Advanced Certificate in Pediatric Neurology Clinical Research

Clinical Research Methods

Adverse Event (AE) – related terms: Serious adverse event, unexpected adverse event, adverse reaction. An undesirable medical occurrence in a participant during a study, regardless of causal relationship to the investigational product. Example: A fever after vaccine administration. Challenges include accurate attribution and timely reporting to regulatory bodies.

Adverse Event Reporting – related terms: Safety monitoring, pharmacovigilance, data safety monitoring board (DSMB). The systematic process of documenting, assessing, and communicating AEs to ensure participant safety. Requires standardized case report forms and adherence to regulatory timelines. Delays can compromise risk assessment.

Age-Stratified Analysis – related terms: Subgroup analysis, pediatric age groups, developmental stages. Statistical examination of data divided by specific age ranges (e.G., Neonates, infants, toddlers). Helps identify age-specific efficacy or safety signals. Small sample sizes in subgroups may limit statistical power.

Algorithmic Randomization – related terms: Computer-generated randomization, allocation concealment, block randomization. Use of software to assign participants to study arms based on pre-specified rules, minimizing selection bias. Requires secure systems to prevent manipulation.

Allocation Concealment – related terms: Blinding, random sequence generation, envelope method. The technique that prevents investigators from knowing upcoming assignments before enrolling a participant. Essential for preserving the integrity of randomization. Inadequate concealment can introduce systematic bias.

Baseline Characteristics – related terms: Demographic data, clinical variables, covariates. Information collected at enrollment describing participants (e.G., Age, gender, disease severity). Used to assess comparability of groups and adjust analyses. Imbalanced baselines may necessitate statistical control.

Blinded Study – related terms: Single-blind, double-blind, triple-blind, masking. Design in which one or more parties (participants, investigators, assessors) are unaware of treatment allocation. Reduces performance and detection bias. Maintaining blinding can be challenging with noticeable side effects.

Case Report Form (CRF) – related terms: Electronic CRF (eCRF), data capture, source document. Structured document used to collect all trial data for each participant. Must align with protocol specifications. Incomplete or inconsistent CRFs compromise data quality.

Case-Control Study – related terms: Retrospective design, odds ratio, matching. Observational design comparing individuals with a condition (cases) to those without (controls) to identify exposure differences. Efficient for rare pediatric neurologic disorders. Susceptible to recall bias and selection bias.

Case-Series – related terms: Descriptive study, clinical vignette, hypothesis-generating. Collection of

consecutive patients with a particular condition, often without a comparison group. Useful for rare pediatric neurological syndromes. Limited inferential value due to lack of control.

Clinical Endpoint – related terms: Primary outcome, surrogate endpoint, composite endpoint. Measurable event that reflects a meaningful health benefit (e.G., Seizure freedom). Selection influences trial relevance and regulatory acceptance. Surrogates must be validated for the pediatric population.

Clinical Trial Protocol – related terms: Study design, standard operating procedures (SOPs), amendment. Comprehensive document outlining objectives, methodology, statistical considerations, and operational details. Serves as the master plan for conduct. Protocol deviations can jeopardize validity.

Composite Endpoint – related terms: Combined outcome, time-to-event, adjudication. A single measure that aggregates multiple individual outcomes (e.G., Death, hospitalization, or severe relapse). Increases event rates, enhancing statistical efficiency. Interpretation can be complicated if component effects differ.

Confounding Variable – related terms: Covariate, effect modifier, bias. A factor associated with both exposure and outcome that can distort the apparent relationship. Example: Socioeconomic status influencing both treatment access and neurodevelopmental outcomes. Statistical adjustment or stratification is required.

CONSORT Statement – related terms: Reporting guidelines, trial transparency, flow diagram. Consolidated Standards of Reporting Trials provide a checklist for publishing randomized controlled trials. Enhances completeness and reproducibility. Non-adherence reduces credibility of pediatric neurology studies.

