



# **REFRACTIVE SURGERY REFERENCE GUIDE**

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# Table of Contents

REFRACTIVE SURGERY .....	1
REFERENCE GUIDE.....	1
1. Brief History of Refractive Surgery .....	5
2. Overview of the main refractive surgery techniques used at LVCCC.....	6
3. The Laser Vision Clinic Central Coast.....	7
4. Referral Procedure for Patients Coming to LVCCC.....	8
5. Assessment of Patients at LVCCC .....	9
6. Patient Education .....	10
7. LASIK.....	11
7.1. The Main Suitability Criteria:.....	11
7.2. Relative Constraints and Contraindications .....	12
7.3. Alternatives for Patients unsuitable for LASIK: .....	14
7.4. Presbyopia Management and Monovision: .....	14
7.5. Laser Technology:.....	14
7.6. The Day of Surgery: .....	16
7.7. Post-operative Instructions:.....	17
7.8. Aftercare Schedule: .....	17
7.9. Aftercare Examination Procedures: .....	17
7.10. IOP Measurement after laser refractive surgery .....	18
7.11. Side-effects, Complications, and Risks .....	19
7.12. Re-treatments .....	20
7.13. Contact lens wear after LASIK .....	21

8.	ASLA, LASEK, and PRK.....	22
9.	Management of potential post-operative signs/symptoms .....	23
9.1.	LASIK.....	23
9.2.	Advanced Surface Laser Ablation (ASLA) patient.....	23
10.	Intraocular lens treatment options .....	24
10.1.	Phakic IOLs.....	24
10.2.	Clear Lens Exchange (CLE) with IOLs insertion.....	24
11.	Co-management.....	25
11.1.	Laser Vision Correction Post-operative Co-management – Information for Optometrists... ..	25
11.2.	Protocols for preoperative and postoperative management .....	26
11.3.	Summary of postoperative appointments and integrated management between LVCCC and the Co-managing Optometrist .....	27
12.	Additional Sources of Information .....	29
13.	Useful Websites:.....	30

## ***PURPOSE OF THIS GUIDE***

This guide provides an overview of current refractive surgery options at Laser Vision Clinic and the Optometrist's role in the co-management of the refractive surgery of the patient.

This guide has been prepared specifically for you and your staff. This will provide you with all the information you may want to know about our practice and the services we offer. This should be used as an informative and instructional guide for better consistency between co-managing facilities. Any new information or co-management materials that are sent to you in the future should be placed in the appropriate sections of this guide.

We sincerely thank you for your referrals and appreciate your confidence in allowing us to share in the care of your patients. If you have any questions or comments, you may talk to our team on 1300 404 484.

# 1. Brief History of Refractive Surgery

There has been considerable interest in refractive surgery for many decades. The principles of correcting refractive error by surgery were laid out as early as 1898, by Lans in Holland, who demonstrated that localized heating of the cornea could alter corneal curvature. In the 1940's, Sato in Japan did pioneering work in refractive surgery using posterior corneal incisions, but, it wasn't until the 1970's that a viable form of refractive surgery came on the scene, when Fyodorov revised the technique of radial keratotomy (RK) by placing the incisions at the anterior surface. In 1978, Dr Leo Bores brought the technology to the USA where it became the first refractive surgery procedure to gain some acceptance. However, RK had significant limitations, primarily in accuracy and long-term stability, particularly in comparison to emerging laser surgery. Hence, there was a rapid decline in RK usage in the 1990's.

An alternative approach to corneal refractive surgery was lamellar keratectomy, which was first performed on humans in the 1960's by the Colombian ophthalmologist, Jose Barraquer, considered the pioneer of modern-day refractive surgery. Dr Barraquer used a freehand surgical technique for creating a corneal lenticule, which was then removed from the eye, frozen, and placed in a cryolathe to be re-shaped to the required power; the re-shaped lenticule was then re-attached to the patient's eye. This early surgical technique was termed "keratomileusis" ('corneal carving'). A motorized microkeratome was later developed for creating the corneal lenticule, and for performing the corneal re-shaping in vivo. This type of "in situ" keratomileusis was the precursor to automated lamellar keratoplasty, or ALK. However, the complexity and low accuracy of this type of surgery prevented widespread acceptance.

Meanwhile, at the IBM Corporation in the 1980's, a research scientist, Srinivasan, saw potential for the interaction of an excimer laser beam on biological tissue. Later, Trokel and Marshall, eventually made the connection with the cornea, and photorefractive surgery was born. In 1987 the German ophthalmologist, Theo Seiler, first used the excimer laser on humans to re-shape the cornea. This was "photorefractive keratectomy" ( PRK).

In principle, LASIK is a combination of the long-established keratectomy techniques for creating a corneal lenticule, with the excimer laser technology for re-shaping the cornea in vivo. The first LASIK surgery on humans was carried out in 1989. Several surgeons are credited with making the major contributions to the clinical evolution of LASIK, in particular, Ioannis Pallikiris and Luis Ruiz.

The term "LASIK" is an acronym for **LASer-assisted In-situ Keratomileusis**.

LASIK has been performed in Australia since 1995, and it has become the predominant refractive procedure since 1997.

## 2. Overview of the main refractive surgery techniques used at LVCCC

LASIK is by far the most commonly used refractive surgery procedure. However, some people's eyes are unsuitable for LASIK, hence, alternative techniques are used. The main other techniques, and the indications for their use, are summarized in the table below. This table is a guideline only, as there can be particular characteristics and requirements of each individual patient that would make a different approach advisable. Descriptions of the surgical techniques are given in the ensuing sections of this document.

LASIK ( <b>LAS</b> er-assisted In-situ Keratomileusis)	Used as the procedure of first choice.
ASLA ( <b>A</b> dvanced <b>S</b> urface <b>L</b> aser <b>A</b> blation)	May be used instead of LASIK if ...Central corneal thickness is less than 500um. <ul style="list-style-type: none"> <li>• Corneal topography shows inferior steepening.</li> <li>• Basement membrane corneal dystrophy is present.</li> <li>• Optic nerve head disease is present.</li> <li>• Certain defence forces personnel (aircrew, divers).</li> </ul>
Clear lensectomy and IOL insertion / Refractive lens exchange	May be used instead of laser refractive surgery if ... <ul style="list-style-type: none"> <li>• The Rx sphere power exceeds -10D or +5D, and the patient is over 60 years of age.</li> <li>• Significant cataract progression is likely to occur.</li> <li>• The patient has lenticular opacities and is suitable for presbyopia correction using a multifocal IOL.</li> </ul>
Post IOL insertion- refractive laser surgery	May be used in combination with other procedures ... <ul style="list-style-type: none"> <li>• If astigmatism is &gt; 2D.</li> <li>• To preserve corneal tissue in thin corneas.</li> <li>• Corneal graft cases with high astigmatism.</li> </ul>
Photo Therapeutic Keratectomy	For Recurrent Corneal Erosions and Band Keratopathy

### 3. The Laser Vision Clinic Central Coast

Laser Vision Clinic Central Coast is a brand new, purpose-built facility and the only clinic on the Central Coast to offer laser eye surgery. The clinic is part of the Central Coast Day Hospital, a licensed day hospital specializing in the full spectrum of eye surgery procedures including cataract, retinal & oculo-plastic surgery.

