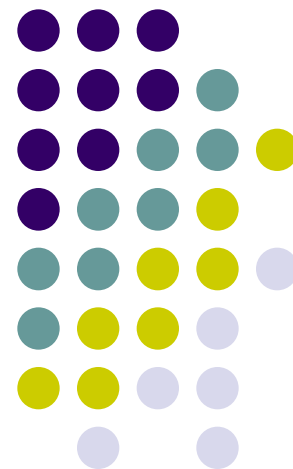


OCULAR PHARMACOLOGY

Pharmacology for Technicians



Lynn Lawrence, CMSgt(ret), USAF CPOT, ABOC, COA, OSC



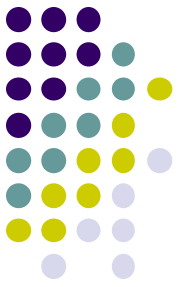
Overview

- Role of the Assistant
- Medication Check
- Patient Safety
- Reaction Prevention
- Drug Categories
- Drug Administration
- Vitamin Supplements
- Drug Instillation Procedure
- Drug Documentation

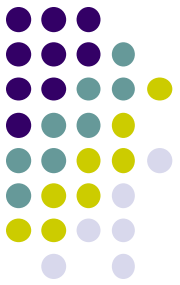
Sight Gags by Scott Lee, O.D.



ROLE of the ASSISTANT AND TECHNICIAN



- Accurate documentation/recording
- Patient Education...can assist in preventing mistakes
- NEVER Work in Doubt!
- Read and re-read the medication request
- Be careful with hand-offs/transfers!
- Patient Safety



The Medication Check

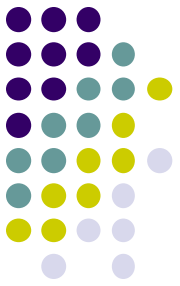
- For “Ophthalmic Use”, must be on the container
- Check name
- Check dosage
- Check expiration date
- Check for contamination

The Patient Checks



- Reason for visit
- Check patient's current health condition
- Verify patient allergies
- Provider medication request
- Check visual acuity...**always**
- Check IOP...**always**
- Check angles...
- Do not leave the patient unattended and routinely monitor
- Check blood pressure before dilation

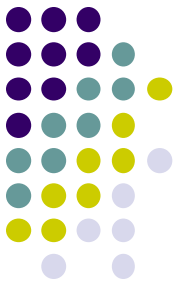
PATIENT CASE HISTORY



The best way to prevent an adverse reaction is to perform an excellent case Hx?

- General Health
- Medications
- Allergies





Current Medications

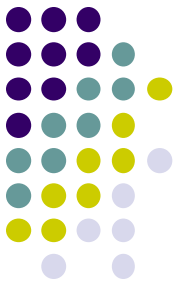
- ❑ Name
- ❑ Amount taken
- ❑ Frequency
- ❑ Prescribed for
- ❑ Prescribed by
- ❑ Illegal drugs too!

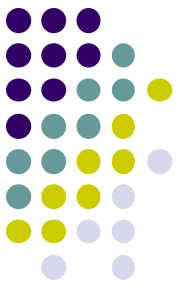


Why is illegal drug use important?

Critical checks

- Doctor's medications request
- Pupils
 - PERRLA
- Angles
 - Open/clear
- Pressures
- Medications...always inspect medication
 - Heart meds
 - Blood pressure...before dilation
- Current health





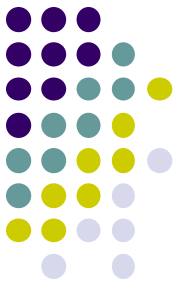
Blood Pressure... note

- Check before medication
- Please understand the procedure
- Correct position
- Explain it
- Perform it
- Document it
- No more than 3 attempts

A sphygmomanometer is used to measure arterial blood pressure.



What is the speed in which you regulate the release of pressure during the measurement



Readings

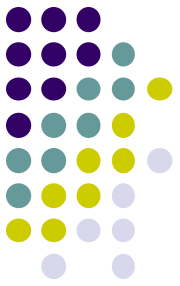
- **Normal**

- The “normal” for adults is approximately 120mmHg /between 70-80mmHg

- **Abnormal**

- Mild Hypertension
 - 145-159mmHg/90-104mmHg
- Severe Hypertension
 - 160mmHg or more/100mmHg or more
- Hypotension
 - Below normal blood pressure 100mmh/ under 70

Tonometry



- **Instruments**

- **Applanation- Goldmann...touches patient**

This is the industry gold std

What medication is used during this test?



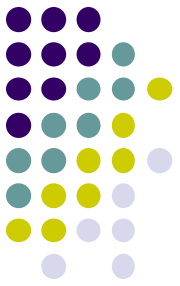


Pupil Testing

- Explain test
- Proper lighting
- Perform direct and consensual
- Swinging flashlight
- Evaluate near response
- [Recording](#) accuracy



Pupil Testing

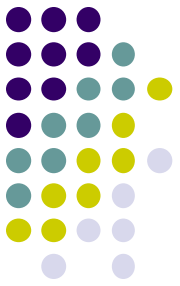


- ❑ Light the pupil for _____ seconds?
- ❑ Assure that the sensory pathway is working
- ❑ Direct/consensual responses to light
- ❑ Response to accommodation

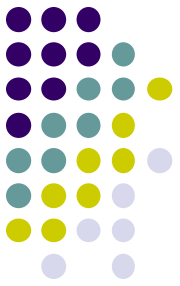


APD

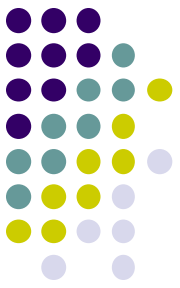
Dilate: Yes or No?



