICE CENSUS 2002 TO 2007

Contributing Editors

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Dr. Hj. Radzlian Othman

OPHTHALMOLOGY SERVICE CENSUS

Since 2002, yearly ophthalmology service census were systematically collected by ophthalmology departments. The completed census forms were returned to Selayang Hospital for compilation and analysis. As of 2007 onwards, the census collections were changed to monthly and data were entered via NED web application by staff at each ophthalmology department. All the MOH ophthalmology departments participated in this census (Table 5.1). Example of census collection form is included at the appendix of this report.

Table 5.1: Number of MOH ophthalmology departments with census data

Year	2002	2003	2004	2005	2006	2007
No of ophthalmology departments	29	32	32	32	34	36

Aggregated census data of various aspects of ophthalmology services for the year 2002 to 2007 are shown in the following figures.

Figure 5.1: Number of out-patients (total and new cases) seen at ophthalmology clinics, 2002-2007

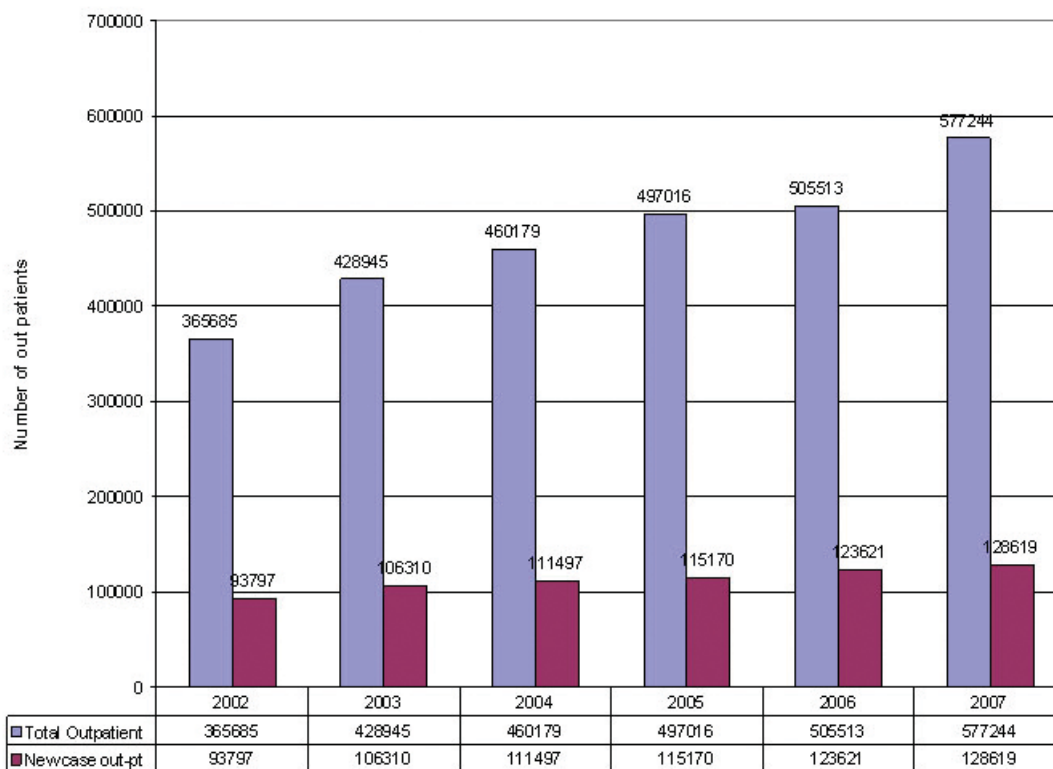


Figure 5.2: Number of in-patients admitted to eye wards, 2002-2007

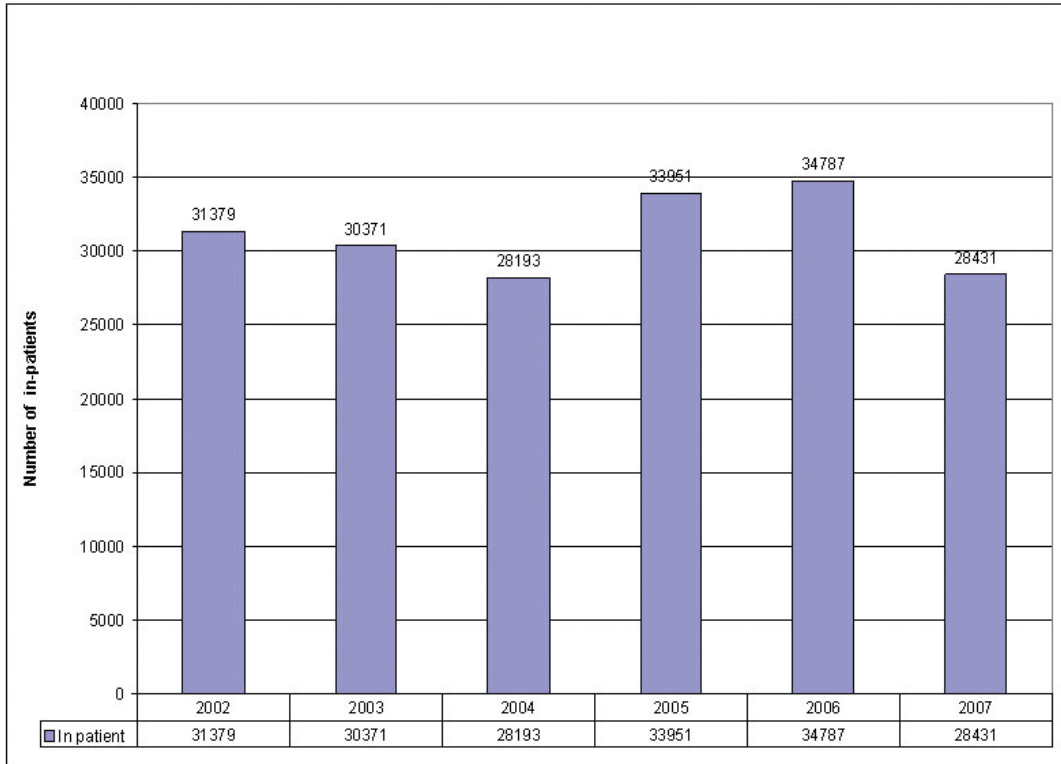
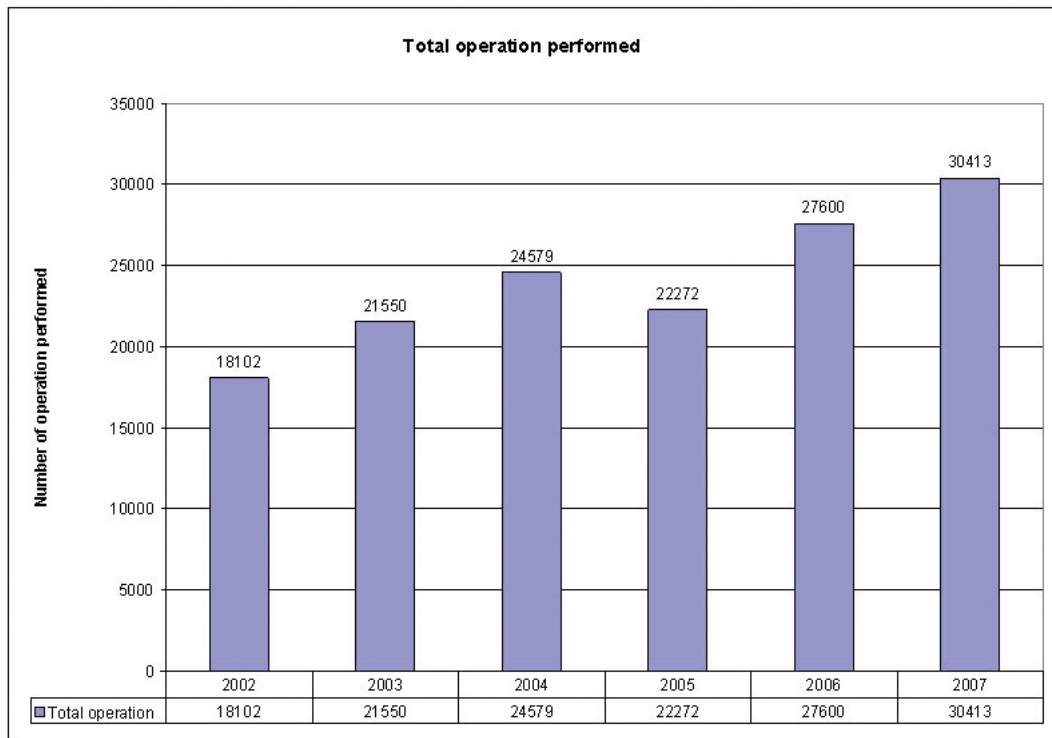


Figure 5.3: Number of ocular operations performed, 2002-2007



Ocular operations include surgeries performed in operating theaters and with grade B and C as classified in Fee Acts 1951

Figure 5.4: Number of cataract surgeries, ECCE and phacoemulsification performed, 2002-2007

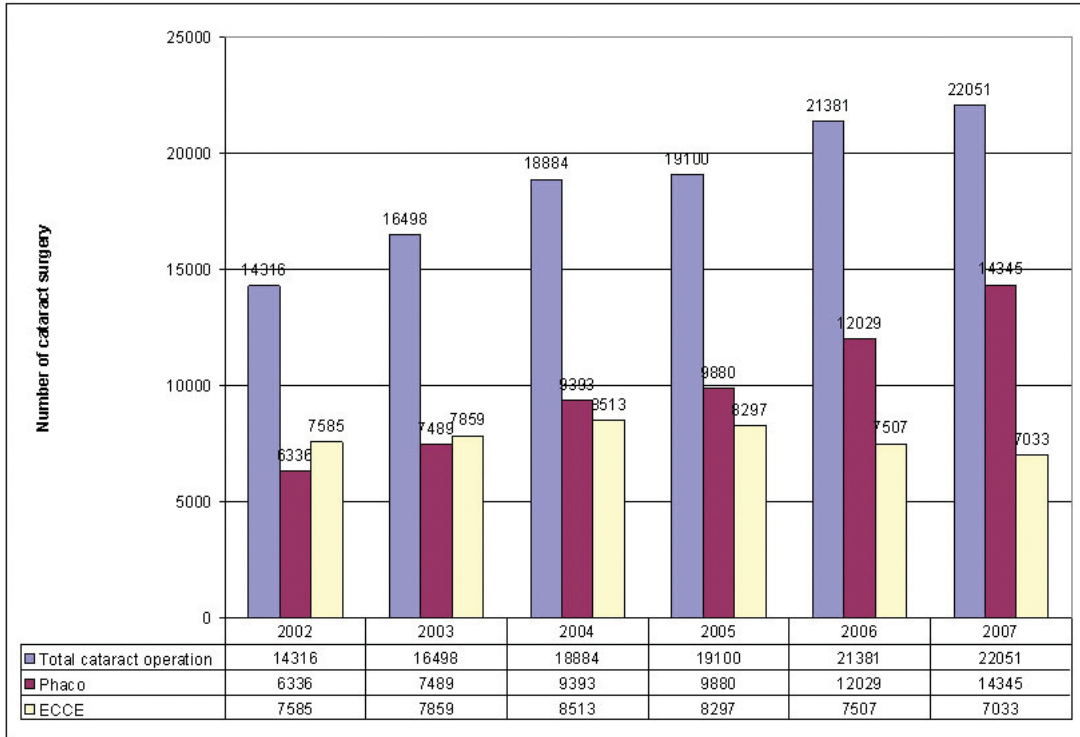
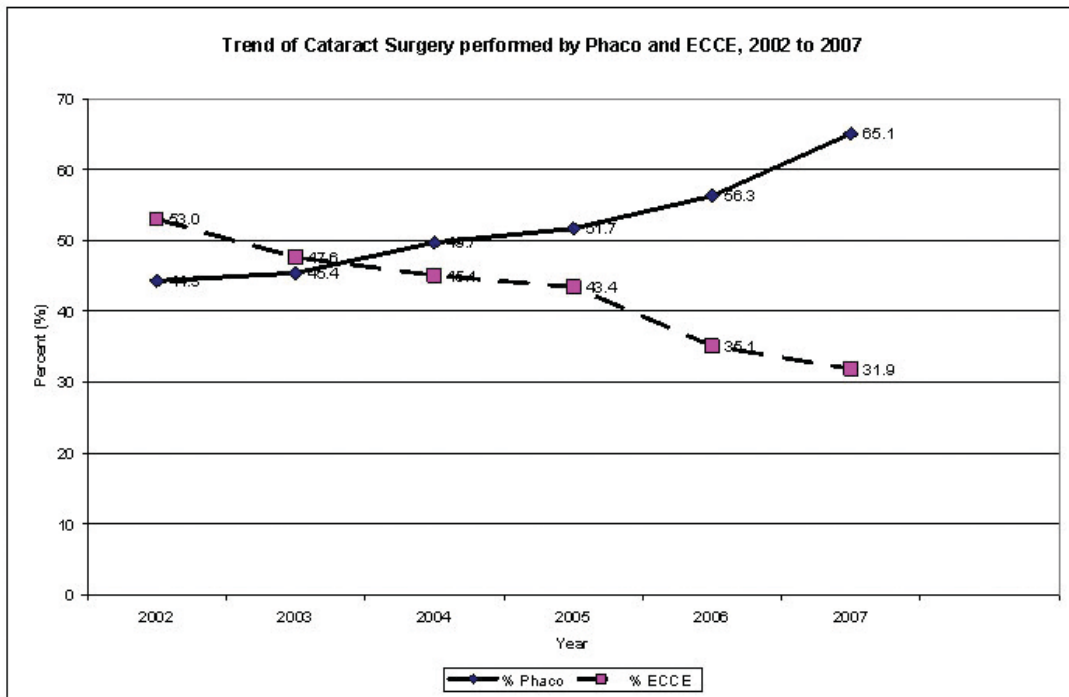
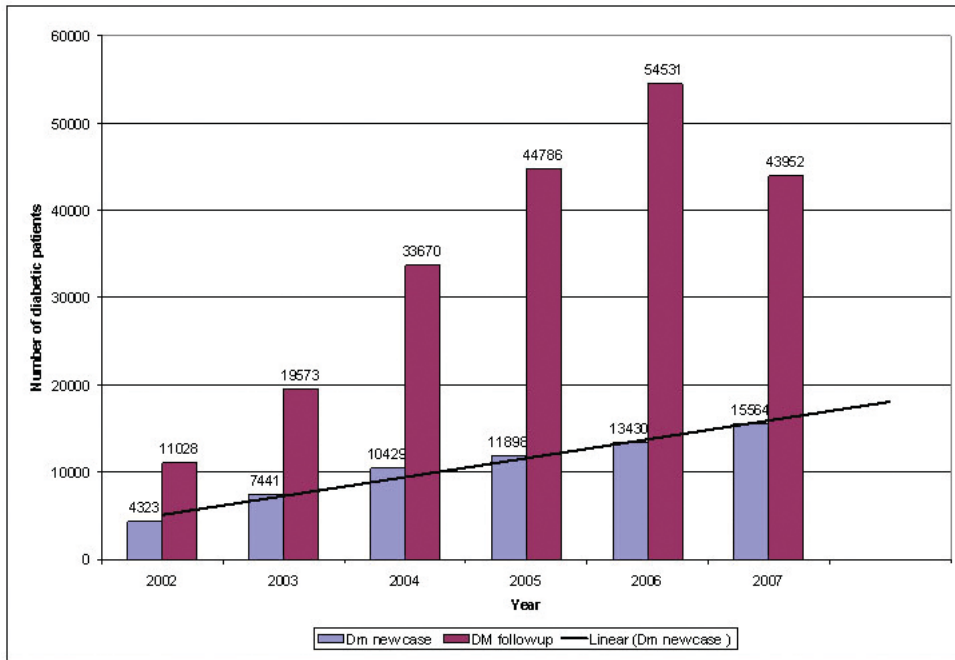


Figure 5.5: Percent distribution of ECCE and phacoemulsification



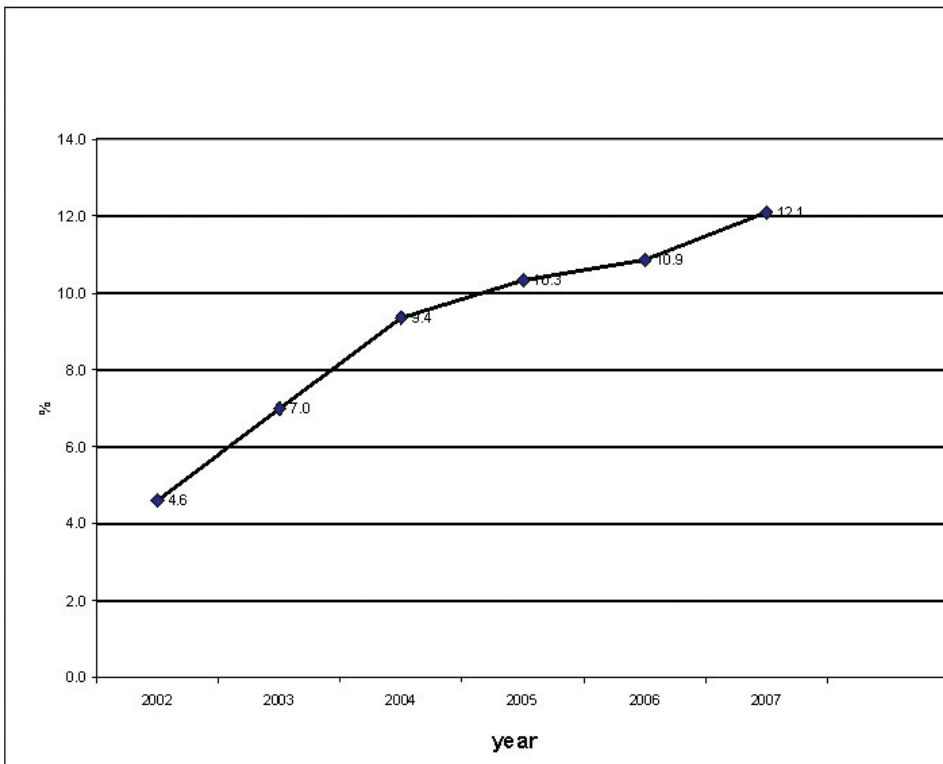
(Note: the trend of phaco increased by 22 % from 2002 to 2007)

