NATIONAL BOARD OF EXAMINATIONS

Module for

Thesis work

For DNB candidates

NATIONAL BOARD OF EXAMINATIONS
(Ministry of Health & Family Welfare)
Ansari Nagar, New Delhi-110029

Contents

Introduction

The National Board of Examination was established in 1975 with the primary objective of improving the quality of the Medical Education by elevating the level and establishing standards of post graduate examinations in modern medicine, on an all India basis. There are more than 700 accredited hospitals/institutions, imparting DNB courses in 58 medical specialties. In order to improve the competencies of DNB candidates in medical research (as envisaged in the requirement of thesis submission by them) it has been suggested to conduct short term workshops on regional basis.

The present workshop has been designed to enhance the competencies of the participants in the area of research methodology and thesis protocol writing so that they are able to write thesis and protocol in a better way.

General Objective

To enhance the knowledge and skills of the participants so that they are able to improve the thesis research

Specific Objectives

After the workshop the participants should be able to :

- Discuss how to select topic for DNB thesis, write protocol and plan and monitor the research work for their thesis

Main Content Areas

- Selection of topic and writing thesis protocol.
- Planning and monitoring of thesis research work.
- Ethical issues in research

Duration

1 day

Methodology

The participants would be provided with relevant reading materials and exercises for various sessions by the group facilitator. The orientation to basic concepts would be done through discussion by facilitators in groups.

This would be followed by group work / exercises during which participants would complete the assigned group tasks/exercises and would make presentation to the group facilitator in the group.

Category & Number of participants

The DNB candidates from NBE accredited hospitals/ institutions. The number of the participants per workshop will be 35-40.

Evaluation of Workshop

- Feed back from the participants on given format.
- Analysis of the exercises/ group tasks performed during group work

Tentative workshop schedule

9.30-10.30AM	Registration, Inauguration & workshop brief
10.00-12.00PM	Group work-I, Issues related to protocol writing and research in DNB accredited hospitals/institutions(Including ethical issues, funds, committees etc).
12.00 1.00 PM	Group work-II Identification of topic for thesis work and writing a good thesis protocol.
2.00- 4.00 PM	Group work-III, Planning of DNB thesis work
4.00 -5.15PM	Group work-III, Writing of DNB thesis

Group work-I, Issues related to protocol writing and research in DNB accredited hospitals/ institutions (Including ethical issues, funds, committees etc

Group Task

The participants would be divided into groups and each group would complete the task of identifying Issues related to protocol writing and research in DNB accredited hospitals/ institutions (Including ethical issues, funds, committees etc)

i. Select a chairperson (for guiding, directing and control of discussion) and reporter (for recording the main discussion points & presentation) in the group.

ii. Each of the participants would list the problems/ difficulties faced in protocol writing and research in DNB accredited hospitals/institutions as given in the exercise-1.

iii. Each of the participants would list the suggestions for overcoming these problems/ difficulties faced in protocol writing and research in DNB accredited hospitals/institutions as given in the exercise-1.

iv. The facilitator would discuss the problems listed by each participants along with suggestions given in the group and finally the group would list out key problems and suggestions for overcoming these problems.

Exercise-1, identifying Issues related to protocol writing and research in DNB accredited hospitals/ institutions (Including ethical issues, funds, committees etc)

1. Please consider your own hospital/ institutions and the DNB training programme and list five difficulties related to protocol writing and conduction of thesis work .

2. Please write your suggestions for overcoming the difficulties related to protocol preparation and thesis work. Please also refer to the SOPs for ethical committee as recommended by ICMR details given in the handout.

Group work-II, Identification of topic for thesis work and writing a good thesis protocol.

Group Task

The participants would be divided into groups and each group would complete the task of Identification of topic for thesis work and writing a good thesis protocol.

i. Select a chairperson (for guiding, directing and control of discussion) and reporter (for recording the main discussion points & presentation) in the group.

ii. Each of the participants in the group would select any three of the sample titles for thesis given in the annexure and select few titles for DNB thesis or they may add of their own and select the best suitable title by referring to the parameters given in the exercise-2.

iii. Then each participants would select one thesis protocol given in the annexure and complete the rest of the exercise-2 by listing out the positive and negative points in the protocol selected.

iv. The facilitator would discuss the best title for thesis research selected by each of the participants and also the positive and negative points in each of the protocol pf the participants. And finally list out the key points of the discussion.

v. Based upon the above discussion each of the participants would write the key points for a protocol on the topic selected by them as given in the exercise-2.