The technology implemented at LVCCC is world's best eye laser technology and currently only available in a handful of facilities in Australia and New Zealand. The clinic is equipped with Carl Zeiss VisuMax Femtosecond Laser and the MEL 80 Excimer laser. These are currently the most technologically advanced refractive lasers available and provide the highest quality bladeless vision correction.

Dr Anil Arora, Medical Director LVCCC and Ophthalmic Surgeon, has been practicing on the Central Coast and in Sydney since 1998. Dr Arora has successfully performed eye surgery on thousands of patients. He was the first to bring retinal eye surgery to Central Coast and he has now brought laser vision correction services to the area. Until recently the Central Coast did not have a facility offering vision correction surgery; patients had to travel to Sydney and Newcastle. Patient's can now confidently expect to receive the world's best eye laser technology right here at LVCCC

The specialist refractive surgeons are Dr Arora and Dr Chowdhury.



***Dr Anil Arora***

Medical Director, LVCCC

M.B., B.S., M.M., F.R.A.N.Z.C.O. Grad.Dip.Med.  
(Refractive Surgery)



***Dr Vivek Chowdhury***

M.B., B.S. (Hons), Ph. D., F.R.A.N.Z.C.O.

## 4. Referral Procedure for Patients Coming to LVCCC

Most patients who come to LVCCC have been referred by a practitioner. Patients do not need a referral to come to the clinic for an assessment. However, it is desirable for the practitioners to provide some background information on the patient's general and ocular status. The practitioner may use the Referral Pad available from LVCCC, or the practitioner can send us relevant details using his/her own stationery.

When patients contact the LVCCC clinic to arrange their initial appointment they are informed of the following:

- The laser consultation can take 60-90 mins, depending on the case. The initial tests will be carried out by clinical staff, then the patient is given the opportunity to book a further visit with the surgeon.
- They should bring sunglasses, and should not drive a vehicle for two hours after the consultation, if dilating eyedrops are to be used at the surgeon consultation.
- If they are current contact lens wearers, they are asked to abstain from wearing the lenses before the laser consultation – for at least 5 days for soft lens wearers, and for at least 3 weeks for rigid lens wearers.
- The actual surgery visit requires about two hours at the clinic. Because the vision will take some time to improve, they will need to bring a companion to drive them home, or plan on using a taxi.
- They will need to return to the clinic for a check-up on the morning after the surgery and 1 week after the surgery.
- Further check-ups will take place with their own referring optometrist, starting with a visit at about 1 month after surgery.

These arrangements can be modified for patients who have to travel from a long distance away. For example, they may be able to have the surgery on the same day as their initial assessment (on the understanding that it is contingent upon the results of the assessment). They may need to make arrangements to stay overnight at the Central Coast so that they can return to the clinic for the check-up on the morning after the surgery.



## 5. Assessment of Patients at LVCCC

The assessment for laser suitability is conducted by the LVCCC clinical staff, and it takes approximately one hour.

- Review of information in the referral letter supplied by the practitioner.
- Recording of ocular and general history.
- Measurement of unaided vision, vision with habitual Rx, binocularity & ocular motility.
- Pupil size in subdued illumination.
- Corneal topography and thickness measurement.
- IOP measurement.
- Subjective refraction and VA.
- Determination of the distance-dominant eye, if monovision correction is to be used.
- Slit lamp examination.
- Counseling and patient education (*see **Patient Education** below for more details*)
- The fee to be paid for the surgery and for the aftercare.
- The need for any further assessments is discussed, e.g. if the stability of the Rx is uncertain, as in the case of young patients or long-term contact lens wearers who may require a longer period of abstinence.
- Case analysis by the surgeon
- Retinal examination by the surgeon
- Surgery date is scheduled if the patient decides to proceed. The patient signs a Consent Form prior to the surgery.

## 6. Patient Education

Prior to considering refractive surgery, the clinical staff inform the patients about the benefits and risks of available procedures and counsel on all available treatment options. Factors considered in patient education include the following:

<b>Patient Education</b>	
Realistic Expectations	<ul style="list-style-type: none"> <li>• Elective procedure and costs</li> <li>• Risks vs. benefits</li> <li>• Potential of enhancement</li> <li>• Monovision</li> </ul>
Alternative Corrections	<ul style="list-style-type: none"> <li>• Spectacles</li> <li>• Contact lenses</li> <li>• Other surgical procedures (e.g., Phakic IOLs or refractive lens exchange procedures with accommodating or multifocal IOLs)</li> </ul>
Normal Symptoms and Side Effects	<ul style="list-style-type: none"> <li>• Discomfort</li> <li>• Dry eye (2–9 months, depending on pre-existing condition)</li> <li>• Fluctuating vision (from 4–6 weeks to 3 months, depending on dry eye and other factors)</li> <li>• Halos and glare at night (4–6 weeks)</li> <li>• Foreign body sensation (lasting 24-48 hours)</li> </ul>
Risk for Complications	<ul style="list-style-type: none"> <li>• Intraoperative problems</li> <li>• Abnormal healing</li> <li>• Regression</li> <li>• Corneal haze</li> <li>• Loss of Best Corrected Visual Acuity (BCVA)</li> <li>• Higher-order aberrations</li> <li>• Infection</li> <li>• Other surgical complications like corneal ectasia</li> </ul>
Presbyopia	<ul style="list-style-type: none"> <li>• Increased dependence on reading glasses in later years when both eyes are surgically corrected for distance</li> <li>• Optional slight undercorrection of non-dominant eye for reading in patients of presbyopic and prepresbyopic age</li> </ul>
Intraoperative Role of Patient	<ul style="list-style-type: none"> <li>• Maintain fixation on target</li> </ul>
Postoperative Eye Care	<ul style="list-style-type: none"> <li>• Lubrication, instillation of drops</li> <li>• Oral medication, including precautions for use of oral narcotic analgesics and avoidance of alcoholic beverages</li> <li>• Do not rub eyes and wear protective shield at night for first week</li> <li>• Follow-up visits</li> <li>• Reporting of unexpected symptoms</li> </ul>

## 7. LASIK

The popularity of LASIK is largely due to its appeal to patients:

- Post-op pain is unlikely to occur, and bilateral same-day surgery is possible;
- Functional vision is usually present within 24 hours;
- A quick return to normal duties and lifestyle for most people.