Crossover Design – related terms: Washout period, carry-over effect, within-subject comparison. Participants receive multiple interventions sequentially, serving as their own controls. Reduces sample size requirements. Not suitable when interventions have lasting effects on the developing brain.

Data Monitoring Committee (DMC) – related terms: Data safety monitoring board (DSMB), interim analysis, stopping rules. Independent group that reviews accumulating data for safety, efficacy, and futility. Provides recommendations on trial continuation. Conflict of interest must be carefully managed.

Data Management Plan – related terms: Data dictionary, database design, quality control. Blueprint describing how data will be collected, stored, processed, and protected throughout the study. Critical for ensuring integrity of pediatric neurologic datasets. Poor planning leads to data loss or inconsistencies.

Data Safety Monitoring Board (DSMB) – related terms: Independent oversight, interim review, ethical monitoring. Panel of experts tasked with safeguarding participant welfare by evaluating interim safety data. May recommend protocol modifications. Independence from sponsor is essential.

Decline Curve – related terms: Learning curve, proficiency, competency. Graphical representation of performance improvement over time (e.G., Accuracy of EEG interpretation). Helps determine training needs in pediatric neuro-research teams. Plateau may indicate need for new methods.

Design Effect – related terms: Intracluster correlation coefficient (ICC), cluster randomization, sample size inflation. Factor by which sample size must be increased when participants are grouped (e.G., By clinic).

Ignoring design effect can result in underpowered studies.

Diagnostic Accuracy Study – related terms: Sensitivity, specificity, receiver operating characteristic (ROC) curve. Evaluates how well a test identifies a condition (e.G., MRI for cortical dysplasia). Requires a reference standard. In pediatric neurology, gold standards may be invasive or unavailable.

Double-Blind Study – related terms: Masking, allocation concealment, blinding. Both participants and investigators are unaware of treatment assignments, minimizing bias. Particularly important when outcomes are subjective, such as behavioral assessments.

Eligibility Criteria – related terms: Inclusion criteria, exclusion criteria, screening. Set of conditions that determine participant suitability. In pediatric neurology, criteria often involve age range, diagnosis confirmation, and comorbidities. Overly restrictive criteria limit generalizability.

Endpoint Adjudication – related terms: Blinded committee, central review, event validation. Process where independent experts verify that reported outcomes meet predefined definitions. Reduces misclassification of events like seizure recurrence. Requires clear adjudication charter.

Enrolment Target – related terms: Recruitment goal, sample size, accrual rate. Number of participants needed to achieve statistical power. Determined during protocol development based on effect size and variability. Failure to meet target delays study completion.

Ethics Committee Review – related terms: Institutional review board (IRB), informed consent, assent. Formal assessment of study ethical acceptability, especially important for vulnerable pediatric populations. Requires documentation of risk-benefit analysis. Delays can impede study start.

Event-Driven Trial – related terms: Time-to-event analysis, hazard ratio, censoring. Study design where duration depends on occurrence of a predefined number of events (e.G., First seizure). Allows efficient use of resources but may extend recruitment if events are rare.

Exploratory Analysis – related terms: Hypothesis-generating, post-hoc, subgroup. Analyses performed beyond primary objectives to discover patterns or signals. Useful for identifying novel biomarkers in pediatric neurology. Must be interpreted cautiously to avoid false discoveries.

Factorial Design – related terms: Interaction effect, multiple interventions, 2×2 design. Simultaneous evaluation of two or more interventions and their combined effect. Reduces total number of participants needed compared with separate trials. Complex analysis required to assess interaction.

Feasibility Study – related terms: Pilot study, pre-trial assessment, recruitment rate. Small-scale investigation to determine practicality of larger trial (e.G., Ability to enroll children with rare epilepsies). Identifies logistical barriers early. Not intended for efficacy conclusions.