Figure 5.6: Diabetic patients seen at ophthalmology clinics, 2002-2007



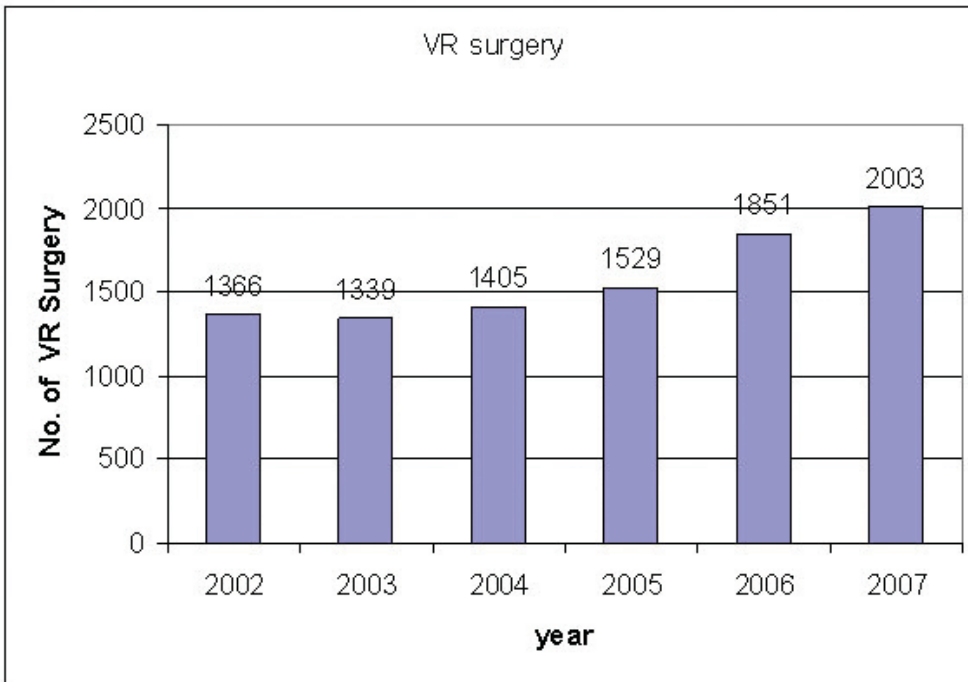
(Note: Diabetic new cases increased by 3000 each year)

Figure 5.7: Proportion of new patients at eye clinics who came for diabetic eye screening, 2002-2007



(Note: Percentage of new cases of diabetic eye screening increased by 8% over last 6 years)

Figure 5.8: Number of vireo-retinal surgery performed at VR designated hospitals, 2002-2007



(Note: Number of VR surgeon at MOH hospitals increased from seven in 2002 to ten in 2007)

Figure 5.9: Number of refractions performed at ophthalmology clinics, 2002-2007

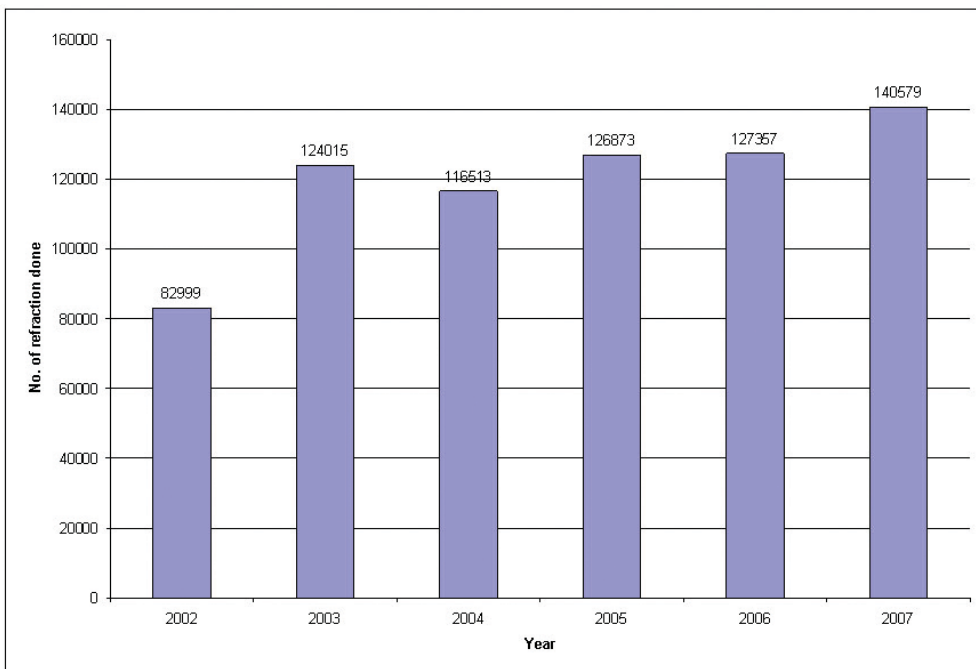


Figure 5.10: Number of patients who had low vision assessments, 2002-2007

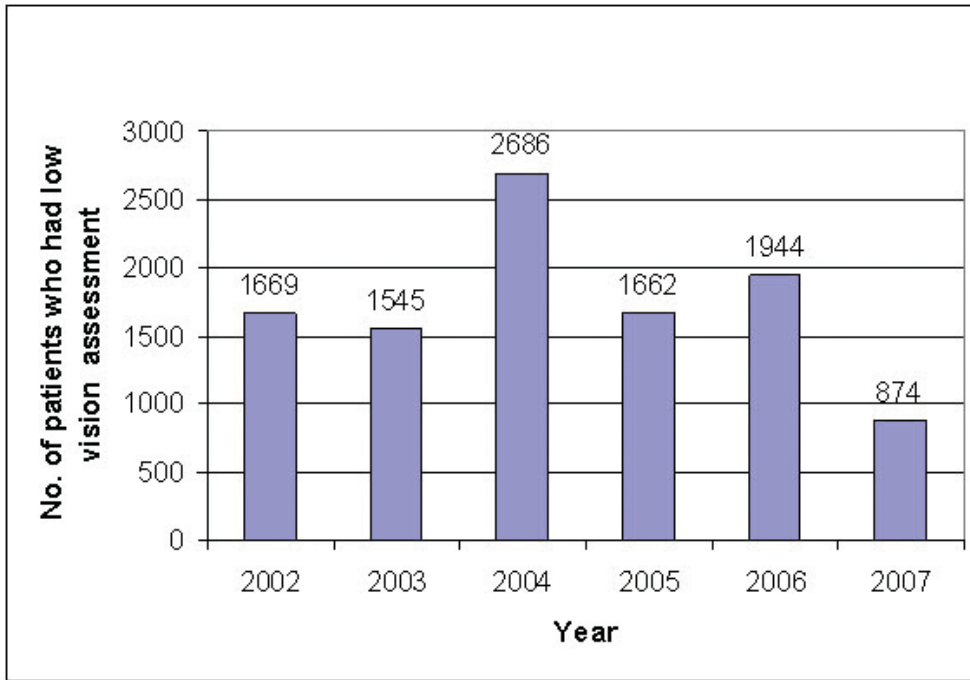


Figure 5.11: Number of premature infants screened for retinopathy of prematurity, 2002-2007

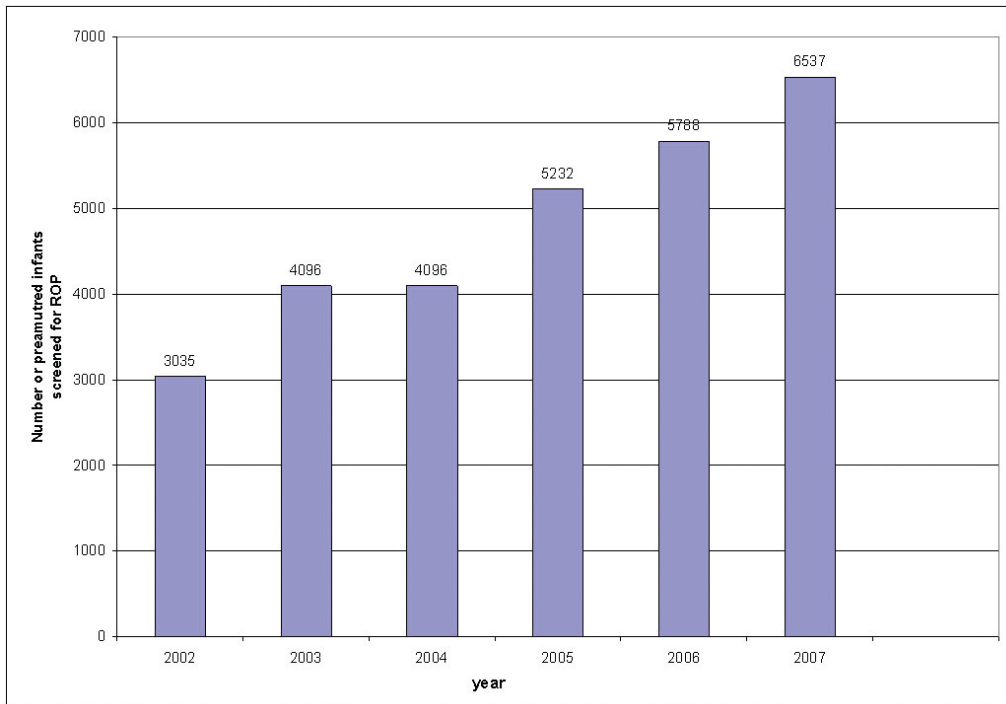
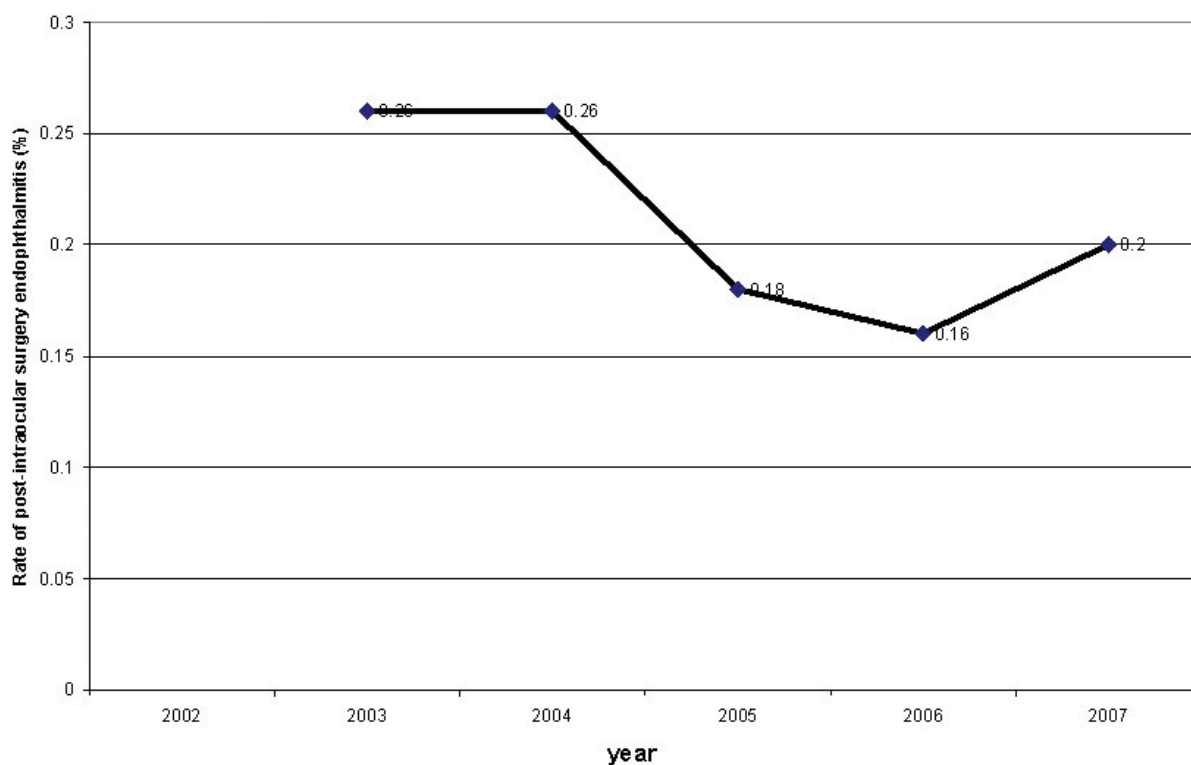


Figure 5.12: Rates of post-intraocular surgery endophthalmitis, 2003-2007



(Note: Data for 2002 was incomplete. There were 12 hospitals with rates higher than the national standard of 0.2% in 2007)

APPENDIX

APPENDIX 1

Medical Devices Survey on Ophthalmology Services at MOH Hospitals, 2008

Report prepared by Dr. Goh Pik Pin and Dr. Mariam Ismail

A phone survey was conducted from 21 to 25 July 2008 in all the 36 MOH ophthalmology departments and eight district hospitals which have resident optometrists but without ophthalmologist. The purpose of the survey was to collect data on medical devices available and to determine the distribution of these devices. The survey focused on essential devices required in providing basic eye care services and specific equipment for vitreo-retinal services. A more complete center survey which includes all ophthalmic devices will be conducted at the end of each year starting 2008.

The medical device survey was conducted via phone interview to staff at the ophthalmology department. The findings of July 2008 medical device survey are illustrated in the following tables and figures.

Results

Table 1: Medical devices or equipment at ophthalmology clinics, MOH hospitals

State	Hospitals	Slit Lamp	Indirect Ophthalmoscope	Anterior Segment Camera	Fundus Camera	A scan	B scan	Argon Laser	Nd Yag Laser	Diode Laser
Perlis	Kangar	6	4	1	1	1	1	1	1	1
Kedah	Alor Star	10	8	1	1	1	1	2	2	1
	Sungai Petani	9	1	0	1	1	1	1	1	1
P.Pinang	Pulau Pinang	12	6	1	1	1	1	1	1	1
	Bukit Mertajam	8	2	0	0	1	1	1	1	0
Perak	Ipoh	10	2	0	1	1	1	1	1	1
	Taiping	5	3	1	0	1	1	1	1	1
	Sri Manjung	2	1	0	0	1	1	1	0	0
	Teluk Intan	7	4	0	0	1	1	1	1	0
Selangor	Selayang	13	12	1	1	3	3	3	1	1
	TAR Klang	8	8	0	1	1	1	1	1	1
	Ampang	9	5	1	1	1	1	1	1	1
	Sungai Buloh	7	6	1	0	1	1	1	1	1
	Serdang	12	3	0	1	2	2	2	1	1
W.P	Kuala Lumpur	21	10	1	2	2	2	2	1	2
	Putrajaya	3	3	0	1	1	1	1	1	0
N. Sembilan	Seremban	7	3	0	1	1	1	1	1	1
	Kuala Pilah	3	2	0	0	1	1	1	0	0
Melaka	Melaka	15	5	0	1	1	1	1	1	1
Johor	Sultanah Aminah, JB	12	6	0	2	1	1	2	1	1
	Sultan Ismail, Pandan	6	8	1	1	1	1	1	1	1
	Muar	5	2	0	0	1	1	1	0	1
	Batu Pahat	4	2	0	0	2	1	1	0	0
Kelantan	Kota Baru	9	5	0	1	2	1	1	0	0
	Kuala Krai	2	2	0	0	1	0	0	0	0
Terengganu	HSNZ K. Terengganu	12	9	1	1	1	1	1	1	0
Pahang	TAA Kuantan	7	5	0	1	3	1	1	1	1
	Temerloh	8	6	0	1	3	2	1	1	1
Sarawak	Kuching Umum	6	6	0	1	2	1	1	1	0
	Miri	2	2	0	0	1	0	1	0	0
	Sibu	2	3	0	0	1	0	1	0	0
	Bintulu	1	1	0	0	1	0	0	0	0
Sabah	Queen Elizabeth KK	6	4	0	1	2	1	1	2	1
	Keningau	2	1	0	0	1	0	0	0	0
	Sandakan	2	2	0	0	1	1	1	1	0
	Tawau	3	1	0	0	1	0	1	0	0
Total		256	153	10	23	48	35	39	27	21

