

# METHODOLOGICAL LANGUAGE - Part 1

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## SUMMARY

The position of our country within international scenario has been increasing and Brazilian medicine follows this development. For this, it is our responsibility as human sciences professionals the adoption of modern principles ruling the preparation and publication of scientific papers and, among those principles, quality methodological criteria must be complied with. With this purpose, this inter-department and inter-disciplinary group of the Medical College of the University of São Paulo presents to *Acta Ortopédica Brasileira* a glossary of the terms that are frequently used in scientific methodology and related areas, such as epidemiology, statistics, and library sciences, added by some names and abbreviations of enti-

ties referred to on research programs. This combination of words, titles and abbreviations shall be of a great help to those who, by knowing them, shall be closer to the scientific community, enabled by the co-living, participation, discussion and engagement, which shall lead to a better understanding and shall target the improvement of their projects and publications.

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**Keywords:** Glossary; Controlled Vocabulary; Methodology

1. **ABNT:** Brazilian Association of Technical Rules. National Normalization Forum, recognized as a Public Expediency entity, Law # 4150, of November 1962.
2. **Acceptance error:** the same as type-I or alpha error.
3. **Accuracy:** when a measurement or procedures representing the true value of a studied phenomenon.
4. **Alternative hypothesis:** a hypothesis that will be considered as acceptable if the null hypothesis is rejected; this is the hypothesis opposing the nullity one, in the sense of stating a difference among the groups object to study.
5. **Analogy evidence:** is the one achieved by analogy, such as that comparing similar knowledge whose fact is proven in one, but unknown in the other, such as the effective evidence of a known drug in a known disease and a similar nature drug for a similar disease in similar specie.
6. **Analytical study:** the one in which the researcher uses the probability theory; this is a comparative study.
7. **Applicability:** degree in which the results of an observation, study or review are true in other environments.
8. **Assay:** in literature, means a creative text about any subject or that the author presents a personal view and adopts a thought approach.
9. **Average life expectation:** the average lifetime of a population, expected for a given future moment.
10. **Basic area** is the general domain of the knowledge to which the activities of the Post Graduation Program refer, exactly as described in CAPES Database. It characterizes the domain of the knowledge that is a reference to its activities.
11. **Bioethics:** systematic study of the moral dimensions of life sciences and healthcare using a variety of ethical methodologies in an interdisciplinary concept.
12. **Biological gradient:** is one of the items from Hill's eight principles – if exposure increases, so will increase the risk of a disease.
13. **BIREME:** Latin-American and Caribbean Center for Health Sciences Information. The abbreviation stands for Biblioteca Regional de Medicina (Regional Medicine Library).

14. **Blind:** masked; the investigator is aware of the therapy being administered to a subject, but the subject is unaware of what he/she is receiving.
15. **BVS:** Health Virtual Library.
16. **CAPES:** Coordination for the Improvement of University-Level Professionals, bonded to the Ministry of Education. It regulates and certifies all Post-Graduation Courses in the country.
17. **Case control study:** is a study beginning with the identification of individuals carrying the disease or endpoint of interest (cases) and an appropriate group without the disease or endpoint. The relationship between a characteristic (intervention, exposure, or risk factor) with the endpoint of interest is examined by comparing the frequency or level of the characteristic in cases and controls. Many times, those studies are described as retrospective because they always pursue something that occurred in the past.
18. **Casualized:** the same as randomized.
19. **Casualty:** unpredictable, uncertain event. Its occurrence is not related to specific characteristics.
20. **CD - ROM:** medium for data storage in a CD.
21. **CEP:** Committee on Ethics in Research.
22. **Chances:** determined by casualty and not by other factors. Opposite to determinism.
23. **Check-list:** evaluation spreadsheet containing questions that, when answered, aim to evaluate the quality of a scientific study.
24. **Clinical Trial:** is a scientific study of which design is made so as to test the effects of a drug or therapy in order to determine its effectiveness or safety; always include human beings.
25. **CNPq:** National Council for Scientific Development.
26. **Cochrane Library:** database set, published in CD-ROM and in the Internet, updated at each four months. It is the most reliable evidence information source about the effects of health interventions; it contains an updated information sources set about Evidence-Based Medicine, including the Cochrane's Systematic Review Database. <http://www.cochrane.bireme.br>
27. **Cognition:** knowledge acquisition.