Follow-up Period – related terms: Observation window, longitudinal assessment, attrition. Time frame after intervention during which outcomes are measured. In pediatric neurology, may span months to years to capture developmental changes. Loss to follow-up threatens validity.

Genetic Association Study – related terms: Genome-wide association study (GWAS), single nucleotide polymorphism (SNP), linkage disequilibrium. Examines relationship between genetic variants and disease traits (e.G., Susceptibility to migraine). Requires large sample sizes; population stratification can confound results.

Good Clinical Practice (GCP) – related terms: Regulatory compliance, ethical standards, quality assurance. International ethical and scientific quality standard for designing, conducting, recording, and reporting trials. Ensures rights, safety, and data integrity of pediatric participants. Non-compliance may lead to audit findings.

Harms Assessment – related terms: Safety monitoring, adverse event grading, risk-benefit analysis. Structured evaluation of negative outcomes associated with an intervention. In pediatric neurology, special attention to neurodevelopmental toxicity. Requires predefined severity scales.

Health-Related Quality of Life (HRQoL) – related terms: Patient-reported outcome (PRO), validated questionnaire, pediatric scales. Measurement of perceived physical, mental, and social well-being. Instruments such as PedsQL are adapted for children with neurological disorders. Sensitive to cultural differences.

Hierarchical Modeling – related terms: Multilevel analysis, random effects, cluster data. Statistical approach that accounts for data nested within higher-order units (e.G., Patients within hospitals). Improves estimate precision when analyzing multicenter pediatric neurology trials.

Hypothesis-Testing Framework – related terms: Null hypothesis, alternative hypothesis, type I error. Structured method for evaluating whether observed data support a specific claim (e.G., New therapy reduces seizure frequency). Requires pre-specified significance level, often 0.05.

Informed Consent – related terms: Assent, parental permission, ethical disclosure. Process by which participants (or their guardians) voluntarily agree to partake after understanding risks and benefits. Must be age-appropriate for children with cognitive impairment. Documentation is mandatory.

Intention-to-Treat (ITT) Analysis – related terms: Per-protocol analysis, handling of dropouts, conservative estimate. Includes all randomized participants in the groups to which they were assigned, regardless of adherence. Preserves randomization benefits, especially important in pediatric trials with high attrition.

Interim Analysis – related terms: Data monitoring, stopping rule, alpha spending. Planned examination of data before trial completion to assess safety or efficacy. Requires statistical adjustment to control overall type I error. Premature stopping can overestimate treatment effect.

Inclusion Criteria – related terms: Eligibility, target population, screening. Specific attributes participants must possess (e.G., Age 2-12, confirmed diagnosis of focal epilepsy). Define the study's scope and affect external validity. Too narrow limits applicability.

Incidence Rate – related terms: Prevalence, event rate, person-time. Number of new cases of a condition occurring in a defined population during a specified period. Used to describe occurrence of rare pediatric

neurologic events. Accurate denominator essential.

Independent Variable – related terms: Predictor, exposure, covariate. Factor manipulated or measured to assess its effect on the outcome (e.G., Dosage of antiepileptic drug). Clear definition avoids confusion with confounders.

Informed Assent – related terms: Child consent, age-appropriate explanation, voluntariness. Child's affirmative agreement to participate when they possess sufficient maturity. Distinct from parental permission but both required for most pediatric studies.

Instrument Validation – related terms: Reliability, construct validity, psychometric testing. Process of confirming that a measurement tool (e.G., Developmental scale) accurately captures the intended construct in children. Poorly validated instruments bias results.

Inter-Rater Reliability – related terms: Agreement statistic, kappa coefficient, consistency. Degree to which different assessors produce similar ratings (e.G., EEG interpretation). Essential for multicenter pediatric neurology studies to ensure comparable data.

Intervention Fidelity – related terms: Protocol adherence, implementation quality, monitoring. Extent to which the delivered intervention matches the planned protocol. Deviations can dilute treatment effect, especially in behavioral or rehabilitation studies.

