

Study Designs & Critical Steps in Clinical Study

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Course Objectives PHO II

Students are able to:

- ◆ Explain the study design in ophthalmology, and design their own researches
- ◆ Discuss the application of the epidemiologic to eye care
- ◆ Describe the critical steps in clinical studies

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5 Summary

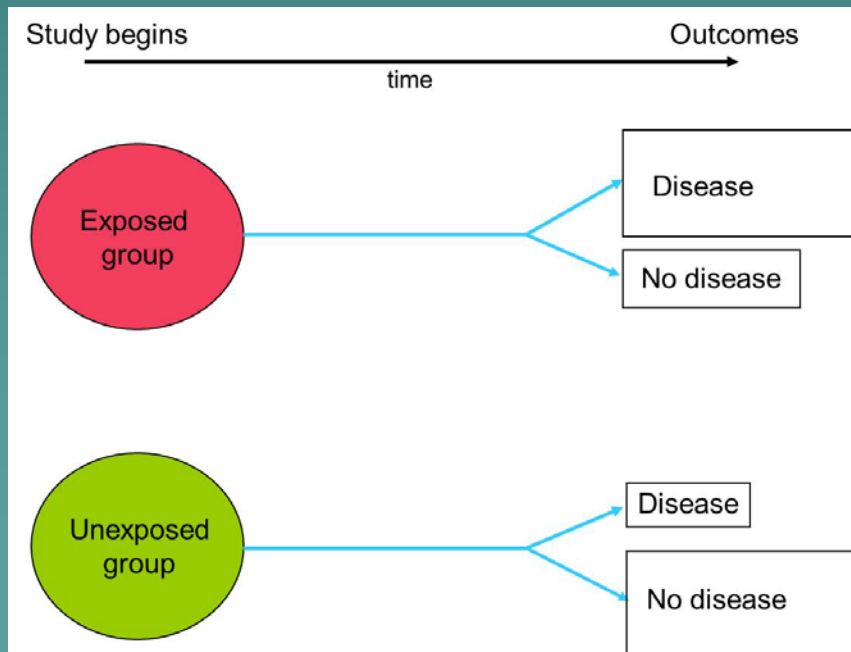
1. To measure how much blindness or serious eye disease there is in the community, and to find out who in the community is most affected
 - ◆ What type of study should be performed?



Population-based,
cross sectional survey

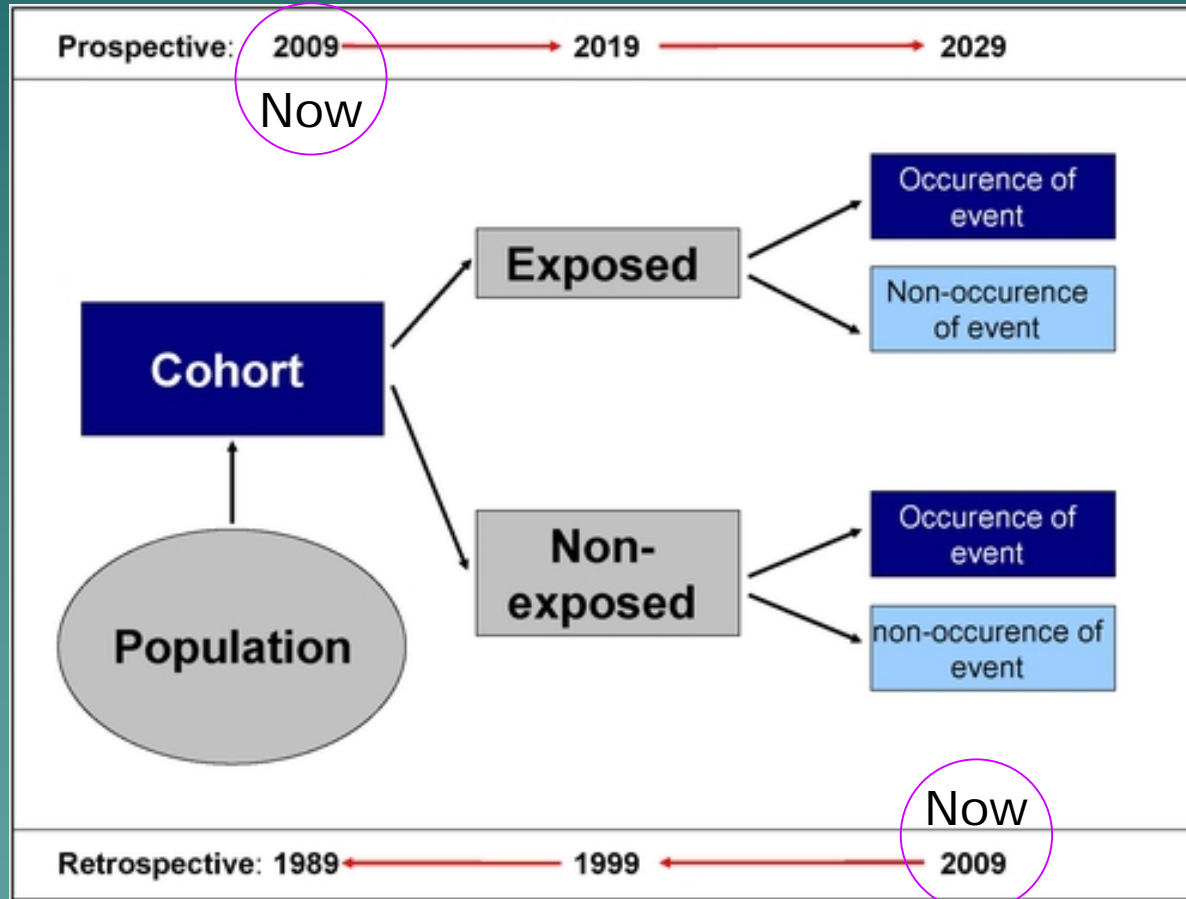
5 Summary

2. To determine how long it takes people in the community to develop blindness or serious eye disease
 - ◆ What type of study should be performed?



- ◆ Cohort study

Prospective & Retrospective Cohort



5 Summary

3. To compare and evaluate two or more different preventive strategies or treatments, in terms of effectiveness and cost
 - ◆ What type of study should be performed?
 - ◆ Clinical trial, RCT

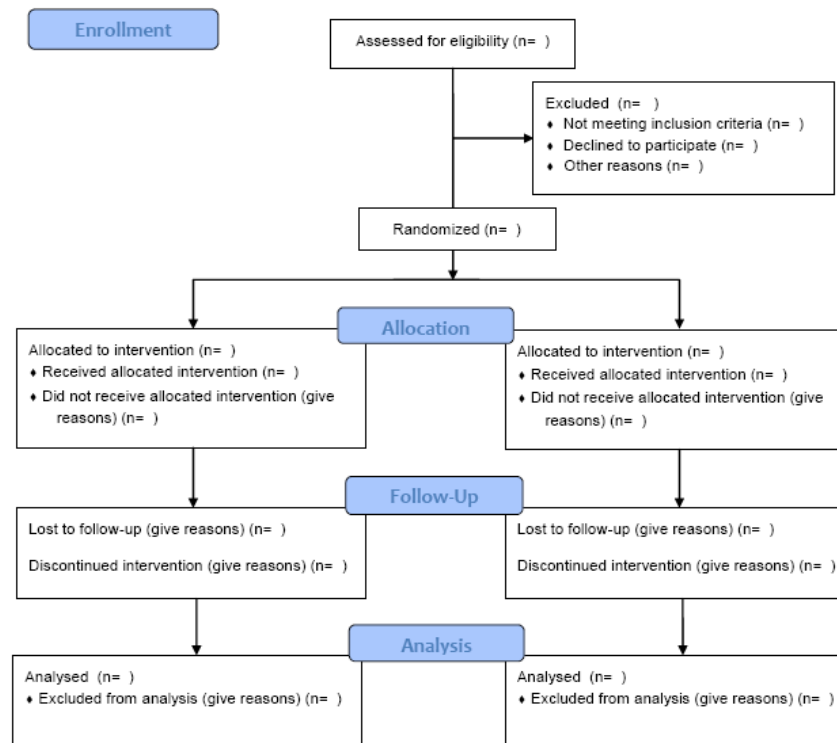


- ◆ Dr. Ben Thompson, Waterloo scientist nearing clinical trials for 'lazy eye' treatment in adults by transcranial direct current stimulation (tDCS) directly over the primary visual cortex (Feb 2016)

