DISTANCE LEARNING COURSE

Ophthalmic Facilities and Equipment
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OVERVIEW

This module will introduce you to the facilities and equipment of an ophthalmic practice. Included is information related to the physical layout of the clinic office, ophthalmic equipment, optical dispensaries and equipment, and ambulatory surgical facilities and equipment. An explanation of patient flow in the clinic and ASC is also provided.

THE OPHTHALMOLOGY OFFICE

A typical ophthalmic office is designed to provide eye examinations and minor surgical procedures in a safe, efficient, patient-friendly environment. Most offices are designed to create easy access for patients (including handicap access) and to provide a logical “flow” through the practice. Although office space and design for each practice varies, there are common rooms and waiting areas found in all ophthalmic offices, as outlined below.

Patient Exam Rooms and Waiting Areas

- **Reception Desk:** Upon arrival at the office, all patients check-in at a reception counter or desk. Typically, a sign-in sheet is available for patients to write their name and time of appointment.

- **Patient Reception Area:** This waiting area provides a place for patients, family members and friends to sit while they wait for their appointment. Reading materials (magazines, patient education materials, practice brochures) are available and some practices also offer beverages and refreshments for people who are waiting.

- **Children Reception Area:** Many practices have a “kids waiting area” that provides a dedicated space for children. This area may include puzzles, games, and books to help entertain children while they are waiting for their exam.

- **Pre-test Room(s):** This area provides dedicated space to begin the initial testing for the eye exam.

- **Ancillary Testing Room(s):** Many practices dedicate space for ancillary diagnostic tests such as A-Scan, B-Scan, corneal topography, etc. Having a specific area for these tests allows the practice to maintain a smooth flow of patients through the clinic area.

- **Visual Field Room(s):** Provides space and equipment for completing visual field examinations for patients.

- **Sub-waiting (dilation) Area:** Many patients require a dilated exam. To ease the flow in the clinic area and free up space in the exam rooms, most ophthalmic practices have a dedicated waiting area for patients who have been given dilating drops for their exam.

- **Examination Lane(s):** This is a room where patients are given a thorough eye exam. The typical exam lane includes a patient exam chair and various pieces of equipment and instruments necessary to complete the exam.

- **Surgical Counselor’s Office:** Patients who are being recommended for surgery will meet with a surgical counselor to schedule a date for surgery, review insurance reimbursement issues, and discuss pre-operative and post-operative procedures. A dedicated office or meeting area provides privacy for patients and the counselors to discuss these items.

- **Business Office:** Business operations, such as billing and collections, patient check-out and payment of accounts, finance, and bookkeeping are critical to the success of the practice. As such, dedicated office space is provided for these functions.
Other Office Areas

- **Chart Filing Area:** Patient charts are normally organized in a dedicated area of the practice for ease of retrieval and filing.

- **Private Doctor Office(s):** A private work area for the doctor to complete his/her daily business functions.

- **Staff Lounge/Conference Area:** Most practices provide a lounge or meeting area for staff to take breaks, eat lunch, conduct meetings, etc. These areas normally include a refrigerator, microwave, table, and chairs.

- **Staff Lavatory:** A bathroom facility available to doctors and staff members.

- **Patient Lavatory:** A bathroom facility dedicated for patients and family members or friends.

- **Contact Lens Instruction Area:** This space provides new contact lens wearers an area to practice inserting and removing their contacts.

- **Optical Dispensary:** Office space dedicated to the sale of eyeglasses and accessories.

Patient Flow

1. When the patient enters the office he/she is greeted by the receptionist, who completes the patient registration process. The patient is then asked to have a seat in the patient reception (waiting) area to wait for the eye examination to begin.

2. To start the exam, the patient is usually called by an ophthalmic assistant or technician who will begin the initial pre-testing needed in preparation for the physician’s eye examination. Initial testing can be conducted either in an examination lane, or in a pre-test area.

