

ROLE OF BIOSTATISTICS IN HOSPITALS

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Abstract:

Biostatistics is the term used when the tools of statistics are applied to the data that is derived from biological sciences such as medical field. We need to use biostatistics discriminately. It is a very powerful tool in the hands of a skilled person. This article attempts to describe biostatistics and makes an effort to apply it to hospitals through a case study.

Keywords/Key Phrases: Biostatistics Hospital Medical Records

1. Introduction

"He who accepts indiscriminately will often be duped unnecessarily. But he who distrusts statistics indiscriminately will often be ignorant".

Medical statistics goes under different names when applied to different fields in Medicine. It is called Health statistics when applied to public health or community health. It is called Medical statistics when related to study of defect, injury, disease, efficacy of drug, serum and line of treatment. It is also termed as Vital statistics when demographics pertaining to vital events like Births, miscarriages and deaths are involved.

Biostatistics as a Science

Biostatistics is a science. It is used in the following areas successfully:

Anatomy and Physiology

- To define what is normal or healthy in a population and to find limits of normality.
- To find the difference between Means and proportions of normal at two places are different time periods. Eg; Height and weight in Andhra Pradesh is 5.5 ft for a male and 5” for a female.

Pharmacology

- To find the action of drug
- To compare the action of two different drugs or two dosages of same drug
- To find the relative potency of new drug with respect to a standard drug

Practice of Medicine

- To compare the efficacy of a particular drug, operation or a line of treatment.
- To find an association between two attributes in the study by applying appropriate test procedure.
- To identify signs and symptoms of a disease or syndrome.

Community medicine / Public health

- To test the usefulness of sera and vaccines
- In epidemiological studies -Statically test the role of causative factors.

Biostatistics is a science of figures like Statistics. It can answer questions like:

What are the leading cases of death or sickness ?

Whether a particular disease is raising or falling in severity and prevalence ?

Which age group, sex, social class, profession or place is most affected ?

Levels or standards of health reached ?

Age and sex composition of population?

Weather a particular population is growing, falling, ageing or ailing ?

Which health program should be taken up or given priority.

Capturing right data in Electronic Medical Records to enable biostatistics:

Statistics helps the Medical Record profession in a big way especially the descriptive statistics which comprises the percentages, Ratios, Rates, Tables, and Charts etc. The Data captured in the EMR must be well structured and designed to yield to analysis on various combination of parameters. Biostatistics can then be used to analyze this data thus captured for further conclusions.

A Case Study: Application of Biostatistics at SSSIHMS-PG

Sri Sathya Sai Institute of Higher Medical Sciences (SSSIHMS-PG) started in November 1991. It has the following specialities: Cardiology & Cardiothoracic surgery, Urology, Ophthalmology,

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Plastic Surgery, Orthopedics and Gastroenterology. The hospital is a Super Specialty hospital with 320 beds. We have another hospital of ours in Whitefield, Bangalore which also has specialties like Cadiology, Cardiothoracic vascular surgery, Neurology and Neurosurgery. Both the hospitals render service totally free of cost to one and all.

We have a very good web based Electronic Medical Records software. We capture both text and image data for every patient. All patient related information clinical, demographic and personal are captured in the software. The following are the minimum information captured in the EMR to facilitate any type of statistical analysis that may be required.

1. The demographic information is entered in the EMR only once, at the time of first visit of the patient. The details are then available in all other modules in the EMR. Personal & Demographic Details.
 - a. Name
 - b. Age
 - c. Sex
 - d. Marital Status
 - e. Occupation
 - f. Income
 - g. Religion / Community
 - h. Address details like District, City & State and pin code are codified and captured.
2. Unique patient ID for every patient is very important. We have strictly implemented this to facilitate easy centralized data capture. All information of the patient, irrespective of number of visits he/she makes, for which ever problem, is always captured, under the same patient id.
3. The other details that are captured during admission / surgery / treatment are:
 - a. Height
 - b. Weight
 - c. Blood Group
 - d. Allergies

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4. Adoption of Standards for all diagnosis & treatment information :
5. Diagnosis Information are captured at OP and IP levels using standard coding schemes like ICD from WHO to help us compare our data with other hospitals easily.
6. Procedures done on the patient are codified using standard coding schemes. Where coding is not available we must carefully codify them temporarily using custom codes. They can then be migrated to standard codes once available.
7. Medicines administered to patients, along with dosage are captured against each patient id.
8. Lab Investigations are ordered in the computer by the Doctors. The results are also captured at the Labs by patient id and date.
9. Any other detail or parameter that a hospital may analyze or study at a later date is added from time to time. The data is codified and captured wherever possible so that it can be searched and retrieved unambiguously.