CONsolidated Standards of Reporting Trials (CONSORT)



CONSORT 2010 Flow Diagram



5 Summary

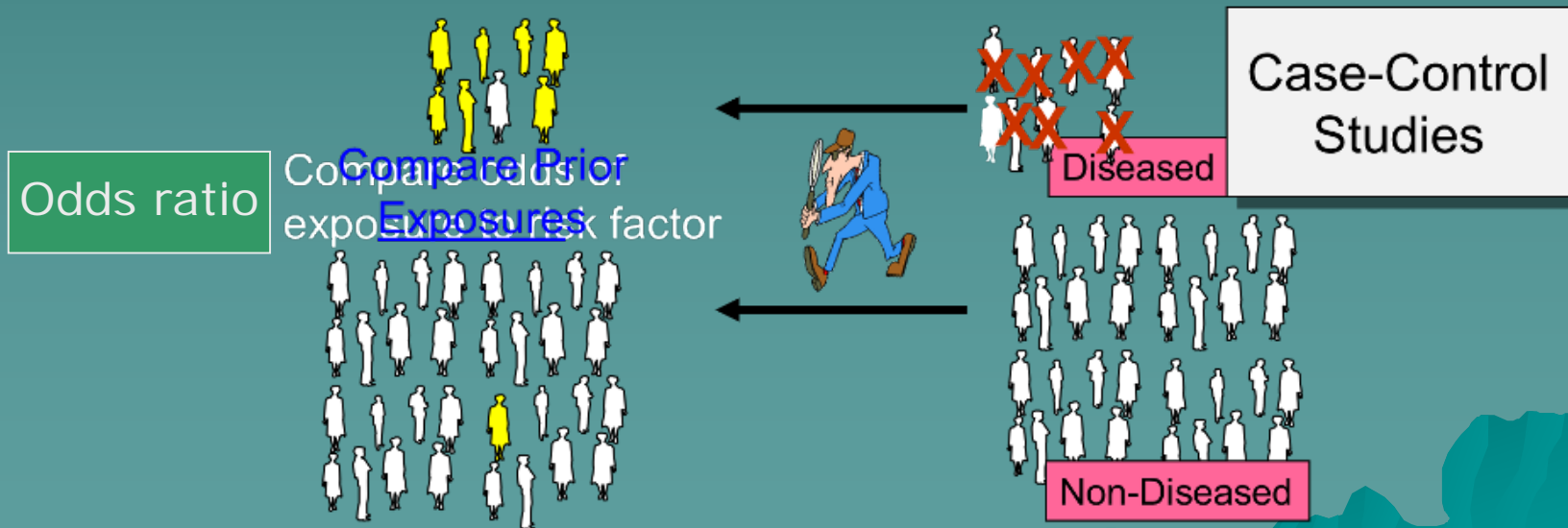
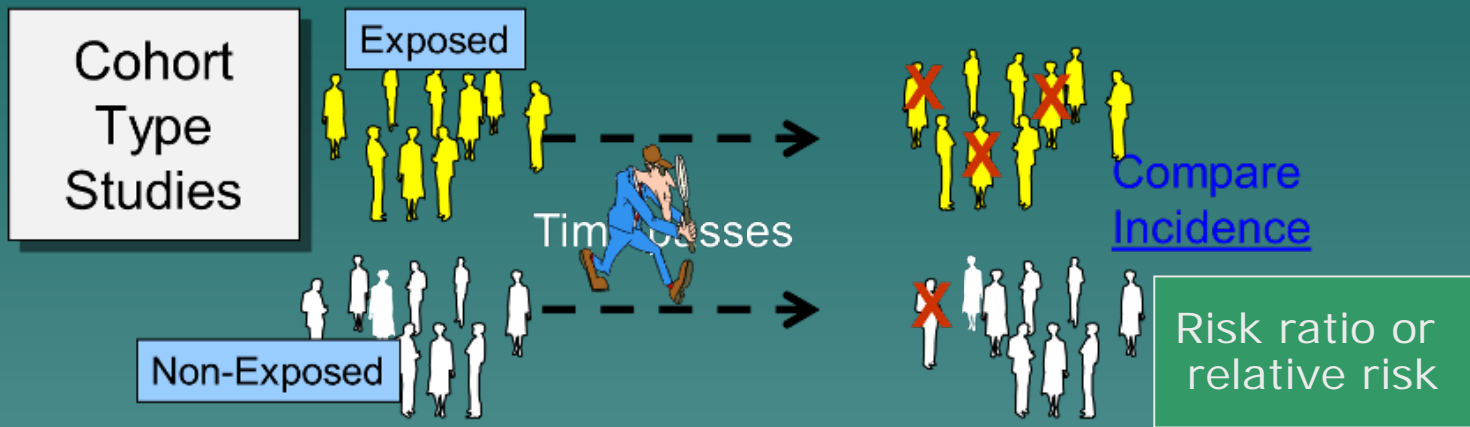
4. To identify factors that increase the risk of eye disease and visual loss in the community

◆ What type of study should be performed?

◆ Case-control study

◆ Cohort study

Cohort vs. Case-Control Studies



5. Summary

5. To concerned with the planning, management, logistics and delivery of health care
- ◆ What type of study should be performed?



- ◆ Operational research (health services research)

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The Epidemiologic Approach to Eye Care

Community Eye Health JOURNAL

VOLUME 27 |

Working with communities to improve their eye health



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As an eye health worker you will be aware of various community interventions for improving eye health. These can involve **encouraging people to take better care of their eyes** (e.g. specific behaviour change programmes such as encouraging hand and face washing and improving infant feeding practices) and projects that **increase the number of people who make use of available services** (e.g. encouraging older people to come for cataract surgery, conducting outreach programmes, providing services in the community, or mass drug distribution programmes).

The key message of this issue is that improving eye health in the community can only be done in partnership with the community itself. There is no 'one size fits all'. A service or intervention that has been successful in one community may very easily fail in another.

This is because each community is different, and there may be specific beliefs and traditions which will affect community members' willingness to change their habits or behaviour. There may also be particular barriers, unique to a particular community, that may limit the uptake of different services. It is therefore essential to first understand the community and then to involve them in the planning of interventions and services that suit their needs.

In some communities, a lack of knowledge, or risky behaviour that is considered socially acceptable, may increase people's risk of vision loss and blindness. This includes the behaviour of individuals (e.g. working in hazardous environments without eye protection) or the community as a whole (e.g. socially acceptable feeding practices that may lead to higher risk of vitamin A



Community awareness raising session on available rehabilitation services

deficiency). It is important to fully understand these underlying issues before trying to make any changes and to work together with the community to challenge risky behaviour and promote good eye health behaviour.

A second key way that you can improve eye health at the community level is to understand the potential barriers to uptake of services. There are many reasons why communities may not use eye health services, even when they are available. The barriers will vary from community to community (see the panel on page 63) and will require different solutions, depending on circumstances and what resources you have available. Ways of overcoming these barriers, and improving the community's eye

health, should be found in the local community.

Showing respect for the community, and involving them in both the design and the implementation of services is crucial to any programme's success. This issue discusses how to involve all members of the community – including women and people with disabilities – in order to make sure that everyone's voice is heard. We will look at simple, effective ways in which you can empower the community to improve their eye health and work alongside them to deliver services that adequately meet their needs and that everyone is comfortable and confident using.