Pupil Testing



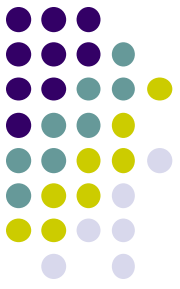
- **Anisocoria- unequal pupil sizes**
 - “cor” = pupil
 - “aniso”=difference
- **Hippus- “jumping” pupil**
 - Most commonly seen in younger patients



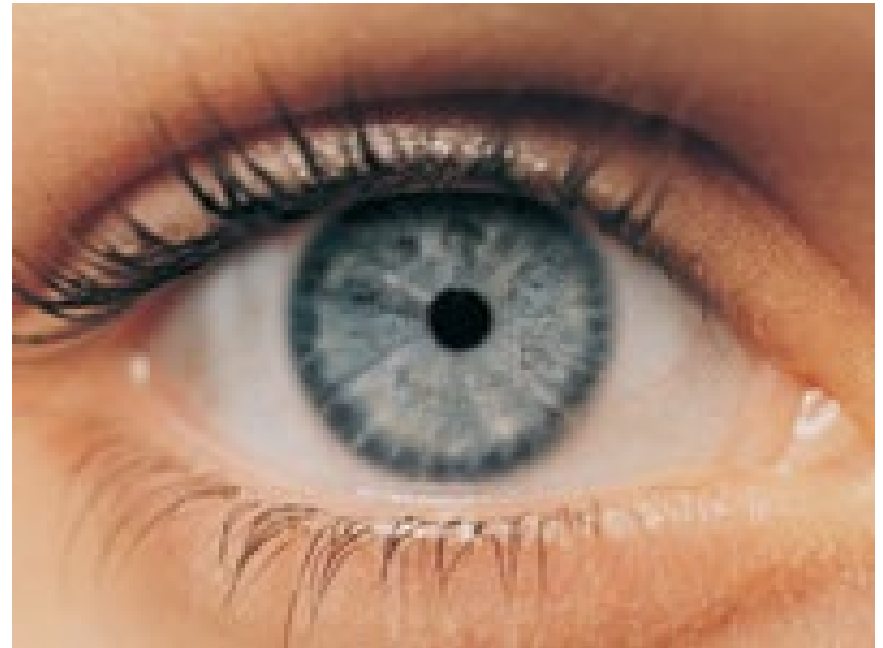
Recording

- P-pupils
- E-equal
- R-round
- R-react to
- L-light
- A-accommodation
- -RAPD/-Marcus Gunn

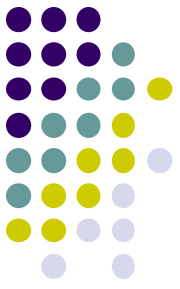




Mydriatic And Miotic Effects

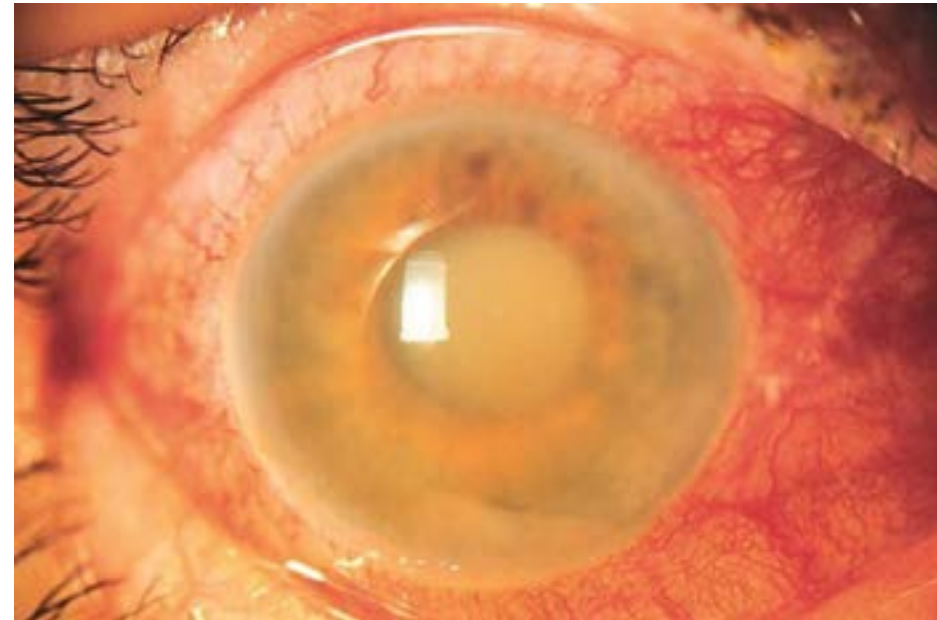


Which is miotic and which is mydriatic?



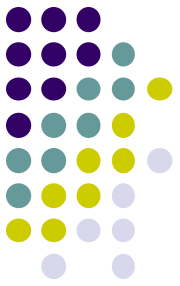
Verify Angle Depth

- When the doctor has seen the patient
- When the doctor has not seen the patient



Be aware, patients can have a reaction to the preservatives in the medications
Benzalkonium chloride (BAC) is a common preservative

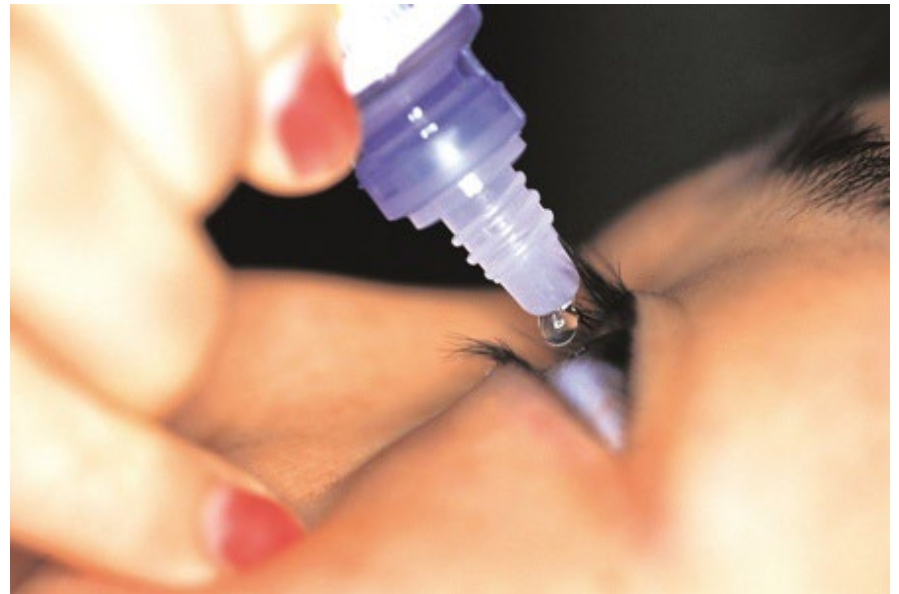
Wash your hands!
Before and After Patient Care!



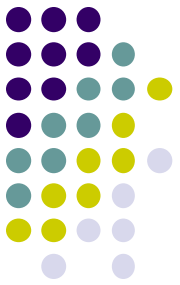


Drop Instillation

- Clean hands
- Explain procedure
- Remember safety
- Inspect bottle
- Check expiration date
- Do not contaminate the container



What is wrong with this picture?



Drops...