Mobile Camps: We have a mobile unit which tours all the few hundred villages around. We collect the treatment information and also follow-up on these treatments in our secondary and tertiary care hospitals if need be. The information collected enables us to statistically identify areas prone to certain types of disease and provide preventive care eg: renal calculus, rheumatic fever.

Postoperative Checkup: The seva doctors do the follow-up of the patients post-operative condition. They collect the health status and convey to us. This helps us to get a feedback on how our post-operative patients are faring.

Retrieval of data for Biostatistics

Easy Retrieval of Medical Records data and analysis of parameters described is possible, once the data is codified and captured in the way described above. The data is hosted on a good database to help us search and analyze the data fast. It has a good facility to export the data thus retrieved in popular formats like excel, word etc. I have analyzed the data for the past 1 year admissions in the Cardiology/Cardiothoracic vascular surgery department. The data used here is very limited only for demonstration purposes. It may not be a good representative sample of the

whole population. An effort has been made to demonstrate the application of biostatistics to our hospital data. To start with, a state-wise distribution of the inpatients who visited our hospital from the sample population is shown in Diagram-1.

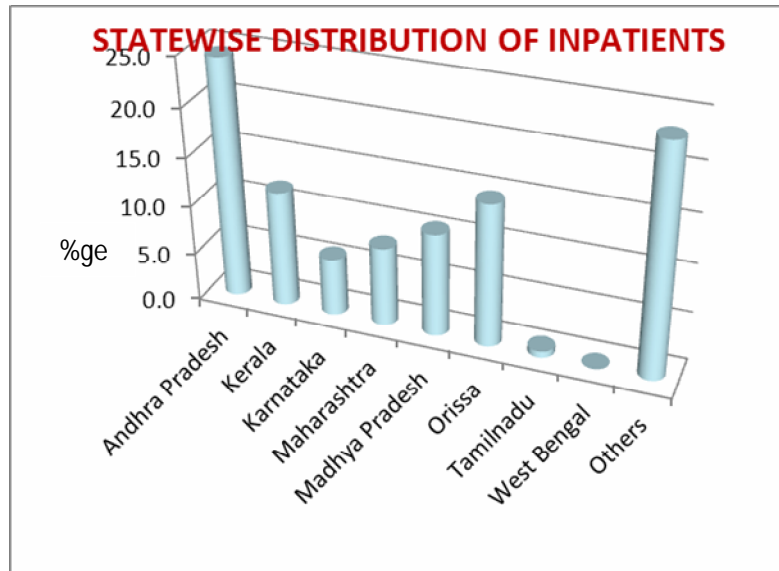


Diagram-1

We can analyze the data age group wise to derive certain conclusions. The age group where coronary artery disease occurs in the select population of our patients are shown along with probable conclusions purely based on statistical analysis in diagram-2. It can be seen that till the age of 20 there is very less chance of cardiac disease. There is a 17% chance of a person suffering from cardiac disease in the age group of 1-3 years. These are patients with congenital heart disease. We can then see the increase of incidence of disease from the age of 19-60. The maximum percentage of population with cardiac disease is in the age range 41-60. There is a drop in the number of cases with cardiac disease after the age of 60.

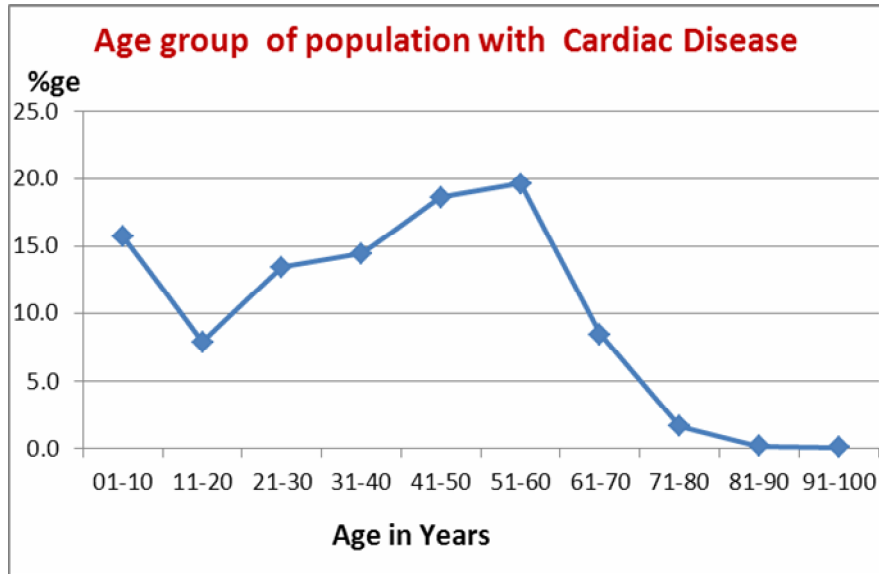


Diagram-2

We will now take a smaller section of this population, only those with coronary artery disease and correlate it with age. A graph thus plotted is shown in diagram-3. We can see that there is a significant increase in number of patients who acquire coronary artery disease from the age of 30 years. It peaks at the age of 60 where maximum number (40%) of people who suffer from coronary artery disease. There is drop in this number from the age 61 to 80.

