**Table of contents (IADVL Research** **Compendium)**

1. Introduction to Biomedical Research

a. Describe various dimensions of health research

b. Explain the fundamental principles and key components of health research process

c. Outline various challenges in designing and implementation of research studies

d. Recognize major issues related to study methods and measurements used in research

1. Formulation of Research Question, Hypothesis and Objectives

a. Paraphrase a research question

b. Distinguish between descriptive and analytical questions

c. Explaining in details FINER criteria and PICOT model

d. Developing research hypothesis/es

e. Defining the research objectives(s)

1. Literature search

a. Recognizing the importance of performing a literature review

b. Describing the steps in performing a literature review

c. Outlining the steps in writing a literature review

1. Measurement of Disease frequency

a. List commonly used measures of disease frequency

b. Define prevalence and incidence

c. Describe uses of prevalence and incidence measures

d. Recognise relationship between incidence and prevalence

1. Designing a Descriptive study

a. List the types of descriptive observational study designs

b. Describe the uses of descriptive study designs

c. Recognise key elements of cross sectional study designs

d. Describe the key issues in conducting a descriptive study (with examples)

1. Designing an Analytical Study

a. List the types of analytical observational study designs

b. Recognise key elements of cohort study design

c. Recognise key elements of case-control study design

d. Describe the key issues in conducting an analytical study (with examples)

1. Designing a Diagnostic study
   1. Discuss the basic concept of diagnostic study
   2. Define and describe sensitivity, specificity, positive predictive value, negative predictive value, likelihood ratio
   3. Describe the key issues in conducting a diagnostic study (with examples)

1. Designing an Interventional Study/Clinical Trial

a. Describe the basic concepts in randomized controlled trials

b. Define the purpose of randomization, allocation concealment, blinding related to experimental study design

c. Identity and classify different types of trial designs

d. Describe the concept of superiority/equivalence/inferiority trial

1. Designing an Epidemiological Study
   1. Describe the basic concepts in epidemiological studies
   2. Discuss the various errors of measurement in epidemiological studies
   3. Distinguish terminologies in epidemiology such as chance, bias and confounding
   4. Identify measures to alleviate the errors of measurement in epidemiological studies
   5. Describe the key issues in conducting an epidemiological studies (with examples)
2. Designing a Qualitative Research

a. Recognize the difference between Qualitative and Quantitative research methods

b. Relate the basic concepts of Qualitative research

c. Explain the Focussed group discussion, In-depth interview with steps in conducting the same

d. Describe the methods of data management in Qualitative research

e. Data analysis in qualitative research

f. Describe the key issues in conducting a qualitative research (with examples)

1. Designing Systematic review and Meta-analysis
   1. Describe the process of structuring a research question, searching and appraising the literature, data extraction, analysis and synthesis, and reporting the results for systematic review
   2. Describe the process of formulating research question, develop methodology, inclusion/ exclusion criteria, explicit search strategy, critical assessment of the validity and analysis of the findings in included studies, the dependent and independent variables under review, weighing studies according to sample size, sensitivity analysis, synthesis and interpretation of results for meta-analysis
2. Measurement of Study Variable

a. List the scales of measurement for different types of data

b. Describe and compute the measures of central tendency

c. Explain the purpose of measures of dispersion

d. Illustrate the advantages and disadvantages of these measures

1. Sampling Methods:

a. Recognise the importance of sampling in research

b. Distinguish between probability & non probability sampling

c. Discuss the strengths and limitations of each type of sampling method

1. Sample Size

a. Recognise the role of sample size in the power of a statistical test

b. Outline the steps in estimating a sample size

c. Determine the sample size required to estimate population parameters

d. Describe design effect and its influence on statistical power

1. Study Population

a. Outline the steps in selecting a study population

b. Define inclusion and exclusion criteria

c. Distinguish between internal and external validity

d. Recognize and address issues related to non-response/ failure to follow-up

1. Development of Concept Paper and Protocol for Bio-medical Research

a. Outline elements of a concept paper

b. Translate research idea into one-page concept paper

c. Describe the various steps in writing a successful research protocol

d. Outline the important components of a research proposal including SPIRIT protocol for Clinical Trial

1. Project management including planning a study

a. State the fundamental principles of project management

b. Describe the road map to study planning and management

c. Recognize common reasons for study failures

d. Designing Multi-centric studies with highlights on memorandum of understanding (MoU)

e. How to do research in private practice

1. Funding of Research

a. List of Funding agencies

b. Application to Funding Agencies

c. Utilization of funds

d. Drafting of “Statement of Expenditure”

e. Roles and responsibilities of funding agencies

1. Principle of Data Collection and Data Collection Tool

a. Describe the essential steps in data collection

b. Identify the approaches to ensure data quality during data collection

c. Explain the various types of data collection tools (including google from)

d. Describe the components of a data collection tool

e. Define the procedure for construction of a data collection tool

f. Outline the design of a data collection tool

g. Data collection by doctors in private practice

1. Data managemen*t*

a. Outline basic structure of a database

b. Identify issues related to data storage

c. Recognize elements of data entry

d. Distinguish types of databases

1. Data Analysis

a. Describe sequence of data analysis strategy

b. Relate plan of analysis with the nature of research question

c. Outline steps for initial and advanced stages of analysis

d. Describe the concept of Confidence interval

1. Ethics in Biomedical Research

a. Identify the range of ethical issues that need to be addressed in biomedical research with highlights on Good Clinical Practice (GCP) and Benefit vs. Risk

b. History of GCP

c. Elaboration of Pillars of Good Clinical Practice, viz. Autonomy, Beneficience, Non-malaficience, Justice, Honesty and Confidentiality

d. List key national and international guidelines and regulations that guide the development and review of research studies

e. Recognize the process and issues related to the conduct of health research and practice of medicine

f. Ethics Committee Clearance (with highlight on IEC clearance for those involved in private practice)

g. Describe research misconduct

1. Conducting Clinical Trial

a. Registration of Clinical Trial

b. Recognize the importance of various reviews and clearances prior to the implementation of clinical trials (DCGI/CTRI)

c. Identify critical issues in clinical trial implementation including the roles and responsibilities of the stake-holders of clinical trial (sponsor, investigator, regulator)

d. Indemnity for investigator and insurance of participants

e. Data Archival

f. Management of Adverse event including data safety management board (DSMB)

g. Compensation in Clinical Trial

1. Drafting of Manuscript

a. Important component of a manuscript, including Abstract, Key Words, Running Title, Introduction, Methodology, Results, Discussion, Conclusion

b. Referencing method (including Vancouver and Harvard style)

c. Describe the process of drafting case-reports and case-series

d. Introduction to CONSORT, STOBE, PRISMA guidelines

1. Publication Ethics, Selection of Journal and Responding to Reviewer’s Comment/Rejection

a. Recognize various ethical issues related to publication

b. Describe plagiarism, authorship criteria, conflict of interest, copyright and acknowledgement

c. Make use of the guidelines available from various national and international organizations for publication ethics

c. Search for Journals indexed by various Indexing Authorities

d. Protocol of Replying to Reviewer’s comment

e. Approach for responding to rejection in Journal.