Inverse Probability Weighting – related terms: Propensity score, causal inference, missing data adjustment. Statistical technique that creates a pseudo-population where treatment assignment is independent of observed covariates. Useful when randomization is not feasible.

Kaplan-Meier Estimate – related terms: Survival analysis, censoring, time-to-event. Non-parametric method to estimate the probability of remaining event-free over time (e.G., Seizure recurrence). Visualized as a survival curve; differences tested with log-rank test.

Kinetic Modeling – related terms: Pharmacokinetics, dose-response, concentration-time curve. Mathematical representation of drug absorption, distribution, metabolism, and excretion. In pediatric neurology, scaling doses according to body weight or surface area is critical.

Linear Mixed-Effects Model – related terms: Random intercept, repeated measures, longitudinal data. Handles correlated observations (e.G., Repeated neurocognitive scores) while accounting for both fixed and random effects. Provides flexibility for missing data patterns.

Longitudinal Study – related terms: Cohort design, repeated measures, trajectory analysis. Observes the same participants over multiple time points to assess change (e.G., Developmental milestones after therapy). Attrition and time-varying confounding are major challenges.

Loss to Follow-up – related terms: Attrition, dropout, censoring. Participants who discontinue study participation before outcome assessment. Can introduce bias if reasons are related to treatment or outcome. Strategies include retention plans and sensitivity analyses.

Masking – related terms: Blinding, concealment, placebo control. Process of keeping participants, investigators, or outcome assessors unaware of treatment allocation. Prevents expectation bias, especially in subjective neurologic assessments.

Medical Device Regulation (MDR) – related terms: FDA clearance, CE marking, risk classification. Legal framework governing safety and performance of devices used in pediatric neurology (e.G., Neurostimulators). Compliance required for trial initiation.

Meta-Analysis – related terms: Systematic review, pooled estimate, heterogeneity. Statistical technique that combines results from multiple studies to derive a summary effect size. In pediatric neurology, can overcome small individual sample sizes. Publication bias must be assessed.

Methodological Rigor – related terms: Internal validity, bias control, reproducibility. Degree to which study design and conduct minimize systematic errors. High rigor strengthens confidence in findings and facilitates translation to clinical practice.

MITT (Modified Intention-to-Treat) – related terms: Per-protocol, safety population, analytic set. Variant of ITT that excludes participants who never received any study medication but retains most randomized subjects. Balances purity of analysis with practical considerations.

Multicenter Trial – related terms: Site variability, central monitoring, harmonization. Study conducted across several institutions to increase sample size and generalizability. Requires standardized procedures and robust data coordination, especially when evaluating rare pediatric neurologic disorders.

Multiplicative Interaction – related terms: Effect modification, synergy, statistical interaction. Situation where the combined effect of two exposures differs from the product of their individual effects. Important when assessing combined therapies (e.G., Drug plus behavioral therapy).

Neurodevelopmental Outcome – related terms: Cognitive score, motor milestone, adaptive behavior. Measures reflecting brain development and function over time. Frequently used as primary or secondary endpoints in pediatric neurology trials. Sensitive to timing of assessment.

Neuroimaging Biomarker – related terms: MRI, diffusion tensor imaging, functional connectivity. Objective indicator derived from imaging that reflects disease state or treatment response. Validation requires correlation with clinical outcomes. High cost may limit use in large pediatric studies.

Non-Inferiority Trial – related terms: Equivalence margin, active control, superiority. Design aiming to demonstrate that a new intervention is not unacceptably worse than standard care. Appropriate when existing therapy already provides substantial benefit. Margin selection is critical.

Observational Study – related terms: Cohort, case-control, cross-sectional. Research where investigators observe outcomes without assigning interventions. Allows study of real-world practices in pediatric neurology. Susceptible to confounding and selection bias.

Open-Label Study – related terms: Unblinded, pragmatic trial, real-world evidence. Participants and investigators know the treatment being administered. Facilitates assessment of adherence and feasibility

but increases risk of bias.