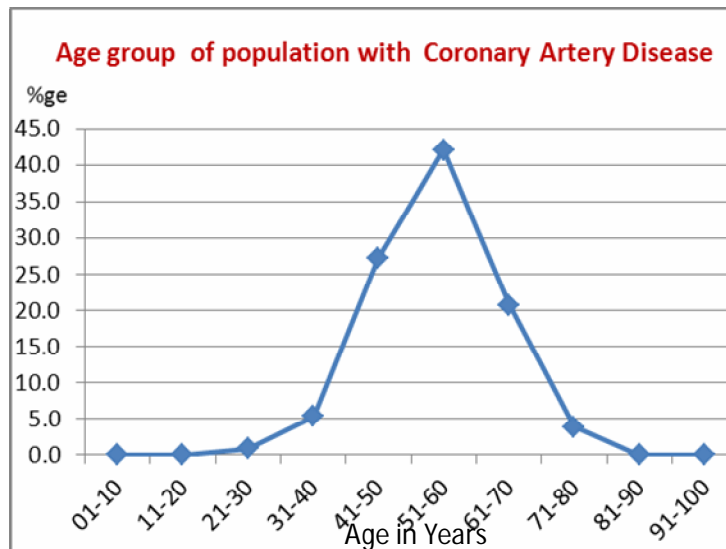


Diagram-3

We will now analyze a few other parameters. Shown below is the pie chart of the causative

factors of cardiac disease (diagram-4). This has been extracted from the diagnosis codes of cardiac patients. We can see from the pie chart that Hypertension is the major cause of cardiac disease, closely followed by Alcoholism and Diabetes.

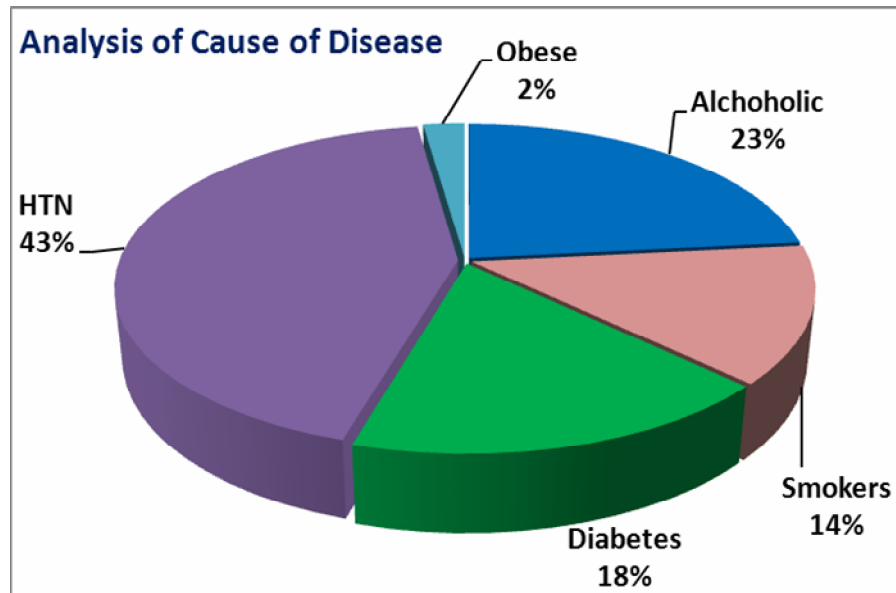


Diagram-4

Thus any amount of correlation and comparison can be done with good data which easily yields to analysis. I have made an effort to show how analysis on various parameters can be very rewarding. We can analyze well structured data to derive meaningful conclusions by applying Biostatistics. So a need for capturing data in a structured, codified and accurate manner is a very important prerequisite to do good biostatistical analysis. A computer can store large amounts of data, sort, search and analyze this data very fast & accurately. So computers extend invaluable help in biostatistical analysis. Good analysis tools may be required to do complex analysis, but basic features built into Microsoft Excel may not suffice for this purpose. There are special statistical packages like SPSS that have statistical tools like Chi Square test, Anova etc. They will prove to be very useful to us in statistical analysis. Thus Biostatistics can be skillfully used to our advantage by one and all. A computer can greatly enhance our skills in biostatistical analysis.