Academic Workshop

Academic Foundation Programme Application Evening

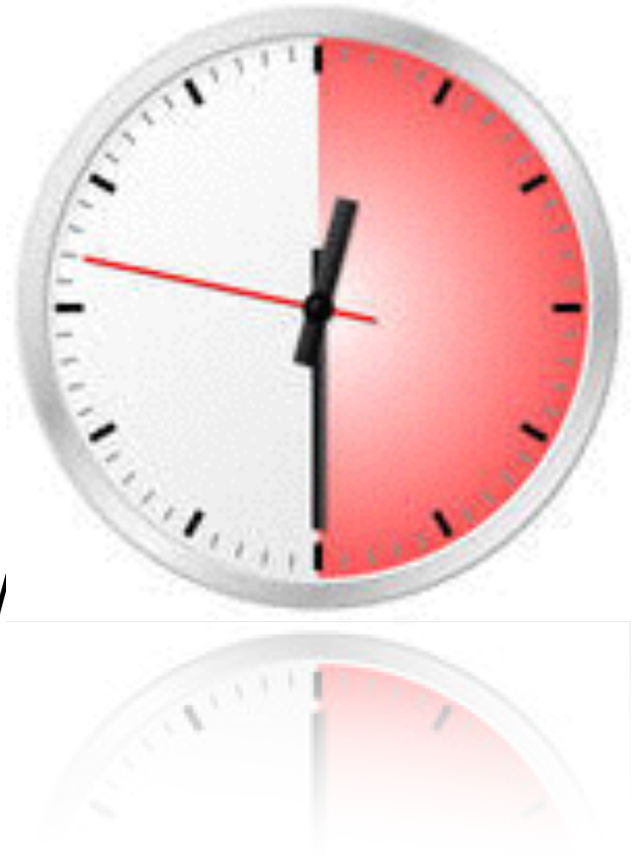
The information contained therein is based on the application experiences of current AFP trainees. It is not meant to substitute official advice provided by the UKFPO or Academic Units of Application. If there is a discrepancy between the advice provided here and the official advice, you should follow the latter.

Overview

- Typical format of the academic interview
- Preparation
  - What they are looking for?
  - Common questions
  - Top tips
- Abstract critical appraisal
  - Types of study
  - General approach to appraisal
  - Mini appraisal as a group
- Questions

Typical Format

- **30 minutes** preparation:
  - Clinical scenario(s)
  - **Abstract**
- **10 minute** academic interview
  - Discussion of abstract
  - Why are you applying to the AFP?



What are they looking for?

Genuine interest in and commitment to academia:

- Evidence of academic experience - teaching/research/leadership
- Extra academic achievements
- Evidence of career planning/aspiration - does not need to be concrete
- Realistic goals for potential AFP projects

Capability:

- Initiative/self-direction and reflective practice
- Organisational skills and versatility
- Analytical skills, especially under pressure
- Team and leadership skills
- Clinical skills

Common Questions

- Why do you want to do an AFP?
  - **Why are you interested** in research/teaching/management?
  - What would like to **achieve** during the AFP?
- Do you have any particular **research interests**?
- Previous **experience** of research/teaching/audit?
  - Briefly **summarise.** What did you **learn**?
- How will you **balance** demands of the clinical programme with additional academic components/competencies?
- Summarise a paper you have read recently
- Describe a time you worked effectively in a team/as a leader

Top preparation tips

- Think hard about **personal** motivations for applying
    - The AFP is not the only way into academic medicine - best viewed as an **opportunity for dedicated time to develop academic skills**
- **Prepare** some (semi)-rehearsed **answers** to **likely questions**
- Use personal **experience to reinforce** answers
- Answer questions **concisely**
- **Practice reading/appraising** abstracts

Abstract Appraisal

Critical appraisal:

- **Systematic** method to assess the **validity**/merit of research
- Highlight strengths and weaknesses
- Essential part of **evidence-based medicine**
  - EBM: “conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett et al., BMJ, 1996)