vi. The facilitator would give feed back to the participants

Exercise-2, Please refer to the thesis titles given in the Handout-1, or you may choose three topics for thesis of your own experience and select any three and analyse these three on the following parameters

Research problem/ Issue	Topic No.1		Topic No.2		Topic No.3	
	Yes	No	Yes	No	Yes	No
Is the issue relevant to your specialty?						
Is the issue very common and has been done by many researchers?						
Is the issue very rare and very few researchers have worked on it?						
Will the number of subjects to be covered be available to you during the time frame?						
Can the research be done with in the resources (Library, equipment, lab facilities, surgical cases load, number of procedures done in the hospital etc.) which you have at your disposal in your hospital?						
Can you complete the research within the time frame as required by National Board of Examinations (Six months before the examination)						
Do you require the approval from ethical committee for the study?						
Will your data collection techniques and tools be acceptable by the study population / cases from where you intend to collect data?						
Do you have the facilities for data analysis?						
Any other						

2. List the most common research topic you can cover during your thesis research work. Discuss in the group and with your facilitator the reason for selecting the topic for your research work.

3. Refer to any one of the thesis protocol given in the Handout-2, and discuss in the group and list out the followings:

Good /positive points in the write up

Deficiencies / negative points in the write up

4. Considering the title you have finalised (refer to the handout-12,, write a draft thesis protocol

Title page for your thesis protocol

Introduction (Giving introduction to the subject, rationale for the study and justification etc.)

Objectives for the study

General Objective

Specific Objectives

Review of literature

Please mention the main heads and subheads under which you would like to review the relevant literature.

Materials and methods
Study area

Study population

Sampling techniques and sample size

Data collection techniques

Primary data collection

Secondary data collection

List the tools for data collection

Data analysis plan

Tabulation plan

Statistical analysis plan

Statistical tests of significance

Any other specify

References

Group work-III, Planning and monitoring thesis work

Group Task

The participants would be divided into groups and each group would complete the task of identifying Issues related to guidance and monitoring thesis work for DNB candidates

i. Select a chairperson (for guiding, directing and control of discussion) and reporter (for recording the main discussion points & presentation) in the group.

ii. Each participant would list the problems/ difficulties faced in planning and monitoring thesis work for DNB candidates in DNB accredited hospitals/institutions as given in the exercise-3.

iii. Each participant would list suggestions for overcoming these problems as given in the exercise-3..

iv. The facilitator would discuss the above issues and generalise important key issues at the end of the discussion. The group would develop a plan for monitoring the thesis work as given in the exercise-3.

v. Each of the participant would go through the thesis provided to him/her and give remarks on various parameters as mentioned in exercise-4.

vi. The facilitator would generate the discussion and highlight important issues.

Exercise-3, Planning and monitoring thesis work of DNB candidate

1. Please list the problems/ difficulties faced in planning and monitoring thesis work for DNB candidates in DNB accredited hospitals/institutions

2. Please list suggestions for overcoming these problems

3. Discuss in the group and develop a plan for monitoring the thesis work.

Exercise-4, Assessment of thesis work

Please refer to the thesis given to you and comments on the following aspects of the thesis. In case modifications are required please indicate the specific modifications desired.

4.1 Name of Specialty _____

4.2 Title of Thesis _____

_____

_____

4.3 Introduction

4.4. Review of literature

4.5 Aims & Objectives of the study

4.6 Material & Method

4.6.1 Study area

4.6.2 Study population

4.6.3 Sample size & sample technique

4.6.4 Data collection technique and tools

4.6.5 Data analysis

4.6.6 Results

4.6.7 Discussion

4.6.8 Conclusions

4.6.9 Recommendations

4.6.10 References/ Bibliography

4.6 .11 Annexure

Handout-1, Sample Titles For the DNB Thesis

ANAESTHESIOLOGY

Studies Of Incidence Of Side Effects And Response To External Stimuli Following Two Intravenous Inducing Agents For General Anaesthesia E.G., Thiopentone And Propofol In Operation Of Miner Urological Procedures

A Prospective Study Of Incidence Of Transient Neurological Symptoms After Spinal Anaesthesia With 5% Hyperbaric Lignocaine Compared With 0.5% Hyperbaric Bupivacaine

Comparision Of The Effect Of Caudal Midazolam With Bupivacaine In Post Operative Analgesia In Children

Comparision Of The Effect Of Caudal Midazolam With Bupivacaine In Post Operative Analgesia In Children

Oral Clonidine Premedication Enhances Quality Of Postoperative Analgesia By Intrathecal Fentanyl

