Curriculum Development Centers Program

Component 2: Evidence-Based Medicine

Unit 5: Evidence-Based Practice
Lecture 4

Using EBM to assess questions about diagnosis

- Diagnostic process involves logical reasoning and pattern recognition
- Consists of two essential steps
  - Enumerate diagnostic possibilities and estimate their relative likelihood, generating *differential diagnosis*
  - Incorporate new information from *diagnostic tests* to change probabilities, rule out some possibilities, and choose most likely diagnosis
- Two variations on diagnosis also to be discussed
  - Screening
  - Clinical prediction rules

Diagnostic (un)certainty can be expressed as probabilities

- Probability is expressed from 0.0 to 1.0
  - Probability of heads on a coin flip = 0.5
- Alternative expression is odds
  - Odds = Probability of event occurring / Probability of event not occurring
  - Odds of heads on a coin flip = 0.5/0.5 = 1
- Rolling a die
  - Probability of any number = 1/6
  - Odds of any number = 1/5

Some other probability principles

- Sum of all probabilities should equal 1
  - e.g., p[heads] + p[tails] = 0.5+0.5 = 1
- Bayes' Theorem in diagnosis
  - Post-test (posterior) probability a function of pre-test (prior) probability and results of test
  - Post-test probability variably increases with positive test and decreases with negative test

Diagnostic and therapeutic thresholds (Guyatt, 2008)

| 0% | Test Threshold | | Treatment Threshold | 100% |

Probability below test threshold; no testing warranted

Probability between test and treatment threshold; further testing required

Probability above treatment threshold; testing completed; treatment commences

Screening tests for disease

- "Identification of unrecognized disease"
- Aim to keep disease (or complications) from occurring (1° prevention) or stop progression (2° prevention)
- Requirements for a screening test
  - Low cost
  - Intervention effective
  - High sensitivity – do not want to miss any cases; usually follow up with test of high specificity

Americans love screening tests despite lack of evidence

- Despite their limitations, screening tests for cancer are very popular with Americans (Schwartz, 2004)
- But cost of FP tests is substantial; in one study of screening for prostate, lung, colorectal, and ovarian cancer (Lafata, 2004)
  - 43% of sample had at least one FP test
  - Increased medical spending in following year by over $1000
- Despite lack of evidence for benefit of Pap smear in women with hysterectomy, procedure is still widely done (Sirovich, 2004)
- Despite lack of evidence for benefit of annual physical exam, two-thirds of physicians still believe it is necessary (Prochazka, 2005)

Clinical prediction rules

- Use of results of multiple "tests" to predict diagnosis
- Best evidence establishes rule in one population and validates in another independent one
- Examples of clinical prediction rules
  - Predicting deep venous thrombosis (DVT) (Wells, 2000; Wells, 2006)
    - High sensitivity, moderate specificity
    - Better for ruling out than ruling disease
  - Coronary risk prediction – newer risk markers do not add more to known basic risk factors (Folsom, 2006)