Common for clinical applications... (aka combo)

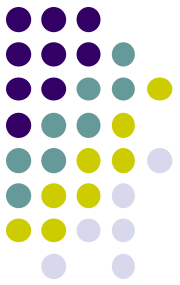
- Tropicamide (.5 – 2%)
 - Phenylephrine (2.5 – 10%)
 - Proparacaine (.5%)
 - Cyclopentolate (1-2%)
- * Children medications...





Floppy Eye Lid Syndrome –
the lid no longer has tension
and does not remove the
bacteria from the eye

Bacteria



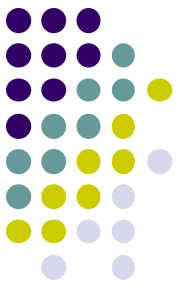
TPA – vs DPA

- Therapeutic Pharmaceutical
Application...when the problem is **known** and
you treat the condition
- Diagnostic Pharmaceutical
Application...when the problem is **unknown**
and you treat the symptoms

CATEGORIES



- Anesthetics cause a temporary loss of feeling around the nerve in which applied – (caine)
- Antibiotics – treat infections
- Antifungals – treat fungus caused infections
- Antivirals – treat virus caused infections
- Mast Cell Stabilizers – relief of seasonal allergies and conjunctivitis
- NSAIDS – treatment of inflammatory conditions with out the us of Steroids



Pharmacology: Diagnostic Agents

Mydriatic Drugs

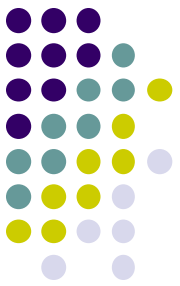
- **Phenylephrine (Neo-Synephrine, Mydfrin)**
 - Causes pupil **dilation**
 - Strength: 2.5%, 10%
 - Effective: 4-6 hours
 - Systemic Side Effects:
 - **Irregular heart beat**, headache, hypertension, cardiac arrest (very rare)
 - Action: Stimulates the iris dilator muscle

Pharmacology: Diagnostic Agents

Cycloplegic Drugs



- **Tropicamide (Mydracyl) (muscle paralysis)**
 - Causes pupil **dilation**
 - Strength: 0.5%, 1%
 - Effective: 5-6 hours
 - Systemic Side Effects: Uncommon



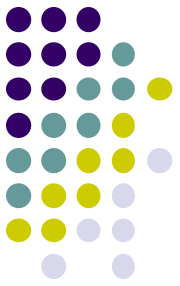
Pharmacology: Diagnostic Agents

Cycloplegic Drugs

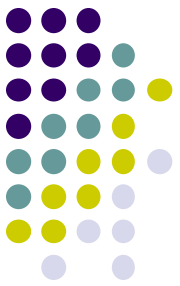
- **Cyclopentolate (Cyclogel) (dilation)**
 - **Strength: 1.0% and 2.0%**
 - **Effective 24 hours**
 - **Side Effects: Dry mouth, excitation, facial flushing, tachycardia, angle closure due to dilation**
 - **Action: Paralyzes the sphincter muscle of the iris (dilation) and the ciliary muscle (prevent accommodation)**

Pharmacology: Diagnostic Agents

Stains



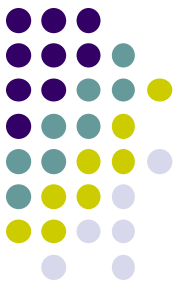
- **Fluorescein...used to stain cornea surface**
 - Strips
 - Mixed with anesthetic
 - Injected (angiography)
- **Rose Bengal...used to stain dead cells**



Pharmacology: Anesthetics

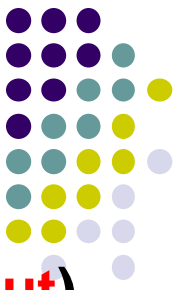
- **Commonly used anesthetics:**
 - **Proparacaine 0.5%**
 - **Tetracaine 0.5%**
 - **Lidocaine 1.0%-5.0%**
 - **Benoxinate plus fluorescein (Fluress)**
 - **Proparacaine plus fluorescein (Fluoracaine)**

What is the typical duration for routine anesthetics?



Pharmacology: Therapeutic Agents

- **Miotics**
 - **Action: contraction of the iris sphincter muscle (pupil constriction)**
 - **Use: lowering of intraocular pressure by improving drainage of the aqueous humor through the trabecular meshwork.**
 - **Used in performing a YAG PI**



Pharmacology: Therapeutic Agents

- **Glaucoma Treating Drugs** (production vs output)
 - **Adrenergic-blocking agents**
 - Timolol, Betaxolol, Levobunolol
 - **Adrenergic-stimulating agents**
 - Epinephrine
 - Dipiverfrin
 - **Carbonic Anhydrase Inhibitors (CAI)** production
 - Acetazolamide
 - Methazolamide
 - Dorzolamide

*Can **change color** of eyes and lashes

Can cause **hyperemia** = red irritated eyes

Patient **allergies** are very important

Glaucoma treatment



**WEARING SPECIAL
GLASSES ANTIGLAUCOMA**
(spring and summer)



**EYE DROPS
CARBONIC ANHYDRASE
INHIBITORS**

Helps reduce
the production
of intraocular fluid



**EYE DROPS AGONISTS
OF ALPHA ADRENERGIC
RECEPTORS**

Helps to reduce the
production of eye fluid
and improves its outflow



**EYE DROPS
CONTAINING
PROSTAGLANDINS**

Reduces
intraocular pressure



**EYE DROPS
BETA BLOCKERS**

Helps reduce
the production
of intraocular fluid



**DO NOT WORK TOO LONG WITH
THE TABLET AND AT THE COMPUTER**



**CARBONIC
ANHYDRASE
INHIBITORS**

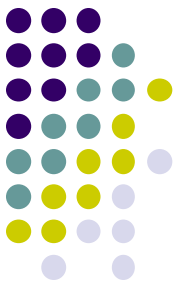
Helps reduce
the production
of intraocular fluid



**LIGHTING SHOULD
ALWAYS BE OF HIGH QUALITY**



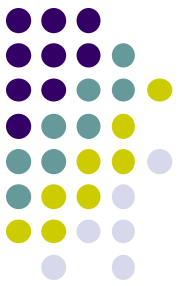
Beta Blocker



any of a class of drugs that prevent the stimulation of the adrenergic receptors responsible for increased cardiac action. Beta blockers are used to control heart rhythm, treat angina, and reduce high blood pressure, eye pressure

WARNING!!!!