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- 28. Cohort study:** those are observational studies, usually prospective, with two or more groups, all without the disease at the beginning of the study, being a group exposed to a factor, but not the other. The groups are observed during a variable period of time, depending on the characteristics of the disease under study, and, at the end, it enables the calculation of the risk of developing a disease due to exposure.
- 29. Conclusions:** a section in a scientific study based on the results, containing logical inferences and corresponding in an equal or superior number to the proposed objectives, usually presented with statistical reliance.
- 30. CONEP/MS:** National Committee on Ethics in Research, from the Ministry of Health: bonded to National Health Council, it is responsible for examining and authorizing, based on ethical aspects, any research on genetics and human reproduction involving new drugs, vaccines, diagnostic tests, equipment, inputs, and health-related devices.
- 31. Conference:** speech delivered by a single speaker, usually a well-recognized professional in the area or within a given social-cultural context; that speech is not always followed by debates, being limited to the communication of one's ideas.
- 32. Conglomerate sample:** a process where the initial unit to be selected is a conglomerate of elements (people). For example, a sample of 40 patients in a clinic with 400 patients can be selected from 4 different offices, in a total of ten, meaning 4 conglomerates of patients. Then (in our example), the patients from those 4 offices are selected (sample elements).
- 33. Consistence:** in epidemiology, a term expressing similarity of the results achieved in different kinds of studies, populations and circumstances evaluating the relationship between the same variables.
- 34. Control group:** study subjects not receiving treatment or therapy.
- 35. Control:** in clinical trials comparing two or more interventions, a control is an individual in a comparator group receiving placebo, no intervention, standard treatment or other kind of treatment.
- 36. Controlled clinical trial** is an experiment in which investigators randomly assign subjects to a therapy group and also to a control or placebo group.
- 37. Convenience sample:** a non-probabilistic sample, methodologically defined as the one in which there is an intentional selection of respondents.
- 38. Correlation coefficient:** quantifies the degree in which two random variables are related to each other, provided the relation is linear.
- 39. Correlation:** consists of the combination of two quantitative variables, of which variations play a role. It does not judge if one is the cause or the result of the other. Both variables can increase values in parallel (positive correlation) or in contrary (negative correlation).
- 40. Cost-benefit analysis:** an economical analysis converting effects into the same money patterns, such as costs, and comparing them. Today, the social benefit is included in the costs.
- 41. Cost-benefit study:** those analyzing a procedure against its economical and especially social costs.
- 42. Cost-effectiveness study:** it converts effects into health terms and calculates costs for any additional gain.
- 43. Cost-effectiveness:** it measures the cost of a procedure compared to its endpoint.
- 44. Cost-usefulness:** it converts health effects within personal preferences and describes the cost for some additional quality gain.
- 45. CPE:** Epidemiological Research Center.
- 46. Credibility:** of a trial, according to the Aristotelian principle, is the term used when conclusions are based and substantiated by data.
- 47. Critical evaluation:** process of evaluation and interpretation of clinical researches' results by a systematic evaluation of validity, results importance and applicability.
- 48. Cross-over study:** the administration of the same therapy one after the other, in a specific or randomized order, to the same group of patients.