3. Following pre-testing, the patient may be escorted to an ancillary testing area or room where tests such as HRT, GDx, corneal topography, A and B-scan, are completed by the technician prior to the patient seeing the physician. In addition, the patient might be escorted to a visual field room where visual field testing is completed prior to the physician’s exam (based on office protocols, or previous instruction by the physician).

4. During the pre-testing stage the patient might have had their pupils dilated and need some time for full dilation to take effect. In this case, the patient will be escorted into the sub-waiting dilation area to wait comfortably until the pupils are fully dilated.

5. Once the patient has finished dilating or completed pre-tests, or ancillary testing, the patient will be escorted into an examination lane where the physician’s portion of the eye exam is completed.

6. Following the eye exam, the patient may be escorted into a surgical counselor’s office for surgery scheduling, or the patient might be escorted into another ancillary testing area to complete tests that were ordered at the time of the eye exam.

7. Once all clinical activities are complete, the patient is escorted to the check-out area of the business office where subsequent appointments can be scheduled and payment for the eye examination is made.

8. Following the check-out process the patient might be escorted to the optical dispensary where the patient can present a prescription for new spectacles, and at the same time choose a new pair of glasses with the help of a dispensing optician.
9. After the visit to the optical dispensary, the patient leaves the office and is released from patient activity at that time.

**Common Ophthalmic Clinic Equipment**

Specialized equipment is necessary to complete different eye tests and procedures. Following is a list and description of the more common pieces of equipment and instruments. Information regarding the use of ophthalmic equipment in testing and delivery of care is provided in the module, Anatomy of a Patient Exam.

- **Amsler Grid Eye Test Cards**: Helps diagnose macular problems and is performed on patients with complaints of distortion, letters “jumping” when reading, or anyone with unexplained decrease in near vision. Patients describe the normal or abnormal appearance of gridlines on a chart. Distortions in the gridlines on the chart are recorded by the technician.

- **Auto Refractor**: A computerized instrument used to help determine the eyeglasses prescription.

- **Auto-keratometer**: An instrument used to measure the curvature of the cornea. These measurements are frequently taken on patients who are being fitted for contact lenses, measured for intraocular lenses for cataract surgery, or who may have corneal problems.

- **Chart Projector**: An instrument designed to project letters, numbers, or images onto a screen; used to check visual acuity.

- **Corneal Topographer**: A computerized optical or digital instrument used to measure and map the curvature of the cornea. This is useful in diagnosing corneal diseases such as keratoconus and astigmatism. The testing is often performed for contact lens fittings and preliminary evaluations for refractive surgery such as LASIK.

- **Direct Ophthalmoscope**: A hand-held instrument used at close range to view the inner structures of the eye.

- **Exam Chair and Stand**: The patient chair attached to a device that is designed to hold the phoropter, slit lamp, ophthalmoscopes, retinoscopes, and other eye examination equipment.

- **Exophthalmometer**: Instrument used to measure abnormal protrusion of the eye.

- **Fundus Camera**: Digital or analog camera designed to photograph the retina.

- **Geneva Lens Clock**: An instrument used to determine the base curve of a lens.

- **Gonio Lens**: A mirrored lens used to examine the angle structures in the front portion of the eye that allow for fluid outflow (primarily a screening test for glaucoma).

- **Indirect Ophthalmoscope**: An instrument worn on the physician’s head that allows viewing of the peripheral retina.

- **Lasers**: Acronym for Light Amplification by Stimulated Emission of Radiation. Different types of lasers are used in several applications in ophthalmology. The following lasers are typically found in the ophthalmic clinic.
  - **Argon Laser**: Laser in which the light source is argon gas excited by electricity, used in the treatment of diabetic retinopathy, macular degeneration, trabeculoplasty, and iridotomy.
  - **Nd:YAG Laser**: The principal application of this laser in ophthalmology is for posterior capsulotomy and iridotomy.
- **Lensometer**: Instrument used to document the patient’s current spectacle prescription. The readings identify not only the power of the lens, but also the type of lens (as described in the module, Optical Dispensary).

