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Definition of population and randomization of sample in clinic surveys

Definição da população e randomização da amostra em estudos clínicos

The first step for design a scientific study is to raise doubts which at that moment could not be solved with the information available in literature (a gap in knowledge). In clinic surveys, one should expect that the response to that doubt is to contribute to improve medical practice. The following step is to determine what population will be investigated. For example, when evaluating the efficacy of an intraocular lens (IOL) with yellow pigmentation in the prevention of macular degeneration related to age (ARMD), the population to be studied would be made up by patients operated by cataract, who received the implant of that IOL in one or more specific zones in a certain time [1-3].

In case the results may be considered different for patients under 50 years of age (less probability of developing AMD) and those over 70 years of age (more probability of developing ARMD), in order to increase the significance of data, one can restrict the population only for patients over 70 years of age. That is how one can state what and who will be studied in the research.

It is not mandatory that the population of the study be representative of sphere of the query to be evaluated. For instance, the patients submitted to cataract surgery and who received the yellow IOL implant in the Clinic Hospital of the University of São Paulo (HCFMUSP) are not representative in the world of all the patients who underwent IOL cataract surgery. Nevertheless, the evolution of those patients may not be very different from the others, so that the results of the research are also valid for patients of other areas (extrapolation of the conclusions).

In case constitutional (fair eye) or environmental (exposure to the sun) factors are considered important and influence the results, the study thus has to be done again by other research groups in other situations. So, the reader will have to appraise the articles in which the studied population is similar to real life.

The study of a population may valuate all of their elements or only part of it. In the sample, analysis is performed based on a portion (representative) the body of people. In the case of the yellow IOL, if it is unfeasible to examine all the patients who were operated by cataract and who received the yellow IOL in HCFMUSP (population), one can choose a sample of subjects that stands for that body of people. One must know that the only way of guarantee the importance of that sample is by means of random selection, so each element of that body of people has exactly the same probability of being selected. The ideal would be that selection be masked, in order not to be have the researcher influence the study.

Randomization is a process of selection in which each patient has the same probability of being drafted, so he can make up the sample or can be set in one of the study groups. In a non-randomized study, the researchers could allocate the better patients of the sample in the intervention group (those who live closer, who are more cooperative and who have the better prognosis), even involuntarily. Nonetheless, this fact could jeopardize the validity of the results.

The randomization contributes for the homogeneity of the characteristics of the sample related to sex, age and other prognostic elements. In general, in case-control studies, the first Table of results shows the characteristics of both study groups, emphasizing their homogeneity. The similarity among groups is a guarantee for the reader, so the subjects of both groups should have similar characteristics and the intervention should be the only divergent variable to be studied.

In a prospective study, in the case of a population of individuals who had yellow IOL surgery, one can randomize the sample when drafting some individuals for follow-up. In a retrospective study, past some years of surgery, one can draft the subjects who will be called or who will have their hand books evaluated. In a controlled randomized study, where we will have the study group and the control group, from all the patients eligible to participate in the research (referred for cataract surgery), one will draft the subjects who will be part of the study group (yellow IOL) and the subjects who will be part of the control group (transparent IOL). In randomization, it is crucial to have all the individuals of the population with the same chance of being selected for the sample and of being allocated in each of the studied groups. Any error during the process of sampling is considered bias of selection (methodological error) and may

affect the results. So, for example, if the researcher tends to allocate younger patients in the study group, it may occur methodical bias in the results, because the younger patients may have a lower incidence of ARMD. The data of this research may diverge from other similar studies and the team will lose credibility.

In randomized selected samples of a population, one can measure the precision of the results of the study, when calculating the trust interval (TI), which indicates the precision in which the value of the percentage of each studied variable corresponds to the real value of the percentage of the population and the value 'p' (level of significance) reflects the chance of results being due to the intervention or randomization.

We know that not all the randomized patients, in order to make up the sample, will get to the end of the study, and it may occur cases of loss of follow-up or occurrence of adverse event during follow-up. The rule is that all randomized and selected individuals in order to take part in the study have to be included in the analysis of the results. The number (n) of subjects participating in the research could never drop during the study. Any case of loss of follow-up or interruption of treatment has always to be considered, even if analyzed separately. Losses of follow-up greater than 10% of the sample or asymmetric losses for both study groups may jeopardize the validity of the results (bias of exclusion). For example, in the case of the evaluation of the efficacy of the IOLs, a loss of a much significant follow-up in the yellow IOL group could explain the fact that those individuals of the group got so satisfied that they did not have to come back to the study- this would mask the data, once the best results could not be analyzed.

Thus, sampling is a statistical technique that means to extract a portion (sample) from the whole (population), with the objective of evaluating certain characteristics of that population. The validity of the study is directly linked to randomization, to the size of the sample, to the indicators of precision of the data (IC and "p") and to the magnitude of loss of follow-up. It is important that the readers analyze the items above, so they could evaluate the possibility of extrapolation of the results of the sample for the population of the survey and evaluate if the conditions of the study, the characteristics and the prognostic elements of that population are similar to their real life. One should consider, in this case, the extrapolation of the conclusions of the article for his patients or for his own research[4-5]. We know that those questions are part of the essence of the critical analysis of literature.

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