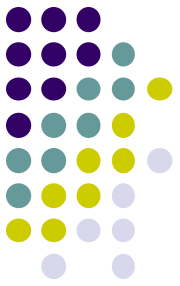
- Be very sure to verify meds during every visit for glaucoma patients to ensure that the patients are not already on beta blockers
- Be on the lookout for heart, anxiety, and anti-depressive meds



Pharmacology: Therapeutic Agents

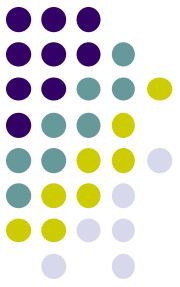
- **Glaucoma Treating Drugs**
 - **Alpha Agonists (watch for heart conditions)**
 - **Stimulates mydriasis and vasoconstriction**
 - Apraclonidine
 - Brimonidine (Alphagan P)
 - **Prostaglandin Analogs (PGA's)**
 - **Reduces aqueous production**
 - Bimatoprost
 - Latanoprost
 - Travoprost

Pharmacology: Therapeutic Agents



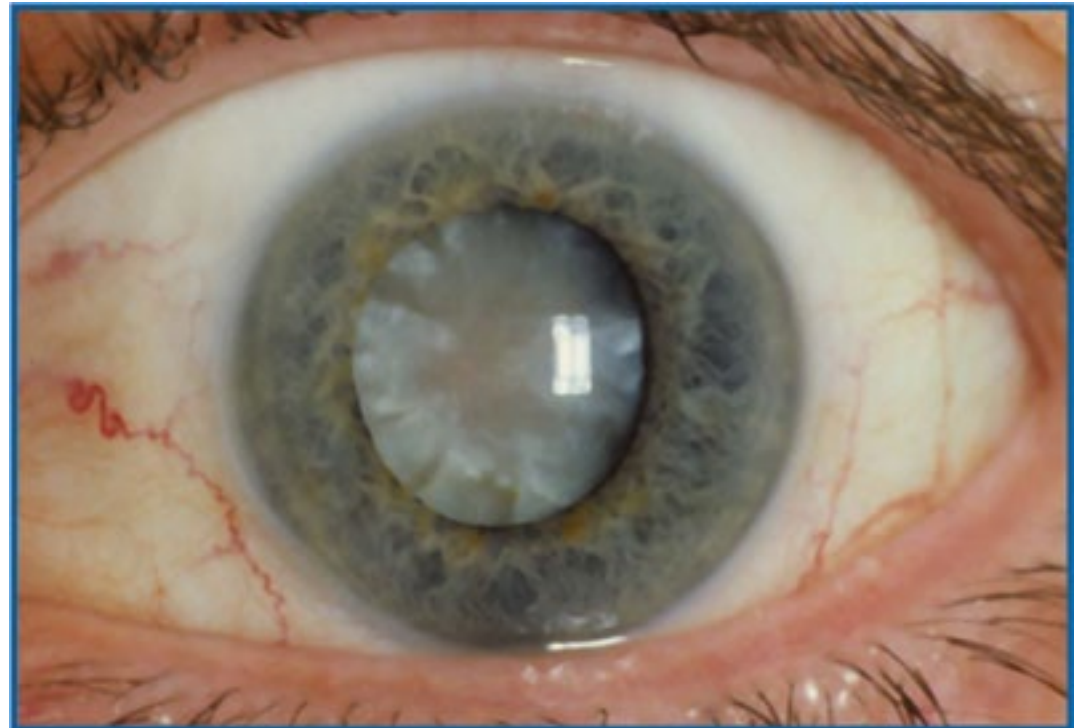
- **Antibiotics**
- **Antivirals**
- **Antifungals**
- **Beta Blockers**
- **Corticosteroids...prevents swelling**
- **Non-steroidal Anti-inflammatory Drugs (NSAIDS)**
- **Decongestants**
- **Antihistamines**
- **Mast Cell Stabilizers**
- **Lubricants**

Cataract Medications



Pre-surgery drops:

- **Antibiotics**
- **NSAIDS**
- **Steroids**



Medication Application Procedures

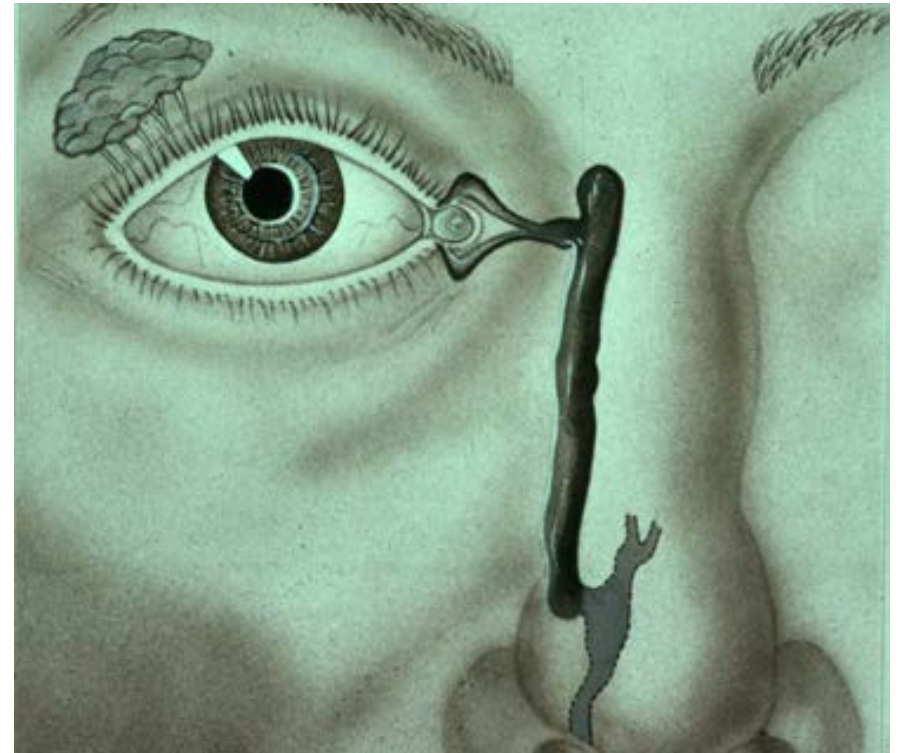


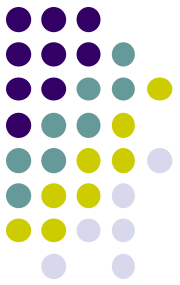
- Wash hands thoroughly before administration
- Give medications with patient in inclined position...why?
- Tilt head backward or lie down and gaze upward/downward
- Gently grasp lower eyelid below eyelashes and pull the eyelid away from the eye to form a pouch
- Place dropper directly over the eye. Avoid contact of the dropper with the eye, finger or any other surface
- Release the lid slowly and close the eye
- Occlude puncta for 2-3 minutes
- Wait 5 minutes before administering a second medication or drop
- Dim room lighting can assist in reducing blink reflex