- **Maddox Rod**: A transparent rod used in testing visual fusion.

- **Nerve Fiber Analyzer (HRT, GDX)**: This computerized, digital instrument captures the appearance of the nerve fibers of the optic nerve. This test is useful in the diagnosis and maintenance of glaucoma.

- **Occluder**: An opaque device used to cover the eye during an eye examination.

- **Ophthalmodynamometer**: An instrument used for measuring blood pressure in the central retinal artery by applying pressure to the sclera.

- **Optical Coherence Tomography (OCT)**: An instrument that takes transpupillary images of the retina to assist in diagnosis and treatment of retinal diseases.

- **Pachymeter**: An instrument used to measure the thickness of the cornea. This is commonly used in the diagnosis of glaucoma and corneal disease.

- **Perimeter (Visual Field)**: An instrument used in visual field testing to document abnormal defects in a patient’s central and peripheral vision. This test is most commonly used to diagnose and monitor glaucoma and other neurological eye problems.

- **Phoropter**: An instrument containing a battery of convex, concave and cylindrical lenses used to determine an eyeglass prescription.

- **Potential Acuity Meter (PAM)**: An instrument most frequently used to test the potential for improvement in visual acuity after cataract surgery.

- **Prism Bar**: A plastic bar containing a series of prisms used to test for diplopia (double vision).

- **Retinoscope**: An instrument used to objectively determine the refractive error of the eye.

- **Slit Lamp**: An instrument with two oculars (eyepieces) that allow the examiner to view ocular structures through an attached low-powered microscope

- **Snellen Acuity Eye Chart**: An eye chart, manual or automatic, where measurement of the visual acuity is accomplished based upon standard sizes of letters visible to the normal eye at specified distances.

- **Specular Microscope**: An instrument used to view the corneal endothelium under high magnification.

- **Tonometers**: Instruments used to measure intraocular pressure in the eye. There are different types of tonometers:
  - **Goldman Tonometer**: Is normally mounted on a slit lamp, but can also be a hand-held instrument designed to be used with patients who cannot position themselves in the slit lamp chin rest.
  - **Tonopen**: A hand-held tonometer.
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- **Ultrasonography (Biometry):** A piece of equipment that uses the reflection or echo of sound waves to measure the length of the eye or detect abnormalities. Two types of tests are performed:
  - **A-Scan:** Used to measure the length of the eye to assist in the calculation of the power of an intraocular lens to be used in cataract surgery.
  - **B-Scan:** Provides two-dimensional reconstruction of the ocular and orbital tissues. It is also used to detect ocular tumors and retinal detachments.

- **Wheelchair Exchanger (Ramp):** Mechanical device that permits the typical patient chair in an examination lane to be easily moved out of normal position, so that the physician can examine a patient in a wheelchair.

### THE OPTICAL DISPENSARY

The Optical Dispensary offers patients the option to fill their eyeglass prescription directly in the doctor’s office. Information regarding optical dispensaries, the eyeglass prescription, and optical staff responsibilities are covered in the module, Optical Dispensaries. In this section we will focus on dispensary space, furniture, and equipment.

Most optical dispensaries are located in a convenient, highly visible area adjacent to the patient waiting area. This allows patients easy access and viewing of merchandise. A selection of frame styles in varying shapes, colors, and sizes are available along with the latest technologies in lens materials, designs, and coatings so the optician can present options to patients for their eyewear purchase. Various optical instruments and equipment, along with specially designed furniture are needed for an in-house optical dispensary.

#### Common Optical Dispensary Equipment and Furnishings

- **Frame Displays:** Used to display the various styles of frames offered by the dispensary. The types of displays vary from specially designed wood cabinetry containing glass shelving to simple frame bars to display the frame styles.

- **Dispensing Tables:** Specially designed tables or desks used when completing a patient order.

- **Lensometer:** An instrument designed to measure the patient’s current spectacle prescription. The readings identify not only the power of the lens, but also the type of lens.

