AL-FARABI KAZAKH NATIONAL UNIVERSITY
FACULTY OF MEDICINE AND PUBLIC HEALTH
DEPARTMENT OF EPIDEMIOLOGY, BIOSTATISTICS AND
EVIDENCE-BASED MEDICINE

GUIDELINE FOR SEMINARS ON PATIENT AND SOCIETY
COURSE

COMPOSER:
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MODULE 1: INTRODUCTION TO EPIDEMIOLOGY AND EVIDENCE-BASED MEDICINE

Seminar 1: Foundations of Epidemiology

Learning Objective: Define epidemiology, its core purposes (assessment, etiology, evaluation), and distinguish between descriptive and analytical approaches.
Key Concepts: History of epidemiology, population vs. individual perspective, measures of occurrence (introduction to incidence/prevalence), natural history of disease.
Practical Application: Analyze a brief outbreak report to formulate descriptive epidemiological questions (Who? Where? When?).

Seminar 2: Epidemiological Study Design

Learning Objective: Classify, compare, and select appropriate observational (cohort, case-control, cross-sectional) and experimental study designs.
Key Concepts: 2x2 contingency table, measures of association (RR, OR), internal vs. external validity, confounding, bias.
Practical Application: Given a series of research questions, match each to the optimal study design and justify the choice.

Seminar 3: Communicable & Non-Communicable Disease Epidemiology

Learning Objective: Contrast the epidemiological principles, dynamics, and prevention strategies for communicable and non-communicable diseases (NCDs).
Key Concepts: Chain of infection, Ro (reproduction number), herd immunity vs. multifactorial causation, risk factors, and population-level prevention for NCDs.
Practical Application: Case study comparison: Develop a containment strategy for an influenza outbreak vs. a population-level intervention plan for diabetes prevention.

Seminar 4: Evidence-Based Medicine (EBM) - The 5-Stage Cycle

Learning Objective: Apply the 5-step EBM process (Ask, Acquire, Appraise, Apply, Assess) to a clinical/public health question.
Key Concepts: Formulating PICO/PECO questions, efficient database searching (PubMed/MeSH), principles of critical appraisal for validity and relevance.
Practical Application: Workshop: From a clinical scenario, create a PICO question, execute a structured literature search, and appraise the abstract of a retrieved article.

Seminar 5: Systematic Reviews, Meta-Analysis & GRADE

Learning Objective: Describe the methodology of systematic reviews and meta-analyses and interpret results using the GRADE framework.
Key Concepts: Hierarchy of evidence, forest plots, heterogeneity (I^2), assessing certainty of evidence (GRADE: Risk of bias, inconsistency, indirectness, imprecision, publication bias).
Practical Application: Critically evaluate the methods and results section of a published systematic review, focusing on the quality of evidence (GRADE) for a key recommendation.

MODULE 2: INTRODUCTION TO BIOSTATISTICS

Seminar 6: Research Proposal & Questionnaire Design

Learning Objective: Outline the core components of a research proposal and design a valid, reliable data collection questionnaire.
Key Concepts: Study rationale/aims, methodology outline, ethical considerations, question types (open/closed, Likert), piloting, reliability (test-retest, internal consistency).
Practical Application: In groups, draft the methods section of a proposal and design a short questionnaire on a chosen public health topic, then peer-review for clarity and bias.

Seminar 7: Measurement in Epidemiology: Frequencies, Rates, Ratios

Learning Objective: Calculate and interpret key epidemiological measures of disease frequency and association.
Key Concepts: Prevalence (point/period), incidence (cumulative, density), mortality, morbidity, risk ratio (RR), odds ratio (OR), rate ratio.
Practical Application: Using data from a cohort study table, calculate and interpret incidence risk, prevalence, and relative risk.

Seminar 8: Summarizing Data - Distributions & Descriptive Statistics

Learning Objective: Organize data into frequency distributions and compute measures of central tendency and dispersion.
Key Concepts: Frequency tables, histograms, mean, median, mode, range, interquartile range (IQR), variance, standard deviation (SD).
Practical Application: Given a dataset of patient blood pressures, create a frequency distribution, histogram, and calculate and interpret the mean, median, and standard deviation.