The first step will always be to understand and

Continues overleaf

Diseases at the back of the eye

	Age-related macular degeneration (AMD)	Open-angle glaucoma	Diabetic retinopathy (DR)
CLINICAL HISTORY	Examination AMD: Decreased, rapid loss of central and reading vision Myopia AMD: Gradual loss of central vision	Usually no symptoms, then gradual loss of the peripheral field of vision which can lead to loss of central vision	Usually no symptoms, then progressively gradual loss of central vision Proliferative DR: Sudden or gradual loss of vision
EXAMINATION	Examination AMD: None, or small, or scattered drusen Myopia AMD: Myopia of choroid and retinal pigment of macula	Pale and cupped disc, concentric visual field loss, may have elevated intraocular pressure (IOP)	Nonproliferative DR: Exudates near macula Proliferative DR: New vessels or vitreous haemorrhage
IMAGES	Examination AMD Early atrophic AMD Late atrophic AMD	Examination Cupped disc Glaucoma	Examination Diabetic maculopathy Diabetic maculopathy Diabetic maculopathy
MANAGEMENT	Examination AMD: Refer for specialist opinion if available • Symptoms are present for less than three months • Vision is better than reading (logMAR 0.7) Myopia AMD: No treatment is available, but patients may benefit from low vision aids	Treatment cannot improve sight, so refer only if the patient will use central vision Refer to better than reading (logMAR 0.7) • Low-vision aids • Surgery	Maculopathy: Refer for laser or intravitreal injections if refer to Ophthalmologist Proliferative DR: Refer for laser if any new vessels or vitreous haemorrhage. Stop laser treatment every 3-4 months Proliferative DR: After laser, monitor the patient every three months for the first year
RECOMMENDATIONS FOR PATIENTS	All these conditions are chronic, and cannot be completely cured. We expect anti-VEGF injections to improve vision in exudative AMD and diabetic maculopathy in the near – but not all – patients. In glaucoma and proliferative DR, treatment will only prevent the condition getting worse. In order to manage these chronic and incurable diseases effectively, patients must attend the clinic regularly for the rest of their lives	The sight will not be improved by treatment, which aims to prevent further loss of vision. Eye drops may be used to ease any pain, and to control inflammation. Surgery or laser may lower the IOP permanently but will require frequent examinations for the first three months	Maculopathy: The injection treatment is the same as for maculopathy (AMD). Laser may lead to a more permanent cure, but will require treatment every 3-4 months Proliferative DR: After laser, monitor the patient every three months for the first year

Primary Level Management RED EYE NO INJURY

Differential diagnosis of red eye with no injury

	Conjunctivitis	Corneal abrasion	Acute iritis	Acute glaucoma
Eye	Usually both eyes	Usually one eye	Usually one eye	Usually one eye
Vision	Normal	Usually decreased	Often decreased	Marked decrease
Eye pain	Normal or gritty	Usually very painful	Moderate pain, light sensitive	Severe pain (forehead and around)
Discharge	Watery	Watery	Watery	Watery
Conjunctivae	Generalised (concrete)	Redness most marked around the cornea	Redness most marked around the cornea	Generalised redness
Cornea	Normal	Grey, white spot (fluorescein staining)	Usually clear. Descemet's precipitates may be visible with magnification	Very close to flat in the centre
Iris/retina	Normal	Occasionally opacity	Redness in the anterior chamber (hypopyon)	Shadow or flat
Pupil size	Normal and round	Normal and round	Small and can be irregular	Mid dilated and oval
Pupil response to light	Active	Active	Minimal reaction or already small	Minimal or no reaction
Intraocular pressure (IOP)	Normal (but do not attempt to measure IOP, risk of infection)	Normal (but do not attempt to measure IOP)	Normal or slightly raised	Raised
Photophobia	Slight	Slight	Significant	None
Useful diagnostic signs, tests	Discharge in both eyes with clear cornea, normal pupil and normal vision	White spot or mark on the cornea which stains with fluorescein	Small pupil which becomes irregular as it dilates	Very painful eye with poor vision and dilated pupil. Raised IOP and shadow in cornea

Management of a red eye with no injury

Treat	Conjunctivitis	Corneal abrasion	Acute iritis	Acute glaucoma
Antibiotic ointment	Apply 4-5 times daily for 5 days. Reduce on symptoms	Apply antibiotic drops or ointment	Do not use pupil only if diagnosed in confirmed	One 500mg 500mg and paracetamol drops only if diagnosed in confirmed

8 The Epidemiologic Approach to Eye Care

1. A general doctor working in a remote district noticed that many blind patients came to hospital.
 - ◆ The doctor approached the Regional Minister of Health and asked that an ophthalmologist be appointed, and equipment provided.

8 The Epidemiologic Approach to Eye Care

1. The Minister was not satisfied with being told that there were " a lot of blind people coming to the hospital", and wanted to know more before committing limited resources.

Q. What information could the doctor provide relatively quickly and easily?

8 The Epidemiologic Approach to Eye Care

A. The doctor could go to *the hospital records* for the previous year to find out how many blind people came to the hospital and what were the causes of blindness.



8 The Epidemiologic Approach to Eye Care

2. The Minister wanted to know whether the kind of equipment requested was suitable to treat people who were blind in the District served by the hospital.

Q. What information would the Minister need to answer this question, and how could it be obtained?

8 The Epidemiologic Approach to Eye Care

A 2. The hospital data may be *biased*.

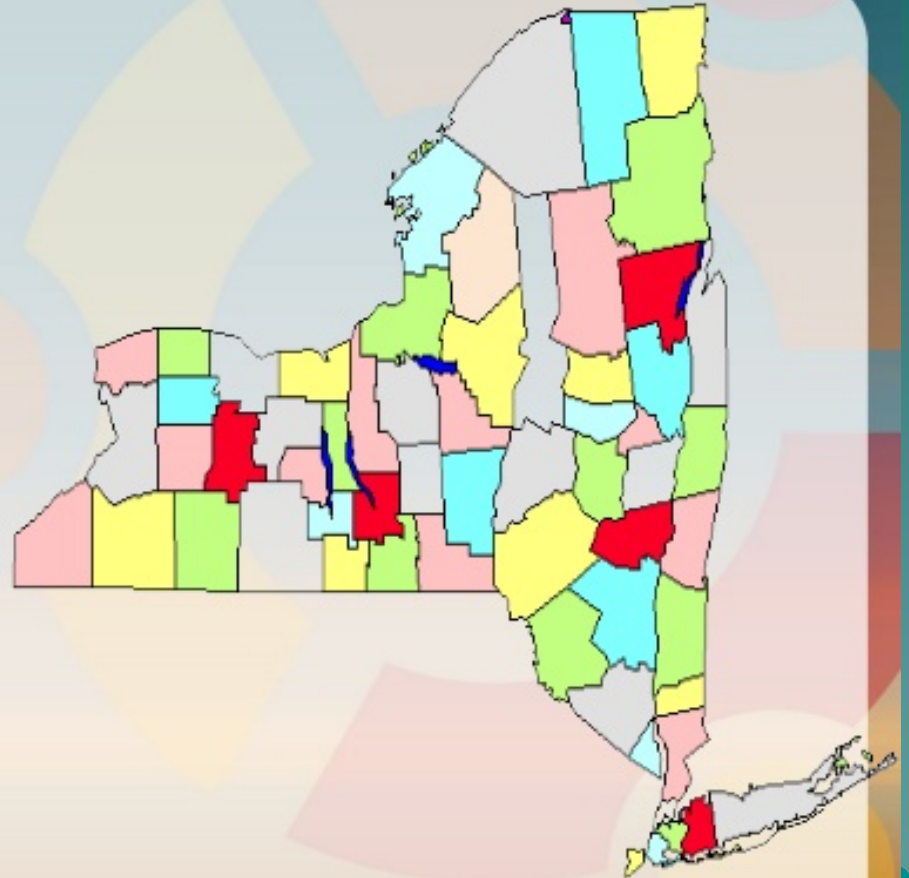
A community based survey would be needed.

An *estimate* of the number of blind from selected *sample* of people from the population of interest, by *random sampling methods*.

To determine *the cause and the prevalence* of blindness.

CLUSTER RANDOM SAMPLING

It is sometimes called *AREA SAMPLING* because this is usually applied when the population is large. In this technique, groups or clusters instead of individuals are randomly chosen.