- **UV Meter:** Measures the transmittance or absorption of potentially harmful UV rays for various lens materials. It is also used to demonstrate darkening of photochromic lenses.

- **Ultra Sonic Cleaner:** Chemically cleans frames and lenses with ultrasonic vibrations.

- **Frame Warmers:** Two different types of frame warmers are used to adjust eyeglasses.
  - **Salt Pans:** This heating element enables the optician to mold and adjust eyeglasses by applying heat to various parts of an eyeglass frame with the use of glass beads or salt.
  - **Air Frame Warmer:** Like a traditional frame warmer, this heating element will warm various parts of an eyeglass frame using warm air in place of salt or glass beads.

- **Small Hand Tools and Files:** Assorted tools, including various pliers, small screwdrivers, wrenches, and files, that are used for adjusting and repairing eyeglass frames.

- **Pupilometer:** An instrument used to measure a patient’s binocular or monocular PD (pupillary distance) at various distances.
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- **Lens Clock:** An instrument used to measure the front and back curvatures of a spectacle lens.

- **Optical Finishing Lab:** Some ophthalmology practices operate an optical finishing lab, which is a facility that provides the ability to cut, edge, and assemble a patient’s eyeglasses on premise. A small inventory of uncut lens blanks of varying prescriptions are sometimes stocked on-site to expedite the delivery of uncomplicated eyeglass prescriptions. Various pieces of equipment and instruments are needed to set-up an on-site finishing lab, but we have not included them in this module.

**AMBULATORY SURGERY CENTER (ASC)**

An ambulatory surgical center (ASC) provides surgical services in a safe, efficient, cost-effective and patient-friendly environment. Procedures such as cataract surgery are routinely performed in this type of facility, as well as other ophthalmic procedures (identified in the module, Scope of Service). Surgical services are limited to those which can be safely and effectively provided on an outpatient basis and are typically elective and non-emergent in nature.

**ASC Facility**

A typical ASC will consist of the following rooms and areas:

- **Reception/Waiting Room:** Similar to the ophthalmic clinic, a reception counter or desk is provided for patient check-in. Chairs, tables, reading materials, and beverages are normally available for patients, family members, and friends.

- **Pre-op:** An area restricted to staff members and patients to complete the pre-operative procedures.

- **Female and Male Dressing Rooms:** This area is used for patients to remove some of their clothing, as necessary, and dress in appropriate surgical attire, i.e., head coverings, foot coverings, etc.

- **Operating Room:** A sterile room where the surgical procedure will take place. The operating room is equipped with the necessary surgical equipment, instruments, supplies and medications needed to perform the procedure.

- **Procedure/YAG Laser Room:** This room is used for minor surgical procedures and laser procedures.

- **PACU (Post Anesthesia Care Unit):** Following surgery, patients are placed in a post-operative recovery area that includes beds or reclining chairs, privacy curtains, bed side chairs for family members or friends, and other furnishings.

**Other Areas Found in an ASC**

- Medical Records Storage
- Patient Consultation Room
- Instrument Room
- Patient Bathrooms
- Administrator’s Office
- Medical Director/Doctor’s Office
- Mechanical Room
- Soiled Utility Room
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- Electrical Room
- Janitor’s Closet
- Clean/Sterilization Area
- Storage
- Staff Lounge Area

Common ASC Equipment and Instruments

Depending on the type of surgical cases being performed, equipment in the ASC will vary. A description of the most common ophthalmic surgical equipment is provided below.