Figure 1: Distribution of fundus cameras at MOH hospitals

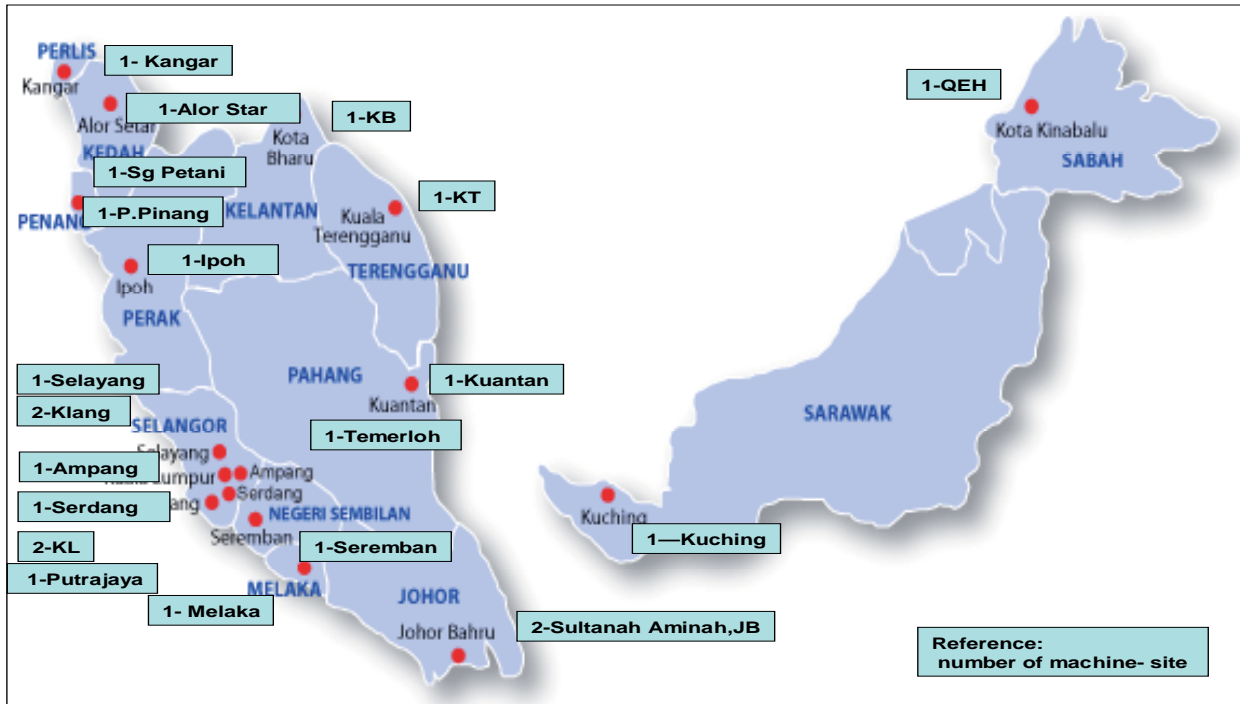


Figure 2: Distribution of argon laser machines at MOH hospitals

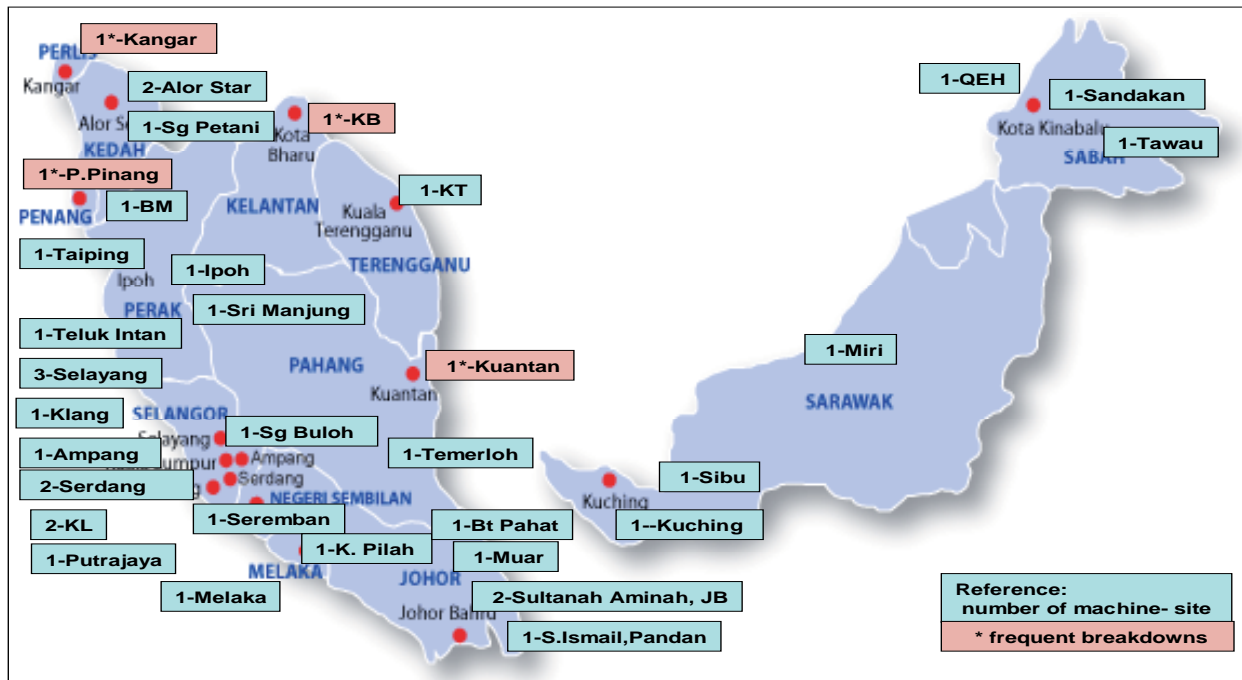


Table 2: Medical devices in ophthalmology operating theater, MOH

State	Hospitals	Operating Microscope	Phaco Machine	Cryotherapy Machine	Posterior Vitreotomy Machine	Endolaser
Perlis	Kangar	3	1	2	1	1
Kedah	Alor Star	4	3	2	2	1
	Sungai Petani	1	1	2	1	2
P.Pinang	Pulau Pinang	4	4	1	1	1
	Bukit Mertajam	2	1	0	0	0
Perak	Ipoh	2	2	0	0	0
	Taiping	1	2	1	0	0
	Sri Manjung	1	0	1	0	0
	Teluk Intan	2	1	1	0	0
Selangor	Selayang	3	3	2	2	2
	TAR Klang	3	3	1	2	1
	Ampang	1	2	2	1	0
	Sungai Buloh	2	1	1	0	0
	Serdang	4	1	1	1	1
W.P	Kuala Lumpur	4	2	2	2	1
	Putrajaya	1	2	1	0	0
N. Sembilan	Seremban	3	1	1	1	1
	Kuala Pilah	1	1	1	0	0
Melaka	Melaka	2	3	1	1	1
Johor	Sultanah Aminah, JB	4	3	3	2	1
	Sultan Ismail, Pandan	3	1	1	1	1
	Muar	1	2	0	0	0
	Batu Pahat	2	1	0	0	0
Kelantan	Kota Baru	2	1	1	1	0
	Kuala Krai	1	0	1	0	0
Terengganu	HSNZ K Terengganu	4	2	1	1	1
Pahang	TAA Kuantan	2	1	1	1	1
	Temerloh	1	2	2	1	0
Sarawak	Kuching	1	1	1	1	1
	Miri	2	0	1	0	0
	Sibu	1	0	1	1	0
	Bintulu	1	0	0	0	0
Sabah	Queen Elizabeth KK	3	1	1	1	0
	Tawau	1	0	0	0	0
	Sandakan	1	0	0	0	0
	Keningau	1	0	0	0	0
Total		75	48	37	25	17

Figure 3: Distribution of operating microscopes at MOH hospitals

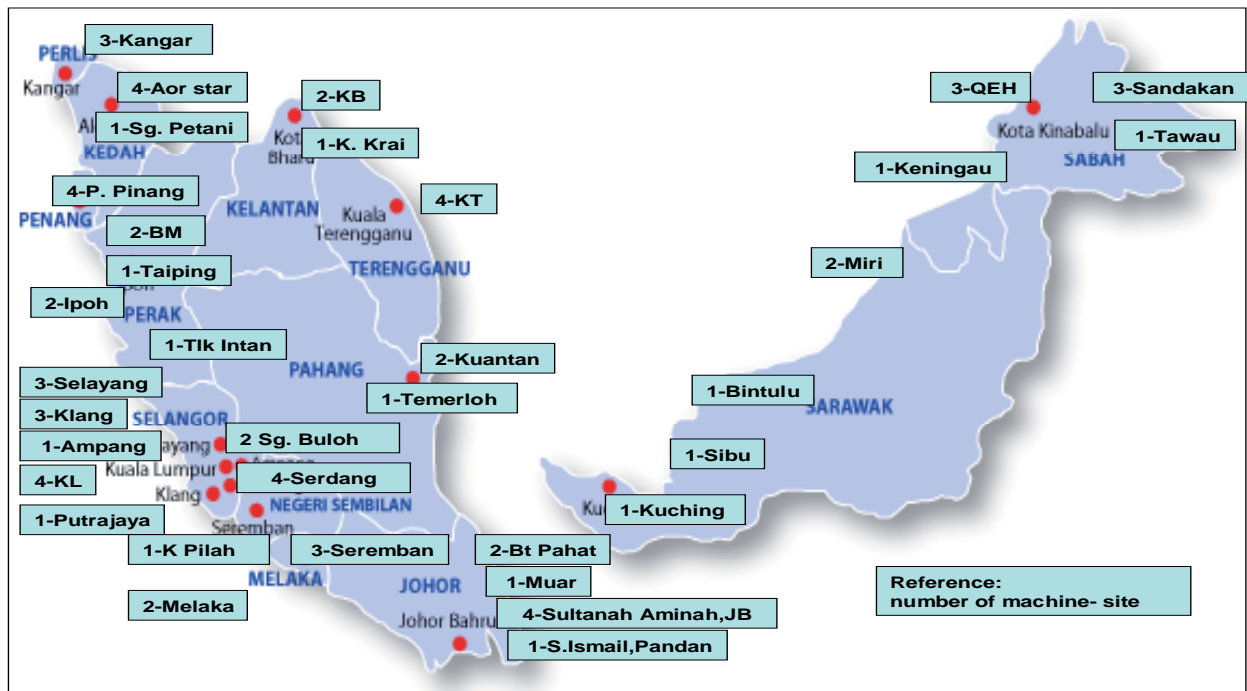


Figure 4: Distribution of phacoemulsification machines at MOH hospitals

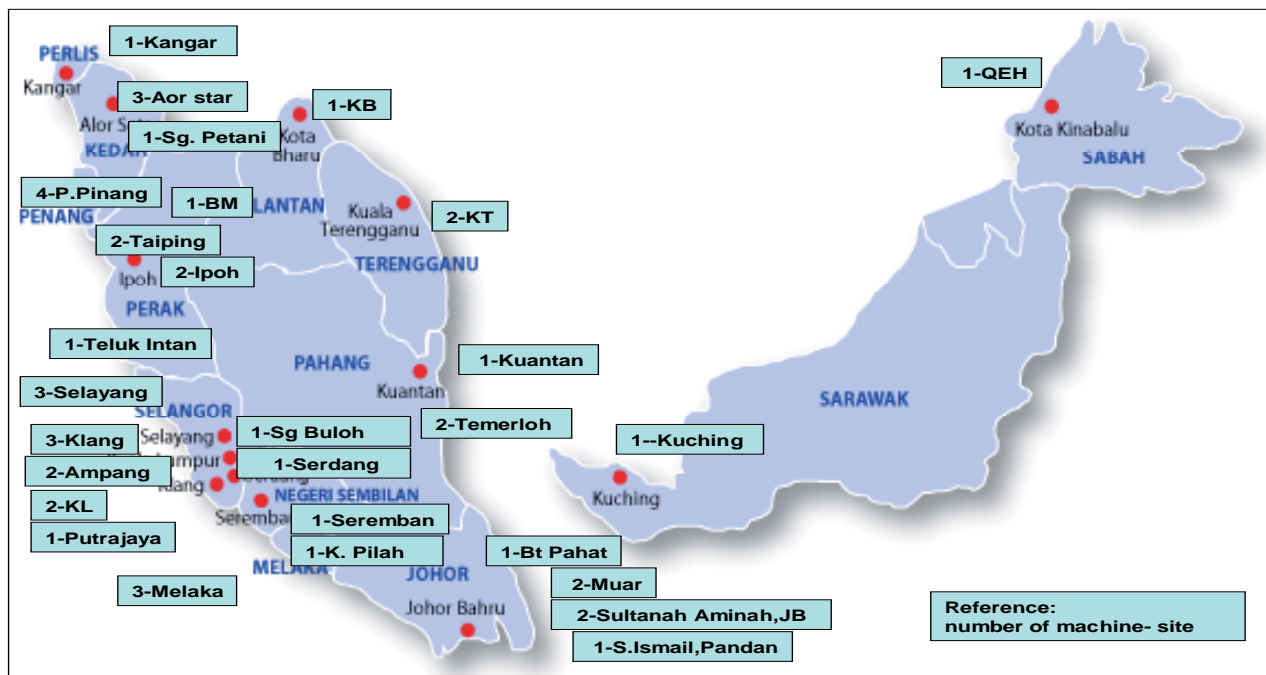


Figure 5: Distribution of resident optometry services at district hospitals without ophthalmologists

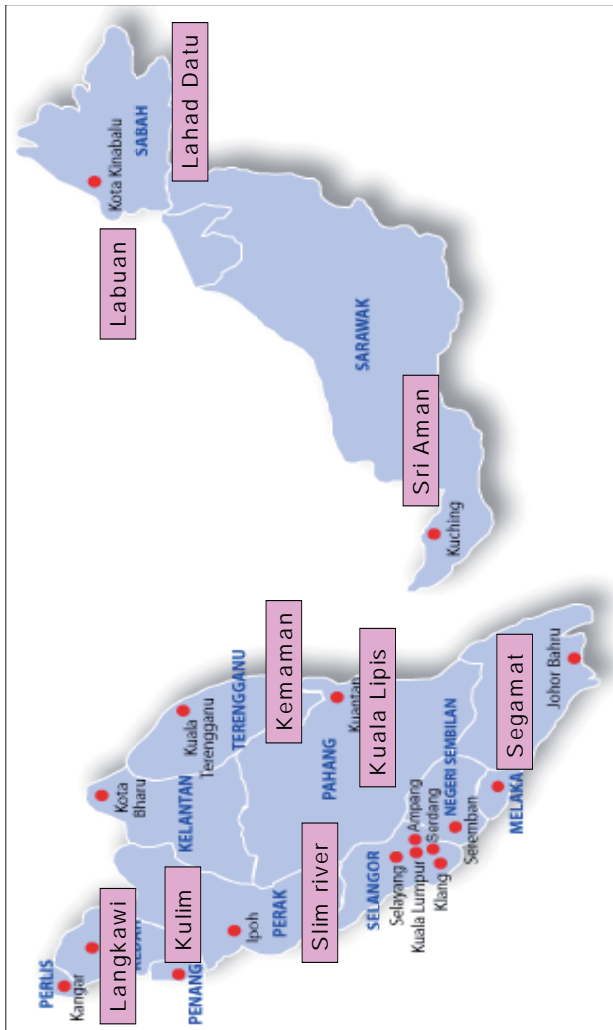


Table 3: Facilities and medical devices at eight district hospitals with optometrists without ophthalmologists

State	Centre	Optometrist	Refraction Room	Slit Lamp	Indirect Ophthalmoscope	Fundus Camera	A scan	B scan	Operating Microscope	Phaco Machine
Kedah	P Langkawi	1	Yes	1	1	1	1	0	1	1
	Kulim	1	Yes	2	1	0	0	0	0	0
Perak	Slim river	1	Yes	1	1	0	0	0	1	0
Johor	Segamat	1	Yes	1	1	0	1	0	0	0
Terengganu	Kemaman	2	Yes	1	1	0	1	1	1	0
Sabah	Lahad Datu	1	Yes	1	0	0	1	0	1	0
Sarawak	Sri Aman	1	Yes	1	1	0	0	0	1	0
WP	Labuan	2	Yes	1	0	0	0	0	0	0
	Total	10	8	9	6	1	4	1	5	1

APPENDIX 2

Health Clinics With Fundus Cameras (Dated November 2008)

State		Health clinic /Klinik Kesihatan(KK)	Modal	Date Install
Perlis		(2 Units)		
	1	KK Kangar, Perlis	Topcon	December 2007
	2	KK Arau, Perlis	Kowa	December 2007
Kedah		(9 Units)		
	1	KK Pokok Sena, Kota Star	Topcon-Analog	2005
	2	KK Kulim	Kowa	December 2006
	3	KK Guar Chempedak, Yan	Topcon	March 2007
	4	KK Langkawi	Topcon	July 2007
	5	KK Pendang	Topcon	September 2007
	6	KK Sungai Petani	Topcon	December 2007
	7	KK Serdang	Topcon	December 2007
	8	KK Bandar Alor Star	Topcon	July 2008
9	KK Kuala Kerteh	Topcon	July 2008	
Pulau Pinang		(4 Unit)		
	1	Bukit Mertajam-Out patient department (OPD)	Topcon	November 2007
	2	KK Butterworth	Topcon-Analog	2001
	3	KK Seberang Prai OPD	Topcon	July 2007
	4	KK Nibong Tebal -OPD	Kowa	December 2006
Perak		(3 Unit)		
	1	KK Jelapang	Canon	November 2006
	2	KK Setiawan	Canon	November 2005
	3	KK Hutan Melintang	Canon	August 2007
Selangor		(6 Units)		
	1	KK Pandamaran	Canon	November 2006
	2	KK Kuala Selangor	Topcon	November 2007
	3	KK Telok Datok, Banting	Topcon	September 2007
	4	KK Bt. 9 Cheras,Ulu Langat	Kowa	February 2006
	5	KK Sg. Besar	Kowa	July 2008
	6	KK Serendah	Kowa	August 2008
WP Kuala Lumpur		(3 Units)		
	1	KK Jinjang	Kowa	January 2007
	2	KK Tanglin	Kowa	September 2008
	3.	KK Putrajaya	Topcon	December 2007

	(9 Units)			
Negeri Sembilan	1	KK Seremban	Topcon Analog	2001
	2	KK Bahau	Topcon	September 2007
	3	KK Tampin	Topcon	July 2007
	4	KK Port Dickson	Topcon	July 2007
	5	KK Seremban	Topcon	December 2008
	6	KK Kuala Pilah	Kowa	December 2006
	7	KK Jelebu	Kowa	January 2008
	8	KK Jempol	Kowa	January 2008
	9	KK Rambau	Kowa	January 2008
	(5 Units)			
Melaka	1	KK Ayer Keroh	Topcon	September 06
	2	KK Jasin	Topcon	September 2007
	3	KK Umbai	Topcon	December 2008
	4	KK Selandah	Topcon	July 2008
	5	KK Durian Tunggal	Kowa	August 2008
	(11 Units)			
Johor	1	Mersing, Johor	Topcon	September 2007
	2	KK Pasir Gudang	Topcon analog	2001
	3	KK Mahmoodiah	Topcon	
	4	Outpatient Department, Hospital Kota Tinggi	Kowa	December 2006
	5	KK Pontian	Kowa	December 2006
	6	KK Batu Pahat	Canon	December 2007
	7	KK Bandar Maharani	Canon	September 2007
	8	KK Paya Mas, Muar	Canon	September 2007
	9	KK Parit Jaya	Canon	December 2007
	10	KK Endau	NA	NA
	11	KK Segamat	NA	NA
	(4 Units)			
Pahang	1	KK Bandar Maran	Topcon Analog	2001
	2	KK Indera Mahkota	Topcon	July 2008
	3	KK Balok, Kuantan	Topcon	November 2008
	4	KK Jaya Gading	Topcon	November 2008

	(10 Units)			
Terengganu	1	KK Ketengah Jaya	Kowa	July 2007
	2	KK Kuala Besut	Kowa	December 2007
	3	KK Bukit Payong, Marang	Kowa	December 2007
	4	KK Hiliran, Kuala Terengganu	Kowa	December 2007
	5	KK Batu Rakit, Kuala Terengganu	Kowa	December 2007
	6	KK Permaisuri, Setiu	Kowa	December 2007
	7	KK Kerteh, Kemaman	Kowa	December 2007
	8	KK Marang	Topcon	September 2007
	9	KK Ajil, Hulu Terengganu	Topcon	October 2007
	10	KK Kuala Berang, Hulu Terengganu	Topcon	July 2008
	(8 Units)			
Kelantan	1	KK Bandar, Pasir Mas	Canon	2003
	2	KK Bachok	Kowa	December 2006
	3	KK Gua Musang	Topcon	July 2007
	4	KK Pasir Puteh	Topcon	September 2007
	5	KK Wakaf Baru	Topcon	December 2007
	6	KK Kota Baru	Kowa	August 2008
	7	KK Ketereh	Kowa	August 2008
	8	KK Labok Machang	Kowa	August 2008
	(2 Units)			
Sabah	1	KK Luyang	Topcon Analog	2001
	2	KK Sandakan	Canon	2007
	(4 Units)			
Sarawak	1	KK Jalan Mesjid	Topcon Analog	2001
	2	KK Bandar Miri	Kowa	December 2006
	3	KK Pekan Kuching	Kowa	September 2008
	4	KK Lanang, Sibu	Topcon	September 2008
Total	80 Units			

APPENDIX 3: Publications on NED

National Eye Database – A Web Based Surveillance System

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SUMMARY

National Eye Database (www.acrm.org.my/ned) is a web based surveillance system which collects data on eye diseases and clinical performance in ophthalmology service. It is a prospective study with online data collection, concurrent descriptive data analysis and real time report. It includes cataract surgery registry, diabetic eye registry, glaucoma registry, contact lens related corneal ulcer surveillance and monthly ophthalmology service census. This article presents the methodology and some registries reports. The web based surveillance system has made dissemination of report prompt, easy and without barrier.