Types of Clinical Research

Observational Studies

- Descriptive
  - Study **distribution** of disease
  - Generate hypotheses, provide epidemiological data - e.g. cross-sectional surveys
- Analytical
  - Study **determinants** of disease to give an idea of **association**
  - **Case control studies**
  - **Cohort/longitudinal studies**

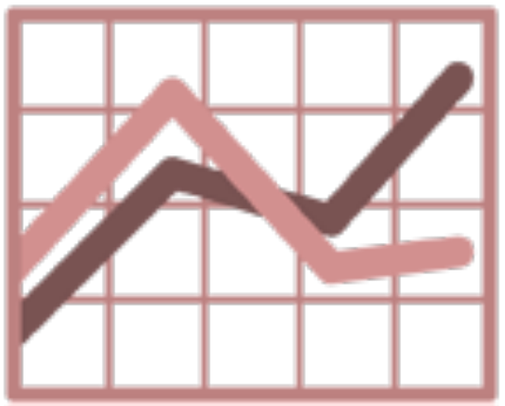
Types of Clinical Research

Observational Studies

- Case control studies
  - **Retrospectively** study **exposure** and development of **disease**
  - Use **odds ratios**
  - **Advantages**: relatively quick to perform and cheap, good for rare diseases or if long latency, can look at multiple factors/exposures
  - **Disadvantages**: Not good for rare exposures, no incidence data, no temporal relationship between exposure and disease, recall bias, selection bias
- Cohort/longitudinal studies
  - **Prospectively** study **exposure** and development of **disease/outcome**
  - Use **relative risk**
  - **Advantages**: good for rare exposures, can investigate temporal relationship, incidence, reduced bias as prospective
  - **Disadvantages**: Not practical for rare diseases, expensive, time consuming, bias from subjects lost to follow-up

Types of Clinical Research

Experimental Studies



- Randomised controlled trials and other trials
- **Planned experiment** for **efficacy** testing
- **Randomisation** to decrease selection bias
- Open-label vs. **blinding** to decrease measurement bias
- Most reliable demonstration of causality (gold standard)
- **Disadvantages**:
  - Selection and exclusion criteria can limit generalisability
  - Not feasible for every intervention e.g. sham surgeries
  - Expensive and time consuming, patients lost to follow-up

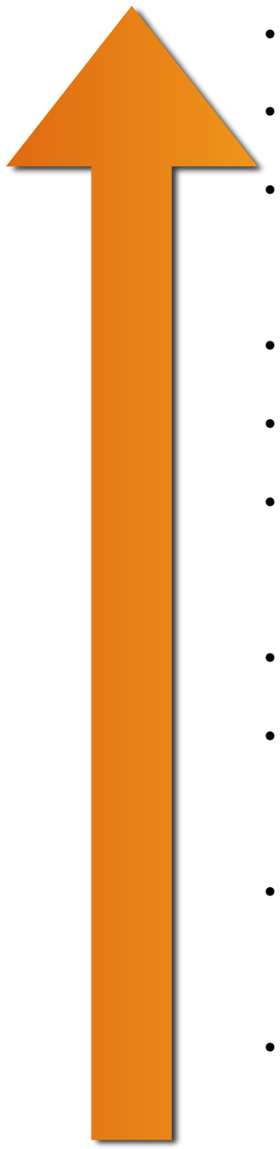
Meta-analysis

- Systematic **identification of trials and assessment of quality** to give cumulative interpretation of multiple studies, usually RCTs
- Result distilled into **Forest plot** with a combined odds ratio and confidence interval
- More data/studies analysed, the more valid the results
- Risk of publication bias - need to search grey literature and publish a funnel plot
- Studies may be too heterogeneous to pool

Phases of Trials

- **Phase I**
  - First phase of **human** testing
  - Small groups, **healthy volunteers**
  - Investigate **safety** and tolerability
- **Phase II**
  - Investigate **efficacy and safety** in larger groups
  - A = dosing requirements study, B = efficacy
    - Case series or small RCT against placebo
- **Phase III**
  - Randomised controlled trials investigating efficacy and safety
  - Usually multi-centre
  - Treatment compared with **current gold-standard or placebo**
  - Long and expensive
  - Needed for interventions to be endorsed by national/international regulators
- **Phase IV**
  - Post-marketing surveillance/pharmacovigilence
  - Detect rare/long term effects/interactions over larger patient population & duration