- **Autoclaves**: This device is used to sterilize the surgical instruments before use in surgery.
- **Camera and Video System**: Provides visibility of the intraoperative procedure to the operating room staff.
- **Eye Stretchers**: These are patient gurneys designed specifically for eye surgery and are contoured to make the surgical site more accessible to the ophthalmic surgeon. In many ASCs the patient is placed on the eye stretcher in the pre-operative area and remains on the stretcher through surgery and for post-operative recovery.
- **Monitors**: Equipment that provides ongoing monitoring of all patient vital signs during the surgical procedure.
- **Operating Microscope**: This instrument is used by the ophthalmic surgeon to obtain an enlarged view of the eye.
- **Phaco**: A commonly used abbreviation for an instrument used during phacoemulsification (cataract) surgery. This instrument breaks the lens (cataract) into small pieces and aspirates the lens material out of the eye.
- **Surgical Instruments**: There are many different tools used to accomplish the surgical procedure. These instruments are selected based on surgeon preference and are very delicate and fragile due to the nature of the surgery being performed on the eye.
- **Ultrasonic Cleaner**: Using ultrasonic waves, this equipment gently cleans and decontaminates any accumulated debris on the surgical instruments. This is done before sterilization, recognizing the delicacy of the instruments.

Patient Flow in the ASC

- The patient and responsible party will enter the waiting room and be greeted by a receptionist who completes patient check-in. Every effort will be made to complete all necessary paperwork prior to admission to speed up the check-in process. Any remaining documentation will be completed at this time and the patient will be advised of their patient rights.
- The patient is escorted to the assigned pre-operative area. Here, they may remove some of their “street clothes” and don appropriate surgical attire. All patients entering the restricted area will don head covers. Patient belongings are held in a labeled bag, which remains with the patient throughout the encounter. The patient is made comfortable in the pre-operative area.
- The pre-operative nurse will interview the patient, perform a pre-operative assessment, confirm the patient’s history and understanding of the planned procedure, attach monitoring devices to the patient, complete the pre-operative checklist, and implement pre-operative physician orders.
The patient is escorted into the operating room or procedure room and positioned for surgery.

Anesthesia appropriate to the length and nature of the surgical procedure is administered. This may involve an anesthesiologist/anesthetist, the surgeon, and/or an RN nurse monitor.

The patient is prepped with an antiseptic solution as ordered by the surgeon and sterile drapes are applied to establish a sterile field per surgeon preference.

The surgical procedure is then performed.

When the procedure has been completed, a sterile dressing may be applied, the drapes are discarded, monitoring devices are removed and the patient is transferred to the post-anesthesia care unit (PACU).

The PACU nursing staff monitors the patient, provides appropriate pain management as needed, and discharge instructions are given to the patient and family as appropriate.

Prior to discharge, a physician assesses the patient and a discharge order is documented in the medical record.

The patient is offered nourishment, assisted with changing clothes as needed, and released from the facility to the care of a responsible adult.

REFRACTIVE SURGERY CENTERS

Refractive surgery centers are outpatient surgical facilities in which refractive procedures are performed. These refractive surgical procedures are performed to reduce or eliminate nearsightedness, astigmatism, and farsightedness. The procedures involve either reshaping the cornea or inserting a lens into the eye to decrease a patient’s dependence on glasses or contact lenses. Many refractive surgical options are now available to patients because of rapidly changing technology. Currently, LASIK is the most commonly performed refractive procedure and is usually performed in a surgical suite, an outpatient surgery center, or a refractive surgery center.

The most commonly performed refractive procedures include:

- **LASIK (Laser-Assisted In Situ Keratomileusis):** A procedure using a laser/lasers to reshape the cornea, often using wavefront technology to maximize results.

- **Corneal Relaxing Incisions (CRIs):** A procedure in which incisions are made into the cornea to reduce astigmatism. This procedure is sometimes performed at the time of cataract surgery, but can also be completed in a physician office’s minor procedure room.

- **Refractive Lens Exchange (RLE):** A procedure involving the removal of the eye’s natural lens, either clear or cloudy (cataract), and the insertion of an intraocular lens. This lens may be monofocal, multifocal, or accommodative, depending on the patient’s needs.

