

The Use of Statistics and Probability in Nursing

Statistics and probability are widely used in nursing. However, nurses call them risk assessment and quality improvement. Thus, specialists working in health care read and do research as well as design evidence-based protocols with exact following of statistical guidelines. To do all this, nurses must have at least minimal understanding of statistics. The aim of this paper is to study how exactly statistics and probability are applied in nursing.

One of the most dramatic stories that demonstrates the importance of using statistics to improve nursing care happened to nurse Florence Nightingale. In the 1800s, this woman collected and analyzed mortality rates of British militaries during peaceful times and then compared the data with mortality rates of civilians. According to her research, soldiers twice as likely to die as the result of injuries and diseases. Moreover, Florence Nightingale concluded that mortality rates of soldiers at the peacetime were almost at the same level as the mortality rates of soldiers fighting in the Crimean war that took place in the territory of Turkey. She used this information and her statistical analysis to demand alterations in public health policy. Florence Nightingale became famous for collecting evidence to protect the science that deals with health care (Lim, 2010). This story became an example for other nurses to follow and integrate statistics into good nursing practice.

Forms of Statistics Used in Nursing

As for modern times, the use of statistics and probability has been increasing, especially over the last ten years (French, 2002). Furthermore, application this kind of evidence has become the standard for decision making in the sphere of healthcare (Giuliano & Polanowicz, 2008). As for the forms of statistics used in nursing, researchers prefer descriptive and inferential ones. Thus, descriptive statistics is primary efficient at evaluating general tendency and variance. For instance, it is used when the average age, weight or body temperature is presented for a group of people (Giuliano & Polanowicz, 2008).

In other words, descriptive statistics is applied to describe a study sample. In contrast, inferential statistics uses the data gathered from the study sample to draw conclusions regarding more significant group of people. Inferential statistics make it possible for clinicians to design predictions about a certain group of population from the data received from a sample of that population (Giuliano & Polanowicz, 2008).

Typical Statistical Techniques

The significant number of study questions in nursing deals with identifying whether there is any dissimilarity between a group of variables or groups on a certain variable and whether that dissimilarity is random. Prior to choosing the most efficient method for a research, several aspects about the information and individual variables must be observed. First, it is necessary to determine whether the variable is categorical or continuous. If the variable is categorical, chi-square test is usually used. It assesses statistically prominent dissimilarities between periodicities or proportions for two or more groups. This test contrasts the actual periodicity with the expected periodicity of each variable evaluated in each group. For instance, during the research of patients with sepsis, there were two important variables such as “gender (male or female) and survival to hospital discharge (yes or no)” (Giuliano & Polanowicz, 2008). The chi-square test was conducted to identify whether these variables were remarkably different in the groups of patients with sepsis and without it.

If continuous variables are observed, the researcher needs to identify whether these variables have normal distribution. To evaluate this, the Fisher measure of skewness is applied. The distribution is normal if 95% of values for variables do not exceed ± 1.96 SDs. If values for variables exceed this rate, then the distribution is skewed (Giuliano & Polanowicz, 2008).

If it is determined that variables do not have normal distribution, the researcher needs to develop a nonparametric statistical test. It allows to understand whether group dissimilarities had statistical significance. Besides, nonparametric statistical tests are conducted if researchers want to give an interpretation of skewed data gathered from a sample. There are such nonparametric

statistical tests as the Cochran Q test, the Mann-Whitney U test, the chi-square test, and the Wilcoxon rank-sum test (Giuliano & Polanowicz, 2008). At the same time, parametric statistical tests presuppose that variables of the research are continuous, have normal distribution and possess variance on the same level. The most significant difference between two kinds of statistical tests is that nonparametric tests are not conducted for evaluating population parameters. As for examples of parametric statistical tests, researchers often choose such tests as Pearson correlation, ANOVA, and simple linear and nonlinear regressions (Giuliano & Polanowicz, 2008).

Studying of Variance

Another important aspect is the evaluation of the difference between independent and dependent variables. Independent variables are intentionally changed (e.g. medication vs placebo, common diet vs dietary changes) to gain the necessary outcome, particularly blood pressure. Dependent variables are variables that change in reply to various independent variables. They can also be named outcome variables. For instance, if the researcher wants to determine whether ACE inhibitor or placebo for high pressure leads to alterations in blood pressure measures (dependent variable is blood pressure whereas the independent variable is treatment options (ACE inhibitor or placebo), then the independent variable is a categorical variable and the dependent variable is a continuous variable (Giuliano & Polanowicz, 2008).

Regression

Regression is applied when the researcher wants to assess the connections between the dependable variable and particular independent variables. During the analysis, the level of relations between these variables is used to design a regression equation. Regression equation is effective for making predictions. The following statistical technique is especially useful in nursing because it allows to interpret interrelationships between a range of variables. For instance, the method can be applied to a study that analyzes the impacts of three growing dosing regimens (continuous variable) of two various kinds of medications or a placebo (categorical

variable) aimed to reduce blood pressure or placebo on measures of blood pressure (continuous variable) after giving three various medications in three different doses. In this case, the independent variables are various doses of two blood pressure medications or a placebo. The dependent variable is blood pressure readings.

Conclusion

In conclusion, statistics and probability are widely used in nursing. The first case of effective applying statistical data to healthcare was found in the 1880s when a nurse offered making changes in nursing after analyzing mortality rates of civilians and soldiers. As for modern times, the popularity of statistics and probability has been increasing. The most widespread forms of statistics in nursing are descriptive and inferential. In fact, both forms are very connected because descriptive statistics is used for describing a study sample, whereas inferential statistics draws conclusions about specific population on the basis of data collected from the study sample. There are different kinds of statistical tests that can be conducted in nursing. Usually, they can be divided into parametric and nonparametric. The choice of test depends on the distribution variables, particularly whether it is normal or skewed. One of the most effective statistical techniques for nursing research is regression because it allows to interpret interrelations between groups of variables.