8 The Epidemiologic Approach to Eye Care

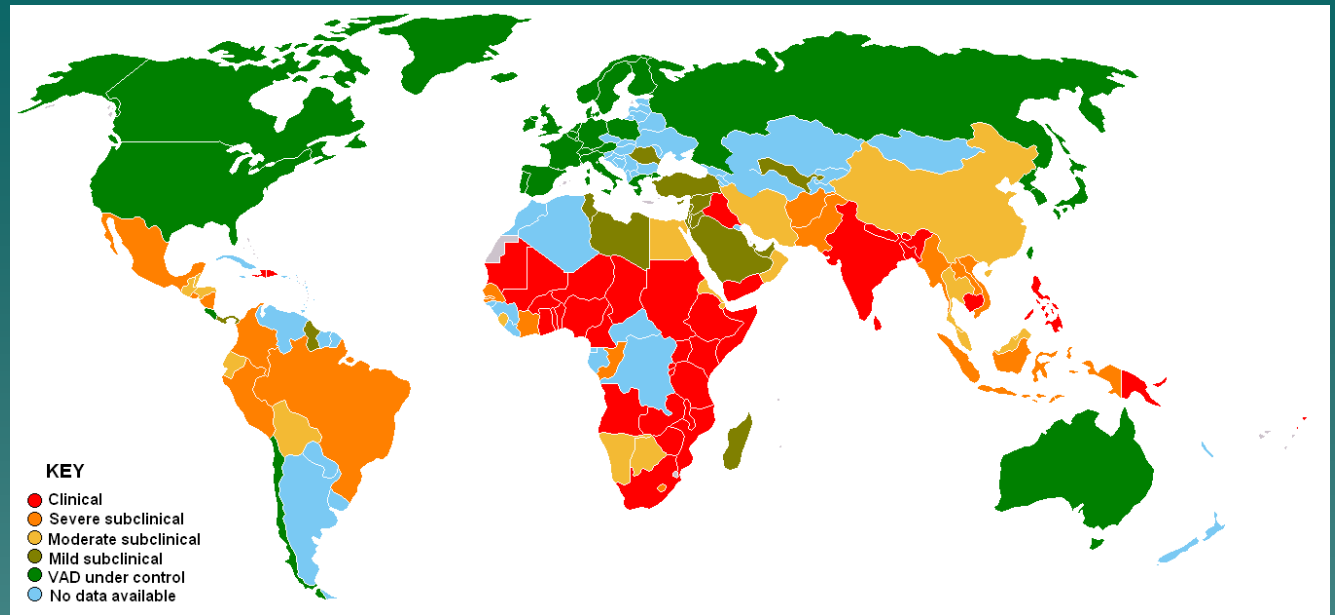
3. The results showed that one cause of blindness occurred in one geographic area, and another condition only affected children.

Q. Why is it important to know this information?

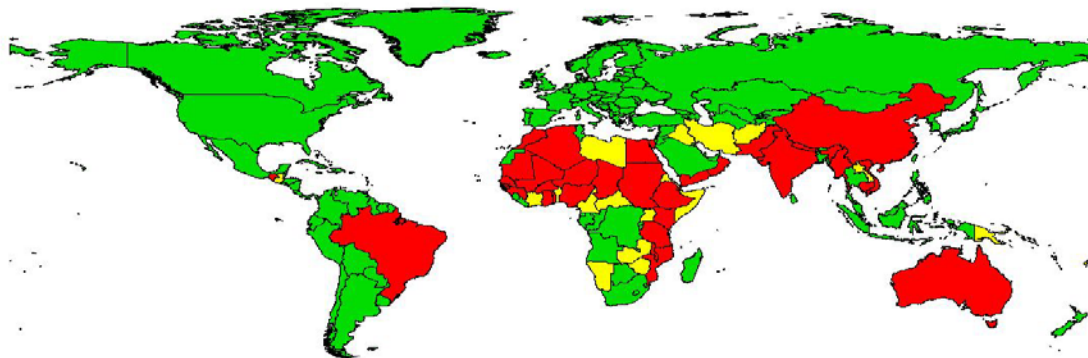
8 The Epidemiologic Approach to Eye Care

A 3. It is important to know this so that specific groups in the District can be targeted with specific interventions.

Knowing who in a population is most affected is called *the distribution*



The Global Distribution of Active Trachoma



Country trachoma status:

- No active trachoma
- Data confirmed endemic active trachoma
- No data identified, believed endemic active trachoma

8 The Epidemiologic Approach to Eye Care

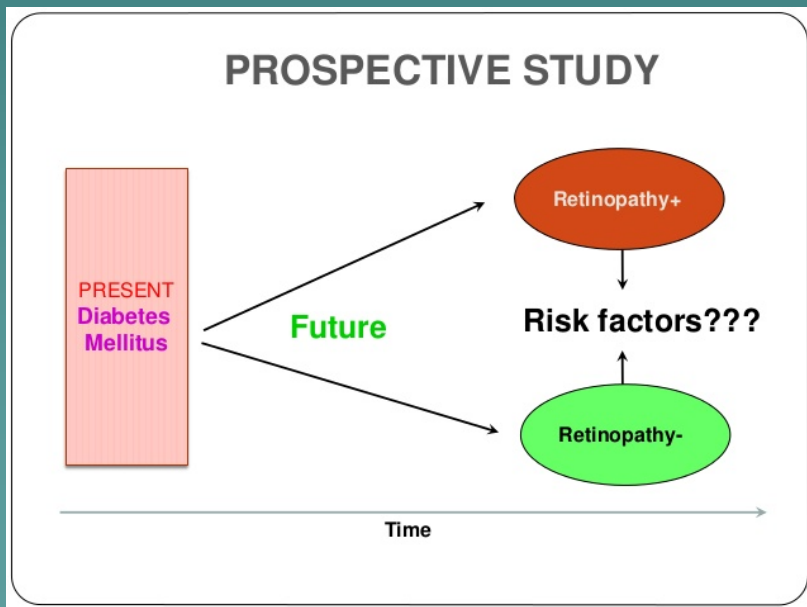
4. The Minister wanted to know whether the contract for the Ophthalmologist should be long term or short term, and whether he should be budgeting for a second one.

Q. What kind of study would need to be done to supply this information?

8 The Epidemiologic Approach to Eye Care

A 4. The number of new cases occurring over time, which is *the incidence* of disease or blindness.

A longitudinal or cohort study would be needed.



8 The Epidemiologic Approach to Eye Care

5. The ophthalmologist was appointed, but was soon asking for more equipment.

To know the underlying causes of the blinding conditions, and whether could be preventable.

Q. What kind of studies would need to be done to address these issues, and why is it important to know this?

8 The Epidemiologic Approach to Eye Care

A 5. Because this provides the opportunity for prevention, or modifying the course of the disease.

There are several types of **epidemiological studies** which address issues of causation:

- **case-control study**
- **cohort study**

8 The Epidemiologic Approach to Eye Care

6. The ophthalmologist wanted to know whether the new treatment which seemed to be effective in patients in the U.S.A., would also be effective in the patients he was seeing in the hospital.

Q. What kind of study could he do?

8 The Epidemiologic Approach to Eye Care

A 6. *Clinical trials* are the method of choice of comparing treatments.

A " *double masked, randomized controlled trial*" is the best method and give the most reliable results.

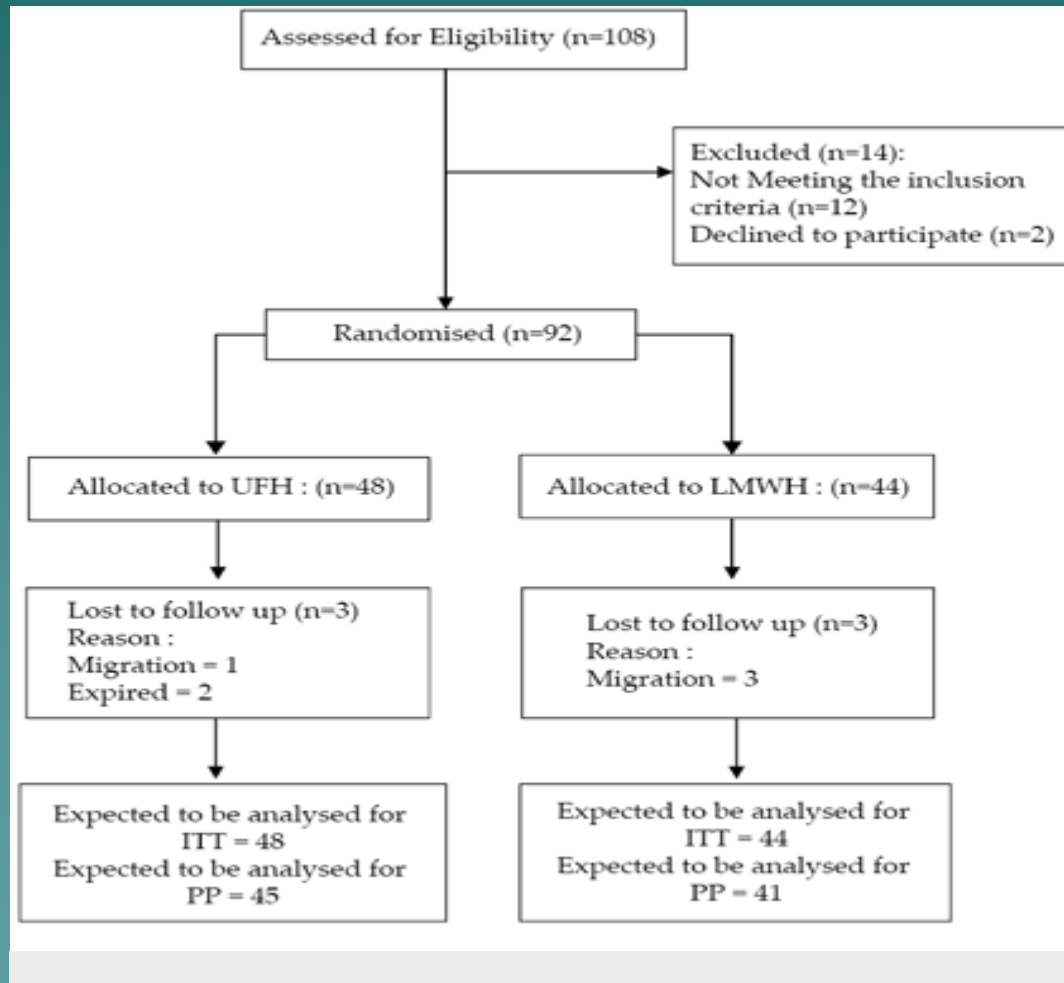
Intention-to-Treat Analysis (ITT)