- 49. Cross-section epidemiological study:** data collection made in a population group in a given moment. (a sample of smokers in a population, to know the incidence of lung cancer).
- 50. Cross-section study:** in cross-section studies, the risk factor and the clinical endpoint are verified at the same time, allowing to portrait the situation. It rarely enables conclusions about cause relationships.
- 51. Database:** set of organized information representing a given performed work.
- 52. Debate:** discussion among two or more people about a given topic.
- 53. Dedalus:** references database of the SIBI / USP – Libraries System of the University of São Paulo.
- 54. Delineation:** of a study is the general structure of how an investigator arranges a scientific research.
- 55. Delivery:** when a certain theme is presented.
- 56. Descriptive statistics:** a part of statistics of which objective is the collection, organization, classification of sample or populations' data, graphic representation, and the calculation of some measurements.
- 57. Descriptive study:** is the one reporting the distribution of diseases according to variables of interest, such as gender, age etc.
- 58. Development Agencies:** governmental bodies or private entities financing scientific researches.
- 59. Dialogue:** to dialogue refers to talking and listening with attention. Dialogue is an essential part of every debate.
- 60. Disciplines:** disciplines in the curriculum structure, developing a topic of a researcher formation or subject related to some research line, according to CAPES definition.
- 61. Discourse, to:** To give an opinion, to defend an idea.
- 62. Discrepancy:** is a value of results diverting from the average. It can be positive or negative.
- 63. Discussion:** section of a scientific article where research results are analyzed, interpreted, criticized and compared to those existent ones about the matter in a mentioned literature.
- 64. Dispersion diagram:** a way to deploy two variables of a population (x and y, representing PE, weight and height) as a graph or table.
- 65. Dispersion:** the way by which data are positioned around a central point.
- 66. Double-blind:** kind of evaluation in a scientific study in which neither the participants (subjects) nor the investigators checking the endpoints know which therapy each participant was submitted to.
- 67. Ecological study:** is a research based on data from a population in a given moment for investigating the relationship of an exposure in order to know or assume a risk factor to a specific result.
- 68. Effectiveness:** evaluates if an intervention works in usual conditions, that is, on a day-by-day basis.
- 69. Efficacy:** evaluates to which extent a specific intervention works in optimal conditions.
- 70. Efficiency:** evaluates of an intervention works in usual conditions, taking costs and risks into consideration.
- 71. EMBASE - EXCERPTA MÉDICA:** this is a broad and updated references database of the pharmacological and biomedical literature comprising 3,500 journals from 110 countries; established in Europe.
- 72. Empirical evidence:** knowledge achieved through experience or intuition.
- 73. Empirical:** empirical results are based on the experience instead of being based on results or other real data.
- 74. Endpoints:** indicators of clinical and functional status of patients, after applying a therapy.
- 75. Epidemiology:** the study of health-related status or events distribution and determinants in specific populations and its applicability for the control and prevention of health problems.
- 76. Epigraph:** sentence introducing a section.
- 77. Epistemology, constructive engagement:** is the critical view of history, logics, genetics, culture, sciences, philosophy and religion, and the relationship of all these values with humanity (Grimm 09/10/99). Critical reasoning about the Universe.
- 78. Epistemology:** episten (Greek) = knowledge, and; logia = study. It is the study of basic knowledge to know how people get to know what they know. In a general sense, it refers to all kinds of knowledge and to the act of knowing. Sometimes, the term is applied only for