KEY WORDS:

Database, Surveillance, Census, Web based, Cataract surgery registry, Diabetic eye registry, Glaucoma registry, Contact lens related corneal ulcer surveillance

INTRODUCTION

Systematic, prospective collection of data on disease distributions, natural history and treatment outcomes in the form of register is valuable in disease surveillance, monitoring clinical performance and healthcare planning. With the advancement in information technology, this effort can be optimized through web application.

The Swedish National Cataract Register (NCR) has been collecting data on cataract extractions since 1992 and has good coverage of all cataract operations performed in Sweden¹. It has evolved into a web-based European Cataract Outcome Study Group with participation from 15 countries (www.eurocat.org)². Data from these cataract surgery registers have been instrumental in setting the basis for quality assurance and enabling further clinical studies. The European Cataract Outcome Study Group has evaluated the database and published articles on cataract surgery outcome³, Cost effectiveness⁴, and quality of life^{5,6}. Due to the large number of cataract surgery registered, the data enable study on rare events such as post-operative infectious endophthalmitis⁷. In the United States of America, the annual National Health and Nutrition Examination Survey (hosted at (<http://www.cdc.gov/nchc/nhanes.htm>)) utilizes web site to disseminate results to public and allows data download for those interested. In United Kingdom, the British Ophthalmological Surveillance (<http://www.inopsu.com>) reports rare but important eye diseases which led to a better understanding and improvement in management^{8,9}.

In 2002, the Ophthalmology service of Ministry of Health (MOH) established the National Cataract Surgery Registry (NCSR). It is a paper-based registry participated by 33 Ophthalmology departments. It contains data on 60,077 patients who have had cataract surgery from 2002 to 2004.

Annual reports^{10,11,12}, and data on various aspects of NCSR has been published^{13,14,15,16,17,18,19,20,21}. As a paper-based registry is effort intensive, it was withheld in 2005 while effort was put into developing a web based registry.

National Eye Database (NED) was established on 1st January 2007. It is a web-based patient registry consisting of Cataract Surgery Registry (CSR), Diabetic Eye Registry, Glaucoma Registry, Contact Lens Related Corneal Ulcer Surveillance, and Monthly Ophthalmology Service Census, MOH. It is supported by the MOH and hosted by the Association of Clinical Research Malaysia (ACRM) at www.acrm.org.my/ned.

The main objectives of NED are to determine the magnitude and trend of eye diseases, to facilitate quality initiatives at individual ophthalmology departments through monitoring of key performance indicators (KPIs), and to stimulate research. The long term goals are to promote quality improvement and provide a benchmarking for comparing and demonstrating good practice. We present the method and some reports of NED in this article.

MATERIALS AND METHODS

NED is a prospective, multi-center cohort study designed to have on-line data entry at study site. Participating centers or source data producers (SDP) are any clinical sites, both public and private, that provide eye care services in Malaysia. Eligible study populations are those fulfilling the criteria for each specific registry. Currently all 35 MOH ophthalmology departments participate in it.

NED is sponsored by the Ophthalmology Service and Clinical Research Centre, MOH. It has a steering committee which establishes policy, directs its activities and is governed by an advisory board. It is managed by a clinical registry manager who coordinates with site coordinators at each SDP.

NED has high level security in protecting its data. Data protection is being ensured at all time through strict compliance with regulatory requirements such as authentication of users and web application owners, access control, encryption, audit trail, control of external

Table I: Data from National Cataract Surgery Registry 2002 to 2004 and NED 2007

	2002	2003	2004	2007 (January to September)
Number of participating centre	25	32	33	30
Total number of surgeries reported	12,798	16,815	18,392	12,072
Number of cases with post-operative vision (%)	12512 (97.7%)	14,683 (87.3%)	6228 (33.9%)	5273 (43.7%)
Patients' Demographic				
Mean age (years)	64.0	63.7	63.5	64.0
% Women	51.0%	50.0%	51.0%	51.5%
% Second eye surgery	30.0%	29.5%	29.8%	29.8%
% Ocular co-morbidity in operated eye	28.8%	36.0%	38.0%	41.3%
Cataract Surgery Practice				
% Performed by specialists	69.0%	71.8%	71.6%	77.2%
% Phacoemulsification (phaco)	39.7%	45.6%	50.7%	65.8%
% Extracapsular cataract extraction (ECCE)	54.0%	47.6%	42.5%	29.2%
% Phaco convert to ECCE	2.4%	2.9%	2.5%	1.7%
% Local anaesthesia	93.6%	93.2%	92.5%	93.6%
% IOL implanted	97.3%	97.5%	97.6%	98.2%
% Implanted with foldable IOL	26.5%	37.8%	45.6%	68.5%
Surgical Outcome				
Rate of posterior capsular rupture (KPI standard- 5%)	6.0%	4.6%	4.1%	4.4%
% of patients with post-operative refracted vision of 6/12 or better for :				
All Patients (KPI standard- 85%)	80.7%	88.6%	89.5%	84.4%
Phacoemulsification	86.9%	93.2%	93.8%	87.6%
ECCE	77.5%	84.5%	85.0%	79.9%
Annual incidence of post- operative infectious endophthalmitis	0.20%	0.24%	0.16%	0.26%

Table II: Characteristics of diabetic patients registered to Diabetic Eye Registry, NED, January to September 2007

	All pts reported N=7797	Pt without DR N=4335	Pt with DR N=2838
Age Mean (SD) years	57.0 (11.4)	56.9 (12.3)	56.6 (9.8)
% Female	54.2	55.0	46.4
Type of diabetes mellitus (DM)			
- % NIDDM	91.5	92.6	90.9
- % IDDM	5.8	4.8	6.7
Mean Duration of DM, years (SD)	7.7 (7.0)	6.3 (6.1)	9.9 (7.4)
% with systemic co-morbidity	77.8	75.9	80.0
% with hypertension	64.5	63.2	67.0
% with hypercholesterolemia	17.7	17.5	18.3
% with ischaemic heart disease	11.7	12.0	11.9
% with renal impairment	6.2	3.5	10.3
% Smoking	9.68	8.54	10.99
No. of patient without DR (%)	4335 (55.6%)		

Table III: Status of diabetic retinopathy on diabetic patients registered to Diabetic Eye Registry, NED, January-September 2007

	Right eye	Left eye
With diabetic retinopathy (DR) only	2559 (32.8%)	2580 (33.1%)
With maculopathy	703 (9.0%)	663 (8.5%)
Types of DR		
% Mild non proliferative DR	44.4%	44.8%
% Moderate non proliferative DR	25.9%	25.7%
% Severe non proliferative DR	9.3%	8.6%
% Proliferative DR	14.8%	14.9%
% Advance diabetic eye disease	7.2%	6.3%



Fig. 1: National Eye Database home page at www.acrm.org.my/ned

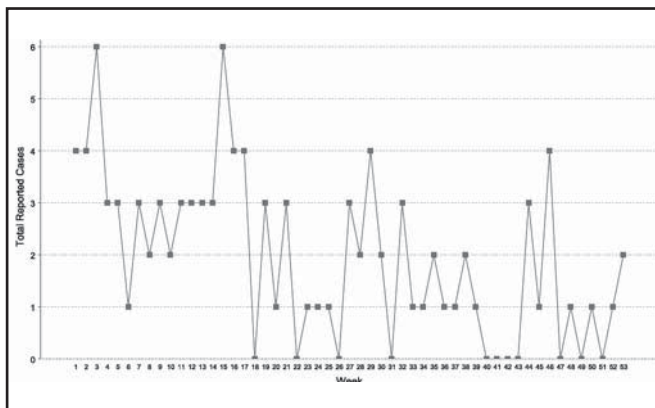


Fig. 2: Epidemiologic curve of contact lens related corneal ulcer, by week, 2007

communication links and access, as well as system backup and disaster recovery.

Head of departments and site sub-investigators, usually ophthalmologists at each SDP, are given the right to manage data entered by their own centres, including data edit, data download and view centre reports. They ensure complete data ascertainment and up to date data entry. Site coordinators, usually optometrists or paramedical staffs are responsible to enter data and supervise other staff to enter data.

Descriptive analysis is performed concurrently as the data are being received and are displayed as tables and graphs in reports. Reports are of two types, SDP report based on data entered by individual SDP, and overall report based on aggregated data entered by all SDPs. Individual patients' identification is never displayed in the report. Reports are accessible in real time on the website. Annual reports are

published, both on the web and hard copy. By having reports on the web, timely dissemination is especially effective.

RESULTS

NED home page is shown in Figure 1. The icon 'eNED web application' will bring registered users to the protected web page for data entry and to view reports.

Table I displays CSR data entered from 1st January to 30th September 2007 and for comparison, data from the NCSR for the year 2002, 2003, and 2004 were shown. Over the years, patients who have had cataract surgery had similar mean age at surgery, i.e. 64 years, had equal gender distributions and about one third of them had second eye cataract surgery. The proportion of cataract surgery performed using phacoemulsification technique has increased from 54.0% in 2002 to 65.8% in 2007. This trend is reflected in the increasing proportion of foldable intraocular lens (IOL) being implanted, from 26.5% in 2002 to 68.5% in 2007. Results for KPI based on cataract surgery shown reduction in the rate of posterior capsular rupture, from 6.0% in 2002 to 4.4% in 2007, with the standard sets at 5%. While percentage of patients with post-operative refracted vision of 6/12 or better over the years was above target set, i.e. 85%.

From January to September 2007, 7797 diabetic patients, who were seen for the first time at Ophthalmology clinics, were registered at Diabetic Eye Registry (Table II). More than half (55.6%) did not have diabetic retinopathy. Among those who have diabetic retinopathy, 70% of the eyes have mild or moderate non-proliferative diabetic retinopathy, while 30% has severe non-proliferative diabetic retinopathy, proliferative diabetic retinopathy or advanced diabetic eye disease. The later group of patients will need laser photocoagulation or vitrectomy. (Table III)

Figure 2 shows the epidemiologic curve of the incidence of contact lens related contact lens ulcer reported to NED in 2007. A total of 103 cases were reported. Most of them related to monthly disposable lens and caused by bacteria.

DISCUSSION

The findings from cataract surgery and diabetic eye registry demonstrate their usefulness in evaluating patients' characteristics and status of diseases, in monitoring the trend of cataract surgery practice and surgery outcomes. The database has made tracking of KPI and clinical practice trend easy and efficient.

NED provides useful information in epidemiology of eye diseases with data on visually threatening eye diseases such as cataract, diabetic retinopathy, glaucoma and contact lens related corneal ulcer. The clinical outcome data in NED is useful in assisting MOH, Non-Governmental Organizations, private healthcare providers and industry in program planning and service evaluation. This effort will lead to better management of eye disease, thus continuous improvement of ophthalmic service.

There is a plan to incorporate audit tools such as cumulative sum (CUSUM) 22 into NED web application to effectively monitor doctors' clinical competency. This will be implemented once the pilot study on CUSUM in monitoring surgeons' cataract surgery complication, i.e. posterior capsular rupture and post-operative visual outcome has been completed. NED will actively promote participation by university hospitals and private eye care providers so that its' database will truly be national.

The main challenge faced by NED is incomplete case ascertainment, especially when the registry collects outcome data in a prospective manner. For example, in cataract surgery registry, only 43.7% of patients operated in 2007 have records on post-operative refracted vision. Measures to increase active case ascertainment include awareness through road shows, newsletters, NED specific scientific meetings, journal publications and presentation at national and international scientific meetings, as well as active reminders by NED clinical registry manager. The other challenge is to ensure continuous funding to support NED web application.

CONCLUSION

The attempt in applying information technology in clinical performance monitoring is timely, especially with the government's effort to improve public service accountability and MOH's commitment in ensuring high standards of healthcare. The NED web application will overcome conventional constraints in paper-based surveillance, i.e. short of human resources, delay in timely dissemination and storage place for data collection forms. With electronic-NED, ophthalmologists will have access to individual centre and

national aggregated data on important eye diseases and eye services by a click of the mouse.

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REFERENCES

1. Lundström M, Stenevi U, Thorburn W. The Swedish National Cataract Register: A 9-year review. *Acta Ophthalmol Scand.* 2002; 80: 248-57.
2. Lundström M, Barry P, Leite E, Seward H, Stenevi U. 1998 European Cataact Outcome Study. Report from the European Cataract Outcome Study Group. *J Cataract Refract Surg* 2001; 27: 1176-84.
3. Lundström M. Measuring surgical outcomes. Ed. *J Cataract Refract Surg.* 2004; 10: 2025-26.
4. Kobelt G, Lundström M, Stenevi U. Cost-effectiveness of cataract surgery: Method to assess cost-effectiveness using registry data. *J Cataract & Refract Surg* 2002; 28: 1742-49.
5. Lundström M, Stenevi U, Thorburn W. Quality of life after first- and second-eye cataract surgery. Five-year data collected by the Swedish National Cataract Register. *J Cataract & Refract Surg.* 2001; 27: 1553-59.
6. Lundström M, Brege KG, Florén I, Lundh B, Stenevi U, Thorburn W. Cataract surgery and quality of life in patients with age-related macular degeneration (AMD). *Brit J Ophthalmol* 2002; 86: 1330-35.
7. Lundström M, Wejde G, Stenevi U, Thorburn W, Montan P. Endophthalmitis following cataract surgery. A nation-wide prospective study evaluating incidence in relation to incision type and location. *Ophthalmology.* 2007; 114: 866-70.
8. Stanford MR. A British ophthalmological surveillance unit. *Br J Ophthalmol* 1997; 81: 932-33.
9. MR Stanford on behalf of the British Ophthalmological Surveillance Unit Steering Committee. Five years of surveillance. The British ophthalmological surveillance unit. *Br J Ophthalmol* 2002; 86: 838-39.
10. Goh PP, R Sharmala, G Rajalakshmi, Ronald AD. The First Report of National Cataract Surgery Registry 2002.
11. Goh PP, R Sharmala, G Rajalakshmi, Ronald AD. The Second Report of National Cataract Surgery Registry 2003.
12. Goh PP, R Sharmala, G Rajalakshmi, Ronald AD. The Third Report of National Cataract Surgery Registry 2004.
13. Rajalakshmi G, Goh PP, Mariam I. National Cataract Surgery Registry 2002-2003- Profile of Patients Presenting for Cataract Surgery. *Am J Ophthalmol* 2005; 139: S1 (supplement).
14. Yen SS, Goh PP, Mariam I. National Cataract Surgery Registry 2002-2003 - A Report of Clinical Outcome. *Am J Ophthalmol* 2005; 139: S2 (supplement).
15. Tara MG, Rampal SL, Choong YF, Goh PP. National Cataract Surgery Registry: Cataract Surgery in Diabetes Mellitus. *Am J Ophthalmol* 2005; 139: S2 (supplement).
16. Li Chang, Choong YF, Goh PP. National Cataract Surgery Registry (NCSR) - Types of Anaesthesia And Intra-Operative Complications. *Am J Ophthalmol.* 2005; 139: S3 (supplement).
17. Goh PP, Rampal SL, Choong YF. National Cataract Surgery Registry 2002-2003 - The Risk of Acute Endophthalmitis Following Cataract Surgery. *Am J Ophthalmol* 2005; 139: S4 (supplement).
18. Goh PP, Rampal SL, Choong YF. National Cataract Surgery Registry 2002-2003 - Predictors for Poor Visual Outcome. *Am J Ophthalmol* 2005; 139: S4 (supplement).
19. Shamala R, Goh PP, Mariam I. National Cataract Surgery Registry -Cataract Surgery Practice Pattern and Its Trend in Malaysia. *Am J Ophthalmol* 2005; 139: S4 (supplement).
20. Poh EP, Choong YF, Goh PP. National Cataract Surgery Registry: Postoperative Clinically Significant Cystoid Macular Oedema. *Am J Ophthalmol* 2005; 139: S8 (supplement).
21. Lee PP, Goh PP, Lim TO. National Cataract Surgery Registry -Methods *Am J Ophthalmol* 2005; 139: S67 (supplement).
22. Aziz S, Choong YF, Goh P, Ismail M, Lim TO. Cusum - A Statistical Process Control Charting to Monitor Surgeon Performance in Cataract Surgery. *Am J Ophthalmol* 2005; 139: S1 (supplement).

Status of Diabetic Retinopathy Among Diabetics Registered to the Diabetic Eye Registry, National Eye Database, 2007

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SUMMARY

Diabetic Eye Registry, a web based registry hosted at the National Eye Database (www.acrm.org.my/end) collects data in a systematic and prospective nature on status of diabetic retinopathy (DR) among diabetics seen for the first time at Ministry of Health ophthalmology clinics. The 2007 report on 10, 586 diabetics revealed that 63.3% of eyes examined had no DR, 36.8% had any form of DR, of which 7.1% had proliferative diabetic retinopathy. Up to 15.0% of eyes had vision threatening DR requiring laser or surgery at their first visit. Data on diabetic eye registry is useful in monitoring the quality of diabetic management, particularly in eye screening as reflected by the proportion of patients with severe DR needing intervention at the first visit to Ophthalmology clinics.

KEY WORDS:

Diabetes mellitus, Diabetic retinopathy, Diabetic complication, Diabetic eye screening

INTRODUCTION

Diabetic retinopathy (DR) is not only a common complication of diabetes mellitus (DM)¹ but it leads to disability. It is the main contributor to blindness among working age group^{1,2,3}. Every year, 10,000 American diabetics become blind⁴ and globally 2% diabetics become blind and 10% visually impaired after 15 years of diabetes².