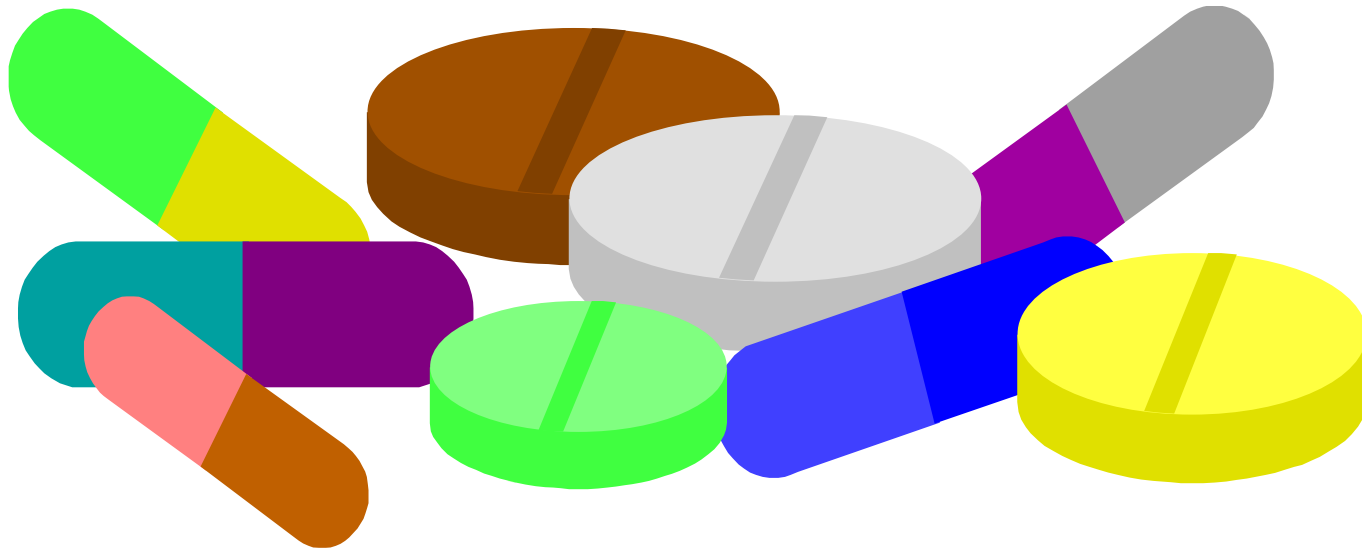
Punctal Occlusion

- Prevent systemic absorption
- Aids in reducing reactions
- Patients with heart condition must be watched
- Close eyes for 2-3 minutes





VITAMIN SUPPLEMENTS



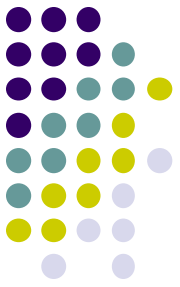
These are very important, especially during the surgery process



Do the math

When validating the cost of supplements, make sure that you **perform the calculations on the properties and amount and quality of the product** that you are attempting to administer to the patient. How much is in the product that you are purchasing

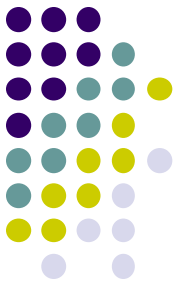
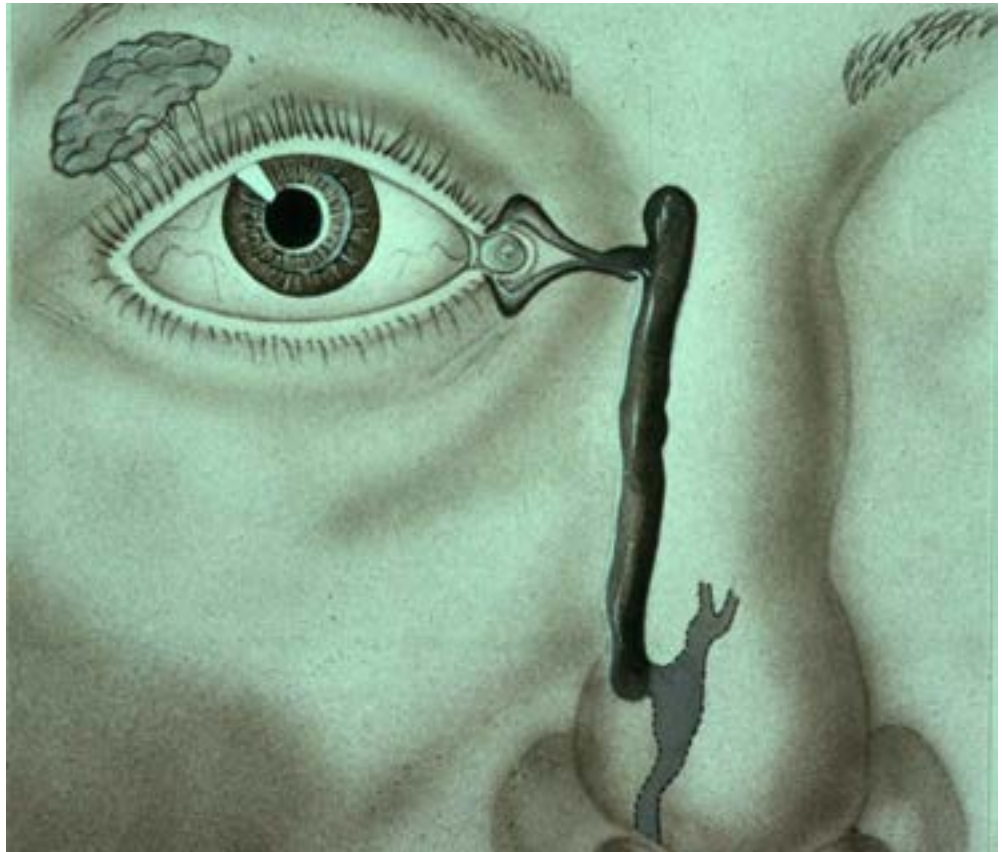
CLASSIFICATIONS



- Orals
- Solutions
- Suspensions (must be shaken)
- Ointments
- Pumps
- Implants