- ◆ Includes all randomized patients
- ◆ Regardless of their adherence, withdrawal, deviation from the protocol
- ◆ As randomized, so analyzed
- ◆ Holds the randomization as of paramount importance
- ◆ Deviation from the original randomized group can contaminated the treatment comparison

Per-protocol Analysis (PP)

- ◆ PP analysis is a comparison of treatment groups that includes only those patients who completed the treatment originally allocated
- ◆ If done alone, this analysis leads to bias

PP vs. ITT



8 The Epidemiologic Approach to Eye Care

7. The ophthalmologist wondered whether treatment would be as effective if given by the community health workers (CHWs) as by the staff, and which approach would be the cheapest.

Q. What kind of research is needed to answer these question?

8 The Epidemiologic Approach to Eye Care

A 7. *Operation research (health services research)*

It is concerned with planning, management, logistics and delivery of health care.

It deals with the use of human resources, organization, the utilization of facilities, the quality of health care, cost, and the relationship between need and demand.

Laorakpogse T, Mahasuwan T, Ausayakhun S, et al. Utilization of the Eye Health Care in Northern Thailand. J Med Assoc Thai 1989; 72: 1-6.

การใช้บริการสาธารณสุขเกี่ยวกับโรคตาในภาคเหนือ

ถนอม เหล่ารักพงษ์, พ.บ. *, ทองท่วม มหาสุวรรณ, พ.บ. **, สมสงวน อัญญคุณ, พ.บ. **,
วิจิตร ศรีสุพรรณ **, บุญส่ง นิลแก้ว **, บุญผา อนันต์สุชาติกุล **, เฉลิมศรี บุญมงคล **

การวิจัยนี้เป็นการศึกษาร่วมกันครั้งแรกระหว่างสถาบันจักษุสาธารณสุข, กระทรวงสาธารณสุขและมหาวิทยาลัย
เชียงใหม่ ใน พ.ศ. 2527. วัตถุประสงค์หลักของการวิจัยนี้เพื่อสืบค้นปัจจัยที่ผู้รับบริการซึ่งเจ็บป่วยด้วยโรคตาชนิดต่าง ๆ
ใช้ในการตัดสินใจไปขอรับบริการจากสถานพยาบาลของรัฐ 4 ระดับคือระดับมหาวิทยาลัย ได้แก่โรงพยาบาลมหาราชนคร-
เชียงใหม่, ระดับศูนย์หรือภาคใต้แก่โรงพยาบาลศูนย์ลำปาง, ระดับจังหวัดได้แก่โรงพยาบาลกำแพงเพชรและพิจิตร. และ
ระดับชุมชนหรืออำเภอได้แก่โรงพยาบาลคลองสูง, โรงพยาบาลพรานกระต่าย, โรงพยาบาลสามง่ามและโรงพยาบาล
ตะพานหินจากจังหวัดกำแพงเพชรและพิจิตร. ตัวอย่างที่ศึกษาได้มาจากประชากร 3 กลุ่ม, กลุ่มแรกจะเป็นการสัมภาษณ์
ผู้ป่วยจำนวน 605 คนจากโรงพยาบาลดังกล่าว. การเลือกตัวอย่างใช้แบบโควต้าซึ่งกำหนดไว้ตามเพศผู้ป่วย, ความรุนแรง
ของโรคตาในโรงพยาบาลแต่ละระดับ. ตัวอย่างที่ศึกษากลุ่มที่สองสัมภาษณ์จากหัวหน้าครอบครัว 496 คนในชุมชนจังหวัด
กำแพงเพชรและพิจิตร, ใช้วิธีเลือกตัวอย่างแบบสุ่มหลายขั้นตอน (Multi-stage stratified sampling) ส่วนกลุ่มที่สามศึกษา
จากจังหวัดพหุ. หัวหน้าแผนกจักษุวิทยาและผู้อำนวยการโรงพยาบาลที่ศึกษาทุกคนในจังหวัดที่ศึกษา. กลุ่มนี้ประกอบด้วย

สำหรับวิธีการที่เหมาะสมเพื่อให้เกิดประโยชน์ในการปรับปรุงคุณภาพของบริการโรคนั้น, จักษุแพทย์ให้ข้อเสนอแนะตามระดับของโรงพยาบาลดังนี้ :

ในระดับโรงพยาบาลมหาวิทยาลัย, จักษุแพทย์มีความต้องการเพิ่มพูนความรู้ความชำนาญในการรักษาโรคตาให้เฉพาะโรคมามากยิ่งขึ้นเช่น โรคของจอรับภาพ. นอกจากนี้ยังเสนอให้เพิ่มจำนวนเตียงผู้ป่วย, จัดให้มีคลินิกเฉพาะโรคให้ครบทุกสาขา, จัดหาเครื่องมือเครื่องใช้ที่มีคุณภาพดี, ให้จักษุแพทย์ออกตรวจผู้ป่วยตั้งแต่เช้าและถ้าเป็นไปได้ควรมีแว่นตาจำหน่ายในโรงพยาบาลด้วย. ควรจัดให้มีห้องผ่าตัดและเจ้าหน้าที่ช่วยผ่าตัดตาโดยเฉพาะและจัดให้สามารถผ่าตัดได้ทุกวัน.

ในระดับโรงพยาบาลศูนย์พบว่าจำนวนจักษุแพทย์และพยาบาลเวชปฏิบัติทางตามีจำนวนไม่เพียงพอเนื่องจากมีผู้ป่วยตามาก ดังนั้นโรงพยาบาลศูนย์จึงควรรับเฉพาะผู้ป่วยที่ส่งมาจากโรงพยาบาลระดับรองลงไปมากกว่าที่จะเป็นผู้ป่วยโดยทั่วไปและควรมีการเพิ่มพูนความรู้และความชำนาญให้แก่บุคลากรด้านจักษุให้มากขึ้น.

สำหรับโรงพยาบาลจังหวัด, มีข้อเสนอแนะว่าควรจัดหาเครื่องมือเครื่องใช้เพียงพอควรจัดหน่วยงานให้ชัดเจน, ควรมีหอผู้ป่วยแผนกตาโดยเฉพาะและมีจักษุแพทย์ประจำ. ประการสุดท้ายควรมีการนิเทศทางด้านวิชาการเพิ่มเติม.

ได้รับการสนับสนุนทุนวิจัยขององค์การอนามัยโลก. *โรงพยาบาลกำแพงเพชร, กระทรวงสาธารณสุข, กำแพงเพชร **มหาวิทยาลัยเชียงใหม่, เชียงใหม่

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8 The Epidemiologic Approach to Eye Care

8. The ophthalmologist had been working for 10 years, and trained ophthalmic nurses and CHWs to integrate Primary Eye Care in Primary Health Care.

He wanted to know whether there had been any impact on blindness in the District.

Q. How could this be determined?

The Epidemiologic Approach to Eye Care

A 8. **A repeat survey** could be done, and compare the prevalence of blindness.

However, the other factors should be concerned when interpretation the findings.