DERMATOLOGY

Clinico - Etiological Stdu Of Chronic Urticaria : A One Year Study (Review Of 312 Patients

A Clinical Profile Of Cutaneous Manifestations In Systemic Diseases

ENT

To Compare The Results Of Tympanoplasty With And Without Cortical Mastoidectomy In Cases Of Safe Chronic Suppurative Otitis Media

Laser Tonsillectomy Versus Standard Dissection Method- A Comparative Study

GENERAL MEDICINE

Assessment Of Risk Factors For Corponary Artery Disease In The Geriatric Population Of Pondicherry

Carotid Intima Media Thickness As An Independent Predictor Of Coronary Artery Disease

Endothelium-Dependent Brachial Artery Flow Mediated Vasodilatation in Patients With Type 2 Diabetes Mellitus With And Without Dyslipidemia

Serum Ferritin In Aute Myocardial Infarction

A Study Of Clinical Profile Of Thrombocytopenia In Adult Patients

GENERAL SURGERY

Clinical Study Of Acute Cholecystitis

Laparoscopic Assisted Appendicectomy
Clinical Study Of Solitary Thyroid Nodule

Randomized Clinical Trial Of Lightweight Composite Mesh Versus Standard Polypropyene Mesh For Lichtenstein Inguinal Hernia Repair

Comparative Analysis Of Electrocautry And Ultrasonic Scalpel In Laparoscopic Surgery

OBSTETRICS & GYNAECOLOGY

Management Of Third Stage Of Labour: A Comparative Study Between Cord Drainage And Non-Drainge Of Cord Blood

Role Of Mri In Fetal Medicine

Role Of Hysteroscopy In The Evaluation Of Female Infertility

A Clinical, Sonological And Histopathological Study Of 50 Ovarian Tumors

Risk Factors For Abruptio Placentae - A Case Control Study

OPHTHALMOLOYGY

Ocular Motor Nerve Palsies-A Clinical Study

Surgical And Visual Outcome Of Phacoemulsification Surgery

Evaluation Of Surgical Results Of Penetrating Keratoplasty In Bullous Keratopathy

Clinical Profile And Management Of Glaucoma In Uveitis Patients

ORTHOPAEDICS SURGERY

Study Of Different Modalities Of Treatment For Tibial Condylar Fractures

Heel Pain: Role Of Footwear In Its Management

Study Of Specificity And Sensitivity Of Various Diagnostic Modalities In Osteoarticular Tuberculosis

Analysis Of Implant Failure

PAEDIATRICS

Study Of Incidence Of Occult Bacteremia In Young Febrile Children

Study Of Serum Ige In Children With Wheeze

A Clinical Study Of Rickets In Infants

Comparative Study Of The Efficacy Of Nebulised Adrenline Versus Salbutamol In Wheeze Associated Respiratory Tract Illness In Children 2 Months To 2 Years

RADIODIAGNOSIS

MRI Evaluation Of Spinal Tumors

Doppler Sonography In Acute Renal Obstruction

Ultrasonographic Evaluation Of Space Occupying Lesions Of Liver

Comparative Analysis Of Computed Tomography & Magnetic Resonance Imaging In Detection Of Oral Cavity & Oropharyngeal Lesions

Handout -2, Sample Of Thesis Protocols
Comparison of failure rate of NSV by fascial interposition with NSV by double ligation of seminal vesical cut end of vas only without fascial interposition

GENERAL SURGERY

INTRODUCTION

Since the advent of NSV in China in 1974 by Dr Li there has been various techniques for vasectomy. Whether it is by silk thread or by thermal cautery etc. but till date the failure rate of NSV by simple ligation and excision of 1 cm of vas has been upto 2-3% and in some of American literature it is as high as 11-14%. This may be because of spontaneous recanalization as a result of slippage or slough out of ligature or by formation of sperm granuloma etc.

David Shokal et al has shown in their studies that by fascial interposition (that is putting a barrier of spermatic fascia between two cut end of vas) the failure rate became almost nil even the period of sperm clearance from distal vas dramatically reduced from 12 weeks to 3-4 weeks.

During procedure of fascial interposition the spermatic fascia is pulled and tied with seminal vesical cut end of vas just below the initial ligature so that the seminal vesical cut end of vas lies outside of spermatic canal and testicular cut end of vas lies within spermatic canal with spermatic fascia lying as barrier which prevent from spontaneous recanalization. But by doing so two ligature are put on the seminal vesical end one for initial vasectomy and another while tying the fascia below the initial ligation.