Topical Anesthetics

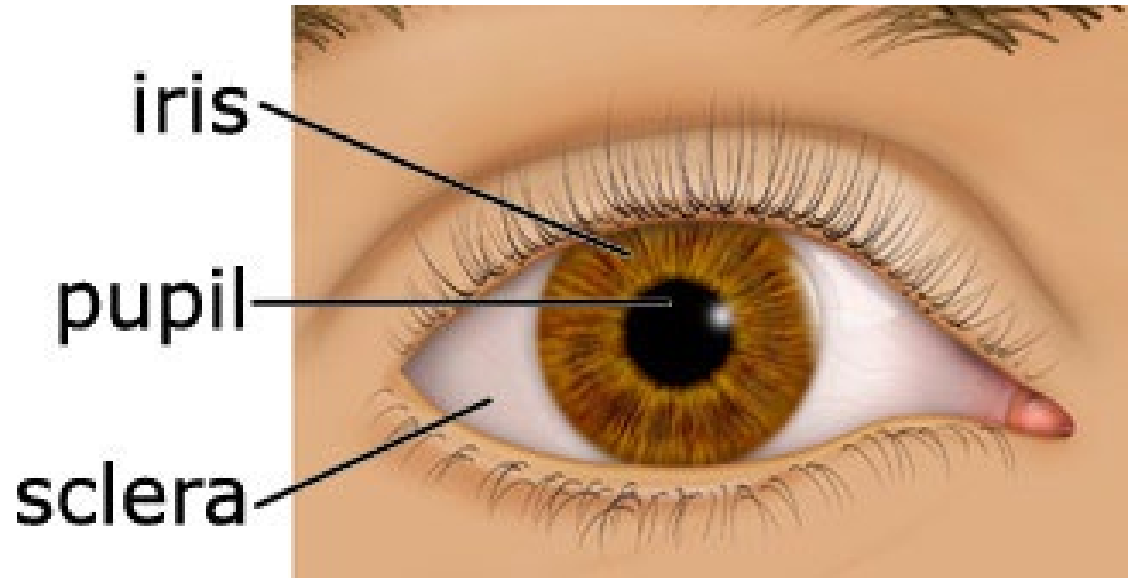
- Proparacaine
- Tetracaine
- Cocaine



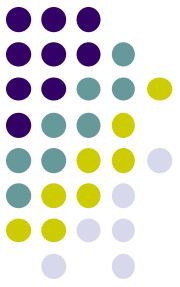


Mydriatics & Cycloplegics

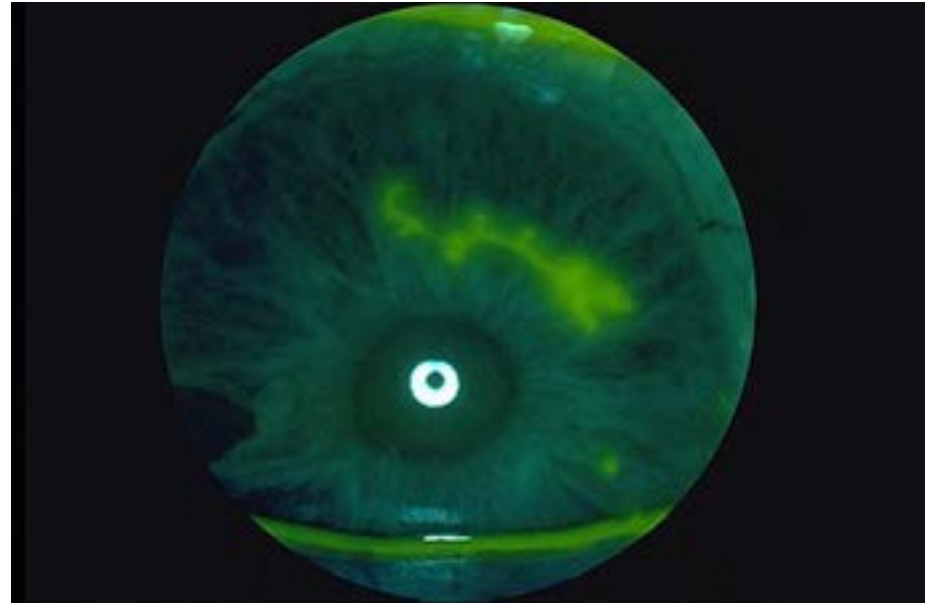
- Tropicamide
- Phenylephrine 2.5-10%
- Cyclogyl
- Atropine
- Homatropine
- Scopolamine



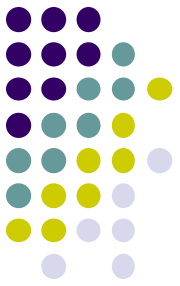
Dyes & Stains



- Fluorescein
- Rose Bengal
- Lissamine Green
- Fluress



CLINICAL ADMINISTRATION



- Patient History
 - Ask about recreational drug use!
- Clinical Procedures Which May Be Influenced by Medications

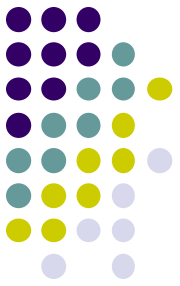
THERAPEUTIC AGENTS

TPA – **known problem**



- Antibiotics
- Anti-virals
- Drugs that lower IOP
- Anti-inflammatory agents
- Non-Steroidals
- Combinations

GLAUCOMA MANAGEMENT



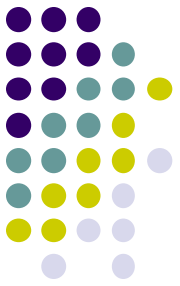
- Pilocarpine
- Beta-Blockers
- Carbonic Anhydrase Inhibitors (CAI)
- Adrenergic Agonists



Medications

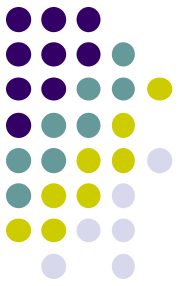
- IOP Lowering Medications
 - Azopt
 - Betimol
 - Betoptic S
 - Combigan
 - Iopodine
 - Istalol
 - Lumigan
 - Timolol
 - Travatan
 - Xalatan
- Dosages vary
- Insurances may not pay for brand names
- Some medications work on some pts but not on others
- Pt should run out of their medications
- Compliance is a big issue with many patients

OCULAR INFLAMMATION



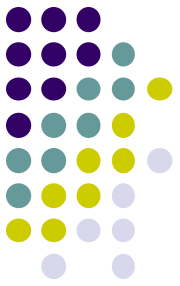
- Corticosteroids
- Steroid-Antibiotic Combinations
- Non-Steroidal Anti-inflammatory Drugs (NSAIDS)
- Oral Analgesics