Course Objectives PHO II

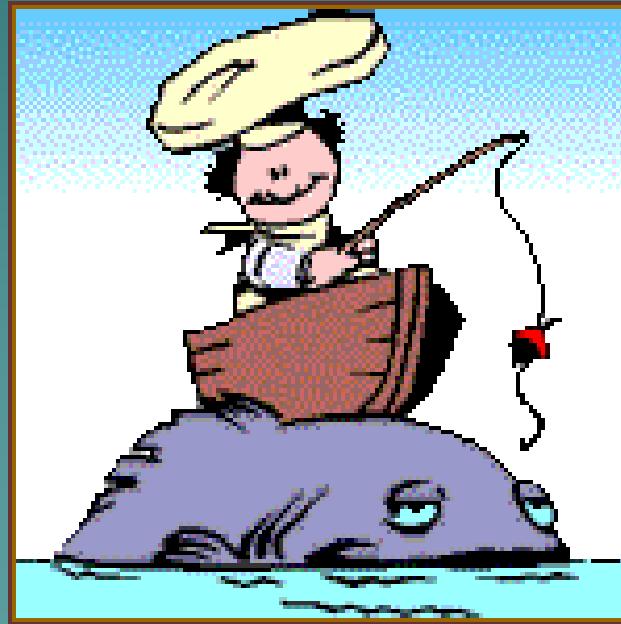
Students are able to:

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14 Critical steps in Clinical Study

1. Define specific goal(s)

- ◆ Diffuse fishing expeditions often get nowhere



Define specific goals

- ◆ Primary objectives
- ◆ Secondary objectives
- ◆ ควรสอดคล้องกับคำถามวิจัย (research questions) และสมมติฐานของการวิจัย (research hypothesis) ที่ตั้งไว้

5 ลักษณะของคำถามวิจัยที่ดี

1. มีความชัดเจนและไม่คลุมเครือ โดยเมื่ออ่านคำถามวิจัยแล้ว จะสามารถเข้าใจจุดประสงค์ของการวิจัยได้ทันที
2. ต้องสามารถตอบปัญหาที่ระบุได้จริง โดยไม่มุ่งหวังจะตอบปัญหาหลายอย่างเกินไป
3. ควรแสดงให้เห็นว่า คำตอบที่ได้จะนำไปใช้ประโยชน์อย่างไร เช่น
 - ทำให้มีการเปลี่ยนแปลงวิธีการรักษาผู้ป่วย
 - ทำให้มีการเปลี่ยนแปลงวิธีการวินิจฉัยใหม่ให้ดีขึ้นกว่าเดิม
 - ทำให้มีการเปลี่ยนแปลงพฤติกรรมของประชากรเพื่อหลีกเลี่ยงปัจจัยเสี่ยงที่ค้นพบ

5 ลักษณะของคำถามวิจัยที่ดี

4. เป็นสิ่งที่สอดคล้องกับความต้องการของสถาบันหรือนโยบายของชาติ

เพราะ

- มีประโยชน์และมีความคุ้มค่าแล้วในการทำวิจัย
- ทำให้การขอรับทุนสนับสนุนได้ง่ายขึ้น

ควรหลีกเลี่ยงความซ้ำซ้อนในการสร้างงานวิจัยตามสม্মันนิยม โดยคำนึงถึง
การวิจัยแบบบูรณาการหรือ สหสาขาแทน

5 ลักษณะของคำถามวิจัยที่ดี

5. ต้องแสดงให้เห็นว่า ผู้วิจัยมีความพร้อมและแสดงข้อดีหรือความสามารถในการสร้างงานวิจัยนี้ได้ดีกว่าผู้อื่นอย่างไร เช่น
 - จะทำการศึกษาในโรคที่พบบ่อยในท้องถิ่นของตน (เพราะถึงแม้คำถามวิจัยจะน่าสนใจและมีประโยชน์ แต่ถ้าทรัพยากรไม่พร้อม เช่น โรคที่พบน้อย) อาจทำให้การวิจัยล้มเหลวได้
 - มีความชำนาญในหัตถการหรือสิ่งที่คิดค้นใหม่

14 Critical steps in Clinical Study

2. Review literature thoroughly

- ◆ May discover questions already answered
- ◆ May find better ways to design study, or other areas worth considering
- ◆ May find background data required to determine sample size
- ◆ At least 5 years!
- ◆ How?



14 Critical steps in Clinical Study

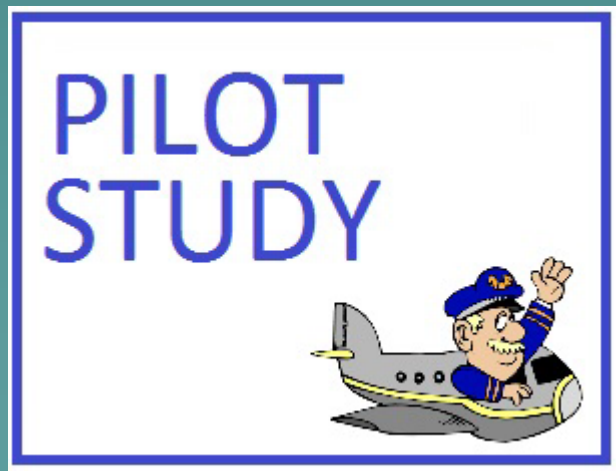
3. Select sample size*****

- ◆ May need more or fewer patients than originally anticipated
- ◆ Required sample size may prove so large that study is impractical



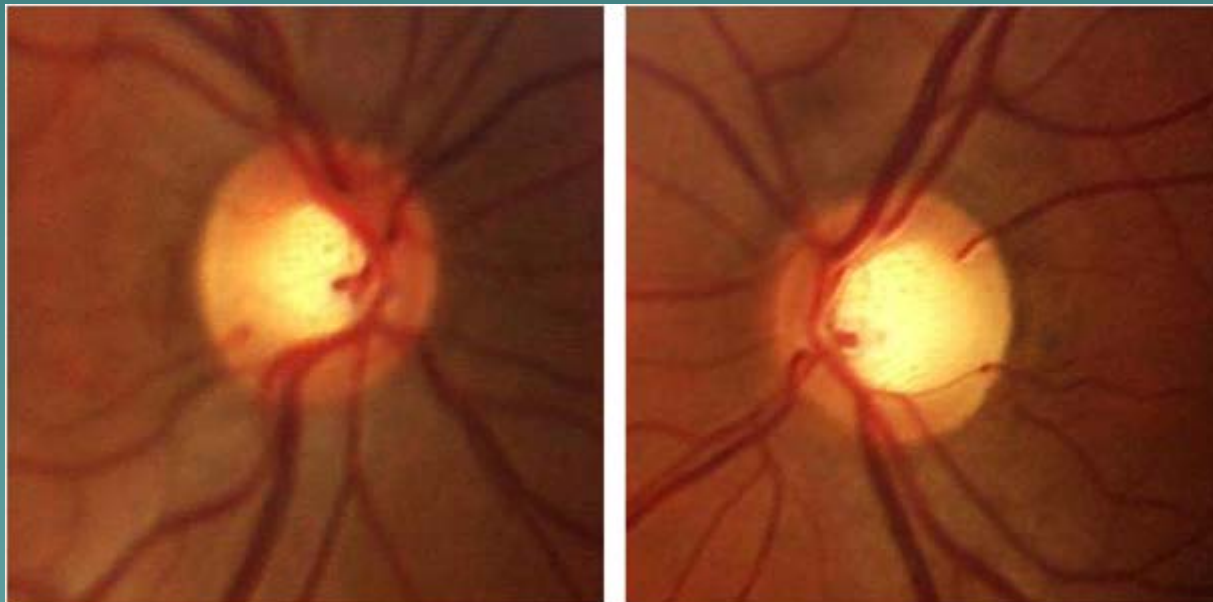
14 Critical steps in Clinical Study

4. Establish, standardize, and quantify reproducibility of forms, procedures, and personnel before starting study (*pilot trial*) and at frequent intervals thereafter



14 Critical steps in Clinical Study

- ◆ Magnitude of intra- and inter-observer variation must be known for analysis of results