Now failure rate becomes almost nil with the fascial interposition may be because of the spermatic fascia which is kept between two cut ends which act as barrier for spontaneous recanalization or it may be because of double ligation at seminal vesical end which serves as extra safety valve against spontaneous recanalization even after first ligature slips out or sloughs out.

People have avoided ligature and used thermal cautery to prevent any ligature on vas so that there is no slipping or sloughing ligature on the vas resulting in spontaneous recanalization.

Till date no study has been done to see the effectiveness of fascial interposition alone or effectiveness of double ligation of seminal vesical cut end of vas without fascial interposition for this low incidence of failure rate.

So, present study is aimed at comparative effectiveness of fascial interposition with double ligation of seminal vesical cut end of vas and effectiveness of double ligation of seminal vesical cut end of vas only without fascial interposition.

AIMS & OBJECTIVES

"To compare the failure rate of NSV by fascial interposition with NSV with double ligation of Seminal Vesicle cut end of vas only without fascial interposition".

MATERIAL AND METHODS

Study will be conducted among two groups of clients each consisting of 100 cases. In one group NSV will be performed by fascial interposition in which double ligation of seminal vesical cut end of vas is a part and parcel and in second group NSV will be performed by double ligation of seminal vesical cut end of vas only without any fascial interposition.

The cases which will be excluded from the study will be clients having local skin infection, previous scrotal injury, large varicocele, large hydrocele, filariasis, intrascrotal mass, cryptoorchidism, or inguinal hernia.

Semen analysis will be done at 2 weeks, 4 weeks, and 12 weeks after NSV to see for early sperm clearance of the distal vas and compare the result in terms of failure.

OBSERVATION

The result of failure rate of NSV by double ligation of seminal vesical cut end of vas without fascial interposition will be compared with NSV with fascial interposition, during study period.

A COMPARATIVE STUDY OF BIPOLAR PROSTHESIS WITH AUSTIN MOORE PROSTHESIS IN THE TREATMENT OF DISPLACED FEMORAL NECK FRACTURES IN ELDERLY

ORTHOPAEDICS

AIMS & OBJECTIVES

To compare the results of Bipolar Prosthesis with Austin Moore Prosthesis in the treatment of displaced femoral neck fractures in elderly.

This study is designed to determine whether there are any significant differences at a minimum period in

- the rate of prosthetic dislocation
- post operative medical and wound complications
- need for revision surgery
- incidence of hip pain
- recovery of preinjury levels of ambulatory status
- activities of daily living

INTRODUCTION

Fracture neck of femur is one of the commonest injuries causing morbidity and mortality in patients of geriatric age group. With improvement in standards of health and longevity, this fracture is being increasingly encountered. Fractures of femoral neck have always presented great challenges to orthopaedic surgeons and remain in many ways today the unsolved fracture as far as treatment and results are concerned.

Even the current emphasis on Osteoporosis aims finally to decrease the incidence of this fracture as this is the fracture with the greatest risk to independent ambulation. With due care and precise surgery these difficult fractures can be successfully treated.

Prostheses for the femoral head became popular soon after their introduction because they offered a solution, at least in part, to several troublesome problems in hip surgery.

Hemiarthroplasty using either Bipolar or Austin Moore prosthesis has been advocated as the best treatment in displaced femoral neck fractures in elderly, for early rehabitation, by permitting early mobilization and preventing the dreaded complications of non-union and avascular necrosis.

REVIEW OF LITERATURE

1. Unipolar versus bipolar Hemiarthroplasty : Functional outcome after femoral neck fractures at a minimum of 36 months of follow up.

Journal of Orthopaedic Trauma 16(5) : 317-322, May 2002.
Org. Barnard, C. et al.

Functional ability was compared between both groups with regard to recovery of ambulatory status and activities of daily living as well as the incidence of hip pain at a minimum of 36 months of fracture follow up. No significant differences were found between the unipolar groups.

2. Unipolar or Bipolar Prosthesis for the displaced intracapsular hip fracture?
An unanswered question.

Clinical Orthopaedics and related research (353) : 81-85, August, 1998.
Gilbert, Marvin, S.M.D. : Cupozzi, James, M.D.,

Modular prostheses were developed to address the problems of loosening, cartilage wear and protrusion which were seen with single unit endoprostheses. Modular Unipolar prostheses address many of these problems and are significantly less expensive than the Bipolar prosthesis.

A survey of the treatment of displaced intracapsular femoral neck fractures in the U.K.

Crossman PT. et al

Department of Trauma and Orthopaedic Surgery, Luton and Dunstable Hospital, U.K. Paul Crossman@beeb.net.