some knowledge acquired by scientific means (Johnson). In Germany and Italy it is also called Knowledge Theory and, by some authors, as Sciences Philosophy. The purpose of epistemology is to distinguish authentic sciences from pseudosciences; the deep investigation from the superficial one, the search for the truth.

**79. Essay:** the exposition about some theme or idea defending against or in favor with the objective of making it recognized or accepted.

**80. Event:** the basic element to which probability can be applied; it is the result of an observation or experiment, or the description of a potential result.

**81. Evidence:** the trend supporting a fact; depending on how evidence is achieved, its graduation varies: strong/ weak.

**82. Experimental evidence:** terminology used for proving that this combination was shown by means of intervention study – clinical trial; this is one of Hill's eight principles.

**83. Experimental study:** those studies performed on laboratory animals or specimens, the majority of which with a comparative study and a control group, some randomized.

**84. Expose:** to narrate, present details of a story or to describe a situation.

**85. FAPESP:** São Paulo State's Research Support Foundation. It is bonded to the Department of Sciences, Technology, Economical Development and Tourism.

**86. FINEP:** Studies and Projects Financier of the Ministry of Sciences and Technology.

**87. Focus area:** Restrict specialization domain in which healthcare professionals work.

**88. FUNDAP:** Administrative Development Foundation, bonded to São Paulo State's Civil House.

**89. Genotype:** set of all genes of a person.

**90. Geriatrics:** medical specialty addressing the health of the elderly.

**91. Gerontology:** Science addressing the problems of the elderly, under all aspects: biological, clinical, historical, economical, and social.

**92. Glossary:** vocabulary included as an appendix in a study, especially for clarifying the meaning of some words.

**93. Guidelines:** instructions that must be followed when dealing with and evaluating patients with specific clinical conditions.

**94. Hierarchic structure:** enables the research in broader or more specific terms or all terms belonging to a same hierarchic structure.

**95. History control:** the group of patients that served as comparators, and was addressed before the experimental group.

**96. Impact factor:** this is defined as the number of times in which Journals articles are mentioned during a specific period (numerator), divided by the total number of articles published by the same Journal within the same period.

**97. Incidence study:** is the one studying the number of new cases within a period of time in a population during the same period.

**98. Inclusion and exclusion criteria:** characteristics of the individuals to be enrolled in a research determining who can be included and who cannot.

**99. Inference:** what results from reasoning based on a general hypothesis to predict a specific circumstance (from general to specific).

**100. Informed consent:** the formal agreement provided by a subject in a research, after being informed about the objective, methods that will be employed, for how long he/she will be followed up, expected benefits and everything related to a participating individual in terms of risks that may arise as a result of his/her participation, as well as researchers' liabilities. Consent is free for the participant, who is allowed to dropout research at any moment, without penalties.

**101. Intervention study:** the same as clinical trial.

**102. It is about a relationship proposed between two variables or factors, which incorporates one correlating to one therefore as an expected consequence.**

**103. Keywords:** term used by the U.S. National Medicine Library to index articles at the Index Medicus and MEDLINE; unique language for Indexation and Retrieval of the information on Latin-American and Caribbean System of information in health sciences.

**104. Learning authors:** students of a course or post-graduation program, authors of thesis or manuscripts or other kind of intellectual work, according to the concepts by CAPES.

**105. Learning body:** students of a course or graduation or post-graduation program registered in a school year.

**106. Life expectation:** it studies the survival time for an individual at certain age, which may or may not correspond to an event, e.g. hip fracture.

**107. Life philosophy:** concept about the world that supports an individual's usual day-by-day behavior.

**108. Linear correlation:** a distribution trend, in line, of data from two variables when disposed in a dispersion diagram.

**109. Mastership essay:** the communication of the results of a research and reflection, discussing a similarly unique and specific theme.

**110. Meeting:** smaller than a Congress, but broader than a simple meeting.

**111. Multiple analysis:** an analysis where the effect of many variables (independent) are considered against one variable (dependent).

**112. Negative control:** the group used as a comparator, receiving only placebo.

**113. Negative study:** used for describing studies of which results are not statistically significant.

**114. Non-probabilistic sample:** is the one where the likelihood of each element (individual) among a population to be chosen is unknown. It is very difficult to select a representative sample in a non-probabilistic sample.

**115. Null hypothesis:** hypothesis challenged in a hypothesis test. It usually indicates an equality to be contradicted.

**116. Nullity hypothesis:** determines if two or more population samples do not differ from each other; determines that the results observed in a study are not different from what happens by chance.