The prevalence of DR differs by regions and it is best estimated from population based survey. The recent Singapore Malay Eye Study on 3280 Malay adults 40 to 80 years with diabetes revealed 35.0% prevalence of any form of DR, 4.9% with proliferative DR (PDR) and 35.0% with macular edema. Among those known DM, 35.3% have any DR, 6.8% has PDR and 10.8% has vision threatening DR⁵. However, population based survey is labour intensive and costly. Thus, hospital based multi centre studies have been conducted to assess the magnitude of DR among diabetics. Results from these studies may serve as proxy indicator to prevalence of DR^{6,7,8,9,10,11,12,13}. Table I shows results from studies done on DR in Malaysia and other countries.

The prevalence of DR varies with type of DM. Among Malaysian diagnosed to have DM before the age of 40 years, the prevalence of DR was 12.3% in type I and 22.3% in type II DM, and prevalence of proliferative DR was 4.0% in type I and 9.3% in type II DM¹⁴. In advanced country like the

United State prevalence of DR for all diabetics was 86.4% for type I and 40.3% for type II DM, and vision threatening DR was 42.1% for type I and 8.2% for Type II DM^{15,16}.

The prevalence of DR increases with duration of DM. In Malaysia, prevalence of DR among type I DM was 9.9% after 5 years, increased to 35.8% after 10 years of diagnosis, and for type II DM, it was 10.0% and 42.9% respectively¹⁴. In the United State, the prevalence was 5% after 5 years, increased to 60% after 10 years for type I DM, and for type II DM taking insulin, it was 40% and 84% respectively, for type II DM not taking insulin, it was 24% and 53% respectively^{17,18}.

Data on diabetic patients seen at hospitals provide essential information on severity of DR and the proportion of patients who need treatment. The Diabetic Eye Registry was established in 2007. It is a web based registry hosted by the National Eye Database. It collects data on diabetic patients seen at the first time at ophthalmology clinics. We present here some descriptive findings of the first year data.

MATERIALS AND METHODS

Details of the NED methods is presented in this same issue. Data on diabetic patients who were seen for the first time at ophthalmology clinics were recorded on data collection forms. This was done by trained paramedical staff or medical doctors who saw the patients. The forms were later entered into the web based registry.

Thirty three MOH ophthalmology departments took part in the registry. Participation is voluntary and thus the completeness of data ascertainment on diabetics seen at each centre is difficult to determine. Though features such as range check and compulsory fields to reduce error and missing data are in place in the web based application, there remained a small percentage of variables with missing data.

Grading of DR is based on the International Clinical Diabetic Retinopathy Disease Severity Scale¹⁹ (Table II). Maculopathy is presence if there is evidence of hard exudates or retinal thickening at the posterior pole. Clinical significant macular edema (CSME) is presence when retinal thickening or hard exudates is ≤ 5000 μm from the centre of fovea or retinal thickening is \geq one disc size in an area \leq one disc diameter from the centre of fovea. Vision threatening retinopathy (VTR) includes severe NPDR, PDR and maculopathy. The data were analysed using Stata software²⁰.

RESULTS

Coverage

From 1st January to 31st December 2007, 15,564 new diabetics patients were seen at MOH Ophthalmology clinics and these data were registered to the Monthly Ophthalmology Service Census at National Eye Database website²¹. Of these, 10,856 (69.8%) patients were registered to diabetic eye registry.

Characteristic of Diabetic Patients

The mean age of patients registered was 57.2 years; About half were at working age group; between 30 to 60 years (52.8%). There were slightly more female (54.6%) and Malay (54.0%) patients formed the majority. (Table III)

Medical and Ocular History

Most of the patients (92.0%) have type II DM, 64.1% with less than 10 years of DM and 82.0% was treated with oral medication. About 2/3 has hypertension and 9% was current smokers. (Table IV). Majority of the patients seen were referred from government healthcare facility (91.7%). (Table V)

One hundred and sixty patients seen were pregnant. Although the current protocol for pregnant diabetics states that these women should have their eye examined at the time of conception or at least during the first trimester, only in 41.2% had eye examination. Majority of the patients seen were referred from government health care facility (91.7%). (Table V)

Status of Eye

More than two third of the patients has never had any prior eye examination. Among those who have had eye examination, 71.9% had it done about one year ago. (Table VI) More than one third of eyes had unaided vision of 6/12 and better, one third had vision between 6/18 to 3/60 and about 10% was blind with worse than 3/60 vision. Among those examined, 40.9% did not have other ocular disease, 44.2% patients had evidence of cataract, 3.1% had glaucoma and 0.5% had rubeosis irides, a sign which signifies retinal ischemia. (Table IV)

More than half of the eyes (63.3%) examined did not have diabetic retinopathy and 36.8% had any form of DR, 16.5% had mild non-proliferative DR (NPDR), 9.8% had moderate NPDR, 3.4% has severe NPDR, 7.1% has proliferative DR. About 9.5% of eyes have maculopathy, of which, 4.2% had clinical significant macular edema (CSME). As such, 14.7% of eyes had vision threatening retinopathy (VTR). (Table VII)

Treatment plan

Of the 10,856 patients registered majority (83.3%) were given an appointment for routine follow up eye examination, 10.2% required laser photocoagulation, 3.1% needed diabetic vitrectomy and 0.5% needed fundal fluorescence angiogram to assess extend of retinal ischaemia or maculopathy. (Table VIII)

Table I: Literature Review of Recent Studies by Types of DR and in Comparison with Present Study

Study, year	Sample Size	No DR	Any DR	PDR*	VTR**
Universiti Sains Malaysia Hospital, 1996 ⁶	140		48.6%	6.2%	
DiabCare Asia in 29 public hospitals, 1997 ⁷			23.5%, (background DR)		
DiabCare Asia Project in 10 public hospitals, 1998 ⁸ ,			37% (background DR)		
DiabCare Asia Project in 49 private clinics in Malaysia, 2001 ⁹	438		23.5% (background DR)	5.4%	(0.8%- legal blindness)
DiabCare Asia Project at 19 public hospitals in Malaysia, 2003 ¹⁰	1244		11.1%		
University Malaya Medical Centre, Malaysia, 2005 ¹¹	217		51.6%	28.1%	
Veterans Affairs Medical Center in USA, 2005 ¹²	1219	63.0%	23.4%	0.9%	3.8%
An inner-city primary care clinic in Australia, 2007 ¹³	495	51.7%	37.3%	-	11.0%
Singapore Malay Eye Study 2008 ⁵ 2006,	3280	65.0%	35.3%	6.8%	10.8%
Present study, 2007	10,856	63.3%	36.8%	7.1%	14.7%

*PDR - Proliferative diabetic retinopathy

**VTR - Vision threatening retinopathy

Table II: International Clinical Diabetic Retinopathy Disease Severity Scale (adapted from ref?)

Proposed disease severity level	Findings observable upon dilated ophthalmoscopy
No apparent retinopathy	No abnormalities
Mild NPDR***	Microaneurysms only
Moderate NPDR	More than just microaneurysms but less than severe NPDR
Severe NPDR	Any of the following: >20 intraretinal hemorrhages in each of 4 quadrants Definite venous beading in 2+ quadrants Prominent intraretinal microvascular abnormalities in 1+ quadrant And no signs of proliferative retinopathy
PDR	One or more of the following: Neovascularization Vitreous/ preretinal hemorrhage

***NPDR = Non proliferative diabetic retinopathy,

Table III: Demographics of Diabetic Patients by Status of DR, National Eye Database, 2007

	All N=10856		Without DR N=5558		With DR N=4145		% within the group
	57.2		56.7		56.8		
Mean Age, years	No.	%	No.	%	No.	%	
Age group, years							
<30	196	1.8	156	2.8	33	0.8	16.8
30-<60	5725	52.8	2960	56	2412	58.2	42.1
>=60	4232	38.9	2080	41	1404	33.9	33.2
Missing	703	6.5	362	6.5	296	7.1	42.1
Gender							
Male	4863	44.8	2481	44.6	1907	46.0	39.2
Female	5927	54.6	3060	55.1	2211	53.3	37.3
Missing	66	0.6	17	0.3	27	0.7	40.9
Ethnic							
Malay	5857	54.0	2877	51.8	2324	56.1	39.7
Chinese	2523	23.2	1309	23.6	970	23.4	38.4
Indian	1996	18.4	1101	19.7	729	17.6	36.5
Other	395	3.6	232	4.2	96	2.3	24.3
Missing	85	0.8	114	2.1	47	1.1	55.3

Table IV: Number and percentages of diabetic patients by past medical and ocular history, National Eye Database, 2007

	No.	%
Types of DM		
Type II	9995	92.0
Type I	571	5.3
Missing	290	2.7
Duration of DM, years		
<5	3612	33.3
5-10	3355	30.8
>10-20	1625	15.0
>20	333	3.1
Missing	1931	17.8
Types of treatment		
Oral medication	8958	82.0
Insulin	1393	11.8
Other	727	6.2
Systematic co-morbidity		
None	2463	22.7
HPT	6935	63.9
Hypercholesterolemia	1981	18.2
IHD	1203	11.1
Renal Impairment	632	5.8
CVA	260	2.4
Amputation	70	0.6
Others	1064	9.7
Smoking	991	9.1
Pregnant	160	3.3% among female
Ocular co-morbidity		
None	4435	40.9
Cataract	4799	44.2
Glaucoma	337	3.1
Rubeosis irides	58	0.5
Others	445	4.1

Table V: Number and percentages of diabetic patients by sources of referral to Ophthalmology clinics, National Eye Database, 2007

Sources of referral	N=10856	
	No.	%
Government OPD clinic/Klinik Kesihatan/Klinik Desa	6576	60.6
Government hospital-MO or specialist	3378	31.1
General Practitioner (GP)	133	1.2
Private Hospital-MO or specialists	82	0.8
Optometrists	14	0.1
Others	38	0.4
Missing	635	5.8

Table VI : Number and percentages of diabetic patients by past history of eye examination, National Eye Database, 2007

Eye examination	N=10856	
	No.	%
Never had eye examination before	7701	70.9
Had eye examination before	1871	17.2
• Last 1 year	1354	71.9
• Last 1-2 years	79	4.2
• > 2 years	1	0.1
• Missing	450	23.9
Missing	1284	11.8

Table VII: Number and percentages of diabetic patients by severity of diabetic retinopathy and maculopathy, National Eye Database, 2007

Severity of Diabetic Retinopathy	Right Eye n=9575		Left Eye n=9556		All eyes N=19131	
	No.	%	No.	%	No.	%
No apparent diabetic retinopathy	6058	63.3	6051	63.3	12109	63.3
Mild non proliferative diabetic retinopathy	1578	16.5	1573	16.5	3151	16.5
Moderate non proliferative diabetic retinopathy	931	9.7	944	9.9	1875	9.8
Severe non proliferative diabetic retinopathy	337	3.5	307	3.2	644	3.4
Proliferative diabetic retinopathy	671	7.0	681	7.1	1352	7.1
	n=10381		n=10428		n=20809	
Maculopathy	1002	9.7	979	9.4	1981	9.5
Clinical significant macular edema	432	4.2	434	4.2	866	4.2
Vision threatening retinopathy	1440	14.7	1422	14.5	2862	14.7

Table VIII: Number and percentages of diabetic patients by treatment plans, National Eye Database, 2007

Treatment plans	N=10856	
	No.	%
Follow up only	9038	83.3
Need laser	1103	10.2
Need vitrectomy	332	3.1
Need further assessment such as FFA	49	0.5
Missing	631	5.8

DISCUSSION

With 69.8% coverage, data collected on 10,856 at diabetic eye registry is relatively representative of all new diabetic patients seen at MOH Ophthalmology clinics.

NHMS III estimated the prevalence of known diabetics among population 18 years and older as 7.0%²². This gives an estimate of 1,492,665 people who needed regular eye examinations in Malaysia.

Through NHMS indicated as prevalence of known DM is highest among Indians (14.7%) as compared to Malays (7.4%) and Chinese (6.2%)²², and Indians has the highest rate of lower limb amputation (Indian, 4.6%, Malay, 4.1%, Chinese 4.5%), strokes (Indian, 3.1%, Malay, 2.9%, Chinese 5.5%), and kidney transplant or dialysis (Indian, 2.4%, Malay, 1.2%, Chinese 2.3%). They are also most likely to have higher rate of DR, only 18.4% of those seen at eye clinics are Indians. Barriers for accessing health care, especially in terms of affordability and equity, as well as compliance to medical advice among Indian patients warrants a special study.

The diabetic eye registry also showed very few Type I DM (572, 5.3%) patients. This needs further assessment as patients with Type I DM have a higher proportion of DR when compare to Type II DM^{15,17}.

Majority of patients seen were referred from government health care facilities (91.7%) with only 2.0% from private clinics or hospitals. This low rate of referral is compounded by a disturbing fact from the NHMS III that indicated a significant lower proportion of diabetic patients treated at private healthcare facilities ever having fundal examination as compared to patients in the government healthcare facilities (40.3% vs. 50.6%)²². Although only 22.3% diabetics gets treatment from private clinics²², unless their eyes are examined by treating doctors or private ophthalmologists, those with severe DR who would need to be referred would be denied interventions which can actually retard the disease progression and prevent blindness. Private health care providers need to take a holistic approach in managing diabetic patients and ensure comprehensive medical examination to detect complications which should include annual vision and fundal check as recommended in clinical practice guideline published by MOH/Academy of Medicine²³ and preferred practice pattern by the America Academy of Ophthalmology¹⁹.

As DM complications escalate during pregnancy, clinical practice guideline^{19,23} recommended that diabetics must have their baseline eye examination at the time of conception and at every trimester. The fact revealed a worrisome finding; where less than half of pregnant diabetic had a first eye examination at first trimester or earlier. The knowledge that

diabetics who become pregnant require eye examination at a shorter interval needs to be made known to all doctors and antenatal nurses.

Only one third of the patients who were seen for the first time at ophthalmology clinics has ever had a prior eye examination. This figure is worst than the population based survey at NHMS III where 45% reported ever having their eye(s) checked²².

The distribution of types of DR seen in the patients registered to this registry is comparable to findings from the population based study in Singapore⁵, and DiabCare Asia project at 19 hospitals in Malaysia¹⁰, an inner-city primary care clinic in Australia¹² and Veterans Affairs Medical Center in USA¹³ as shown in Table I.

However, patients seen at MOH clinics had a higher rate of VTR. For every 10 diabetic patients seen for the first time at ophthalmology clinic, 1.5 of them may become irreversibly blind.

Diabetic eye screening should be done where patients receive his/her medical treatment. Detection of severe DR indicates poor blood sugar or blood pressure control. Immediate action in terms of advice to patient to modify their lifestyle and diet, and adjustment of medication for good DM control is necessary to regress or retard DR progression. Patients with more severe DR or those with maculopathy should be referred early to ophthalmology clinics for closer monitoring and laser photocoagulation when indicated.

Management of diabetics need a coordinated team approach from all parties who come into contact with the patients. Nurses and dietician who provide counseling, pharmacists who dispense and counsel on medicine, doctors who provide diabetic medical treatment and opticians or optometrists who prescribe glasses, should remind diabetics patients of the necessary scheduled eye examination. Patients need to be constantly motivated for best possible metabolic control. Warning of potential disability such as blindness, loss of limbs, renal failure requiring dialysis or kidney transplant may be the best motivation to achieve that.

CONCLUSION

Diabetic eye registry provides reliable and useful information for health care policy makers in evaluating the national diabetic program and for participating ophthalmology departments in assessing magnitude of diabetic retinopathy and the eye status among patients referred. Eye care providers who conduct diabetic eye screening, either public or private, are welcome to participate in this web-based registry.

Findings from the 2007 diabetic eye registry clearly revealed the suboptimal eye screening among diabetics, especially among Indians, Type I DM, diabetics who are pregnant and overall infrequent eye examination which cuts across all diabetics. If remedial actions are not taken, many diabetics who are at their prime, productive age group, will be visually impaired or irreversibly blind from DR.

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REFERENCES

1. R Klein, BEK Klein, SE Moss. Visual impairment in Diabetes. *Ophthalmology*. 1984; 91: 1-9.
2. World Health Organization. Prevention of blindness and visual impairment. [webpage]. Available from <http://www.who.int/blindness/causes/priority/en/index6.html>. Accessed 6 July 2008.
3. American Diabetes Association: All about diabetes [webpage]. Available from <http://www.diabetes.org/about-diabetes.jsp>. Accessed 16 January 2004.
4. Fong DS, Llyod P A, Frederick LF, Ronald Klein. Diabetic retinopathy. *Diabetes Care*. 2004; 27: 2540-553 .
5. Tien Y, Wong, MD, PhD,1,2,3 Ning Cheung, MBBS,1 Wan Ting Tay, Prevalence and Risk Factors for Diabetic Retinopathy. The Singapore Malay Eye Study. *Ophthalmology* 2008 (in press).
6. Shirwas SR, Rhaman Isa AB, Reddy SC, *et. al*. Risk factors for diabetic retinopathy in Diabetes mellitus in Kelantan, Malaysia. *Med. J Malaysia* 1996; 51: 447-52.
7. Mustaffa BE, Wan Mohamad WB, Chan SP, *et. al*. The current status of diabetes management in Malaysia. *The Journal of the ASEAN Federation of Endocrine Societies* 1998; 16(2): 1-13.
8. DiabCare-Asia: A survey study on diabetes management and diabetes complication status in Asian Countries. Final country report on outcome data and analysis (1998) Malaysia. Novo Nordisk Healthcare. Asia Pacific Centre, Singapore.
9. Mafauzy M. Diabetes control and complications in private primary healthcare in Malaysia. *Med J Malaysia* 2005; 60: 212-7.
10. Mafauzy M for the DiabCare-Malaysia Study Group. Diabetes control and complications in public hospitals in Malaysia. *Med J Malaysia* 2006; 61: 477-48.
11. I Tajunisah, H Nabilah, SC Reddy. Prevalence and risk factors for diabetic retinopathy-A study of 217 patients from University of Malaya Medical Centre. *Med. J Malaysia* 2006; 61: 451-6.
12. Taylor CR, Merin LM, Salunga AM, Improving diabetic retinopathy screening ratios using telemedicine-based digital retinal imaging technology: the Vine Hill study. *Diabetes Care*. 2007; 30(3): 574-8.
13. Cavallerano AA, Cavallerano JD, Katalinic P, *et. al*. A telemedicine program for diabetic retinopathy in a Veterans Affairs Medical Center--the Joslin Vision Network Eye Health Care Model. *Am J Ophthalmol*. 2005; 139(4): 597-604.
14. WM Wan Nazaimoon a*, R Letchuman B, N Noraini, *et al*. Systolic hypertension and duration of diabetes mellitus are important determinants of retinopathy and microalbuminuria in young diabetics. *Diabetes Research and Clinical Practice* 1999; 46: 213-21.
15. The Eye Disease Prevalence Research Group. The Prevalence Of Diabetic Retinopathy Among Adult Type 1 Diabetic Person In The Untied State. *Arch Ophthalmol* 2004; 122; 246-551.
16. The Eye Disease Prevalence Research Group. The Prevalence of Diabetic Retinopathy among Adults in the Untied State. *Arch Ophthalmol* 2004; 122: 252-563.
17. Klein R, Klein BE, Moss SE, *et al*. The Wisconsin epidemiologic study of diabetic retinopathy. II. Prevalence and risk of diabetic retinopathy when age at diagnosis is less than 30 years. *Arch Ophthalmol* 1984; 102: 520-6.
18. Klein R, Klein BE, Moss SE, *et al*. The Wisconsin epidemiologic study of diabetic retinopathy. III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. *Arch Ophthalmol* 1984; 102: 527-32.
19. American Academy of Ophthalmology. Preferred Practice Pattern: Diabetic retinopathy 2003. San Francisco, Calif: American Academy of Ophthalmology.
20. Stata Statistical Software [computer program]. Release 8.0.College Station, TX: Stata Corp.; 2003.
21. 2007 Report on Monthly Ophthalmology Service, MOH. Available from <http://www.acrm.org.my/ned> Accessed 10 July 2008.
22. Topic 12 Diabetes Mellitus. Volume II. The Third National Health and Morbidity Survey 2006. Institute of Public Health (IPH)2008. Ministry of Health, Malaysia.
23. Clinical Practice Guidelines in the Management of diabetic retinopathy, MOH Publication, 1996.