OCULAR INFECTIONS

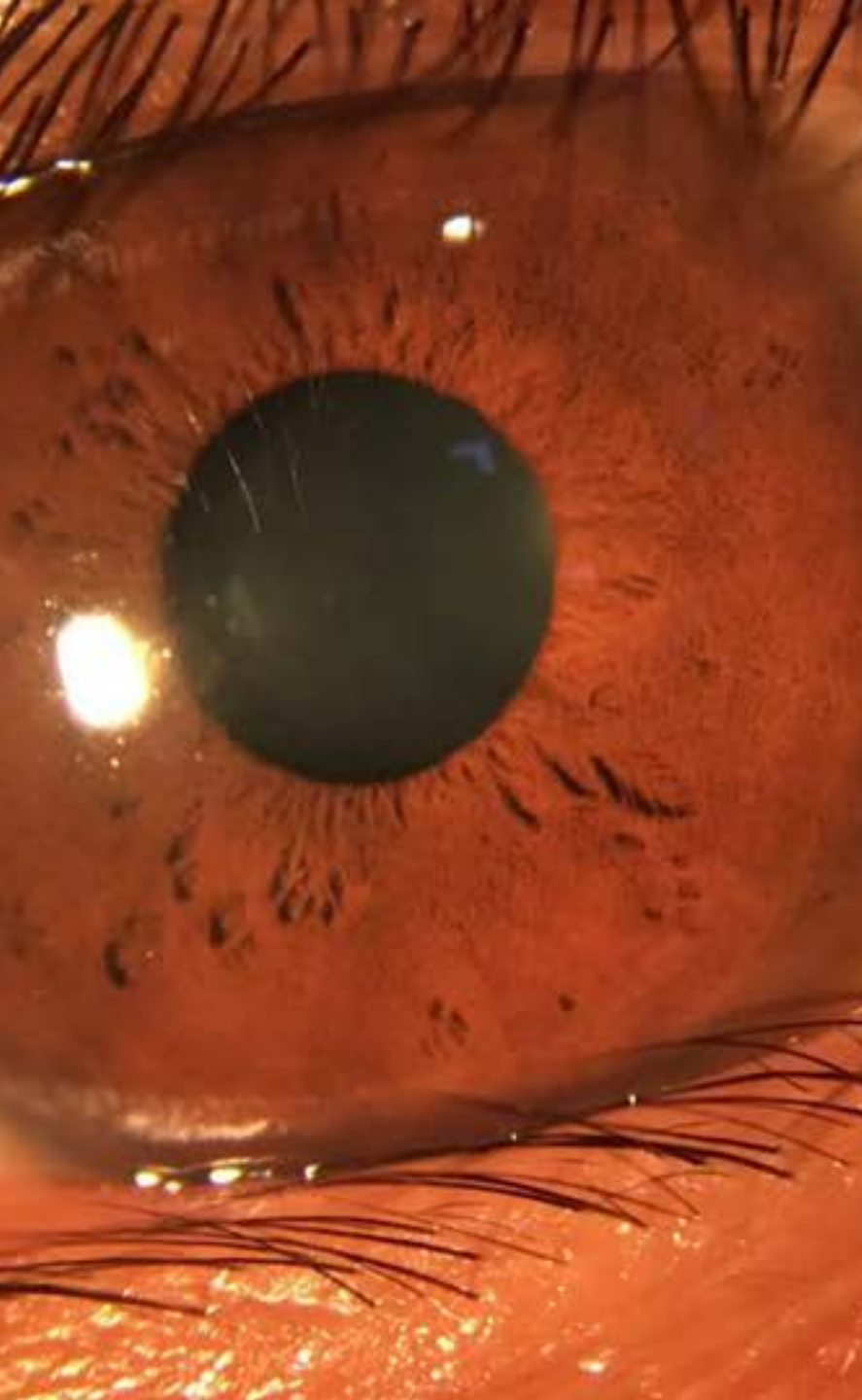


- Topical Antibiotics
- Oral Antibiotics
- Anti-Viral
- Analgesics

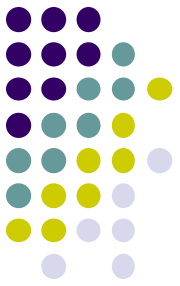
OCULAR ALLERGIES



- Artificial Tears
 - castor oil
- Antihistamine
- Decongestants
- Mast Cell Stabilizers
- Corticosteroids



Other considerations



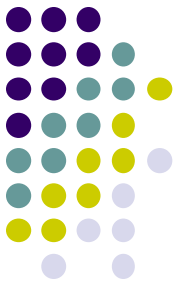
- Eye color
- Chronic illnesses ... diabetic pts
- Age
 - Older patients take longer to dilate due to small pupils
 - Very young patients take longer due to trust
- Ask the patient if they have ever been dilated before

CAP Colors



| Cap Color | Drug Class |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tan | Antibiotics, Antivirals, Antifungals |
| Pink | Anti-inflammatory/Steroids treats allergic reactions, swelling, redness (slows healing can cause cataracts and glaucoma). Do not use on fungal infections |
| Red | Mydriatics/Cycloplegics (dilate pupil) |
| Grey | Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) control inflammation caused by ocular allergies without steroidal side-effects |
| Green | Miotics (stimulates sphincter and causes pupil constriction) |
| Yellow or Blue | Beta-Blockers traditionally used to treat glaucoma, reduce IOP by decreasing aqueous humor |
| Purple | Adrenic Agonists (reduce IOP) |
| Orange | Carbonic Anhydrase Inhibitors (reduce IOP) |
| Turquoise | Prostaglandin Analogues (reduce IOP by increasing aqueous outflow) |