From the clinician's standpoint, LASIK has additional appeal because of the wide range of prescriptions that can be treated, the minimal surgical impact on the epithelium and Bowman's layer, and the absence of significant central corneal haze post-op.

Hence, LASIK is the procedure of first choice, and over 80% of people proceeding with refractive surgery have this procedure.

### 7.1. The Main Suitability Criteria:

The following criteria are guidelines for patient suitability, but they are not absolute requirements. Each surgeon will manage patients on a case-by-case basis.

- Refractive error:
  - ❖ Myopia from -0.50D to -10.00D.
  - ❖ Hyperopia from +1.00D to +5.00D.
  - ❖ Astigmatism powers up to 6.00D.
  - ❖ Stable within +/- 0.50D during the last 12 months.
- Vision and visual acuity: The patient should perceive a significant and worthwhile improvement in subjective vision when the spectacle correction is put in place. Generally this occurs if the unaided vision is 6/9 or poorer, and the best corrected visual acuity is 6/15 or better.
- Central corneal thickness: Preferably at least 500um.
- Corneal topography: No significant distortion of anterior surface, especially at inferior quadrant, and no significant forward protrusion of the posterior surface. For correction of myopia, central K's should preferably be >40D, and for correction of hyperopia, central K's should preferably be <45D.
- Age: Preferred minimum age is 21 years. No maximum age limit yet identified.
- Ocular health: Absence of active infection or inflammation. No significant corneal dystrophy. No significant cataract formation. No history of sensitivity to prescribed ocular medications. See section on "Contraindications".
- General health: No connective tissue disease (e.g. rheumatoid arthritis). No significant hormonal changes. See section on "Contraindications".
- Patient's goals: Should not be unrealistic, e.g. should not expect guarantee of perfect vision, and should not expect to eliminate glasses forever. Myopes should understand that alteration to near vision may impact on vocational and recreational activities.

## 7.2. Relative Constraints and Contraindications

The following factors need to be evaluated prior to refractive surgery as they may lead to potential complications

<b>PREOPERATIVE CONSIDERATIONS/RELATIVE CONSTRAINTS/CONTRAINDICATIONS</b>	
<p><b>Unstable Refractive Error</b></p> <ul style="list-style-type: none"> <li>• Age &lt;21 years (some female patients will reach a stable refractive error prior to age 21 typically not before age 18)</li> <li>• Cataract development</li> <li>• Corneal warpage secondary to long term contact lens wear</li> </ul>	<p><b>Corneal Thickness</b></p> <ul style="list-style-type: none"> <li>• Central corneal thickness less than about 500 microns</li> <li>• Predicted post-operative corneal thickness &lt;410 microns (i.e. &lt;~300 microns under the flap)</li> </ul>
<p><b>Ocular Disease</b></p> <ul style="list-style-type: none"> <li>• Keratoconus</li> <li>• Pellucid marginal degeneration of the cornea</li> <li>• Strabismus or nystagmus</li> <li>• Cataracts</li> <li>• Glaucoma manifesting visual field defects</li> <li>• Fuchs' corneal dystrophy</li> <li>• Other corneal dystrophy that results in recurrent erosion (e.g., granular or lattice dystrophy) may be better served with PRK</li> <li>• Non responsive Keratoconjunctivitis sicca (KCS) or severe dry eye as indicated by patient symptoms and signs.</li> <li>• Corneal staining with a vital dye (e.g., Lissamine green, rose bengal, etc.) &gt; grade three and not responding to dry eye therapy or Schirmer tear tests &lt;5 mm.</li> <li>• Untreated lid disease, e.g., blepharitis or meibomitis</li> <li>• Significant vascularisation of cornea</li> <li>• Pterygium (depending on size and position, may have to be removed prior to LASIK).</li> <li>• High positioned scleral buckles following retinal detachment surgery</li> <li>• Neurotrophic keratitis</li> <li>• Herpes simplex virus (HSV) keratitis ≤12 months prior to surgery</li> </ul> <p><i>*A history of keloid scarring is no longer considered a contraindication.</i></p>	<p><b>Systemic Disease</b></p> <ul style="list-style-type: none"> <li>• Uncontrolled diabetes, type 1 (insulin-dependent) or uncontrolled type 2.</li> <li>• Rheumatoid arthritis or other autoimmune diseases (e.g., lupus) that are not well controlled</li> </ul>

<p><b>Large Pupils</b></p> <p>Patients with larger pupils especially in dim illumination may be at greater risk of observing higher order aberrations should they be present or remain following laser surgery. Patient education and documentation is important.</p>	<p><b>Preoperative Keratometry Readings</b></p> <ul style="list-style-type: none"> <li>• A cornea that is too flat or too steep (predictive K readings for myopic eyes &lt;36 D may result in poor postoperative optics, and for hyperopic eyes &gt;49 D, may result in greater dry eye symptoms)</li> </ul>
<p><b>Unrealistic Expectations</b></p> <ul style="list-style-type: none"> <li>• Expectation of better than 20/20 vision.</li> <li>• Expectation of never needing to use reading glasses.</li> </ul>	<p><b>High Refractive error</b></p> <ul style="list-style-type: none"> <li>• Caution should be taken in hyperopia exceeding +5.00 D or myopia over -10.00 D in patients not otherwise excluded by pachymetry or pupil size.</li> <li>• Lens procedures (e.g., clear lens exchange or phakic intraocular lens (IOL) should be considered or discussed for certain patients in this refractive error range</li> </ul>

### **7.3. Alternatives for Patients unsuitable for LASIK:**

- *Myopia combined with a thin cornea:* ASLA preferable to LASIK, in order to reduce the risk of post-op corneal ectasia in the long-term.
- *High myopia or hyperopia:* Phakic IOL, or a lensectomy with IOL implantation.
- *Keratoconus:* The patient is advised that laser refractive surgery techniques are not generally considered to be a safe and effective treatment for keratoconus because of the risk of post-op ectasia. Patients are informed that new surgical techniques are available in clinical practice, namely, implantation of ring segments and/or the use of the Riboflavin collagen cross-linking procedure, usually for patients who are unable to wear contact lenses. An assessment with a corneal specialist is necessary to confirm suitability. More information about these procedures is available from LVCCC.

### **7.4. Presbyopia Management and Monovision:**

A large proportion of the patients who present for refractive surgery are presbyopic. Many expect that the surgery will eliminate the need for reading glasses as well as the need for distance glasses. Additionally, those presbyopes who are also myopic, and who have therefore always been able to read and perform near tasks without glasses, do not realize that they will need reading glasses after their myopia has been corrected by surgery. Consequently, presbyopes in general, and myopic presbyopes in particular, need to be carefully informed prior to surgery about the expected effect of surgery on their near vision.

Experience has shown that almost all presbyopes appreciate having some amount of monovision after surgery in order to reduce their dependence on reading glasses. The amount of monovision correction given varies from out -0.05D to -2.00D, averaging around -1.25D.