Outcome Measure – related terms: Primary endpoint, secondary endpoint, surrogate marker. Specific variable used to assess the effect of an intervention (e.G., Seizure frequency). Must be reliable, valid, and clinically meaningful for children.

Over-Reporting Bias – related terms: Selective outcome reporting, publication bias, reporting standards. Tendency to publish only favorable or statistically significant results. Undermines the evidence base for pediatric neurology interventions.

Parallel-Group Design – related terms: Concurrent arms, between-subject comparison, control group. Participants are randomized to one of two or more groups that run simultaneously. Most common structure for pediatric drug trials.

Patient-Reported Outcome (PRO) – related terms: Self-assessment, questionnaire, health status. Direct report from the patient (or proxy) about health, symptoms, or quality of life. In children, proxy-report often used; age-appropriate instruments are required.

Pharmacokinetic (PK) Study – related terms: Drug absorption, clearance, dose optimization. Investigation of how the body processes a medication. Essential for dosing in children due to developmental changes in metabolism.

Pharmacodynamic (PD) Study – related terms: Dose-response, biomarker, therapeutic effect. Examines the relationship between drug concentration and its biological effect. In pediatric neurology, PD helps link plasma levels to seizure control.

Placebo Control – related terms: Inert comparator, sham intervention, blinding. Use of an inactive treatment to isolate the effect of the active intervention. Ethical considerations arise when withholding effective therapy from children.

Power Calculation – related terms: Sample size determination, effect size, Type II error. Statistical process to estimate the number of participants needed to detect a predefined difference with adequate probability (commonly 80% or 90%). Under-powering leads to inconclusive results.

Pre-specified Subgroup – related terms: Stratified analysis, interaction test, post-hoc. Subgroup defined before data inspection (e.G., Infants vs. Toddlers). Allows exploration of differential effects while controlling for multiplicity.

Pre-test/Post-test Design – related terms: Baseline assessment, outcome change, repeated measures. Participants are measured before and after an intervention to evaluate effect. Without a control group, causality is difficult to establish.

Primary Endpoint – related terms: Main outcome, hypothesis-driven, statistical power. The most important variable for evaluating study success (e.G., Reduction in seizure days). Determines sample size and regulatory focus.

Propensity Score Matching – related terms: Observational adjustment, covariate balance, causal inference. Statistical technique that pairs participants with similar probability of receiving the treatment based on observed characteristics. Reduces confounding in non-randomized pediatric studies.

Protocol Deviation – related terms: Non-compliance, violation, corrective action. Any departure from the approved study protocol, such as enrolling an ineligible participant. Must be documented and assessed for impact on data integrity.

Protocol Amendment – related terms: Revision, regulatory submission, change management. Formal modification to the original protocol (e.G., Adding an age group). Requires re-approval by ethics committees and may affect ongoing data collection.

Prospective Cohort Study – related terms: Longitudinal follow-up, exposure assessment, incidence. Participants are enrolled before outcome occurrence and followed forward in time. Allows temporal relationship assessment for risk factors in pediatric neurology.

Quality Assurance (QA) – related terms: Monitoring, audit, standard operating procedures (SOPs). Systematic activities to ensure that the trial is conducted and data are generated according to GCP. Essential for maintaining credibility of pediatric research.

Random Allocation – related terms: Randomization, sequence generation, unbiased assignment. Process of assigning participants to study arms using a chance mechanism. Prevents systematic differences between groups.

Randomized Controlled Trial (RCT) – related terms: Gold standard, experimental design, allocation concealment. Participants are randomly assigned to intervention or control, allowing causal inference. In pediatric neurology, RCTs are pivotal for establishing new therapies.

Rate Ratio – related terms: Incidence rate ratio, Poisson regression, relative risk. Comparison of event rates between two groups (e.G., Seizures per month). Useful when follow-up time varies among participants.