APPENDIX 4

Case Report Forms

1. Cataract Surgery Registry- Pre-Clerking, Operative , Outcome By 12 Weeks
2. Diabetic Eye Registry
3. Contact Lens-Related Corneal Ulcer Surveillance
4. Glaucoma Registry
5. Retinoblastoma Registry
6. Age Related Macular Degeneration Registry
7. Monthly Ophthalmology Service Census

**CATARACT SURGERY REGISTRY (CSR) :
PRE-CLERKING RECORD**

Office use: /
Centre

*Instruction: This form is to be filled for patient who is going to have Cataract Surgery but excluded secondary IOL Implantation. Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only. * Indicates compulsory field.*

i) Hospital / Clinic: _____

ii) Date : d d m m y y

SECTION 1 : PATIENT PARTICULARS

*1. Patient Name : _____

*2. Identification Card Number : MyKad / MyKid: _____ Old IC: _____
If MyKad/MyKid is not available, please complete the Old IC or Other ID document No. Other ID document No: _____ Specify type (eg.passport, armed force ID): _____

3. Address : Postcode : _____ Town / City: _____ State: _____

*4a. Date of Birth: d d m m y y y y *4b. Age at notification: (Auto Calculated) year(s) month(s)
(in years) or (in months if <1 yr old)

*5. Gender: Male Female 6. Ethnic Group: Malay Indian Melanau Iban Other, specify : _____
 Chinese Orang Asli Kadazan/Murut/Bajau Bidayuh _____

SECTION 2: MEDICAL HISTORY

(check one box as appropriate)

***1. Surgery On:**
 First eye Date of first eye surgery: _____
 Second eye → Intra-op complications: Yes No

2. Past Ocular Surgery of the Eye to be operated
 None Filtering Surgery
 Vitreoretinal Surgery Pterygium Excision
 Penetrating Keratoplasty Other, specify: _____

3. Cause Of Cataract
 Primary OR Secondary
a) If primary:
 Senile/age related
 Congenital
 Developmental
 Other, _____
b) If Secondary:
 Trauma
 Drug Induced
 Surgery Induced
 Other, _____

***4. Ocular Comorbidity of the Eye to be operated**

(check one or more boxes below if present) None

a) ANTERIOR SEGMENT:
 Pterygium involving the cornea
 Corneal Opacity
 Glaucoma
 Chronic Uveitis
 Pseudoexfoliation

b) MISCELLANEOUS:
 Amblyopia
 Significant previous eye trauma
 Pre-existing non glaucoma field defect (eg. CVA)

Lens Related Complication
 Phacomorphic
 Phacolytic
 Subluxated / Dislocated

c) POSTERIOR SEGMENT:
Diabetic Retinopathy
 Non Proliferative Diabetic Retinopathy
 Proliferative Diabetic Retinopathy
 Maculopathy
 Vitreous haemorrhage
 ARMD
 Other macular disease (includes hole or scar)
 Optic nerve disease, any type
 Retinal detachment
 Cannot be assessed
 Other ocular comorbidity, specify: _____

5. Systemic Comorbidity

(check one or more boxes below if present)

None Renal Failure
 Hypertension Cerebrovascular accident
 Diabetes Mellitus COAD / Asthma
 Ischaemic Heart Disease
 Other, specify: _____

SECTION 3: PREOPERATIVE VISUAL ACUITY MEASUREMENT

Vision	a) Right	b) Left
*Unaided :		
With glasses / Pin Hole :		
Refracted :		
Refraction :	Sp: <input type="radio"/> + <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="radio"/> - <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Sp: <input type="radio"/> + <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="radio"/> - <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	Cy: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Cy: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	Axis: <input type="text"/> <input type="text"/>	Axis: <input type="text"/> <input type="text"/>

SECTION 4: SURGICAL PLAN (Do not need to enter into NED)

1. Date of admission : d d m m y y 2. Date of Operation: d d m m y y

Operation	Eye	Type	Anaesthesia	Team / doctor
	<input type="radio"/> Right <input type="radio"/> Left			
IOL details :	Power	A-Constant	Brand	
5. Pre-op Instructions :				

SECTION 5: PLANNED REFRACTIVE POWER FOR OPERATED EYE

Planned refractive power (in Diopter, with + or - sign)
(It is the value next to the selected IOL power printed on A Scan and in most cases within -0.5 to 0)

+
 -

CATARACT SURGERY REGISTRY (CSR) : OPERATIVE RECORD

Instruction: Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only. * indicates compulsory field.

Office use:
Centre:

i) Hospital / Clinic : _____

ii) Patient Name _____

iii) Identification Card Number : MyKad / MyKid: - - Old IC:
Other ID document No: → Specify type (eg. passport, armed force ID):
If MyKad/MyKid is not available, please complete the Old IC or Other ID document No.

SECTION 1 : OPERATIVE DATA

1a. Surgeon status: Specialist Gazetting specialist Medical officer
*1b. Name of Surgeon: _____
2. Type of Admission: Day Care Not Day Care
*3. Date Of Cataract Operation(dd/mm/yy):
4a. Time: Start: (24 hours)
End: (24 hours)
4b. Duration of cataract operation:

5. SURGERY	6. ANAESTHESIA	7. IOL
<p>*a) Operated Eye:</p> <p><input type="radio"/> Right <input type="radio"/> Left</p> <p>*b) Type:</p> <p><input type="radio"/> Phaco <input type="radio"/> ECCE <input type="radio"/> Phaco converted to ECCE <input type="radio"/> ICCE <input type="radio"/> Lens aspiration <input type="radio"/> Other, specify: _____</p> <p>c) Combined: (check <input checked="" type="checkbox"/> one or more boxes below if perform)</p> <p><input type="checkbox"/> Pterygium surgery <input type="checkbox"/> Filtering surgery <input type="checkbox"/> Vitreo-retinal surgery <input type="checkbox"/> Penetrating Keratoplasty <input type="checkbox"/> Other, specify: _____</p>	<p>a) Type of Anaesthesia:</p> <p><input type="radio"/> General <input type="radio"/> Local ↓ If local</p> <p>(check <input checked="" type="checkbox"/> one or more boxes below)</p> <p>(i) Type:</p> <p><input type="checkbox"/> Retrobulbar <input type="checkbox"/> Peribulbar <input type="checkbox"/> Subtenon <input type="checkbox"/> Subconjunctival <input type="checkbox"/> Facial block <input type="checkbox"/> Topical <input type="checkbox"/> Intracameral</p> <p>(ii) Type of sedation:</p> <p><input type="checkbox"/> None <input type="checkbox"/> Oral <input type="checkbox"/> Intravenous <input type="checkbox"/> Intramuscular</p>	<p>*a) IOL:</p> <p>If Yes -> <input type="radio"/> Posterior chamber IOL <input type="radio"/> Anterior chamber IOL <input type="radio"/> Scleral fixated PCIOL</p> <p>If No -> <input type="radio"/> IOL planned, but not implanted <input type="radio"/> No IOL was planned or implanted <input type="radio"/> Other, specify: _____</p> <p>b) Material:</p> <p><input type="radio"/> PMMA <input type="radio"/> Silicone <input type="checkbox"/> Hydrophobic <input type="checkbox"/> Hydrophilic <input type="radio"/> Acrylic → <input type="checkbox"/> Hydrophobic <input type="checkbox"/> Hydrophilic <input type="radio"/> Other, specify: _____</p> <p>c) Type:</p> <p><input type="radio"/> Foldable <input type="radio"/> Non-Foldable</p>

***8. Intra-Operative Complications** (check one or more boxes below if present)

None
 Posterior capsule rupture
 Vitreous Loss
 Zonular dehiscence
 Drop nucleus
 Suprachoroidal haemorrhage
 Central corneal oedema
 Other, specify: _____

CATARACT SURGERY REGISTRY (CSR): CATARACT SURGERY OUTCOMES THROUGH 12 WEEKS POST-OP

*Instruction: Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only. * indicates compulsory field.*

Office use:
Centre:

i) Hospital / Clinic : _____

ii) Patient Name _____

iii) Identification Card Number : MyKad / MyKid: - - Old IC:

Other ID document No: → Specify type (eg. passport, armed force ID):

If MyKad/MyKid is not available, please complete the Old IC or Other ID document No.

iv) Date of outcome notification (dd/mm/yy) : v) Date of Cataract Operation (dd/mm/yy) : auto

SECTION 1 : POST-OP COMPLICATIONS

(check if the following complication are noted during the first 12 weeks post-operative period)

- a) None b) Infective endophthalmitis c) Unplanned Return To OT

(If Yes) ↓

Date of Diagnosis (dd/mm/yy):

(If Yes) ↓

Reasons	Check one or more boxes below <input checked="" type="checkbox"/>	Date (dd/mm/yy)
a) Iris prolapse	<input type="checkbox"/>	<input type="text"/>
b) Wound dehiscence	<input type="checkbox"/>	<input type="text"/>
c) High IOP	<input type="checkbox"/>	<input type="text"/>
d) IOL related	<input type="checkbox"/>	<input type="text"/>
e) Infective endophthalmitis	<input type="checkbox"/>	<input type="text"/>
f) Other, specify:	<input type="checkbox"/>	<input type="text"/>

SECTION 2 : POST-OP VISUAL ACUITY MEASUREMENT

(Last recorded visual acuity within 12 weeks post-op period operated eye only)

a. Post Operative Period	b. UNAIDED VISION		c. WITH GLASSES/ PIN HOLE		d. REFRACTED VISION (Record of refractive power in diopter is mandatory for operated eye (right/left), if refraction is performed)					
	(i) Right	(ii) Left	(i) Right	(ii) Left	(i) Right			(ii) Left		
Date: <input type="text"/> <input type="text"/> <input type="text"/> dd mm yy										
Post-op _____ weeks (auto calculated)					Sp	Cy	Axis	Sp	Cy	Axis
					<input type="radio"/> + <input type="text"/> . <input type="text"/>	<input type="radio"/> - <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/> + <input type="text"/> . <input type="text"/>	<input type="radio"/> - <input type="text"/> . <input type="text"/>	<input type="text"/>

e. No record of post-operative visual acuity → Reason for no post-op visual acuity record

lost to follow-up
 discharged by doctor
 unable to take vision
 others, specify: _____

f. Factor if post-op refracted VA worse than 6/12 (for operated eye only)
(check one or more boxes below if present)

High astigmatism Cornea decompensation
 Posterior capsular opacity IOL decentration / dislocation
 Cystoid macular edema Retinal detachment
 Infective endophthalmitis
 Preexisting ocular comorbidity, state what: _____
 Other, specify: _____

DIABETIC EYE REGISTRY Office use: / Centre:

Instruction: This data collection form is to be filled for all diabetic patients who are seen for the first time at Ophthalmology clinic, include diabetic patients who are referred for reasons other than diabetic eye screening. Exclude patients who have regular fundal examination by trained eye care providers such as optometrists, MO or ophthalmologists in other centres.
Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only. * indicates compulsory field.

*i) Hospital / Clinic _____ *ii) Date of notification (dd/mm/yy)

SECTION 1 : PATIENTS DEMOGRAPHY AND MEDICAL HISTORY

*1. Patient Name :													
*2. Identification Card Number : <small>If MyKad/MyKid is not available, please complete the Old IC or Other ID document No.</small>		MyKad / MyKid: <input type="text"/>				- - <input type="text"/>				Old IC: <input type="text"/>			
		Other ID document No: <input type="text"/>				Specify type (eg.passport, armed force ID): <input type="text"/>							
3. Residential area :		Postcode : <input type="text"/>			Town / City: <input type="text"/>			State: <input type="text"/>					
*4a. Date of Birth:		d <input type="text"/>		d <input type="text"/>		m <input type="text"/>		m <input type="text"/>		y <input type="text"/>		y <input type="text"/>	
		*4b. Age of notification: Auto Calculated				<input type="text"/> year(s)		<input type="text"/> month(s)					
*5. Gender:		<input type="radio"/> Male <input type="radio"/> Female		6. Ethnic Group:									
				<input type="radio"/> Malay		<input type="radio"/> Indian		<input type="radio"/> Melanau		<input type="radio"/> Iban		<input type="radio"/> Other, specify: _____	
				<input type="radio"/> Chinese		<input type="radio"/> Orang Asli		<input type="radio"/> Kadazan/Murut/Bajau		<input type="radio"/> Bidayuh			
7. Source of referral :		<input type="radio"/> Government OPD clinic / Klinik Kesihatan / Klinik Desa				<input type="radio"/> General Practitioner (GP)				<input type="radio"/> Optometrists/ Optician			
		<input type="radio"/> Government Hospital - MO or specialist				<input type="radio"/> Private Hospital - MO or specialists				<input type="radio"/> Others, specify: _____			
8. Type of DM :		<input type="radio"/> Type II		<input type="radio"/> Type I		<input type="radio"/> Pre-diabetic							
9. Duration of DM :		<input type="text"/> month(s)		<input type="text"/> year(s)									
10. Treatment :		<input type="checkbox"/> Oral Medication only		<input type="checkbox"/> Insulin only		<input type="checkbox"/> Oral medication and insulin		<input type="checkbox"/> Other, specify: _____					
11. Systemic co-morbidity :						12. Risk factors :							
<input type="checkbox"/> None		<input type="checkbox"/> IHD		<input type="checkbox"/> Amputation		<input type="checkbox"/> Current Smoker							
<input type="checkbox"/> HPT		<input type="checkbox"/> CVA		<input type="checkbox"/> Peripheral neuropathy		<input type="checkbox"/> Pregnant → If yes, trimester: <input type="radio"/> 1st <input type="radio"/> 2nd <input type="radio"/> 3rd							
<input type="checkbox"/> Renal Impairment		<input type="checkbox"/> Foot ulcer		<input type="checkbox"/> Other, specify: _____									
<input type="checkbox"/> Hypercholesterolemia		<input type="checkbox"/> Anemia											
13. Ocular Co-morbidity :						14. Has patient had fundus examination before?							
<input type="checkbox"/> None		<input type="checkbox"/> Glaucoma		<input type="checkbox"/> Cataract		<input type="checkbox"/> Other, specify: _____		<input type="radio"/> Yes <input type="radio"/> No					
								Date of last fundal examination (mm/yy) : <input type="text"/> <input type="text"/>					

SECTION 2 : OCULAR FINDINGS AND MANAGEMENT

1. Visual acuity :		a) Right eye				b) Left eye			
		Unaided : <input type="text"/>		With glasses/ Pin hole : <input type="text"/>		Unaided : <input type="text"/>		With glasses / Pin hole: <input type="text"/>	
*2. Fundus Finding :		a) Right eye:				b) Left eye:			
		<input type="radio"/> No view, comments: _____				<input type="radio"/> No view, comments: _____			
		<input type="radio"/> No Diabetic Retinopathy				<input type="radio"/> No Diabetic Retinopathy			
		<input type="radio"/> Has Diabetic Retinopathy (DR)				<input type="radio"/> Has Diabetic Retinopathy (DR)			
		i. Diabetic retinopathy type				i. Diabetic retinopathy type			
		<input type="radio"/> Mild non proliferative diabetic retinopathy				<input type="radio"/> Mild non proliferative diabetic retinopathy			
		<input type="radio"/> Moderate non proliferative diabetic retinopathy				<input type="radio"/> Moderate non proliferative diabetic retinopathy			
		<input type="radio"/> Severe non proliferative diabetic retinopathy				<input type="radio"/> Severe non proliferative diabetic retinopathy			
		<input type="radio"/> Proliferative diabetic retinopathy, including quiescent PDR				<input type="radio"/> Proliferative diabetic retinopathy, including quiescent PDR			
		<input type="radio"/> Advanced diabetes eye disease				<input type="radio"/> Advanced diabetes eye disease			
		<input type="checkbox"/> Persistent vitreous haemorrhage				<input type="checkbox"/> Persistent vitreous haemorrhage			
		<input type="checkbox"/> Tractional retinal detachment				<input type="checkbox"/> Tractional retinal detachment			
		ii. Maculopathy → <input type="radio"/> Yes <input type="radio"/> No				ii. Maculopathy → <input type="radio"/> Yes <input type="radio"/> No			
3. Fundus photograph taken : (one or both eyes)		<input type="radio"/> Yes		<input type="radio"/> No					
4. Plan :		<input type="checkbox"/> Routine follow up as scheduled (patient do not need treatment)				<input type="checkbox"/> Need further assessment such as FFA			
		<input type="checkbox"/> Need procedures →		<input type="checkbox"/> Need laser →		Type of laser : <input type="checkbox"/> Focal laser			
						<input type="checkbox"/> Pan retinal photocoagulation (PRP)			
		<input type="checkbox"/> Need Vitreoretinal surgery		<input type="checkbox"/> Need glaucoma procedure for rubeotic glaucoma					
		<input type="checkbox"/> Others, state: _____							

CONTACT LENS RELATED CORNEAL ULCER SURVEILLANCE

Office use: /
Centre:

Instruction: Please notify all contact lens related corneal ulcer at the time patient is diagnosed by filling in or enter to eNED. Please complete Section 3 and Section 4 by 3 months.

