SYLLABUS OVERVIEW FOR POST GRADUATE DIPLOMA IN "CLINICAL TRIAL AND CLINICAL DATA MANAGEMENT

Suggested Duration: 1 year

Paper I: Clinical Research concepts and Study designs

Clinical Research: Scope of Clinical Research, Good Clinical Practices (GCP), History of clinical research, Fundamentals and components of clinical research Basic terminology used in clinical research Development of Research Question Writing a protocol Clinical Research, Types of clinical trials, clinical trials Phases, Special Clinical Trials, Medical Devices Trials, Un-anticipated risk in clinical research. Investigator Brochure, Informed Consent Form, Sponsor Monitor and Investigator responsibility, SOP in Clinical Trials, Clinical Trial Monitoring, Role of clinical research associate (CRA), QA and QC in Clinical Trials, CRF Design. Recruitment and allocation Randomization

Study Population and Design: Overview of study design, Issues on generalization. Practical aspects: recruitment. Selection of the Questions, Types of questions, adverse effects.
Study design: Natural history, frequent errors. Types of studies: Experimental, uncontrolled, RCTs, other designs – equivalence, non-inferiority, observational, retrospective, sample size, bias and confounding. Experimental Design - issues of uncontrolled studies: before and after comparison in a single group, temporal variation of disease, staff, equipment and environment, learning and psychological effect. Experimental Design – Randomized Clinical Trials: parallel-group design, stratified parallel group design, parallel group randomized block design, complete cross-over design,

simultaneous treatments design, factorial design. Types of randomization: simple, blocked, stratified and Adaptive, Blindness: – unblinded, Single Blind, Double-blind and Triple blind trials, Dichotomous response variables, Sample size: sample size for repeated measures, equivalency of interventional studies, Estimating sample size parameters, fraud and misconduct

References

Leon Gordis (2014). Epidemiology. Elsevier
Lawrence MF, Curt DF, David LD (2010) Fundamentals of clinical trials
Tom Brody (2016). Clinical trials. Elsevier

Paper II: Ethics in Clinical Trials and Drug Development

History clinical Research, Ethical Principles in Clinical Research, Good Clinical Practices, Ethical guidelines for biomedical research on Human subjects Schedule-ICMR Guidelines, Institutional Review Board/Independent Ethics Committee (IRB/IEC), Informed consent in research, Safety monitoring in clinical trials -Termination of Trial, Contents of the Investigator's Brochure, Compliance with Protocol and Informed Consent of Trial Subjects, Notification/Submission to Regulatory Authority, Essential Documents for the conduct of clinical trial, Legal Issues in Clinical Research, Clinical Research in International Settings

Basics of Drug Discovery & Development, Overview and phases of drug Development, Existing and Emerging technologies in Drug Discovery -Hurdles in Drug Development - Drug nomenclature and dosage forms, Routes of drug administration, Pharmacokinetics,

Pharmacodynamics, Drug Interactions, Principles of Clinical and systemic toxicology Pharmacogenomics, Introduction to Pharmacoeconomics

References

Roli M (2017). National ethical guidelines for biomedical and health research involving human participants. ICMR

Declaration of Helsinki: ethical principles for medical research involving human subjects. Fortaleza: World Medical Association. 2013

Federal Policy for the Protection of Human Subjects (‘Common Rule’). U.S. Department of Health and Human Services; (1991); 2001, 2017

International ethical guidelines for health-related research involving humans. Geneva: Council for International Organizations of Medical Sciences; 2016.

WHO (2011) Standards and Operational Guidance for Ethics Review of Health-Related Research with Human Participants

Gupta SK (2011). Drug discovery and clinical research. Jaypee Brothers Medical Publishers

Turner, JR (2010). New Drug Development: An introduction to clinical trials. Springer

Paper III: Application of Clinical data management System (CDMS) and statistical packages

Specific data management system include,

Guidance in selection of the most appropriate data management tools, Development of study documents, including case report forms, data management plans, and data transfer agreements, Design, implementation, and maintenance of an electronic data capture system for data collection, edit checks, specimen tracking, and study metrics reporting, Development and execution of a web-based randomization system, Provision of web-based training on electronic data capture and randomization, Implementation of a data quality assurance strategy, including ongoing data cleaning and site assistance with online data, query resolution, Coordination of external (e.g., core laboratory) data transfers and reconciliation, Medical coding, Programming of interim and final analytic data sets

Building a Project: Introduction to Project Development- Online Designer- Data Dictionary - Project Field Types

Basic Features & Modules: Applications Overview- the Calendar- Scheduling Module- Data Access Groups for multi-site projects

Types of REDCap Projects: Types of Projects- Traditional Project (classic model with data entry forms)

Single Survey Project- Longitudinal Project (multi-use data entry forms,abstract time-points), Longitudinal Project+ Scheduling (multi-use data entry forms,defined time points), Operations(use case for non-study/non-trial)