Hierarchy of studies/evidence



- **1A** - Systematic review (with homogeneity) of RCTs
- **1B** - Individual RCT (with narrow confidence intervals)
- **1C** - All or none study

- **2A** - Systematic review (with homogeneity) of cohort studies
- **2B** - Individual Cohort study (including low quality RCT, e.g. <80% follow-up)
- **2C** - “Outcomes” research; Ecological studies

- **3A** - Systematic review (with homogeneity) of case-control studies
- **3B** - Individual Case-control study

- **4** - Case series (and poor quality cohort and case-control study)

- **5** - Expert opinion without explicit critical appraisal or based on bench research/first principles

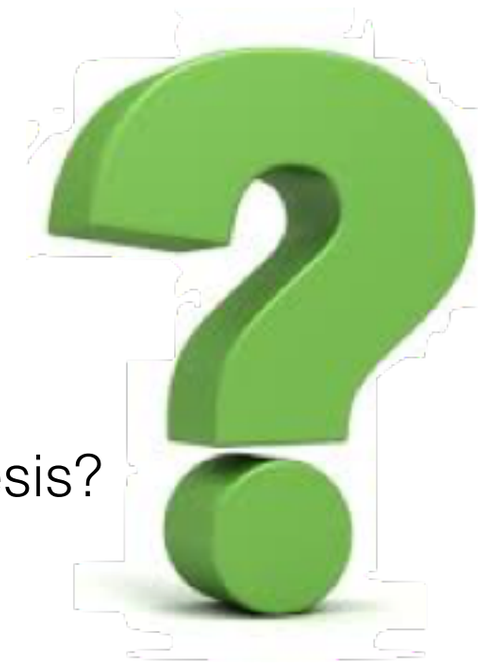
Burns PB, Rohrich RJ, Chung KC. The Levels of Evidence and their role in Evidence-Based Medicine. Plast Reconstr Surg. 2011 July ; 128(1): 305–310.

Approach to critical appraisal

<u>Be able to give a good, but concise summary of the abstract</u>

Introduction and study premise:

- When and where was the study published?
- What is the study about, is it novel?
- Why was the study done/is there a well defined aim/hypothesis?
    - PICO - Population, Intervention, Comparator, Outcome
- Is the research question worth asking?



Approach to critical appraisal

Methods:

- What type of study is it? - observational vs. experimental
- Primary or secondary research?
- Defined outcomes, inclusion & exclusion criteria, blinding, controls?
- Are the measurements used objective or subjective?
- Have sources of bias been minimised?
- Does the study design answer the research question?
- Is the study ethical?

Approach to critical appraisal

Results/Conclusions:

- What does the study show/take home message?
- What does it add to the field?
- Is the interpretation of the data accurate and are the conclusions consistent with the results?
- Can the study be generalised?
- Have limitations of the study been addressed?
- How will the study affect your practice?

Quick Abstract Appraisal
(CONSORT Checklist)

- **Title** - identification of the study as randomised
- **Authors** - contact details for the corresponding author
- **Trial design** - description of the trial design (e.g. parallel, cluster, non-inferiority)
- **Methods**
  - **Participants** - eligibility criteria and the setting where the data were collected
  - **Interventions** - interventions intended for each group
  - **Objective** - specific objective or hypothesis
  - **Outcome** - clearly defined primary outcome for this report
  - **Randomisation** - how participants were allocated to interventions
  - **Blinding** - whether participants, care givers, and those assessing the outcomes were blinded to group assignment
- **Results**
  - **Numbers randomised** - to each group
  - **Recruitment** - trial status - why trial ended or stopped?
  - **Numbers analysed** - in each group
  - **Outcomes** - results for primary outcome for each group and estimated effect size and its precision, i.e. CI
  - **Harms** - important adverse events/effects
- **Conclusions**
  - **General interpretation**
  - **Consistent** with results
  - **Generalisability**
  - **Limitations** - design, bias, imprecision
- **Trial registration** - registration number and name of trial register
- **Funding**

Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG, Schulz KF and the CONSORT Group (2008) CONSORT for reporting randomised trials in journal and conference abstracts. Lancet: 371:281-283

Lies, damn lies, and…

- Not likely to be asked a great deal of statistics
- Need to be able to show awareness of basic concepts and different statistical tools
- Know some definitions just in case, e.g.
  - Power, P valves, confidential intervals
  - We will provide some!