We determine which is the distance-dominant eye, for example, by asking the patient to view a distance target by holding a camera and fixating through the viewfinder using their preferred eye, or by holding a large card and fixating through a hole in its centre. Then, the other eye becomes the one to receive the Near Add. The amount of the Add can be determined from a combination of information involving the patient's age and their primary visual requirements (work, home, recreation). If there is uncertainty, a simulation is carried out using a trial contact lens, or a trial frame demonstration.

Patients are informed that a monovision correction will provide considerable convenience from having to carry around reading glasses, but they will probably still be needed in some situations, such as reading small print in dim light and for prolonged periods of time. Additionally, patients are informed that, because monovision intentionally leaves one eye blurry for distance viewing, they might find it helpful to keep a pair of glasses in the car to use when driving, especially at night. Experience has shown that, once this has been explained, patients are generally quite willing to wear glasses on an occasional basis after refractive surgery.

### **7.5. Laser Technology:**

Manufactured by Carl Zeiss Meditec, VisuMax femtosecond laser and MEL 80 Excimer laser constitute the most sophisticated and technologically advanced laser refractive system available anywhere in the world. Unlike competing laser systems, Carl Zeiss designed both systems from the ground up to work together seamlessly and to provide highly sophisticated, predictable and safe laser vision correction surgery.

At Laser Vision Clinic Central Coast we utilise the MEL 80 laser’s advanced eye tracking, flying Gaussian spot laser beam and optional wavefront guided laser eye treatment to produce the best patient outcomes yet. It is the powerful combination of MEL 80 and VisuMax, together with the sophisticated diagnostic capability of the CRS Master, which allows us to provide patients with what we believe is currently the best laser vision correction surgery equipment available in the world.

**VisuMax femtosecond Laser**

VisuMax is the fastest femtosecond laser currently available. This leads to enhanced clinical outcomes for patients as compared to other lasers on the market.

A femtosecond laser produces extremely short pulses of infra-red light which are used to divide the corneal tissue. A femtosecond is 0.000,000,000,000,001 second (one quadrillionth of a second). One femtosecond compared to one second is like the diameter of a human hair compared to the distance between the earth and the moon. The VisuMax laser produces 500,000 pulses a second, each pulse lasting only a few femtoseconds. Each laser pulse produces a microscopic gas bubble which separates the surrounding corneal tissue. Thousands of closely computer guided laser pulses join together to create a highly precise incision in the corneal tissue.

The accuracy of the VisuMax femtosecond laser allows a flap to be cut and lifted out of the way so that the tissue under the flap can be reshaped to correct refractive error.

**MEL 80 Excimer Laser**

The excimer laser uses high-energy pulses of ultraviolet light to alter the shape of the cornea. It does this by removing extremely tiny amounts of tissue (25 100,000ths of a millimeter at a time), without disturbing other tissue.

MEL 80 laser enables extremely safe and precise correction. Highly developed optics focus the laser beam in a very small spot size and an optimal Gaussian shape. This makes the finest corrections possible with the surrounding tissue unharmed. Intelligent technology tracks the slightest eye movements during laser eye treatment and guides the laser beam to continue to work in precisely the right position.

The surgeon obtains a precise digital “impression” of the patient’s eyes, enabling him or her to recognize even the most subtle abnormalities in the visual process and plan an individual laser eye treatment optimised for the patient.

**What this means for the patient?**

Key differentiating factors

	Carl Zeiss VisuMax	Competing femtosecond lasers
Pulse rate	500 kHz	60-150 kHz
Energy	100 nanojules	Upto 800 nanojules
Accuracy of cutting 110 micron flap	108-112 microns	106-160 microns
Eye pressure during procedure	Average 85 mmHg	Average 180 – 285 mmHg

***Shorter procedure time:***

- Resulting from the higher pulse rate and lower pulse energy transferred to the eye
- In most cases the VisuMax and MEL 80 lasers will be running for less than 30 seconds each
- The entire procedure takes around 30 minutes

***Faster recovery time:***

- Due to extremely fast action of MEL 80 laser, undesired tissue dehydration is minimised and regeneration and recovery is enhanced
- Lower amount of tissue damage outside treatment zone speeds up recovery

***Improved vision outcomes:***

- The accuracy of VisuMax femtosecond laser and the ability of MEL 80 to perform customised wavefront guided LASIK results in best possible outcomes achievable today
- The small spot size of MEL 80 laser beam (0.7mm) as well as its shape, permit the finest corneal corrections of unsurpassed quality

***Lower risk of complications:***

- A femtosecond laser avoids the use of a microkeratome for the creation of corneal flaps. Possible incision-related complications due to a microkeratome malfunction are ruled out
- With lower eye pressure, the eye remains more comfortable and is able to see during the procedure. High eye pressure may be associated with damage to the retina.

**Wavefront-guided optical correction** - current generation laser systems can perform an aspheric ablation to reduce the naturally occurring optical aberrations (wavefront errors) of an eye, e.g. spherical aberration and coma. An optical aberrometer instrument is able to measure the aberrations in vivo, and the data can be incorporated into the excimer laser procedure. In some cases the corneal ablation profile is adjusted to compensate for pre-operative optical aberrations, while in other cases a standardized aspheric profile is applied. Most prescriptions are within the range for a wavefront-guided correction. The clinical advantage of such corrections is that post-operative vision and visual acuity can be slightly improved over a traditional correction, particularly in situations of low illumination and low contrast.

**7.6. The Day of Surgery:**

The visit requires about two hours. Any required pre-operative checks are carried out. Corneal anaesthetic drops are instilled. A Valium is provided. The VisuMax femtosecond laser procedure is carried out. The corneal flap is lifted, and the excimer laser procedure is carried out. The corneal flap is placed back over the ablated stroma, and antibiotic and anti-inflammatory eyedrops are instilled. The procedure is repeated for the second eye. The patient rests for a short while, and then the cornea is checked using the slit lamp to ensure that the flap is in secure position. A transparent plastic shield is placed over each eye, to be worn until the next morning. Instructions are given, along with pain medication, in case needed. Rest is advised. Appointment time for the next morning is confirmed. The surgeon's after-hours phone number is supplied in case of an emergency.



### **7.7. Post-operative Instructions:**

- Use antibiotic and anti-inflammatory eyedrops as prescribed (usually q.i.d, antibiotic for 5 days and anti-inflammatory for 10 days).
- Ocular lubricant for one month (2 hourly for 1 week and then q.i.d for a further 3 weeks). Eye-shields to be worn at night for the first 3 nights.
- No vigorous eye-rubbing.
- Avoid getting water in the eye.
- No swimming for 1 week.
- No eye make-up for 10 days.
- No sports for a month if there is a significant risk of eye contact.
- Avoid driving a vehicle until vision is satisfactory (usually 1-2 days after LASIK and 1 week after ASLA).