**117. Observational analytical study:** the one in which there is no researcher bias.

**118. Paired sample:** random subgroups of a population in which a variable under study is measured before and after the procedure; e.g., pulse before and after stress.

**119. Phase-I study:** the first stage when testing a new drug in humans, usually performed in healthy volunteers, without comparison groups.

**120. Phase-II study:** second stage when testing a new drug in humans: those are randomized, controlled clinical trials.

**121. Phase-III study:** third stage when testing a new drug in humans: a thorough evaluation of the treatment; once a drug is shown to be reasonably effective, it is essential to compare it to standard treatments in force for the same conditions.

**122. Phase-IV study:** is concerned about post-marketing surveillance; these are promotional exercises of limited value.

**123. Phenotype:** an individual's characteristics resulting from genetic products.

**124. Placebo effect:** a favorable response to a therapy, regardless of being real or a placebo; it can be attributed to an expected effect, i.e., suggestion power.

**125. Positive control:** the group used as comparator, receiving conventional treatment – gold standard.

**126. Positive study:** term used for describing studies of which results indicate a beneficial effect of the therapy under study.

**127. Power of association:** is the magnitude of the association between exposure factors and the disease, and the frequency in which such event may happen.

**128. Prevalence study:** is the one calculating the number of individuals with the disease within a given group. This is the basis for any kind of study on public health.

**129. Primary analysis:** the original analysis of obtained data.

**130. Primary study:** original research.

**131. Probabilistic sample:** the one where the likelihood of each element (person) of the population to be selected for sample is known and other than zero. There are many kinds, and, in the case of simple casual sample, the probability of the same for all elements in the population.

**132. Prognostic factor:** refers to the possibility of occurring one or more endpoints related to the disease and the frequency in which this event may happen.

**133. Prospective study:** the one designed for the analysis of future events. These studies may be structured within strict rules and scientific qualities. On the other hand, it is based on issues emerging from daily practice, eventual perception of a problem, or from previous retrospective studies. In prospective studies, the individuals are followed-up from cause to effect. They usually incorporate protocols and pilot studies, have a control group and may be not randomized.

**134. Randomized study:** the one performed with two groups, using a diverse technique or therapy or a group compared to placebo group whose "n" are randomly selected, so that it is impossible to know which is next (e.g., heads or tails). Almost Randomized trials are called as such when it is possible to know which will be the next, e.g. even/ odd days. The evaluation of the randomized studies is usually performed: Blind, when only the study subjects are not aware of therapy, Double-Blind, when additionally to the subject, the researcher is not aware of the therapy as well, and Triple-Blind, when additionally to those, the individuals analyzing the results are also unaware about the therapy for that individual subject.

**135. Recommendation degrees:** recommended reading in a scientific paper in order to help on making a decision, and is expressed by letters: A (when there are strong evidences recommending it), B (evidence exists, but not definitive) and C (when there are strong evidences for contraindicating what the paper recommends)

**136. References:** Section where references of information sources used in that paper.

**137. Regression analysis:** it predicts values for y, a dependent variable, related to x values, an independent variable, using regression mathematics.

**138. Rejection error:** the same as type-II or beta error.

**139. Reliability:** consists on the degree in which repeated measurements of a feature are in agreement. Synonym: reproducibility.

**140. Résumé:** is a list of all moments of the academic-professional life of an individual, arranged and documented based on objective and briefly described information.

**141. Retrospective study:** These are based on facts that already exist. The individuals are followed up from effect to cause. These are kinds of studies that usually present a higher number of trends than prospective studies, since structuring depends on quantitative and qualitative data, sometimes irregular, and does not depend on the investigator.

**142. Risk factor:** an aspect in an individual's condition, lifestyle, or environment that may increase the likelihood of a disease occurrence; these are the characteristics of the patient combined with the development of a disease. Example: Smoking is a RF for cancer.

**143. Sample:** a subgroup of elements (individuals in a clinic) coming from a larger group (population). The study in a sample is intended to acquire information about that population's characteristics; when the sample is representative, this knowledge is favored.