Seminar 9: Statistical Inference: Hypothesis Testing, p-value, CI

Learning Objective: Formulate statistical hypotheses and interpret the p-value and confidence interval in the context of research.
Key Concepts: Null (H_0) and alternative (H_1) hypotheses, Type I/II error, statistical significance, point estimate, confidence interval (CI) calculation and interpretation.
Practical Application: Interpret the results from a published study (e.g., "p=0.03, RR=1.8, 95% CI 1.1-2.9") in plain language, discussing significance, effect size, and precision.

Seminar 10: Descriptive Statistics & Databases (Excel/SPSS)

Learning Objective: Perform basic data management and generate descriptive statistics using statistical software.
Key Concepts: Data entry, coding, cleaning, variable types (nominal, ordinal, continuous), using software to generate tables, summary statistics, and simple graphs.
Practical Application: Hands-on lab: Input a provided dataset into Excel/SPSS, clean the data, define variable types, and produce a descriptive summary report with appropriate tables and charts.

MODULE 3: CONSTRUCTION OF A RESEARCH PROPOSAL

Seminar 11: Analyzing Categorical Data - Chi-square & Related Tests

Learning Objective: Select and apply the correct statistical test for comparing categorical (qualitative) variables.
Key Concepts: Chi-square test (assumptions, formula), Fisher's exact test (for small samples), McNemar's test (for paired/matched data).
Practical Application: Using SPSS and a provided dataset, test for an association between two categorical variables (e.g., smoking status and disease presence) and interpret the output.

Seminar 12: Parametric Tests: t-tests & ANOVA

Learning Objective: Apply t-tests and ANOVA to compare means between groups, checking for necessary assumptions.
Key Concepts: Independent samples t-test, paired t-test, one-way ANOVA, assumptions of normality and homogeneity of variance, post-hoc tests.
Practical Application: SPSS lab: Test for differences in mean blood pressure between three treatment groups using ANOVA, check assumptions, and interpret the results.

Seminar 13: Non-Parametric Tests

Learning Objective: Choose and implement non-parametric alternatives when data violate parametric test assumptions.
Key Concepts: Mann-Whitney U test (the independent samples t-test), Wilcoxon signed-rank test (the paired samples t-test), Kruskal-Wallis test (ANOVA).
Practical Application: Given a non-normally distributed dataset, use SPSS to compare groups using the appropriate non-parametric test and compare the conclusions to a parametric approach.

Seminar 14: Correlation, Regression & Survival Analysis

Learning Objective: Analyze relationships between variables using correlation/regression and analyze time-to-event data.
Key Concepts: Pearson's (r) and Spearman's (ρ) correlation, simple linear regression, Kaplan-Meier curves, log-rank test.
Practical Application: 1) Calculate and interpret a correlation coefficient in SPSS. 2) Interpret a Kaplan-Meier survival curve and log-rank test result from a clinical trial output.

Seminar 15: Presentation of Scientific Projects

Learning Objective: Effectively communicate research findings in a structured scientific presentation.
Key Concepts: Structure of a scientific report/paper (IMRaD), principles of effective data visualization (graphs, tables), oral presentation skills, abstract writing.
Practical Application: Final Capstone: Students present their completed research proposals (developed throughout the seminars), incorporating background, methodology, proposed analysis plan, and expected significance. Peer feedback session.

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2. High-Yield Biostatistics, Epidemiology, & Public Health, 4th Edition, Kaplan USMLE, Lecture
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3. Fundamentals of Biostatistics. Seventh Edition. Rosner. - 2016.-856 p.
4. Primer of Biostatistics. Seventh Edition. Stanton A. Glantz, Ph.D., 2009, 297p.
5. Medical Statistics at a Glance Workbook. Front Cover. Aviva Petrie, Caroline Sabin. John Wiley &
Sons, 2013 - Medical - 120 p.
6. Evidence-Based Medicine. How to Practice and Teach EBM (3rd Edition). S.E. Straus, W.S.
Richardson, Paul Glasziou, R. Brian Haynes.

7. Literature Reviews in Social Work. Robin Kiteley and Christine Stogdon - 2014.-20 p. Additional
literature
8. Evidence-Based Answers to Clinical Questions for Busy Clinicians Workbook - 2009.- 26p.
9. Appraisal of Guidelines for Research & Evaluation II. The AGREE Next Steps Consortium May 2009.-
52 p.