Where check boxes are provided, check (√) one or more boxes. Where radio buttons are provided, check (√) one box only. * indicates compulsory field.

*i) Hospital / Clinic: _____ *ii) Dr in charge : _____

SECTION 1 : DEMOGRAPHICS

*1. Patient Name :																						
*2. Identification Card Number : <small>If MyKad/MyKid is not available, please complete the Old IC or Other ID document No.</small>	MyKad / MyKid:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Old IC:	<input type="text"/>					
	Other ID document No:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Specify type (eg.passport, armed force ID):	<input type="text"/>				
3. Address :		Postcode :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Town / City:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	State:	<input type="text"/>					
*4a. Date of Birth:		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	*4b. Age at presentation: Auto Calculated	<input type="text"/>	year(s)	<input type="text"/>	<input type="text"/>	month(s)
*5. Gender:	<input type="radio"/> Male <input type="radio"/> Female	6. Ethnic:	<input type="radio"/> Malay	<input type="radio"/> Indian	<input type="radio"/> Melanau	<input type="radio"/> Iban	<input type="radio"/> Other, specify:															
7. Source of referral :		<input type="radio"/> Government OPD clinic / Klinik Kesihatan / Klinik Des	<input type="radio"/> Chinese	<input type="radio"/> Orang Asli	<input type="radio"/> Kadazan/Murut/Bajau	<input type="radio"/> Bidayuh	<input type="radio"/> Government Hospital - MO or specialist	<input type="radio"/> General Practitioner (GP)	<input type="radio"/> Private Hospital - MO or specialists	<input type="radio"/> Optometrists/ Optician	<input type="radio"/> Others, specify:											

SECTION 2 : OCULAR HISTORY

*1. Date of Presentation:		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	*2. Duration of Symptoms:	<input type="text"/>	(days)							
*3. Affected eye :		<input type="radio"/> Right Eye			<input type="radio"/> Left Eye			<input type="radio"/> Both Eye											
4. Vision at Presentation :		Right eye						Left eye											
		a) Unaided:	<input type="text"/>	b) With glasses / pinhole:	<input type="text"/>	<input type="text"/>	<input type="text"/>	a) Unaided:	<input type="text"/>	b) With glasses / pinhole:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>					
5. Presumptive causative organism :		<input type="checkbox"/> Bacteria	<input type="checkbox"/> Fungus	<input type="checkbox"/> Acanthamoeba	<input type="checkbox"/> Others, specify: _____														
6. Laboratory investigation specimen sent :		<input type="checkbox"/> Corneal scraping <input type="checkbox"/> Contact lens <input type="checkbox"/> Contact lens solution <input type="checkbox"/> PCR for fungus <input type="checkbox"/> Not sent																	
7. Type of Contact Lens :		<input type="checkbox"/> Daily Disposable <input type="checkbox"/> Weekly Disposable <input type="checkbox"/> 2 weekly Disposable <input type="checkbox"/> Cosmetic coloured contact lens <input type="checkbox"/> Extended wear <input type="checkbox"/> Rigid gas permeable <input type="checkbox"/> Monthly Disposable <input type="checkbox"/> Others, specify : _____																	
8. Brand of Contact lens :		e.g. Pure Vision (Bausch & Lomb), Acuvue (Johnson & Johnson), Biomedic (Cooper Vision), Focus Night & Day (Ciba Vision)																	
9. Wearing Pattern :		<input type="checkbox"/> Daily Wear (removes before sleep)						<input type="checkbox"/> Extended wear (sleeps with lens on)											
10. Cleaning Solution :		<input type="checkbox"/> Alcon	<input type="checkbox"/> Bausch and Lomb	<input type="checkbox"/> Allergan (AMO)	<input type="checkbox"/> Ciba Vision	<input type="checkbox"/> Opto-medic	<input type="checkbox"/> Freskon	<input type="checkbox"/> Sauflon	<input type="checkbox"/> Multisoft	<input type="checkbox"/> I-Gel	<input type="checkbox"/> Medivue	<input type="checkbox"/> Normal Saline	<input type="checkbox"/> Simvue	<input type="checkbox"/> Multimate	<input type="checkbox"/> Pharmasafe Multipurpose solution	<input type="checkbox"/> Tap Water	<input type="checkbox"/> Others, specify : _____	<input type="checkbox"/> Do not use because of daily wear	<input type="checkbox"/> Not known
11. Ocular Trauma :		<input type="radio"/> Yes, specify: _____						<input type="radio"/> No											

SECTION 3 : CULTURE RESULTS BY 3 MONTHS AFTER PRESENTATION

1. Corneal Scraping :		<input type="checkbox"/> Negative (No growth)	<input type="checkbox"/> Bacterial, specify: _____	<input type="checkbox"/> Not Sent	<input type="checkbox"/> Missing data	
		<input type="checkbox"/> Acanthamoeba	<input type="checkbox"/> Fungal, specify: _____	<input type="checkbox"/> Others, specify: _____		
2. Contact lens :		<input type="checkbox"/> Negative (No growth)	<input type="checkbox"/> Bacterial, specify: _____	<input type="checkbox"/> Not Sent	<input type="checkbox"/> Missing data	
		<input type="checkbox"/> Acanthamoeba	<input type="checkbox"/> Fungal, specify: _____	<input type="checkbox"/> Others, specify: _____		
3. Contact lens solution :		<input type="checkbox"/> Negative (No growth)	<input type="checkbox"/> Bacterial, specify: _____	<input type="checkbox"/> Not Sent	<input type="checkbox"/> Missing data	
		<input type="checkbox"/> Acanthamoeba	<input type="checkbox"/> Fungal, specify: _____	<input type="checkbox"/> Others, specify: _____		
4. PCR :		<input type="radio"/> Detected, specify type of organism: _____			<input type="radio"/> Not Detected	<input type="radio"/> Not Sent

SECTION 4 : OUTCOME BY 3 MONTHS AFTER PRESENTATION

1. Final Diagnosis: (based on lab results and clinical response to treatment)		<input type="checkbox"/> Bacterial, specify: _____			<input type="checkbox"/> Fungal, specify: _____									
		<input type="checkbox"/> Acanthamoeba			<input type="checkbox"/> Uncertain			<input type="checkbox"/> Others, specify: _____						
2. Vision by 3 months after presentation:		Right eye						Left eye						
		a) Unaided:	<input type="text"/>	b) With glasses / pinhole:	<input type="text"/>	<input type="text"/>	<input type="text"/>	a) Unaided:	<input type="text"/>	b) With glasses / pinhole:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. Corneal Perforation :		<input type="radio"/> Yes						<input type="radio"/> No						
4. Surgery :		<input type="checkbox"/> No <input type="checkbox"/> Penetrating keratoplasty <input type="checkbox"/> Eviseration <input type="checkbox"/> Cornea Gluing <input type="checkbox"/> Other, specify: _____												
5. Case Referred to other center :		<input type="radio"/> Yes, specify hospital: _____						<input type="radio"/> No						

GLAUCOMA REGISTRY

Office use: /
Centre:

Instruction: This form is to be filled for patient who has glaucoma including glaucoma suspect. Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only.

i) Hospital : _____ ii) Date of notification (dd/mm/yy): / / iii) Type of case: New Follow-up

SECTION 1 : PATIENT PARTICULARS

1. Name of Patient : *			
2. Identification Card Number : *		MyKad / MyKid: <input type="text"/> - <input type="text"/> - <input type="text"/>	
<i>If MyKad/MyKid is not available, please complete the Old IC or Other ID document</i>		Other ID : (specify) (eg. old IC, passport, armed force, hospital registration No.) <input type="text"/> No. : <input type="text"/>	
3. Address :		Postcode: <input type="text"/> Town / City: <input type="text"/> State: <input type="text"/>	
4a. Date of Birth: *		4b. Age at notification: * (Auto Calculated)	
d d m m y y		<input type="text"/> year(s) <input type="text"/> month(s)	
5. Gender: *	<input type="radio"/> Male <input type="radio"/> Female	6. Ethnic Group: *	<input type="radio"/> Malay <input type="radio"/> Indian <input type="radio"/> Melanau <input type="radio"/> Iban <input type="radio"/> Other, specify : _____ <input type="radio"/> Chinese <input type="radio"/> Orang Asli <input type="radio"/> Kadazan/Murut/Bajau <input type="radio"/> Bidayuh
7. Occupation: *	<input type="radio"/> Government employed <input type="radio"/> Private employed <input type="radio"/> Self employed <input type="radio"/> Unemployed		

SECTION 2 : ASSOCIATE FACTORS *

1. Medical History :	<input type="checkbox"/> None <input type="checkbox"/> Hypertension <input type="checkbox"/> Cardiac disease <input type="checkbox"/> Vasospastic disease <input type="checkbox"/> History of steroid therapy
	<input type="checkbox"/> Diabetes <input type="checkbox"/> Hypercholesterolemia <input type="checkbox"/> Stroke <input type="checkbox"/> Respiratory diseases <input type="checkbox"/> Family history of glaucoma

SECTION 3 : OCULAR EXAMINATION *

1. Eye(s) affected:	<input type="radio"/> Right eye only <input type="radio"/> Left eye only <input type="radio"/> Both eyes						
	a) OD		b) OS				
2. VA:	(i) : <input type="checkbox"/> Unobtainable	(ii) Unaided : <input type="text"/>	(iii) With glasses/pH : <input type="text"/>	(i) : <input type="checkbox"/> Unobtainable	(ii) Unaided : <input type="text"/>	(iii) With glasses/pH : <input type="text"/>	
3. CUP-DISC RATIO (VERTICAL) :	<input type="radio"/> 0.1 <input type="radio"/> 0.2 <input type="radio"/> 0.3	<input type="radio"/> 0.4 <input type="radio"/> 0.5 <input type="radio"/> 0.6	<input type="radio"/> 0.7 <input type="radio"/> 0.8 <input type="radio"/> 0.9 <input type="radio"/> No view	<input type="radio"/> 0.1 <input type="radio"/> 0.2 <input type="radio"/> 0.3	<input type="radio"/> 0.4 <input type="radio"/> 0.5 <input type="radio"/> 0.6	<input type="radio"/> 0.7 <input type="radio"/> 0.8 <input type="radio"/> 0.9 <input type="radio"/> No view	<input type="radio"/> 1.0 <input type="radio"/> Undetermined

SECTION 4 : DIAGNOSIS *

1. Diagnosis :	a) OD		b) OS		
	(i) Primary	(ii) Secondary	(i) Primary	(ii) Secondary	
<input type="radio"/> Congenital <input type="radio"/> POAG <input type="radio"/> Glaucoma suspect <input type="radio"/> Others, specify: _____	<input type="radio"/> OHT <input type="radio"/> PACG <input type="radio"/> PAC <input type="radio"/> PAC suspect	<input type="radio"/> PEX <input type="radio"/> Rubeotic <input type="radio"/> Posttraumatic <input type="radio"/> Steroid Induced <input type="radio"/> Malignant <input type="radio"/> Mixed Type <input type="radio"/> Others, specify: _____	<input type="radio"/> PDS <input type="radio"/> Inflammatory <input type="radio"/> Lens induced <input type="radio"/> Post Surgery <input type="radio"/> ICE <input type="radio"/> OHT	<input type="radio"/> Congenital <input type="radio"/> POAG <input type="radio"/> Glaucoma suspect <input type="radio"/> Others, specify: _____	<input type="radio"/> OHT <input type="radio"/> PACG <input type="radio"/> PAC <input type="radio"/> PAC suspect
		<input type="radio"/> PEX <input type="radio"/> Rubeotic <input type="radio"/> Posttraumatic <input type="radio"/> Steroid Induced <input type="radio"/> Malignant <input type="radio"/> Mixed Type <input type="radio"/> Others, specify: _____	<input type="radio"/> PDS <input type="radio"/> Inflammatory <input type="radio"/> Lens induced <input type="radio"/> Post Surgery <input type="radio"/> ICE <input type="radio"/> OHT	<input type="radio"/> PEX <input type="radio"/> Rubeotic <input type="radio"/> Posttraumatic <input type="radio"/> Steroid Induced <input type="radio"/> Malignant <input type="radio"/> Mixed Type <input type="radio"/> Others, specify: _____	<input type="radio"/> PDS <input type="radio"/> Inflammatory <input type="radio"/> Lens induced <input type="radio"/> Post Surgery <input type="radio"/> ICE <input type="radio"/> OHT

SECTION 5 : MANAGEMENT *

	a) OD		b) OS	
1. No treatment : (NPL or poor visual potential eye)	<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No	
2. Observation:	<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No	
3. Current Medical Therapy <i>Note : fixed combination consider as 2 drugs</i>	Antiglaucoma medication (topical/systemic) : <input type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Beta-blockers <input type="checkbox"/> Alpha-adrenergic <input type="checkbox"/> Systemic CAIs <input type="checkbox"/> Prostaglandins <input type="checkbox"/> Hyperosmotic agents <input type="checkbox"/> Topical CAIs <input type="checkbox"/> Cholinergics <input type="checkbox"/> Others, specify: _____		Antiglaucoma medication (topical/systemic) : <input type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Beta-blockers <input type="checkbox"/> Alpha-adrenergic <input type="checkbox"/> Systemic CAIs <input type="checkbox"/> Prostaglandins <input type="checkbox"/> Hyperosmotic agents <input type="checkbox"/> Topical CAIs <input type="checkbox"/> Cholinergics <input type="checkbox"/> Others, specify: _____	
4. Previous Laser Therapy	<input type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Iridotomy <input type="checkbox"/> Trabeculoplasty <input type="checkbox"/> Endocyclodiode <input type="checkbox"/> Iridoplasty <input type="checkbox"/> Transcleral Cyclodiode <input type="checkbox"/> Others, specify: _____		<input type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Iridotomy <input type="checkbox"/> Trabeculoplasty <input type="checkbox"/> Endocyclodiode <input type="checkbox"/> Iridoplasty <input type="checkbox"/> Transcleral Cyclodiode <input type="checkbox"/> Others, specify: _____	
5. Previous Surgery	<input type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Trabeculectomy (plain) <input type="checkbox"/> Trabeculectomy (augmented) <input type="checkbox"/> Drainage Device <input type="checkbox"/> Cryotherapy <input type="checkbox"/> Needling <input type="checkbox"/> Surgical PI only <input type="checkbox"/> Non Penetrating Surgery <input type="checkbox"/> Goniotomy <input type="checkbox"/> Trabeculotomy <input type="checkbox"/> Others, specify: _____		<input type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Trabeculectomy (plain) <input type="checkbox"/> Trabeculectomy (augmented) <input type="checkbox"/> Drainage Device <input type="checkbox"/> Cryotherapy <input type="checkbox"/> Needling <input type="checkbox"/> Surgical PI only <input type="checkbox"/> Non Penetrating Surgery <input type="checkbox"/> Goniotomy <input type="checkbox"/> Trabeculotomy <input type="checkbox"/> Others, specify: _____	

Examined by : Glaucoma Specialist Glaucoma Fellow Other specialist Medical Officer

RETINOBLASTOMA REGISTRY

Office use: /
Centre:

Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only.
 i) Hospital / Clinic: ii) Dr in charge: iii) Date of Notification: / /

SECTION A : DEMOGRAPHICS

1. Patient Name :			
2. Identification Card * Number : <small>If MyKad/MyKid is not available, please complete the Old IC or Other ID document No.</small>	MyKad / MyKid: <input type="text"/> - <input type="text"/> - <input type="text"/>	Old IC: <input type="text"/>	
	Other ID document No: <input type="text"/>	Specify type (eg. passport, armed force ID): <input type="text"/>	
3. Address :	Postcode: <input type="text"/>	Town / City: <input type="text"/>	State: <input type="text"/>
4. Contact number :	Homephone: <input type="text"/> - <input type="text"/>	H/P: <input type="text"/> - <input type="text"/>	
5. Date of Birth:	<input type="text"/> / <input type="text"/> / <input type="text"/>	6. Age at presentation:	<input type="text"/> year(s) <input type="text"/> month(s)
7. Gender:	<input type="radio"/> Male <input type="radio"/> Female	8. Ethnic:	<input type="radio"/> Malay <input type="radio"/> Indian <input type="radio"/> Melanau <input type="radio"/> Iban <input type="radio"/> Other, specify: <input type="radio"/> Chinese <input type="radio"/> Orang Asli <input type="radio"/> Kadazan/Murut/Bajau <input type="radio"/> Bidayuh

SECTION B : OCULAR HISTORY AND PRESENTATION

1. Clinical presentation:	<input type="checkbox"/> Leukocoria <input type="checkbox"/> Strabismus <input type="checkbox"/> Proptosis <input type="checkbox"/> Others, specify: _____		
2. Age of onset:	<input type="text"/> year(s) <input type="text"/> month(s)	3. Duration of disease:	<input type="text"/> month(s)
4. Eye affected:	<input type="radio"/> Right <input type="radio"/> Left <input type="radio"/> Both		
6. Vision at presentation:	Right eye		Left eye
	Unaided: <input type="text"/>	With glasses/pin hole: <input type="text"/>	Unaided: <input type="text"/> With glasses/pin hole: <input type="text"/>

SECTION C : REFER TO TERTIARY CENTER

1. Refer to tertiary center: No Yes → Hospital:

SECTION D : INVESTIGATIONS & CLASSIFICATION

1. Imaging:	Right eye		Left eye	
	<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Presence of mass <input type="checkbox"/> Presence of calcification <input type="checkbox"/> Extraocular extension	<input type="checkbox"/> Optic pathway <input type="checkbox"/> Orbit and adnexa <input type="checkbox"/> Intracranial	<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Presence of mass <input type="checkbox"/> Presence of calcification <input type="checkbox"/> Extraocular extension	<input type="checkbox"/> Optic pathway <input type="checkbox"/> Orbit and adnexa <input type="checkbox"/> Intracranial
b) MRI:	<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Presence of mass <input type="checkbox"/> Presence of calcification <input type="checkbox"/> Extraocular extension	<input type="checkbox"/> Optic pathway <input type="checkbox"/> Orbit and adnexa <input type="checkbox"/> Intracranial	<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Presence of mass <input type="checkbox"/> Presence of calcification <input type="checkbox"/> Extraocular extension	<input type="checkbox"/> Optic pathway <input type="checkbox"/> Orbit and adnexa <input type="checkbox"/> Intracranial
2. Genetic testing (blood):	<input type="radio"/> No <input type="radio"/> Yes → <input type="radio"/> + ve <input type="radio"/> - ve			
3. Diagnosis:	<input type="radio"/> Confirmed Retinoblastoma <input type="radio"/> Not Retinoblastoma, other diagnosis: <input type="checkbox"/> Congenital cataract <input type="checkbox"/> Retinal Dysplasia <input type="checkbox"/> Others, specify: <input type="checkbox"/> Coat's disease <input type="checkbox"/> Persistent fetal vasculature		<input type="radio"/> Confirmed Retinoblastoma <input type="radio"/> Not Retinoblastoma, other diagnosis: <input type="checkbox"/> Congenital cataract <input type="checkbox"/> Retinal Dysplasia <input type="checkbox"/> Others, specify: <input type="checkbox"/> Coat's disease <input type="checkbox"/> Persistent fetal vasculature	
	4. Classification:			
International Intraocular Retinoblastoma Classification (IIRC)				
<input type="radio"/> Group A <input type="radio"/> Group B <input type="radio"/> Group C <input type="radio"/> Group D <input type="radio"/> Group E				