Abstract

Title
Patients' expectations about effects of chemotherapy for advanced cancer.
Background:
Chemotherapy for metastatic lung or colorectal cancer can prolong life by weeks or months and may provide palliation, but it is not curative.
Methods:
We studied 1193 patients participating in the Cancer Care Outcomes Research and Surveillance (CanCORS) study (a national, prospective, observational cohort study) who were alive 4 months after diagnosis and received chemotherapy for newly diagnosed metastatic (stage IV) lung or colorectal cancer. We sought to characterize the prevalence of the expectation that chemotherapy might be curative and to identify the clinical, sociodemographic, and health-system factors associated with this expectation. Data were obtained from a patient survey by professional interviewers in addition to a comprehensive review of medical records.
Results:
Overall, 69% of patients with lung cancer and 81% of those with colorectal cancer did not report understanding that chemotherapy was not at all likely to cure their cancer. In multivariable logistic regression, the risk of reporting inaccurate beliefs about chemotherapy was higher among patients with colorectal cancer, as compared with those with lung cancer (odds ratio, 1.75; 95% confidence interval [CI], 1.29 to 2.37); among nonwhite and Hispanic patients, as compared with non-Hispanic white patients (odds ratio for Hispanic patients, 2.82; 95% CI, 1.51 to 5.27; odds ratio for black patients, 2.93; 95% CI, 1.80 to 4.78); and among patients who rated their communication with their physician very favorably, as compared with less favorably (odds ratio for highest third vs. lowest third, 1.90; 95% CI, 1.33 to 2.72). Educational level, functional status, and the patient's role in decision making were not associated with such inaccurate beliefs about chemotherapy.
Conclusions:
Many patients receiving chemotherapy for incurable cancers may not understand that chemotherapy is unlikely to be curative, which could compromise their ability to make informed treatment decisions that are consonant with their preferences. Physicians may be able to improve patients' understanding, but this may come at the cost of patients' satisfaction with them. (Funded by the National Cancer Institute and others)

N Engl J Med 2012; 367:1616-1625

Abstract Comments

- **Introduction**:
  - Not clear if there is evidence to show pre-existing misinformation in this patient group
- **Methods**:
  - Cross-sectional descriptive (observational) study investigating prevalence - therefore appropriate design
  - Clear inclusion criteria, but no exclusion criteria
  - Unclear why 4 months following diagnosis, & unclear if completed/undergoing chemotherapy
  - Survey quality/design could influence results, & risk of recall bias & subjective opinion
  - Variability in interviewer style gives further potential for bias
- **Results**:
  - Prevalence higher in colorectal cancer, non-white & Hispanic patients, those rating communication with physician favourably:
    - Baseline demographic data not commented on, therefore, have confounders been ruled out, e.g. age?
    - Heterogeneous group: patients that have new diagnosis of metastatic cancer with previous treatments vs. new diagnosis of cancer *per se*
    - No subgroup analysis looking demographic data separately in each cancer type or standardisation
  - If no relationship to educational level, is this a cultural effect? No explanation offered.
- **Conclusions**:
  - Compromised informed consent reasonable conclusion
  - But no evidence that improved understanding of prognosis negatively impacts on doctor-patient relationship as study not designed to analyse this

Closing Comments

- Prepare answers to common questions
- Practice reading abstracts
- Use time wisely - abstract vs. clinical scenarios
  - Use a systematic approach to the abstract
  - Summarise the study well if nothing else
- Show enthusiasm

Questions?