### **7.8. Aftercare Schedule:**

- The first visit takes place the morning after surgery, with the surgeon, to check that there is no acute infection or inflammation of the cornea, that the flap is secure, that the patient is comfortable, and that the visual recovery is proceeding normally.
- The patient is reviewed at LVCCC at approximately 7-10 days post-op.
- Subsequent visits take place with the patient's Optometrist or at LVCCC, depending on the patient's choice, , 1 month, 3 months, and 6 months.
- After 6 months the LASIK aftercare is generally completed, and most patients can have a general eye examination on a schedule to be recommended by their eyecare practitioner.

### **7.9. Aftercare Examination Procedures:**

The main aspects of the aftercare examination are:

- To assess the patient's symptoms with regard to vision and comfort in relation to the needs for work and recreation, and to ascertain that the patient is complying with the instructions pertaining to use of any medications.
- To measure the unaided vision in each eye, the residual refraction, and VA. If VA is poorer than expected, keratometry/mapping may help reveal the presence of any transient corneal irregularity or desiccation. Similarly, the ease or difficulty with which a clear end-point is reached during subjective refraction gives an indication of the optical quality of the cornea, as does the minimum dioptric change in lens power that is required for the patient to discriminate a visual change on the VA chart.
- To ascertain corneal integrity and clarity by slit lamp examination. Check for any dehiscence of the flap edges, erosion of the epithelial surface, inflammatory signs in the cornea, and epithelial in-growth at the flap-stroma interface. Record any significant haze, debris, or striate lines in the cornea.
- To check that IOP is within normal limits while any steroid medication is being used in the post-operative period. Note that measurements obtained by applanation tonometry are affected by the cornea's altered shape and thickness after surgery (see the accompanying information page for how to apply a correction factor).
- When necessary, to prescribe supplementary glasses to correct a significant distance refractive error or to prescribe reading glasses or protective eyewear, as required. For example, monovision cases may benefit from having a pair of glasses for night driving and/or a pair for prolonged reading of fine print.

- In the event of a delayed or unusual healing response, to provide the patient with reassurance about the prognosis.
- To confer with LVCCC in the event of an unusual finding or the possible need for a re-treatment to correct a significant residual refractive error.

The post-op refraction and VA will generally stabilise by about 1-2 months for low refractive error treatments, by about 3 months for moderate refractive treatments, and by about 5 months for high refractive treatments.

Optometrists can use the accompanying “Refractive Surgery Post-op Data Form” to provide periodic written reports to the LVCCC.

### 7.10. IOP Measurement after laser refractive surgery

It is now well known that excimer laser refractive surgery can result in applanation tonometry giving a lower IOP reading than the true IOP of the eye. The IOP itself is not altered, only the measurement obtained from the instrument is affected.

This can be important in clinical practice when trying to interpret the measured IOP values in a patient who may actually have elevated IOP, for example, due to glaucomatous eye disease or a drug-induced side-effect such as a steroid-induced response. It is believed that the main reason for obtaining a lower IOP reading after laser refractive surgery is that corneal rigidity (i.e. resistance to deformation by the applanation probe) is reduced, as would be expected due to the corneal thinning and corneal flattening that occur after laser ablation for myopia correction.

The table below provides a useful guide for practitioners on how much the measured IOP value should be adjusted for a range of myopia correction by excimer laser surgery. This publication is based on patients who had PRK surgery, but subsequent publications have shown that the adjustment is similar for LASIK surgery.

AMOUNT OF LASER TREATMENT (SPHERE EQUIVALENT VALUE)	AMOUNT TO BE ADDED TO THE MEASURED IOP VALUE (from applanation tonometry)
-1.00 to -2.25 Dioptres	+ 2 mm Hg
-2.50 to -4.25 Dioptres	+ 3 mm Hg
-4.50 to -7.00 Dioptres	+ 4 mm Hg
-7.25 to -9.50 Dioptres	+ 5 mm Hg

Reference: “Reduction in Intraocular Pressure after Excimer Laser Photorefractive Keratectomy – Correlation with Pretreatment Myopia”, by A. Chatterjee and colleagues, in *Ophthalmology*, March 1997, vol. 104 (3), pp. 355-359.

### 7.11. Side-effects, Complications, and Risks

There are some expected side-effects from LASIK surgery, as well as certain complications and potential risks. Expected side-effects are those symptoms or signs that occur in many patients, but they have no long-lasting or adverse effect on the health of the eye or vision. Complications are uncommon signs or symptoms, but they may have some effect on eye health or vision, while risks are rare events which can cause significant harm to the patient's eye health or vision.

#### 1. Expected side-effects (transient in nature):

- Discomfort, irritation, dryness of the eye.
- Blurred vision.
- Fluctuating vision.
- Sub-conjunctival haemorrhage.
- Visibility of the ablation zone perimeter.
- Visibility of the flap perimeter.
- Anisometropia, and impaired binocular vision.
- Presbyopic symptoms.
- Night vision blur, haloes, flare.

#### 2. Complications Reported with LASIK:

- Pain.
- Intra-operative epithelial erosion, abrasion, or loss.
- Detached flap
- Striate lines or folds in the flap.
- Wide band of scarring at the flap perimeter.
- Dehiscence of the flap edge.
- Debris in the flap interface.
- Epithelial in-growth at the flap interface.
- Diffuse lamellar keratitis of the flap interface (e.g. "Sands of the Sahara" pattern).
- Under-correction or over-correction, or induced astigmatism.
- Regression of refractive error.
- Irregular astigmatism.
- Central steep 'island' or corneal distortion (has been associated with first-generation broad-beam lasers, but not with current generation flying-spot lasers).
- Loss of BCVA.
- Blepharoptosis. Anisocoria.
- Disruption to binocular vision coordination.
- Drug-induced complications from medications.

#### 3. Risks reported with LASIK:

- Flap dislocation, detachment, or loss.
- Infection of abscess.
- Stromal melt.
- Temporary loss of vision or irreversible blindness.
- Re-activation of latent virus condition, e.g. herpes.
- Induced keratectasia, at the anterior or posterior surface.

## 7.12. Re-treatments

After refractive surgery, the normal healing response of corneal tissue causes the eye to undergo a slight regression towards the original (pre-op) refractive error. However, in some patients, the healing response is more aggressive than usual, resulting in excessive regression and a residual refractive error relative to the intended goal (which is usually emmetropia). Some patients may find that the residual refractive error is disturbing to their vision and lifestyle requirements, so they are interested in having a re-treatment (enhancement). In our experience, approximately 4% of cases undergo a re-treatment.