IN-OFFICE PROCEDURES

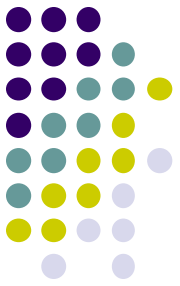


Patient Instruction- Solutions and Suspensions



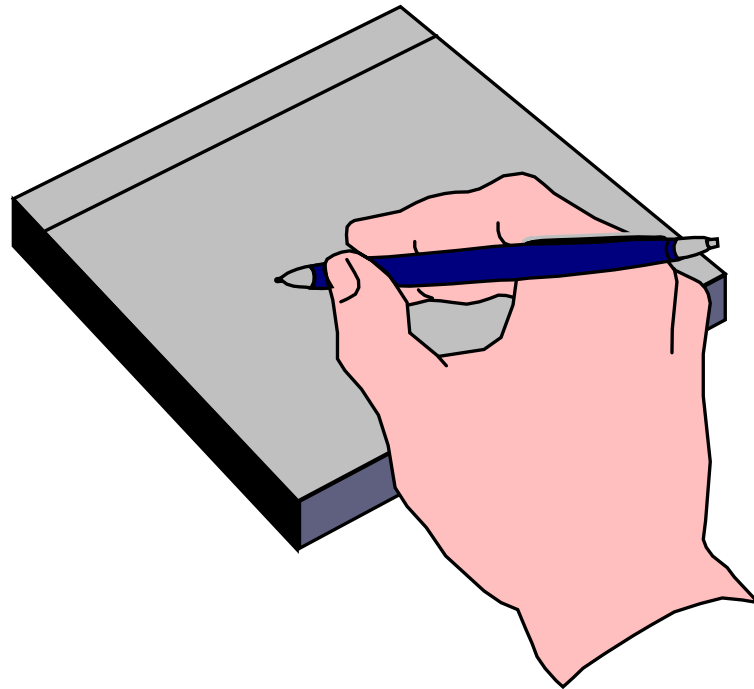
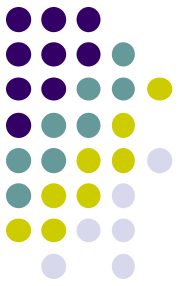
- Wash hands thoroughly before administration
- Tilt head backward or lie down and gaze upward
- Gently grasp lower eyelid below eyelashes and pull the eyelid away from the eye to form a pouch
- Place dropper directly over the eye. Avoid contact of the dropper with the eye, finger or any other surface
- Release the lid slowly and close the eye
- **Occlude punta** for 2-3 minutes
- Wait 5 minutes before administering a second medication or drop

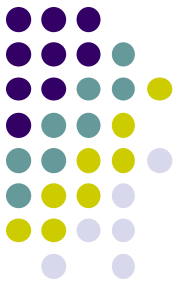
Patient Instruction- Ointment



- Wash hands thoroughly
- Tilt head backward or lie down and gaze upward
- Gently pull down the lower lid to form a pouch
- Place .25 to .50 inch of ointment with a sweeping motion
- Close the eye for 1-2 minutes
- Temporary blurring of vision may occur.
- Remove excess ointment with a tissue
- Wait 10 minutes before applying the second ointment

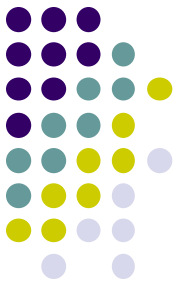
ABBREVIATIONS





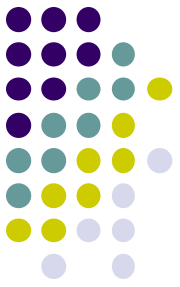
Examples

- ad lib- freely as needed
- ac – before meals
- bid- twice a day
- gtt- Drops
- hs- at bedtime
- pc -after meals
- po- by mouth
- prn- as needed



Examples- con't

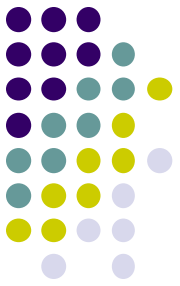
- oint- ointment
- q- every
- qh- every hour
- q4h- every four hours
- qid- 4 times a day
- sig- instructions
- sol- solution
- susp- suspension

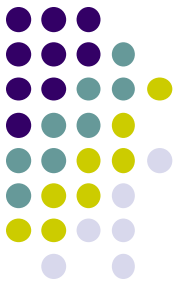


Examples- con't

- tab- tablet
- tid- three times a day
- top- topically
- ung- ointment
- ut dict- as directed

HOW TO WRITE AN Rx



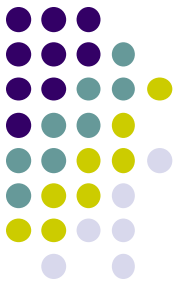
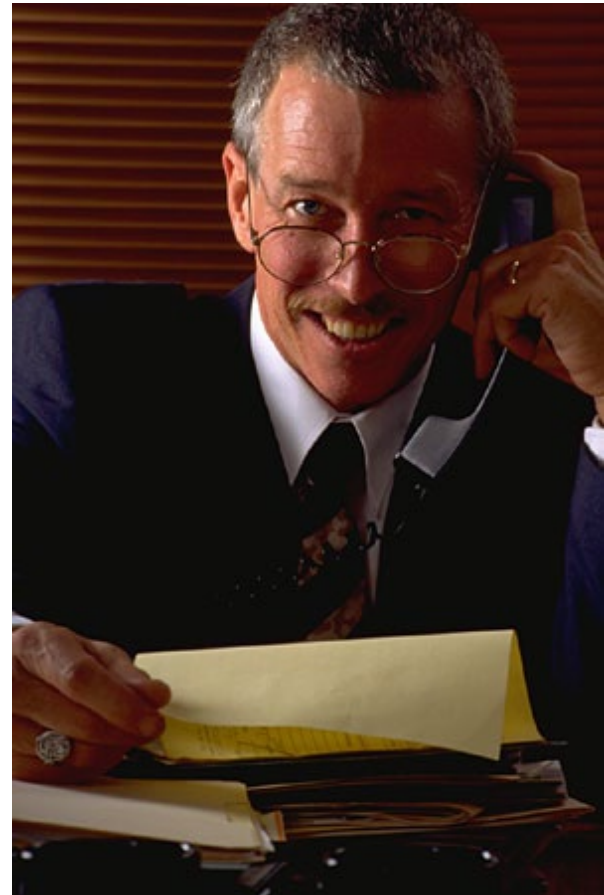


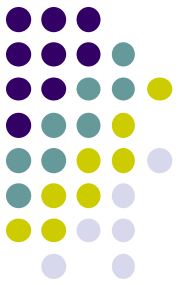
Make sure that you include:

- Full name of patient
- Address can be optional
- Date of Rx
- Inscription: name of drug; concentration
- Subscription: amount to be dispensed
- Instructions: route of administration; number of drops or tablets; frequency of use; refill

What else?

- Make sure that it is legible!
- Legal considerations
- Never go beyond your training
- Don't rush patient care
- Protect your patients and your practice
- Documented training





References and resources

- Ophthalmic Drug Facts 2002
- Ophthalmic Medications and Pharmacology
- Review of Optometry: 2002 Clinical Guide to Ophthalmic Drugs (Melton and Thomas) May issue

THANK YOU!

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