Recall Bias – related terms: Retrospective study, memory error, misclassification. Systematic error arising when participants incorrectly remember past exposures. Particularly problematic in case-control studies involving childhood events.

Reference Standard – related terms: Gold standard, validation, diagnostic accuracy. The best available method for determining true disease status (e.G., Video-EEG monitoring for epilepsy). Determines the accuracy of new diagnostic tests.

Regulatory Authority – related terms: FDA, EMA, MHRA. Government agency responsible for evaluating safety and efficacy of interventions. Requires submission of trial data for pediatric neurology products before market approval.

Reliability – related terms: Test-retest, inter-rater, internal consistency. Degree to which a measurement yields consistent results under unchanged conditions. Critical for neuropsychological tests used in children.

Risk-Benefit Analysis – related terms: Ethical justification, safety profile, therapeutic advantage. Systematic evaluation of potential harms versus expected benefits. Must be favorable for approval of pediatric neurology trials.

Sample Size Re-estimation – related terms: Adaptive design, interim analysis, conditional power. Process of adjusting the planned number of participants based on accumulating data. Helps ensure adequate power without excessive enrollment.

Screening Failure – related terms: Ineligible, enrollment barrier, pre-randomization drop-out. Participant who does not meet eligibility criteria after initial assessment. Common in pediatric neurology due to diagnostic complexity.

Secondary Endpoint – related terms: Exploratory outcome, ancillary measure, hypothesis-generating. Additional outcomes assessed beyond the primary endpoint (e.G., Quality of life). Often inform future research directions.

Selection Bias – related terms: Sampling error, enrollment bias, external validity. Systematic difference between those selected for the study and the target population. Can occur if recruitment favors certain demographics in pediatric neurology clinics.

Serious Adverse Event (SAE) – related terms: Life-threatening, hospitalization, death. Adverse event that results in significant medical consequences. Must be reported promptly to ethics committees and regulatory agencies.

Sham Control – related terms: Placebo, active comparator, blinding. Invasive or procedural intervention that mimics the active treatment without therapeutic effect (e.G., Mock neurostimulation). Helps preserve blinding in device trials involving children.

Single-Blind Study – related terms: Participant blinding, assessor unaware, partial masking. Only one party (usually the participant) is unaware of treatment allocation. Reduces expectation bias but does not protect against investigator bias.

Standard Deviation (SD) – related terms: Variability, dispersion, variance. Statistical measure of spread around the mean. Important for calculating sample size and interpreting effect sizes in pediatric neurology outcomes.

Standard Operating Procedure (SOP) – related terms: Process documentation, compliance, training. Written instructions detailing how specific trial activities should be performed. Ensures consistency across sites and staff.

Statistical Significance – related terms: P-value, confidence interval, null hypothesis. Indicates that observed effect is unlikely due to chance alone, given a pre-specified alpha level. Does not equate to clinical importance.

Stratified Randomization – related terms: Block randomization, minimization, balance. Random allocation performed within defined subgroups (e.G., Age bands) to ensure even distribution across treatment arms.

Subgroup Analysis – related terms: Interaction test, exploratory, multiplicity. Examination of treatment effects within specific participant categories (e.G., Gender, disease severity). Requires caution to avoid false positive findings.

Surrogate Endpoint – related terms: Biomarker, intermediate outcome, validation. Substitute measure that predicts clinical benefit (e.G., EEG normalization). Must be rigorously validated for pediatric neurology before regulatory acceptance.

Sensitivity Analysis – related terms: Robustness check, alternate assumptions, scenario testing. Evaluates how results change under different methodological choices (e.G., Handling of missing data). Enhances confidence in findings.

Sample Bias – related terms: Convenience sampling, selection bias, representativeness. Systematic error introduced when the sample does not reflect the target population. Can arise when recruiting from specialized tertiary centers.