- Re-treatment for residual refractive error:
  - ❖ Regression may occur some weeks or months after LASIK surgery. It can occur in one or both eyes.
  - ❖ In the past, a course of steroid eyedrops used to be tried to see if the regression could be reduced or reversed, as it might have avoided the need for a re-treatment; however, experience has shown this to be largely ineffective with LASIK regression.
  - ❖ If the residual refraction is 0.75D or more, and it has remained stable for at least 3 months, and if the patient is still troubled by the vision, the surgeon may carry out a re-treatment, provided there are no contraindications such as too thin a cornea or irregular astigmatism.
  - ❖ Re-treatments involve lifting the original flap (by using a surgical spatula to separate the flap from the stromal bed).The exposed underlying stroma is ablated by the laser in similar fashion to a primary LASIK surgery, and then the flap is closed.
  - ❖ Flap lifts can generally be done many months or years after the original surgery. If the flap edge is difficult to see, or it is not easy to prise away from the underlying stroma, then the surgeon may create a new flap which is deeper into the stroma than the first one. The depth is set by making appropriate adjustments to the VisuMax Femtosecond laser system.

Note that, almost always, the reason for performing a re-treatment is to correct a residual refractive error; however, in rare instances a secondary procedure may be necessary in order to remove significant epithelial in-growth from under the flap. In such cases, the flap is lifted, and the adherent cellular debris is rinsed off the flap surface. Then the flap is replaced. The post-operative management is the same as for a first-time laser procedure.

### **7.13. Contact lens wear after LASIK**

Although there is not a great deal of published information on the subject, contact lens wear appears to be quite safe after LASIK surgery, with either RGP or soft lenses. Nevertheless, these cases should be managed with extra caution.

It is preferable that lens wear be avoided for the first two months after surgery, and that a gradual adaptation schedule is used when lens wear is commenced. Contact lens wear may be indicated when the patient has developed a residual refractive error or irregular astigmatism that cannot be adequately re-treated by laser surgery, or when the patient desires to use coloured contact lenses for cosmetic reasons.

With soft lenses, the selection of trial lenses can proceed in a similar manner that is used to fit a cornea that has not been re-shaped by laser surgery.

With RGP lenses, traditional designs will produce excessive pooling over the central cornea as a result of the flattening in an eye treated for myopia by LASIK. In some cases this may be acceptable, but in other cases a modified lens design may be necessary, for example, an orthokeratology-type of lens design. It is advisable to avoid lens fittings that cause excessive bearing and motion over the flap edge, in order to reduce the likelihood of any disruption to this area of the cornea.

Patients who are fitted with contact lenses after LASIK should have more frequent follow-up examinations during the first few weeks of lens wear in order to ascertain that the ocular response is acceptable.

## 8. ASLA, LASEK, and PRK

ASLA (Advanced Surface Laser Ablation) and LASEK (Laser-assisted Epithelial Keratomileusis) are refinements of excimer laser PRK (PhotoRefractive Keratectomy).

In **PRK**, the epithelium is removed by the surgeon using a surgical instrument for debridement. The debrided epithelium is then discarded, leaving the stromal surface bare so that the ablation can take place by excimer laser. A bandage contact lens is applied. In the post-op period the epithelium has to regenerate completely. Consequently, PRK has drawbacks such as significant post-op pain and slow visual recovery.

In **LASEK**, the epithelium is removed but not discarded. Using a diluted alcohol solution to soften it, the epithelium is soaked for a few seconds, and then lifted off the stroma as a fairly intact layer; leaving the stromal surface bare for the ablation. After completion of the ablation, the epithelial layer is placed back over the bare stroma, a bandage contact lens is applied, and the healing process begins. Consequently, because some epithelium is re-used, LASEK can sometimes result in less post-op pain and faster visual recovery compared to PRK.

In **ASLA**, after the epithelium is removed, it is generally discarded. Also, non-steroidal anti-inflammatory (NSAID) eyedrops are used just after surgery, in order to reduce the post-op pain. The bandage contact lens is worn for about four days, during which time the NSAID eyedrops are also used. Consequently, the post-op pain and visual recovery are improved. Bilateral same-day surgery is possible, which allows patients to return to normal lifestyle activities relatively quickly. Additionally, if the patient has a moderately high refractive error, and is therefore at risk of developing significant post-op corneal haze, the surgeon may use Mitomycin-C in order to reduce the risk – a surgical sponge is soaked with the Mitomycin solution, and is applied intra-operatively to the bare stroma for a few seconds. A bandage contact lens is applied.

The aftercare protocol for ASLA is much the same as for LASIK patients, as described previously in this reference guide. The main difference is that, with some ASLA patients, the attainment of good comfort and functional vision may take a week or longer to occur, photophobia may be troublesome during the first month, and sub-epithelial corneal haze may persist for several months.. In such instances, the patient may need more frequent monitoring and extra re-assurance.

## 9. Management of potential post-operative signs/symptoms

Below is the list of possible post-operative signs and symptoms of LASIK and ASLA procedures and guide to their management:

### 9.1. LASIK

Potential post-operative signs/symptoms and their management for <i>LASIK</i> patient	
Sign/Symptom	Management
Flap slipped or wrinkled	Refer to surgeon for refloating and smoothing
Epithelial Defect	Monitor daily, consider bandage contact lens
Dryness Loose epithelium Flap oedema	Prescribe preservative- free artificial tears; Monitor; consider bandage contact lens Monitor; measure IOP
Diffuse lamellar keratitis (DLK)	Prescribe antibiotic and corticosteroid and monitor. Inform or refer to the surgeon
Early epithelial ingrowth	Monitor. Inform or refer to the surgeon if progressing
Overcorrection or undercorrection	Prescribe extended wear contact lens, discuss enhancement, part time spectacles, contact lenses
Infection	Refer to the surgeon

### 9.2. Advanced Surface Laser Ablation (ASLA) patient

Potential post-operative signs/symptoms and their management for <i>ASLA</i> patient	
Sign/Symptom	Management
Excessive movement of loose-fitting bandage contact lens or blinked out lens	Replace properly fitted contact lens
Intermittent pain, corneal oedema, conjunctival injection, blurred vision from tight-fitting contact lens	Use cool compresses and artificial tears rather than to attempt to remove and replace a tight-fitting bandage lens
Infiltrates arising from bandage contact lens	Remove bandage contact lens, maintain antibiotic and steroid drops
Overcorrection	Prescribe extended wear contact lens and monitor. If progressing, refer to the surgeon
Mild to marked (grade 2-4) subepithelial oedema or haze	Prescribe steroid drops and monitor. Refer to the surgeon

## **10. Intraocular lens treatment options**

Most refractive surgeons agree that safety and accuracy of corneal refractive surgery declines in eyes having more than 10 diopters of myopia or 5 diopters of hyperopia. For these patients, intraocular lens surgeries may be an option.

### **10.1. Phakic IOLs**

Phakic Intraocular Lens (IOL) surgery is gaining popularity for use in patients who were previously considered unsuitable for laser refractive surgery because of thin corneas, very high refractive error, corneal disease or dystrophy, or chronic dry eye.