Appendix - Useful Concepts

- **The null hypothesis** – default position stating that there is no difference between two or more groups
- **Data distribution** – normal/Gaussian (parametric) vs. skewed (non-parametric) - require different statical tests, as different assumptions are made about the data
- **Standard deviation (SD)** – for normally distributed data – how much **data is distributed around the mean** – +/- 2SD includes 95.4% of data
- **Standard error of the mean (SEM)** – for non-parametric data – measure of how close the **sample mean is to the population mean**
- **P value** – assuming null hypothesis is **true**, p value gives **probability** that observed differences are due to **chance**
- **Confidence interval** – **range** in which we are **confident the true population value lies,** i.e. usually 95% confident. Interval smaller with larger studies
- **Power** – **probability** that a **study** will detect a **significant statistical** difference, i.e. reject the null hypothesis when it is false – i.e. not committing a type II error
  - Increased by:
    - Increasing sample size - therefore used to calculate sample sized needed
    - Increase statistical significance threshold (alpha)
    - Magnitude of effect being studied
  - Reduced by increased SD
- **Errors**:
  - Type 1 – finding difference when null hypothesis is true, i.e. false positive
  - Type 2 – not finding a difference when null hypothesis is false, i.e false negative
- **Validity**:
  - **Sensitivity** – ability to detect true cases = true positives/(true positives + false negatives)
  - **Specificity** – ability to exclude negative cases = true negatives/(true negatives + false positives)
  - **Positive predictive value** – if positive result, how likely to be accurate – true positives/(true positives + false positives) - dependent on disease prevalence
  - **Negative predictive value** – if negative result, how likely to be accurate – true negatives/true negatives + false negatives

Appendix - Useful Concepts

- **Odds** – **probability** that something will **happen** vs. **probability** that something will **not happen**
- **Odds ratio** – **odds of exposure** in cases/**odds of exposure** in controls, OR ≈ RR – if disease rare <10%
- **Relative risk** – **incidence of cases** in all exposed/**incidence of cases** in all not exposed
- **Absolute risk** – **absolute probability of disease occurrence**
- **Absolute risk reduction – difference between even rate in intervention group vs. control group**
- **Number needed to treat – number of patients in a population that require treatment before one patient benefits. Also equal to 1/ARR**
- **Bias** - where results are skewed by study methodology. Many types:
  - **Selection bias** – systematic difference between characteristics of those selected for study and those who were not or differences in characteristics between study groups. More problematic in retrospective analyses
    - E.g. **self-selection/healthy-worker** effect - subjects enrole as concerned about own health and therefore more healthy than average
    - Reduced with randomisation
  - **Analysis/attrition bias** – occurs where participants are lost to follow up or switch between treatment groups. Reduced using intention to treat analysis, where patients analysed according to group originally randomised to
  - **Publication bias** – due to culture of peer review process, negative data is less often published. Problematic for meta-analyses and systematic reviews
  - **Measurement bias** – measurement or classification of disease or exposure is inaccurate – e.g. inaccurate instruments, expectations, observers or participants. Reduced with blinding (single, where subject is not aware of treatment and double where subject and experimenter are not ware of treatment)
  - **Performance bias** – similar to measurement bias - systematic differences in the care provided to participants in the comparison groups other than the intervention under investigation. Reduced with blinding.
  - **Recall bias** – where participants are asked regarding past events and accuracy is therefore reduced. More problematic in retrospective case-control studies

Appendix - Useful Concepts

- **Confounding**
  - Error in interpretation due to factor that is linked to outcome, but not evenly distributed between study groups and not on the causal pathway
  - Sources include: demographics – age, sex, side effects, comorbidities
  - Reduce with:
    - Randomisation
    - Stratification – e.g. by age for subgroup analysis
    - Standardisation e.g. standardised mortality rate – ratio of observed:expected deaths – expected deaths derived from larger population
    - Regression analysis – relationship between two dependent variables
- **Bradford-Hill Causation Criteria** - developed to show evidence of causation versus simple association
  - Strong Association – RR, OR
  - Consistency with other investigations
  - Specificity to factor/intervention of interest
  - Temporal relationship
  - Dose response relationship
  - Plausibility
  - Coherence between epidemiological and laboratory evidence
  - Experimental evidence
  - Analogy, i.e. the effect of similar factors