Safety Monitoring Plan – related terms: Adverse event reporting, DSMB charter, stopping rules. Document outlining procedures for detecting, evaluating, and responding to safety signals throughout the trial.

Standard Error (SE) – related terms: Precision, confidence interval, variability. Estimate of the variability of a sample statistic (e.G., Mean). Smaller SE indicates more precise estimate of the population parameter.

Statistical Power – related terms: Type II error, beta, sample size. Probability of detecting a true effect when it exists. High power reduces risk of false negative conclusions in pediatric neurology trials.

Study Attrition – related terms: Dropout, loss to follow-up, missing data. Participants who discontinue before study completion. May bias results if attrition is related to treatment or outcome.

Study Protocol – related terms: Trial design, SOPs, amendments. Comprehensive document describing objectives, methodology, statistical plan, and operational details. Serves as the blueprint for conduct.

Survival Analysis – related terms: Time-to-event, censoring, hazard ratio. Statistical methods for analyzing the time until occurrence of an event (e.G., First seizure). Kaplan-Meier curves and Cox proportional hazards models are common tools.

Synthetic Control Arm – related terms: External control, real-world data, historical comparator. Use of previously collected data to serve as a control group when randomization is impractical. Requires careful matching to ensure comparability.

Target Population – related terms: Study sample, eligibility, generalizability. Specific group of individuals the research intends to inform (e.G., Children 5-12 years with refractory epilepsy). Defining this guides inclusion criteria and recruitment strategies.

Therapeutic Index – related terms: Safety margin, dose-response, toxicity. Ratio of a drug's toxic dose to its effective dose. Critical for dosing decisions in children whose metabolism differs from adults.

Time-Series Analysis – related terms: Longitudinal data, autocorrelation, trend analysis. Statistical techniques for evaluating data points collected sequentially over time (e.G., Weekly seizure counts). Allows detection of patterns and intervention effects.

Titration Protocol – related terms: Dose escalation, therapeutic window, safety monitoring. Planned schedule for gradually increasing drug dose to achieve optimal effect while monitoring adverse reactions. Important in pediatric neurology where tolerance varies.

Trial Registration – related terms: ClinicalTrials.Gov, WHO ICTRP, transparency. Public listing of trial details before enrollment begins. Enhances accountability and reduces selective reporting.

Type I Error – related terms: False positive, alpha level, significance. Incorrectly rejecting the null hypothesis when it is true. Conventional threshold is 0.05, But adjustments may be needed for multiple comparisons.

Type II Error – related terms: False negative, beta, power. Failing to detect a true effect. Reducing this error requires adequate sample size and appropriate statistical methods.

Unblinded Outcome Assessment – related terms: Assessor bias, detection bias, open-label evaluation. When the evaluator knows the treatment allocation, subjective outcomes may be influenced. Mitigation includes using objective measures or independent adjudication.

Validation Cohort – related terms: External validation, replication, test set. Independent group of participants used to confirm findings derived from the primary dataset. Strengthens generalizability of biomarkers in pediatric neurology.

Variable – related terms: Independent variable, dependent variable, covariate. Element that can change or be measured in a study. Clear definition prevents confusion in analysis.

Vaccine-Induced Neurologic Event – related terms: Post-vaccination syndrome, adverse reaction, immunogenicity. Rare neurologic complications following immunization (e.G., Febrile seizures). Requires rigorous case definition and causality assessment.

Weighted Analysis – related terms: Propensity weighting, survey design, adjustment. Statistical technique assigning different weights to observations to correct for unequal probabilities of selection or to balance covariates.

Withdrawal Criteria – related terms: Discontinuation, safety exit, protocol deviation. Pre-specified conditions under which a participant may be removed from the study (e.G., Severe adverse event). Must be documented and reported.

Zero-Inflated Model – related terms: Count data, excess zeros, Poisson regression. Statistical approach for outcomes with many zero counts (e.G., Number of seizures in a month). Improves model fit and inference.