Phakic IOLs are available to treat myopic eyes up to 20 diopters. These IOLs are an additive concept procedure in which an artificial lens is placed in the eye in addition to the crystalline lens. Phakic IOLs come in different makes and designs. Anterior chamber lenses made of PMMA may be supported in the angle of the anterior chamber or clipped to the iris. Posterior chamber lenses are designed to straddle the crystalline lens, vaulting it anteriorly in order to create a space for aqueous to flow between the IOL and the crystalline lens. These lenses allow the eye to retain its crystalline lens function (accommodation).

### **10.2. Clear Lens Exchange (CLE) with IOLs insertion**

For hyperopic refractive errors beyond the acceptable range for laser refractive surgery, clear lens extraction (CLE) may be an option. The natural crystalline lens is removed using traditional cataract phacoemulsification techniques with an intraocular lens placed in the eye to significantly reduce or eliminate the refractive hyperopia. In younger patients, this approach results in the immediate loss of accommodative ability. Introduction of multifocal and pseudo-accommodating IOL's has made the procedure more acceptable. CLE is not considered a primary treatment for high myopes due to the increased risk of retinal detachment following the procedure



## 11.Co-management

### 11.1. Laser Vision Correction Post-operative Co-management – Information for Optometrists

Patients who have laser vision correction at Laser Vision Clinic Central Coast may choose to have their aftercare with their regular or local optometrist, in a co-management arrangement. The following information provides you with an overview of the co-management system. Further information can be obtained by contacting our team at LVCCC on 1300 404 484

- Follow-up care is 1 day, 1 week, 1 month, 3 months, 6 months and 1 year (comprehensive annual examination). All patients are examined 1 day and 1 week postoperatively at LVCCC.
- Patients are informed that their fee for surgery includes 6 months of aftercare. Should they choose to have their after care with their own optometrist then this portion of the fee (\$450) will be transferred to the nominated Co-Managing Optometrist. Co-Management fee includes both scheduled post-op visits and the occasional visit at other intervals, as dictated by the patient's individual case.
- Patients are asked to make an appointment directly with the nominated Co-Managing Optometrist and a written letter with all details will be provided to the optometrist.
- After completing the post-operative examination for each visit (i.e 1 month, 3 months and 6months visit) the Co-managing Optometrist confirms the patient's attendance by returning us the appropriate post-operative clinical report along with a tax invoice.
- On receipt of the clinical report and tax invoice, the co-management fee is paid to the Co-Managing Optometrist.
- Patients may return to LVCCC at any time if they or the optometrist has any concerns.
- There is no additional co-management payment for enhancement surgery after care.

## 11.2. LVCCC Protocol for preoperative and postoperative management

### Pre-Operative Care

#### **Pre-Operative Examination**

- History: Goals, ocular and systemic condition, allergies
- Spectacle history and neutralization
- Visual acuity
- Refraction: Subjective, manifest, and cycloplegic
- Best corrected visual acuity
- Keratometry
- Topography
- External exam: Lids, pupils (scotopic size), EOM, cover test, ocular dominance
- Slit lamp: Pre and post-dilation including tear film assessment
- Tonometry
- Dilated fundus exam

#### **Inclusion Criteria**

- Myopia: -0.50 to -10.00 D
- Astigmatism: -0.50 to -4.00 D
- Hyperopia: +0.75D to +6.00 D
- Stable Refraction: < 0.50 D change within past 12 months

#### **Exclusion Criteria**

- Active ocular disease
- Pregnancy (including nursing mothers)
- Monocular patients
- Unrealistic expectations

In order to acquire the best measurements for the procedure, we ask that all contact lens wearers remove their contacts for a period of time depending upon which type of lens is worn:

**Soft Lenses:** no contacts 5 days before visit  
**RGP Lenses:** no contacts 30-90 days before visit

### Post-Operative Care

#### **One Day Examination**

- Manifest Refraction and UCVA
- Slit Lamp: Loose or rotated flap, interface opacities or debris, DLK, epithelial cells or ingrowths, etc. NO IOP.
- Continue antibiotic and anti-inflammatory eyedrops QID (Occuflox and Maxidex).
- Continue wearing eye shield at bedtime.

#### **One Week Examination**

- Same as one day exam
- Manifest refraction
- Tonometry
- Discontinue the drops as per the regime (Ocuflax 5 days post-op and Maxidex 10 days post-op if stable)

#### **One Month Examination**

- Same as one week exam including topography.

#### **Three Month Examination**

- Same as one month exam including topography. If the patient is under corrected after LASIK/ASLA it will be determined at this time whether to proceed with an enhancement.

#### **Six Month Examination**

- Same as one month exam including topography.

**11.3. Summary of postoperative appointments and integrated management between LVCCC and the Co-managing Optometrist**

<b>TYPE OF SERVICE</b>	<b>PATIENT'S VISIT</b>	<b>OPTOMETRIST'S ROLE</b>	<b>OPTOMETRIST INVOICES</b>
<b>LASIK /ASLA Refractive Surgery Follow-up</b>	1 month post-op	Provide LVCCC with Report and Tax Invoice	\$150 (GST incl)
	3 month post-op	Provide LVCCC with Report and Tax Invoice	\$150 (GST incl)
	6 months post-op	Provide LVCCC with Report and Tax Invoice	\$150 (GST incl)  <i>Extra necessary consultations, within normal post-op regime should be included in your co-management fee</i>
<b>Routine eye examinations</b>  <i>(from 12 months onwards – for both Refractive Surgery and Enhancement Surgery)</i>	1 year post-op and beyond	Provide LVCCC with Report	Your normal Practice billing regime
<b>Refer back to Surgeon for review</b>  <i>(after 12 months post LASIK/ ASLA surgery)</i>	Extra-ordinary consultations (after 12 month post LASIK/ ASLA surgery)	Provide LVCCC with Report and referral to patient.  Patient may pay consultation fee at LVCCC.	Your normal Practice billing regime

To ensure payment please note on your Tax Invoice details of the consultation, i.e. LASIK/ ASLA Post-op, Enhancement PO, 1 month Post-op, etc.

(Please ensure we have your BPAY or Banking details to allow online payment).

All forms and documents can be downloaded from our website from healthcare professional login page (see below). You can also find the login link on the homepage (bottom of the page)

<http://www.lvccc.com.au/login>

**Username: LVCCC**

**Password: LVCCC**

# 11.4 LVCCC Refractive Surgery Post-op Data Form

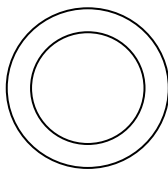
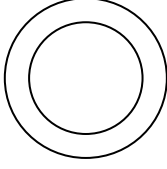
To help us maintain the highest quality surgical outcomes, we appreciate information from your postoperative exams. Please complete and mail or fax this form at your earliest convenience. Thank you for sharing your exam findings.