SECTION E : MANAGEMENT (to be filled up after 3 months)

1. Chemotherapy:	<input type="radio"/> No <input type="radio"/> Yes → Systemic: <input type="text"/> cycles	<input type="checkbox"/> Subtenon: <input type="text"/> times	<input type="checkbox"/> Intravitreal injection: <input type="text"/> times					
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Right eye</th> <th style="width: 50%;">Left eye</th> </tr> <tr> <td><input type="text"/> times</td> <td><input type="text"/> times</td> </tr> <tr> <td><input type="text"/> times</td> <td><input type="text"/> times</td> </tr> </table>	Right eye	Left eye	<input type="text"/> times	<input type="text"/> times	<input type="text"/> times
Right eye	Left eye							
<input type="text"/> times	<input type="text"/> times							
<input type="text"/> times	<input type="text"/> times							
2. Enucleation:	Right eye		Left eye					
	<input type="radio"/> No <input type="radio"/> Yes → HPE Result - Extension of Tumour: <input type="checkbox"/> Intraocular <input type="checkbox"/> Extension → <input type="checkbox"/> Lamina cribrosa <input type="checkbox"/> Bruch's membrane <input type="checkbox"/> Superficial choroids <input type="checkbox"/> Deep choroids <input type="checkbox"/> Sclera <input type="checkbox"/> Optic nerve end	<input type="radio"/> No <input type="radio"/> Yes → HPE Result - Extension of Tumour: <input type="checkbox"/> Intraocular <input type="checkbox"/> Extension → <input type="checkbox"/> Lamina cribrosa <input type="checkbox"/> Bruch's membrane <input type="checkbox"/> Superficial choroids <input type="checkbox"/> Deep choroids <input type="checkbox"/> Sclera <input type="checkbox"/> Optic nerve end						
3. Focal therapy:	<input type="radio"/> No <input type="radio"/> Yes → <input type="radio"/> Laser <input type="radio"/> Cryotherapy		<input type="radio"/> No <input type="radio"/> Yes → <input type="radio"/> Laser <input type="radio"/> Cryotherapy					
4. Radiotherapy:	<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> External beam radiation (EBRT) <input type="checkbox"/> Plaque radiotherapy <input type="checkbox"/> Intensity modulated radiotherapy (IMRT)		<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> External beam radiation (EBRT) <input type="checkbox"/> Plaque radiotherapy <input type="checkbox"/> Intensity modulated radiotherapy (IMRT)					
5. Traditional complementary medicine :	<input type="radio"/> No <input type="radio"/> Yes							

SECTION F : OUTCOME & COMPLICATIONS (to be filled up after 1 year)

1. Vision:	Right eye		Left eye	
	Unaided: <input type="text"/>	With glasses/pin hole: <input type="text"/>	Unaided: <input type="text"/>	With glasses/pin hole: <input type="text"/>
2. Remission:	<input type="radio"/> No regression <input type="radio"/> Complete <input type="radio"/> Partial regression Type of regression: <input type="checkbox"/> Flat scar <input type="checkbox"/> Fish-flesh <input type="checkbox"/> Calcification <input type="checkbox"/> Mixed		<input type="radio"/> No regression <input type="radio"/> Complete <input type="radio"/> Partial regression Type of regression: <input type="checkbox"/> Flat scar <input type="checkbox"/> Fish-flesh <input type="checkbox"/> Calcification <input type="checkbox"/> Mixed	
	3. Recurrence:		3. Recurrence:	
<input type="radio"/> No <input type="radio"/> Yes → Duration from first time treatment: <input type="text"/> month(s)		<input type="radio"/> No <input type="radio"/> Yes → Duration from first time treatment: <input type="text"/> month(s)		
4. Complications:	<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Socket / prosthesis related, specify: <input type="checkbox"/> Disease related, specify: <input type="checkbox"/> Chemo related, specify: <input type="checkbox"/> Radiation related, specify:		<input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Socket / prosthesis related, specify: <input type="checkbox"/> Disease related, specify: <input type="checkbox"/> Chemo related, specify: <input type="checkbox"/> Radiation related, specify:	
	5. Lost to follow up :		5. Lost to follow up :	
<input type="radio"/> No <input type="radio"/> Yes		<input type="radio"/> No <input type="radio"/> Yes		
6. Outcome by 1 year :	<input type="radio"/> Alive <input type="radio"/> Death <input type="radio"/> Unknown			

AGE RELATED MACULAR DEGENERATION REGISTRY

Office use: _____ / _____
Centre: _____

Instruction: To be filled in for new AMD patients only.

Where check boxes are provided, check (✓) one or more boxes. Where radio buttons are provided, check (✓) one box only.

i) Hospital / Clinic: _____ ii) Dr in charge : _____ iii) Date of Notification : / /

SECTION 1 : DEMOGRAPHY

1. Patient Name : _____	
2. Identification Card * Number : MyKad / MyKid: _____ Old IC: _____	
If MyKad/MyKid is not available, please complete the Old IC or Other ID document No. _____ → Specify type (eg. passport, armed force ID): _____	
3. Address : Postcode: _____ Town / City: _____ State: _____	
4. Date of Birth: _____ (dd/mm/yy) 5. Age at presentation: _____ year(s) _____ month(s) <small>(Auto calculated)</small>	
6. Gender: <input type="radio"/> Male <input type="radio"/> Female 7. Ethnicity: <input type="radio"/> Malay <input type="radio"/> Indian <input type="radio"/> Melanau <input type="radio"/> Iban <input type="radio"/> Other, specify: _____ <input type="radio"/> Chinese <input type="radio"/> Orang Asli <input type="radio"/> Kadazan/Murut/Bajau <input type="radio"/> Bidayuh	

SECTION 2 : RISK FACTOR

1. Risk Factors : <input type="checkbox"/> None <input type="checkbox"/> Diabetes Mellitus (DM) <input type="checkbox"/> Hypertension (HPT) <input type="checkbox"/> Past Stroke	<input type="checkbox"/> Ischaemic Heart Disease (IHD) <input type="checkbox"/> Hypercholesterolemia <input type="checkbox"/> Smoking <input type="checkbox"/> Myopia - right eye → <input type="radio"/> Right eye → <input type="radio"/> < 2 d <input type="radio"/> 2-8 d <input type="radio"/> > 8 d	<input type="checkbox"/> Cataract surgery within last 3 months prior to onset of symptoms in the affected eye(s) <input type="checkbox"/> Right eye <input type="checkbox"/> Left eye
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SECTION 3 : QUALITY OF LIFE

1. Quality of Life:	<input type="radio"/> Yes → If Yes, do you have difficulty driving during daytime in familiar places? <input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> No → If No, reason: <input type="radio"/> Never drive <input type="radio"/> Gave up because of poor eye sight <input type="radio"/> Others, specify: _____
ii. Because of your eyesight, do you have difficulty reading ordinary print in newspaper?	<input type="radio"/> Yes <input type="radio"/> No	

SECTION 4 : MEDICAL HISTORY

1. Medical History : <small>(fill in the affected eye only)</small>	a) Right eye	b) Left eye
i. Metamorphopsia:	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No
ii. Scotoma:	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No
iii. Blurring of vision :	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No
iv. Duration of symptoms:	_____ Weeks _____ Months	_____ Weeks _____ Months
v. Previous treatment for AMD:	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No
If Yes, what treatment:	<input type="checkbox"/> PDT <input type="checkbox"/> PDT+Anti VEGF <input type="checkbox"/> Argon Laser <input type="checkbox"/> Anti VEGF <input type="checkbox"/> Intravitreal Triamcinolone	If Yes, what treatment: <input type="checkbox"/> PDT <input type="checkbox"/> PDT+Anti VEGF <input type="checkbox"/> Argon Laser <input type="checkbox"/> Anti VEGF <input type="checkbox"/> Intravitreal Triamcinolone

SECTION 5 : CLINICAL FEATURES

1. Affected eye :	<input type="radio"/> Right eye <input type="radio"/> Left eye <input type="radio"/> Both eyes
2. Vision : <small>(fill in for both affected and non-affected eye)</small>	Unaided: _____ With glasses/ Pin hole: _____ Near vision: _____
3. Fundus Finding :	a) Right eye b) Left eye
i. Type of AMD:	<input type="radio"/> Exudative <input type="radio"/> Nonexudative <input type="radio"/> Exudative <input type="radio"/> Nonexudative
ii. Presence of Drusen:	<input type="radio"/> Yes → <input type="checkbox"/> Soft <input type="checkbox"/> Hard <input type="radio"/> No <input type="radio"/> Yes → <input type="checkbox"/> Soft <input type="checkbox"/> Hard <input type="radio"/> No
iii. Presence of Central Geographic Atrophy:	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> No
iv. Presence of Pigment Epithelial Detachment:	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> No
v. Presence of Subretinal Haemorrhage:	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> No
vi. Presence of Disciform Scar:	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> No

SECTION 6 : INVESTIGATION

1. OCT:	a) Right eye b) Left eye
<input type="radio"/> Done <input type="radio"/> Not Done	<input type="radio"/> Done <input type="radio"/> Not Done
If done, findings: <input type="checkbox"/> Subretinal Fluid <input type="checkbox"/> Pigment Epithelial Detachment <input type="checkbox"/> Others, specify: _____	If done, findings: <input type="checkbox"/> Subretinal Fluid <input type="checkbox"/> Pigment Epithelial Detachment <input type="checkbox"/> Others, specify: _____
2. FFA:	a) Right eye b) Left eye
<input type="radio"/> Done <input type="radio"/> Not Done	<input type="radio"/> Done <input type="radio"/> Not Done
If done, findings: i. <input type="checkbox"/> CNV <input type="checkbox"/> Scar <input type="checkbox"/> PED	If done, findings: i. <input type="checkbox"/> CNV <input type="checkbox"/> Scar <input type="checkbox"/> PED
ii. Type of choroidal neovascularization (CNV): <input type="checkbox"/> Classic <input type="checkbox"/> Minimally classic <input type="checkbox"/> Predominantly classic <input type="checkbox"/> Occult	ii. Type of choroidal neovascularization (CNV): <input type="checkbox"/> Classic <input type="checkbox"/> Minimally classic <input type="checkbox"/> Predominantly classic <input type="checkbox"/> Occult
iii. Location of CNV: <input type="radio"/> Subfoveal <input type="radio"/> Juxtafoveal <input type="radio"/> Extrafoveal	iii. Location of CNV: <input type="radio"/> Subfoveal <input type="radio"/> Juxtafoveal <input type="radio"/> Extrafoveal
3. ICG:	a) Right eye b) Left eye
<input type="radio"/> Done <input type="radio"/> Not Done	<input type="radio"/> Done <input type="radio"/> Not Done
If done, findings: <input type="checkbox"/> Polyps <input type="checkbox"/> Plaque <input type="checkbox"/> No Abnormality	If done, findings: <input type="checkbox"/> Polyps <input type="checkbox"/> Plaque <input type="checkbox"/> No Abnormality

SECTION 7 : DIAGNOSIS *

a) Right eye	b) Left eye
<input type="checkbox"/> Early AMD <input type="checkbox"/> Intermediate AMD <input type="checkbox"/> Advanced AMD: Geographical Atrophy <input type="checkbox"/> Advanced AMD: Choroidal neovascularization (CNV): Active <input type="checkbox"/> Advanced AMD: Choroidal neovascularization (CNV): Treated	<input type="checkbox"/> Early AMD <input type="checkbox"/> Intermediate AMD <input type="checkbox"/> Advanced AMD: Geographical Atrophy <input type="checkbox"/> Advanced AMD: Choroidal neovascularization (CNV): Active <input type="checkbox"/> Advanced AMD: Choroidal neovascularization (CNV): Treated
<input type="checkbox"/> Advanced AMD: Disciform Scar <input type="checkbox"/> Polypoidal choroidal vasculopathy (PCV)	<input type="checkbox"/> Advanced AMD: Disciform Scar <input type="checkbox"/> Polypoidal choroidal vasculopathy (PCV)
<input type="checkbox"/> Others, specify: _____	<input type="checkbox"/> Others, specify: _____

SECTION 8 : TREATMENT *

a) Right eye	b) Left eye
<input type="radio"/> Yes → Type of treatment: <input type="checkbox"/> PDT <input type="checkbox"/> PDT+Anti VEGF <input type="checkbox"/> Argon Laser <input type="checkbox"/> Anti VEGF <input type="checkbox"/> Intravitreal Triamcinolone <input type="checkbox"/> Others, specify: _____	<input type="radio"/> Yes → Type of treatment: <input type="checkbox"/> PDT <input type="checkbox"/> PDT+Anti VEGF <input type="checkbox"/> Argon Laser <input type="checkbox"/> Anti VEGF <input type="checkbox"/> Intravitreal Triamcinolone <input type="checkbox"/> Others, specify: _____
<input type="radio"/> None	<input type="radio"/> None

Form filled by : Medical Retinal (MR) specialist Vitreo-retinal (VR) specialist MR or VR fellow Other specialist Medical officer

NATIONAL EYE DATABASE (NED)	Office use: <input type="text"/> / <input type="text"/>	Centre: <input type="text"/>
MONTHLY OPHTHALMOLOGY SERVICE CENSUS , MOH		

Instruction : Please complete the census form by end of each month.

1. Hospital :								Date(dd/mm/yy):			
2. Month / Year :											

Section 1 : Outpatient	
1. Total Number of Outpatients :	
2. Total Number of New Cases :	
3. Total Number of Follow Up Cases :	
4. Ratio of New Cases vs. Follow Up Cases (auto calculate) : ((3) / (2)) 1: (3/2)	1 :
5. Total Number of Children Screened for ROP :	
6. Total Number of Specialists :	
7. Ratio of Specialist to Outpatients (auto calculate): ((1) / (6)) 1: (1/6)	1 :

Section 2 : Inpatient	
1. Total Number of Inpatients :	
2. Total Number of Emergency Admission :	
3. Total Number of Elective Admission (auto calculate): (1) - (2)	

Section 3 : Operation	
1. Total Number of Operations (Category B and C as in Akta Fi 1951) :	
2. Total Number of Vitreoretinal Surgery :	
3. Total Number of Corneal Transplant :	
4. Total Number of Glaucoma Surgery :	
5. Number of Cases With Infectious Endophthalmitis Following Intraocular Surgery :	
6. Number of Intraocular Surgeries (excluding surgery for penetrating injury):	
7. Percent of post-operative infectious endophthalmitis (auto calculate):((5)/(6)*100%)	

Section 4 : Cataract Service	
1. Total Number of Cataract Surgery :	
2. Total Number of Phacoemulsification :	
3. Total Number of ECCE :	
4. Total Number of Lens Aspiration :	
5. Number of Cataract Surgery in Adults :	
6. Number of Cataract Surgery in Adults Performed as Day Care Surgery :	
7. Percentage of Day Care Cataract Surgery in Adult (auto calculate): ((6) / (5)*100)	
8. Waiting Time for Cataract Surgery :	week
9. Total Number of Cataract Surgeons :	
10. Ratio of Cataract Surgeon to Number of Cataract Surgery (auto calculate): ((1)/(9)) 1:(1/9)	1 :

Section 5 : Diabetic Service	
1. Total Number of New Diabetic Cases Referred :	
2. Total Number of Diabetic Follow Up cases :	

Section 6 : Glaucoma Service	
1. Total Number of New Glaucoma Cases Seen :	
2. Total Number of Follow Up Glaucoma Cases Seen:	
3. Amount of Glaucoma Drug Prescribed (end of year only)	RM
4. Total Amount of Ophthalmic Drug Budget : (end of year only)	RM
5. Percentage of Glaucoma Drug Prescribed: (auto calculate): ((3) / (4) * 100) (end of year only)	

(SECTION 7- SECTION 11: For centres with this subspecialty service only)

Section 7 : Vitreo-Retina (VR) Service	
1. Total Number of New VR Cases Seen :	
2. Total Number of Follow Up VR Cases Seen :	
3. Total Number of VR Surgery Performed :	

Section 8 : Cornea Service	
1. Total Number of New Cornea Cases Seen :	
2. Total Number of Follow Up Cornea Cases Seen :	
3. Total Number of Cornea Surgery Performed :	

Section 9 : Paediatric Ophthalmology Service	
1. Total Number of New Paediatric Ophthalmology Cases Seen :	
2. Total Number of Follow Up Paediatric Ophthalmology Cases Seen :	
3. Total Number of Paediatric Ophthalmology Surgery Performed :	

Section 10 : Oculoplastic Service	
1. Total Number of New Oculoplasty Cases Seen :	
2. Total Number of Follow Up Oculoplasty Cases Seen :	
3. Total Number of Oculoplasty Surgery Performed :	

Section 11 : Medical Retina Service	
1. Total number of New Uveitis cases :	
2. Total number of Follow Up Uveitis cases :	
3. Total number of New ARMD cases :	
4. Total number of Follow Up ARMD cases :	

Section 12 : Optometry Service	
1. Total Number of Refraction :	
2. Total Number of Optometrists :	
3. Ratio of Optometrists to Number of Refractions (auto calculate) : ((1)/(2)) 1:(1/2)	1 :
4. Total Number of Patients With Low Vision (BCVA worse than 6/18 in both eyes) :	
5. Total Number of Patients With Blindness (BCVA worse than 3/60 in both eyes) :	
6. Total Number of Cases Seen at Low Vision Clinic :	
7. Total Number of Low Vision Aids Prescribed :	

Section 13 : Public Health Ophthalmology			
1. Number of Primary Eye Care (PEC) Training Courses Conducted	No. of Courses	No. of Participants	
a. Medical officers :			
b. Paramedic :			
c. Jururawat Masyarakat :			
2. Number of CME Session for Dept :	a. Doctors :		
	b. Paramedics :		
3. Number of Warga Tua Clinic :			
4. Number of District Visit :			
5. Number of Screening Programmes :			
6. Number of Outreach Programmes :			