Special Features within REDCap Projects: Defining Events in Longitudinal Projects, Designating Instruments for Events in Longitudinal Projects, Repeatable instruments and events, REDCap Mobile App, Locking Records, Data Resolution Workflow

Getting acquainted with the SPSS, SAS, R program

Review of terminology: definition of variables and types: Categorical, continuous, repeated measures variables-Measurement scale-Common statistical programs-Orientation to SPSS program-
Getting data into SPSS: Creating a new data set-Valid variable names-Variable view-Adding value Managing SAS Dataset using set statement - SAS functions Overview - String Functions - Conversion Functions - Date Functions - Mathematical Functions- Descriptive statistics-Proc means and proc freq - Proc report-column, define, headline, head skip, compute, order and group - Proc tabulate Proc transpose- Combining data set-one to one reading, concatenation and merge - Array-single and multi-dimensional array - Proc print, proc import and proc export labels-
Virtualization -Samba and Mail Services Virtualization -Advance Security & Networking Concepts. -Concept of Data Analytics & -Data Manipulation in R -Data Import Techniques -Exploratory Data Analysis -Data Visualization -Data Mining: Clustering Technique -Data Mining: Association Rule Mining and Sentiment Analysis -Regression -Anova -Predictive Analysis & Simulation -Implementation of Decision tree- Introductory

References

Beth MS, Janie HW, Dennis MG (2018). An Easy Guide to Research Design & SPSS. Sage publication

IBM (2016). Programming and Data Management for IBM SPSS Statistics 24: A Guide for IBM SPSS Statistics and SAS Users

Vanderbilt University (2015). REDCap Beginner's Guide

Lorda DD, Susan JS (2012). The Little SAS Book: A Primer. SAS Institute

Ron C (2015). An Introduction to SAS University Edition. SAS Institute

Venables WN, Smith DM, The R Core Team (2019). An Introduction to R. R Core Team

Norman M (2011).The Art of R Programming – A Tour of Statistical Software Design. No Starch Press

Winston C (2012). R Graphics Cookbook. O'Reilly Media

Andrew GD, Kevin MS, Minn MS (2010). Epi Info and Open Epi in Epidemiology and Clinical Medicine: Health Applications of Free Software. Creates pace Independent Pub.

JoAnn P, Cris W (2017). A Practical guide to managing clinical trials. CRC Press
Alexey L (2017). Project management in clinical trials

Paper IV: Biostatistics and Statistical Programming

Gain knowledge in study design, data safety monitoring board (DSMB) support, generation of statistical reports, and manuscript preparation. Specific statistical and related topics include:

1. Basics of Biostatistics

Introduction and revision of conventional methods for contingency tables, Chi-square tests. - Measures of frequency and associations, odds ratio, relative risk. - Distribution theory. - Categorical data and GLMs. - Key concepts of estimation and construction of Normal theory. - Hypothesis testing, correlation. - Role of ANOVA, regressions and confidence interval. - Methods of inference based on likelihood theory. - Main types of study designs. - Sources of error-Chance, bias, confounding, association of causality.

2. Biostatistics for Clinical Trial

Study design, selection of outcome measures, and sample size estimation, Collaboration on writing of the study protocol and other study documents, Analysis of specialized, disease-specific outcome measures, Development and/or review of statistical analysis plans and DSMB charters, Design and programming of tables, figures, and listings for clinical study reports, Coordination of DSMB teleconferences and in-person meetings, Statistical analyses and programming for interim and final reports, Scientific support and statistical outputs for manuscripts and presentations to ensure timely dissemination of study results

3. Biostatistics-Regression Analysis

Linear regression, logistic regression, and Cox proportional hazards regression. Coding of explanatory variables, residual diagnostics, model selection techniques, random effects and mixed effect

models, and maximum likelihood estimation. Logistic regression and discriminant analysis with emphasis on classification and prediction. Regularized regression, resampling methods, tree-based methods and support vector machines.

References

Goon AM, Gupta M. K., Dasgupta B (2008): Fundamentals of Statistics, Published by Prentice Hall, 2nd edition.

Gupta SC, Kapoor VK (2000): Fundamentals of Mathematical Statistics, Sultan Chand Sons 10th edition.

Pagano M Gauvreau K (2007). Principles of Biostatistics. Duxbury Press

Rohatgi VK, Saleh AK (2001). An Introduction to Probability and Statistics, John Wiley & Sons.

Beth D, Robert GT (2004). Basic & Clinical Biostatistics. Lange Medical Books

Douglas C M, Elizabeth A P, Vining GG (2006). Introduction to Linear Regression Analysis. Wiley India Pvt Ltd

David C(2015). Modelling Survival Data in Medical Research. Chapman and Hall

Long JS (1997). Regression Models for Categorical and Limited Dependent Variables. Sage publications

Andrzej TG, Tomasz B(2013). Linear Mixed-Effects Models Using R: A Step-by-Step Approach. Springer