Patient's Name \_\_\_\_\_ DOB \_\_\_\_\_ Date of Exam \_\_\_\_\_

Type of Surgery  LASIK  ASLA  LASIK Enhancement  ASLA Enhancement

Follow-up Visit  1 month  3 months  6 months  1 year  Other \_\_\_\_\_

SUBJECTIVE: (Symptoms/comments reported by patient)  
 \_\_\_\_\_  
 \_\_\_\_\_

OBJECTIVE	Right Eye	Left Eye
Date of Surgery	_____	_____
This Post-op Visit	_____	_____
Uncorrected VA	6/_____	6/_____
Best Corrected VA	6/_____	6/_____
Manifest Refraction	_____/_____/_____ x _____ (6/_____)	_____/_____/_____ x _____ (6/_____)
Keratometry Readings	_____	_____
Conjunctiva	<input type="checkbox"/> clear <input type="checkbox"/> other _____	<input type="checkbox"/> clear <input type="checkbox"/> other _____
Cornea:		
Flap Position	<input type="checkbox"/> centered <input type="checkbox"/> other _____	<input type="checkbox"/> centered <input type="checkbox"/> other _____
Epithelial Surface	<input type="checkbox"/> clear <input type="checkbox"/> other _____	<input type="checkbox"/> clear <input type="checkbox"/> other _____
Haze	<input type="checkbox"/> normal <input type="checkbox"/> other _____	<input type="checkbox"/> normal <input type="checkbox"/> other _____
Interface	<input type="checkbox"/> clear <input type="checkbox"/> other _____	<input type="checkbox"/> clear <input type="checkbox"/> other _____
Fluorescein	<input type="checkbox"/> normal <input type="checkbox"/> other _____	<input type="checkbox"/> normal <input type="checkbox"/> other _____
		
IOP <input type="checkbox"/> Air <input type="checkbox"/> Applanation	_____ mm Hg @ _____	_____ mm Hg @ _____

Other findings & comments:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

How do you rate this patient's satisfaction? Very Satisfied  Satisfied  Neutral  Dissatisfied  Very Dissatisfied

Please contact us by telephone if you need assistance with any post-operative condition.

Optometrist's Name: _____	Provider Number _____
Practice Address: _____	
_____	
_____	

## 12. Additional Sources of Information

The following resources relating to refractive surgery may be of interest to practitioners. Practitioners can contact us to obtain more information on any of these, or to have copies of LVCCC's materials sent to their practice.

	FOR PATIENTS	FOR PRACTITIONERS
<b>Brochures and Information Sheets</b>	<ul style="list-style-type: none"> <li>• Vision Correction- Patient Information Booklet</li> <li>• LVCCC-Information Brochure</li> <li>• VISUMAX laser booklet</li> <li>• MEL 80 laser booklet</li> </ul>	<ul style="list-style-type: none"> <li>• Refractive Surgery Reference Guide</li> <li>• Referral pads</li> <li>• LVCCC Post-op data form</li> <li>• Many of these documents can be downloaded from our website from healthcare professional login page (see below). <a href="http://www.lvccc.com.au/login">http://www.lvccc.com.au/login</a> Username: <b>LVCCC</b> Password: <b>LVCCC</b></li> </ul>
<b>Phone Service</b>	<ul style="list-style-type: none"> <li>• We have specialist staff to answer enquiries of prospective patients and post-op patients. The contact number is 1300 404 484</li> </ul>	<ul style="list-style-type: none"> <li>• Our staff orthoptists are available to answer questions about your patients.</li> </ul>
<b>Seminars and Conference</b>	<ul style="list-style-type: none"> <li>• Evening seminars on laser vision correction are held at the clinic, generally on a monthly basis. Check the website for the schedule.</li> </ul>	<ul style="list-style-type: none"> <li>• Our annual conference takes place in February</li> </ul>
<b>Attend the Clinic</b>	<ul style="list-style-type: none"> <li>• When prospective patients attend a seminar they can have their glasses measured for an indication of suitability for refractive surgery.</li> </ul>	<ul style="list-style-type: none"> <li>• Practitioners are welcome to attend the clinic to observe surgery and post-op cases. Call one of our orthoptists to make the arrangements.</li> </ul>
<b>Visit Our Website</b>	<ul style="list-style-type: none"> <li>• <a href="http://www.lvccc.com.au">www.lvccc.com.au</a></li> <li>• Patients can obtain information and view videos, they can email us with questions, and they can arrange appointments.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="http://www.lvccc.com.au">www.lvccc.com.au</a></li> <li>• Healthcare Practitioners login: <a href="http://www.lvccc.com.au/login">http://www.lvccc.com.au/login</a> You can find the link on the homepage (bottom of the page) Username: <b>LVCCC</b> Password: <b>LVCCC</b></li> </ul>

## 13. Useful Websites:

### Laser Vision Clinic Central Coast

Information for Eyecare Practitioners <http://www.lvccc.com.au/login>

Information for the General Public <http://www.lvccc.com.au>

### Industry

MEL 80 Excimer Laser <http://www.zeiss.com.au>

VISUMAX Femtosecond Laser <http://www.meditec.zeiss.com/visumax>

### Journals

Archives of Ophthalmology [www.arch.opht.ama-assn.org](http://www.arch.opht.ama-assn.org)

Journal of the American Society of Cataract and Refractive Surgery [www.ascrs.org](http://www.ascrs.org)

Journal of the International Society of Refractive Surgery [www.isrs.org](http://www.isrs.org)

Ophthalmology [www.aajournal.org](http://www.aajournal.org)

Review of Ophthalmology [www.revophth.com](http://www.revophth.com)

Review of Optometry [www.revoptom.com](http://www.revoptom.com)

Survey of Ophthalmology [www.elsevier.com/inca/publications/store/](http://www.elsevier.com/inca/publications/store/)

### Organisations

American Academy of Ophthalmology [www.eyenet.org](http://www.eyenet.org)

American Academy of Optometry [www.aaopt.org](http://www.aaopt.org)

American Optometric Association [www.aoanet.org](http://www.aoanet.org)

American Society of Cataract and Refractive Surgery [www.ascrs.org](http://www.ascrs.org)

Australasian Society of Cataract and Refractive Surgeons [www.auscrcs.org.au](http://www.auscrcs.org.au)

Eye Surgery Education Council [www.eyesurgeryeducation.com](http://www.eyesurgeryeducation.com)

Food and Drug Administration [www.fda.gov](http://www.fda.gov)

International Society of Refractive Surgery [www.isrs.org](http://www.isrs.org)

Optometrists Association Australia [www.optometrists.asn.au](http://www.optometrists.asn.au)

National Eye Institute [www.nei.nih.gov](http://www.nei.nih.gov)

RANZCO [www.ranzco.edu](http://www.ranzco.edu)