Other less commonly performed refractive procedures include:

- Phakic IOLs – surgically inserted implantable contact lenses
- Intacs – Intracorneal ring segments
- PRK – PhotoRefractive Keratectomy
- LTK – Laser Thermokeratoplasty
- CK – Conductive Keratoplasty
- LASEK/epiLASIK – Laser Epithelial Keratomileusis
Common Refractive Surgery Equipment

Equipment commonly used in laser refractive procedures:

- **Excimer Laser**: A laser that uses a gas made up of argon and fluorine. This laser is used in ophthalmology to reshape the cornea by the process of photoablation, i.e., LASIK or PRK, to eliminate the need for dependence on glasses.

- **Microkeratome**: A surgical instrument used to create a corneal flap in refractive surgery.

- **Intralase**: A laser used to make the flap in LASIK surgery. In some cases, this laser is used instead of the microkeratome.

CONCLUSION

Ophthalmic facilities are designed to support the various services and procedures performed by the physicians and their staff. Therefore, an ophthalmic staff member is exposed to a number of different types of equipment used to facilitate services and treatment to patients. Your training coordinator will provide a tour of your practice facility to familiarize you with the different areas of the practice and the equipment being used.
1. After the initial patient registration process is complete, the patient is asked to:
   a. Proceed to the pre-test area.
   b. Have a seat in the dilation waiting area.
   c. Proceed to the counselor’s office.
   d. Have a seat in the patient reception area.

2. The ancillary testing room is used for:
   a. Diagnostic testing (A-Scan, B-Scan, and corneal topography).
   b. Initial pre-tests before the eye exam begins.
   c. Instilling dilating drops to dilate the patient’s pupils for testing.
   d. None of the above.

3. To start the exam, an ophthalmic assistant or technician performs pre-testing in preparation for the physician’s eye exam.
   a. True
   b. False

4. Once all clinical activities are done, the patient completes the check-out process, which includes:
   a. Scheduling the next appointment.
   b. Payment for the eye exam.
   c. Meeting with the doctor.
   d. A and b.
   e. All of the above.

5. An auto refractor is used to:
   a. Measure abnormal protrusion of the eye.
   b. View the peripheral retina.
   c. Help determine the eyeglasses prescription.
   d. Test visual fusion.

6. An A-Scan is a piece of ultrasound equipment used to:
   a. View the corneal endothelium.
   b. Measure the intraocular pressure of the eye.
   c. Measure the thickness of the cornea in the diagnosis of glaucoma and corneal disease.
   d. Measure the length of the eye to assist in calculating the power of an intraocular lens for cataract surgery.

7. The Snellen acuity chart is used to:
   a. Test for diplopia (double vision).
   b. Document abnormal defects in a patient’s peripheral vision.
   c. Measure visual acuity using various sizes of letters visible to the normal eye.
   d. Measure the curvature of the cornea for patients being fitted for contact lenses.

8. A visual field instrument is used to document abnormal defects in a patient’s central peripheral vision.
   a. True
   b. False
9. A lensometer is used to:
   a. Measure a patient's binocular or monocular pupillary distance.
   b. Measure the front and back curvatures of a spectacle lens.
   c. Measure the patient's current spectacle prescription.
   d. Display various types of lens materials.

10. An optical finishing lab is a facility that is used to assemble patient's glasses.
   a. True
   b. False

11. An ambulatory surgery center is an outpatient facility that provides the ability to perform all types of eye care surgery, regardless of the nature of the procedure.
   a. True
   b. False

12. A phaco instrument is used in what type of surgical procedure:
   a. Retina surgery.
   b. Cataract surgery.
   c. Glaucoma surgery.
   d. Refractive surgery.

13. PACU is an abbreviation for:
   a. Personal ambulatory center uniforms.
   b. Pre authorization call unit.
   c. Patient administration and care unit.
   d. Post anesthesia care unit.

14. Refractive surgery services can be provided either in the doctor's office, in a separate refractive laser center, or in an ambulatory surgery center.
   a. True
   b. False

15. Which of the following lasers is used to perform refractive surgery:
   a. Argon laser
   b. ND:YAG Laser
   c. Excimer Laser
   d. CO2 Laser