14 Critical steps in Clinical Study

5. Prepare detailed protocol

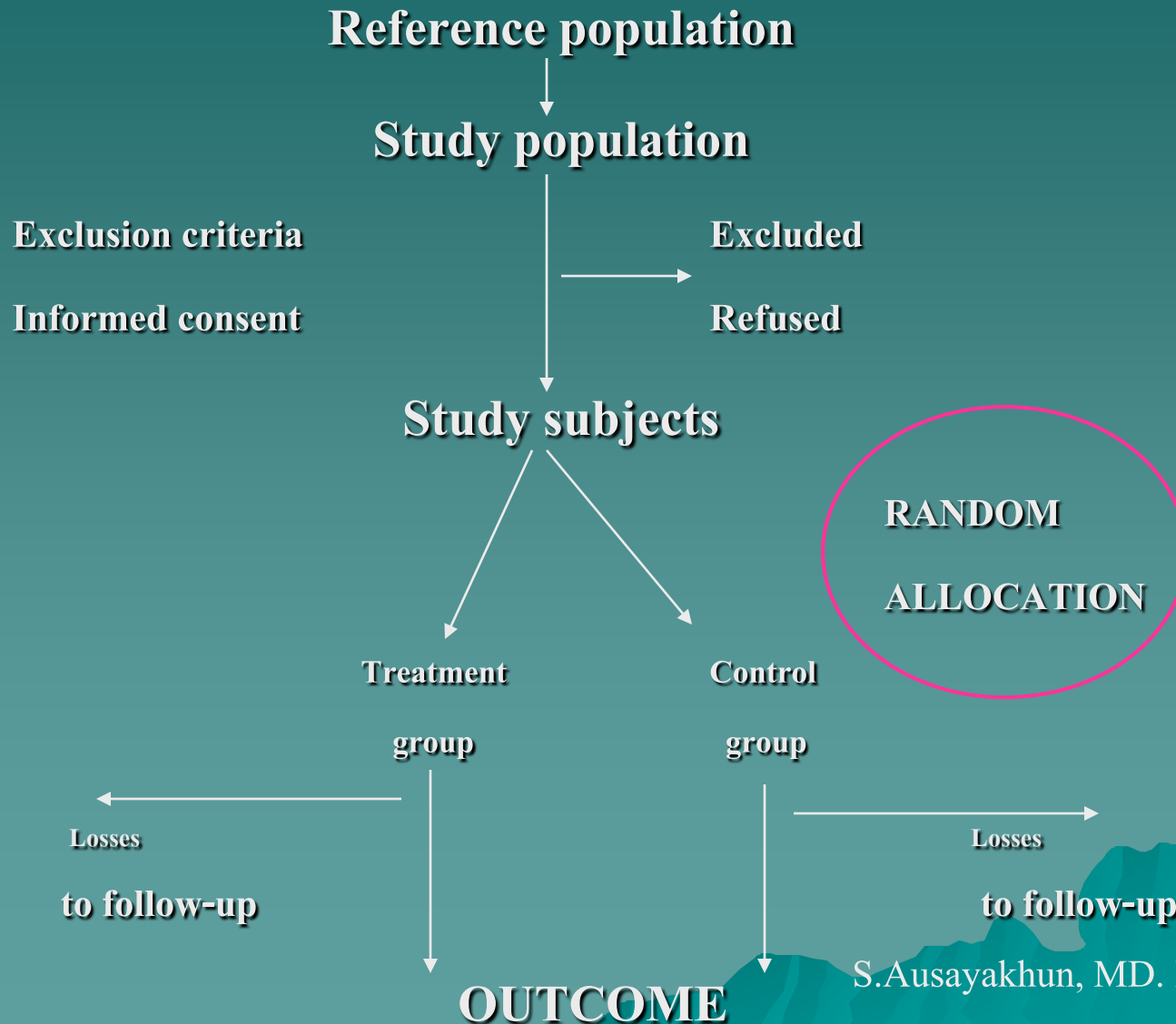
- ◆ Ready reference of all procedures; and basis of "introduction", "method", and "data management and analysis"
- ◆ Prepare "dummy table" for the results

14 Critical steps in Clinical Study

6. If *therapeutic trial*, every patient meeting criteria is offered participation
- ◆ Only after they accept are randomized



Randomized Controlled Trial (RCT)



14 Critical steps in Clinical Study

- ◆ Randomization before enrollment introduces potential bias!!



14 Critical steps in Clinical Study

7. If *case-control study*, examined matching carefully to rule out inappropriate or biased control



14 Critical steps in Clinical Study

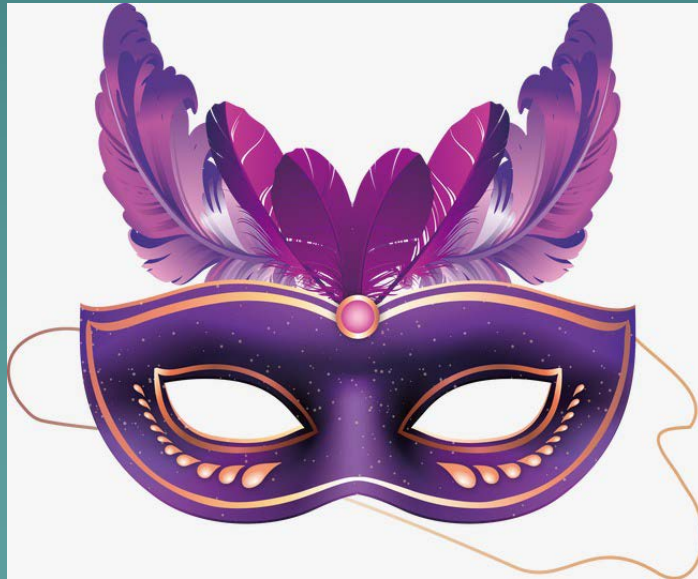
- ◆ Selection of controls most critical part of study; can easily result in biased sample and results



14 Critical steps in Clinical Study

8. Determine whether *masking* remains effective

- ◆ If code inadvertently broken, observations may be biased



14 Critical steps in Clinical Study

9. Conduct repeated, specific searches for bias

- ◆ If bias is discovered only after study completed, study may not be salvageable



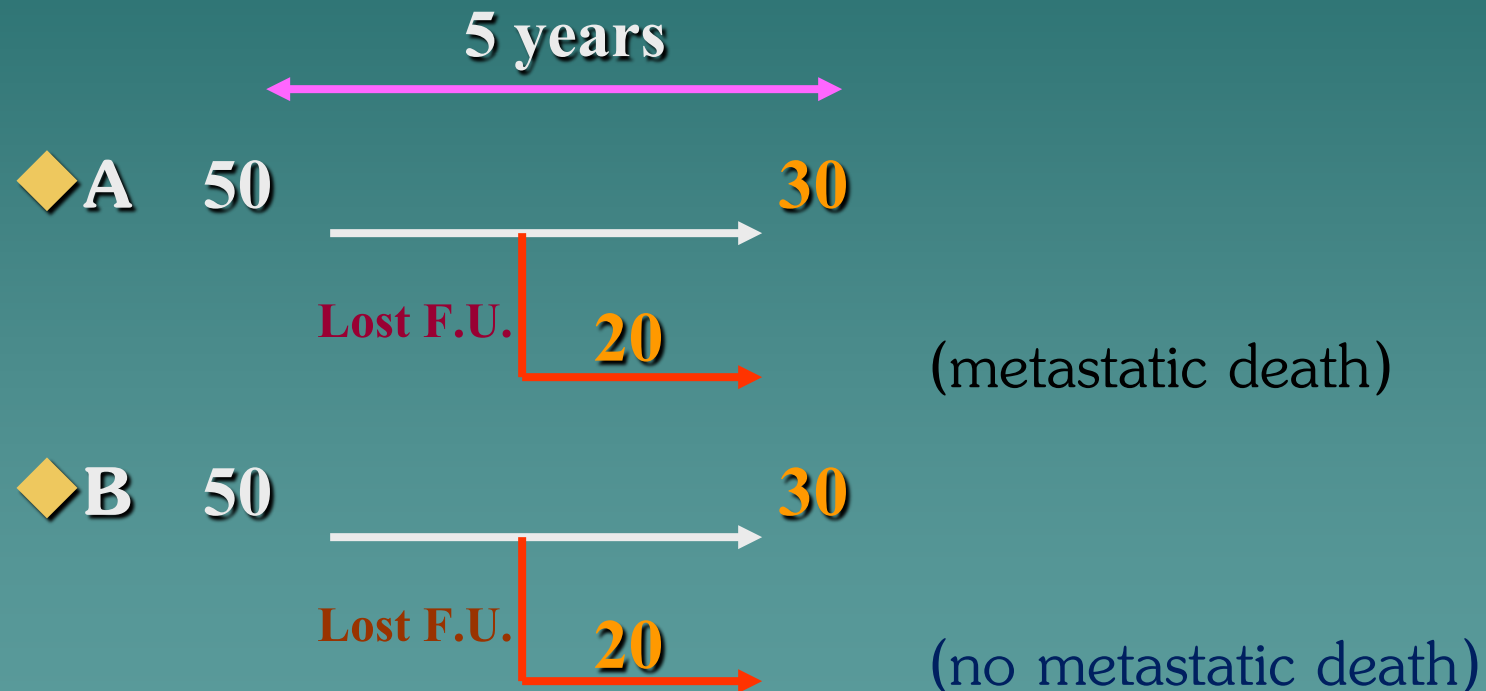
14 Critical steps in Clinical Study

10. Review cases *lost to follow-up* for consistent pattern that might explain results
- ◆ Where possible, trace a random sub-sample to establish definite outcome

14 Critical steps in Clinical Study

- ◆ Patients **lose to follow-up** represent potentially important source of *selection bias*

e.g. prospective study : comparison of photocoagulation (A)
v.s. enucleation (B) in the management of choroidal
melanomas.