**144. Sampling:** the process to obtain a sample of a population. Please, refer to the definition of 'population'.

**145. Scientific Experiment:** a procedure used for testing hypothesis, accept them or reject them. The interpretation of its results eliminates doubts and allows for the reproduction of the whole process.

**146. Scientific hypothesis:** a temporary conjuncture about something's function or status, which is intended to be proven by scientific evidence.

**147. Secondary analysis:** a new analysis made with the same objective but with a different technique or with the purpose of answering to new questions, using the same data.

**148. Secondary data:** the already existing ones, because they have been collected for purposes other than the research in mind.

**149. Secret Allocations or Secrecy of Allocation:** a process used for preventing advanced disclosure of groups formation, in a randomized comparative study.

**150. Sensitiveness analysis:** an analysis used for determining the sensitiveness of the results in a study when the way in which it was performed is changed; used for evaluating the degree of reliability of the results in uncertain decisions.

**151. Simple casual sample:** a sample in which all elements or individuals of the population have the same chance or likelihood of belonging to the sample.

**152. Specificity:** proportion of people having a negative test and not having the disease; it is the proportion of people without the disease not having a positive test or the presence of a risk factor.

**153. Standard Deviation:** a way to represent data dispersion around the average (more or less); it represents fractions of the included population and is equal to the variance square root.

**154. Standard error of average:** Standard deviation of the averages in a sample.

**155. Standard score:** the same as Z score.

**156. Statistical reliability:** estimated probability of an effect being superior or similar to what is seen in a study, by chance; it is usually represented by a P value.

**157. Statistically significant:** makes us understand that the null hypothesis has been rejected, that is, a large difference or larger than the achieved one; presents a low probability of happening by chance.

**158. Statistician:** an individual working with statistics or a person qualified to perform a statistical analysis.

**159. Statistics:** this is the science that collects, summarizes, presents and interpret information (quantitative data), using, for this, hypothesis tests whenever applicable.

**160. Stratified sample:** population sample in which the population was divided into homogenous subgroups, representing a stratum (social, cultural, of income etc.); it requires previous knowledge about the population that shall be divided into strata, with different characteristics.

**161. Study Design:** is the employed methodology.

**162. Survival analysis:** statistical procedure used for estimating survival rates (prognosis) of a population under study.

**163. Survival curve:** a curve representing the population corresponding to a given age.

**164. Systematic error:** in epidemiology, means a repeating error in all evaluations.

**165. Systematic sample:** here, selection is eventual, but defined by a known criterion, e.g., every 10th person on a list.

**166. Thematic area:** a broad and unlimited domain area of knowledge, such as medicine, physiotherapy, physics etc.

**167. Two-phase sample:** a sample taken from a random sample, e.g., the conglomerate sample is taken, and, within it, a sample of study units is taken.

**168. Type-I error:** or alpha-type, statistics, occurs when a difference is shown but it indeed does not exist; this is the false-positive; also called acceptance error; occurs in small samples and when a number of analyses are present; the smaller the samples, the greater the chance to be different; those differences would be diluted in a larger sample. Many analyses occur when various subgroups are compared to each other. An error always occurs, therefore 5% of type-I errors are accepted; this occurs when a researcher rejects a true hypothesis (false-positive).

**169. Type-II error:** or beta-type, in statistics, occurs when a difference is not shown but exists; this is the false-negative; also called rejection error; they occur as a result of small samples (main cause) and of large variability; those two factors mitigate mathematical chances of statistic significance to be shown. An error always occur, therefore 10-20% of this type-II error are accepted; it occurs when a researcher does not reject a false hypothesis (false-negative).

**170. Variation range:** the difference between two extreme values in the distribution of a variable.

**171. Z score:** it measures the extent to which a given result diverts from average in standard deviation units. If diverted to two SD, the Z score = 2 SD.