14 Critical steps in Clinical Study

11. Where indicated, subject all results to rigorous *statistical tests*

- ◆ Required to prove point and necessary for publication



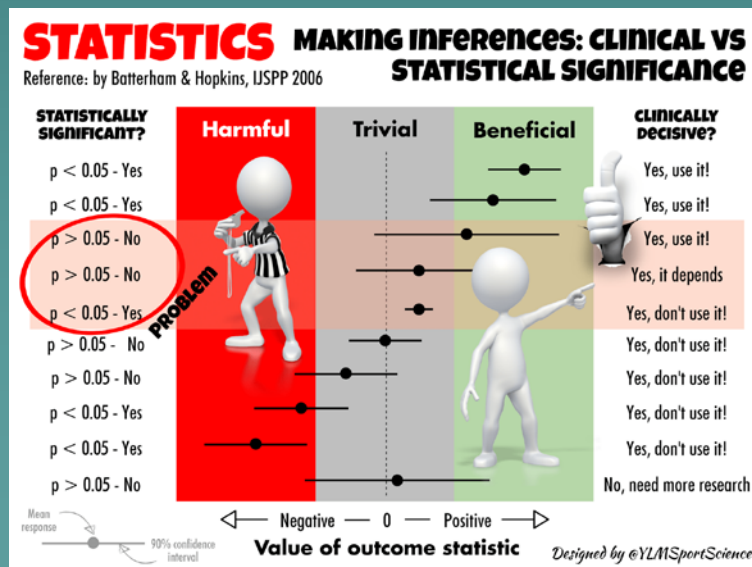
14 Critical steps in Clinical Study

- ◆ But **do not** disregard obvious or potential differences just because they are **not statistically significant**
- ◆ Sample size may simply be too small because of error in original assumptions

14 Critical steps in Clinical Study

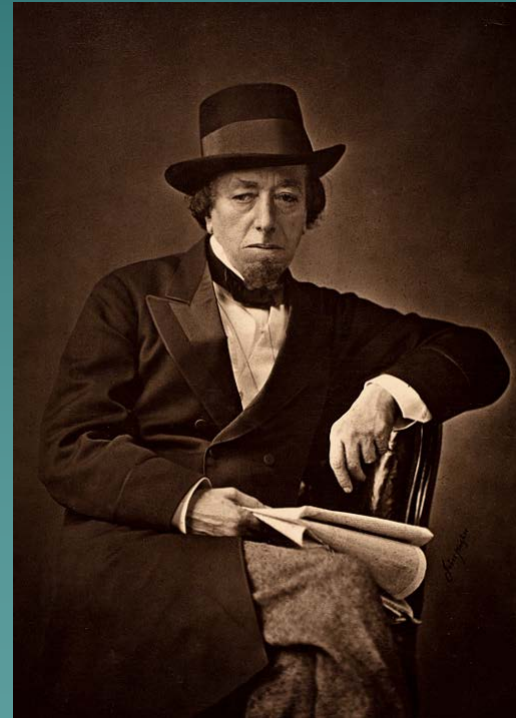
12. Estimate clinical, as well as statistical, significance of results

- ◆ The two are not synonymous and should not be confused



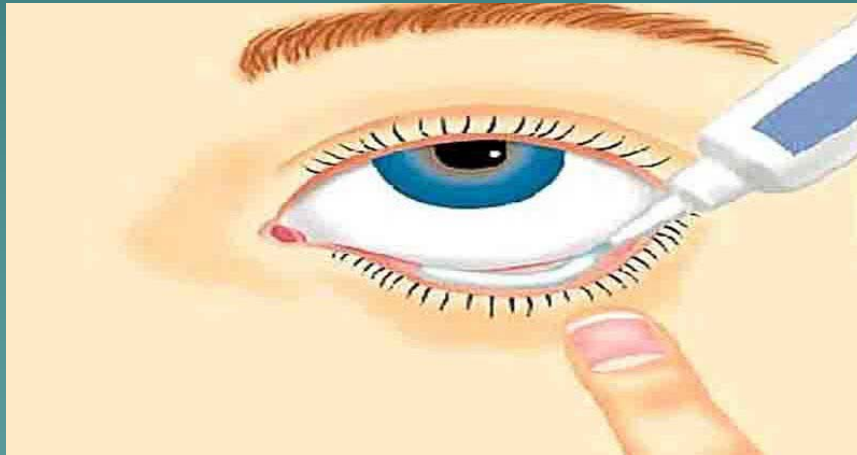
14 Critical steps in Clinical Study

There are three kinds of lies: lies, damned lies, and **statistics!!** (Benjamin Disraeli)



1 st Earl of Beaconsfield

- ◆ e.g. drug A can heal herpes simplex ulcers in 6.7 days, while a placebo takes 7.0 days. The improvement is **statistically** significant, but is it **clinically** significant (cost, side effect, etc.) ?



14 Critical steps in Clinical Study

13. Consider alternative explanations for any apparent *associations*

- ◆ Spurious association
- ◆ Real association:
 - Indirect association
 - Direct association:
 - One-to-one causal relationship
 - Multi-factorial causation

14 Critical steps in Clinical Study

- ◆ Xerophthalmia epidemic in Denmark in 1924 v.s. margarine consumption



14 Critical steps in Clinical Study

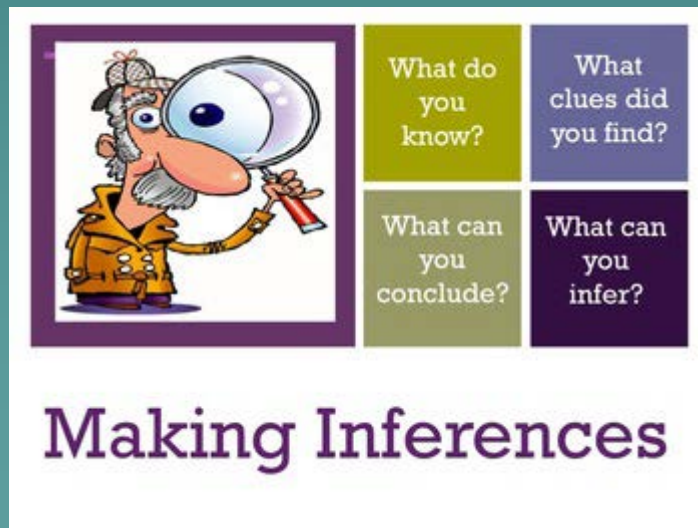
- ◆ Trachoma is associated with hot, dry climates and lack of water.



14 Critical steps in Clinical Study

14. *Inferences* should be strictly grounded in actual observations

- ◆ The greater the distance between inference and actual observation, the more hypothetical and less meaningful the inference



e.g. a history of night blindness proved to be an effective tool for xerophthalmia screening in Java (Sommer, et.al.), but there 's no guarantee that it will work equally well in India (also in Thailand!).



How about your proposal?

- ◆ Research questions?
- ◆ Review literatures
- ◆ Draft the proposal
- ◆ Prepare for the IRB, funding
 - Checklists :งานบริหารงานวิจัย
 - PDF files
 - Registration
(www.med.cmu.ac.th/ros)

Thank you for your attention

Question?