A survey was undertaken to investigate the treatment of displaced intracapsular femoral neck fractures across the U.K. The usual practice at 223 Hospital was recorded for 2 groups of patients, active and frail.

For frail patients, Hemiarthroplasty with an Austin Moore or Thompson prostheses was undertaken at 94% of hospitals, bipolar prostheses were used at 8% and internal fixation was undertaken at 1%.

INCLUSION CRITERIA

- Community and Household ambulators.
- More than 65 years of age.
- Displaced femoral neck fractures.

EXCLUSION CRITERIA

- Non Ambulators

MATERIALS AND METHODS

This study will be conducted in Department of Orthopaedics, Government General Hospital, Pondicherry between August 2005 to August 2006. The facilities, expertise and the necessary infrastructure are available in this hospital.

GROUP I : Bipolar Prosthesis

It consists of a metallic acetabular cup and a polyethylene liner with snap fit socket to be used with a femoral prosthesis with a 22 or 32 mm diameter head. It has got inner and outer bearing.

Available in various sizes:

Approach : Posterior or Lateral.

Methos : As per the manufacturer's manual.

GROUP II : Austin Moore Prosthesis.

It is a fixed stem prosthesis.

Available in various sizes

Approach : Posterior (or) lateral

Method

- Capsulotomy exposes the fracture site.
- Head extracted and measured.
- Acetabulam packed during reaming.
- A notch made in the posterosuperior portion of the neck to maintain anteversion of 10-15^0
- Prosthesis inserted into the canal to seat well over the calcar.
- Reduction achieved by gentle traction
- Wound closed over a negative suction drain/no drain.

Partial weight hearing started on the 2nd post operative day depending on the general condition of the patient in both the groups.

STATISTICAL METHODS

Analysis will be by students 't' test, chi square tests and fisher's exact tests and the results computed.

DEPARTMENT INVOLVED

- Deparment of Orthopaedics, Government General Hospital, Pondicherry.
- Department of Anaesthesia, Government General Hospital, Pondicherry.
- Department of Geriatric Medicine, Government General Hospital, Pondicherry.

Topic: - A comparative study of post operative analgesia with epicural Tramadol and epidural by prenorphine in gynecological surgical patient using combined.

ANAESTHESIOLOGY

INTRODUCTION

The technique of post operative pain relief was first advocated by Cleland in 1949 and since then many experiments has been done to explore its possibilities.

Pain is a protective mechanism that occurs when tissue are being damaged. Surgery produces tissue injury with consequent release of inflammatory mediators that activates peripheral nociceptors, which initiate nociceptive information to the central nervous system to ultimately produce perception of pain. Pain causes reflex, motor & psychic reaction, which include involuntary reflex withdrawal reaction, anxiety, depression, anger and skeletal muscle excitability.

The discovery of opiate receptors in the dorsal horn of spinal cord led to the idea that the subarchnoid injection of small amount of opiates could provide segmental analgesia by direct action on these receptors. So, of the many methods available for post operative pain relief, one is epidural analgesia.

Recent revolution in pain relief by newer opioids has improved our control on post operative pain, making them the most popular drugs for epidural analgesia. So, the need to compare Tramadol and Buprenorphine. Which are frequently used today.

The present study is to evaluate the efficacy and complications of epidural Tramadol and Buprenorphine in relieving the post operative pain in Gynaecological surgeries. Where, the surgery is major one and involves cutting deeper structures, intense analgesia is required in these cases in post operative period.

AIMS AND OBJECTIVES

To evaluate and compare efficacy of epidural Tramadol and Buprenorphine in Gynaecological surgeries with combined spinal epidural technique.

1) To compare the efficacy of drugs.
2) To compare the vital parameters in terms of pulse rate, blood pressure and respiratory rate in each group.
3) To compare the on set of analgesia.
4) To compare the duration of analgesia.
5) To compare the complications if any.

MATERIALS AND METHOD

An open comparative randomized study that included 50 patients of ASA Grade I and II between 30-60 years who underwent Gynaecological surgeries under combined spinal epidural technique.

Ethics committee's permission has been taken, patient belonged to ASA Grade I and II and age of patients between 30-60 years randomly allocated in two groups.

Patients were divided into two groups of twenty five each.

GROUP A – Tramadol 2 mg/kg.

GROUP B – Buprenorphine 3 μ/kg.

The study was to compare Tramadol and Buprenorphine for analgesic efficacy, on set of analgesia, duration of analgesia and side effects of two drugs.

Inclusion criteria of patients for study

The patients aged between 30-60 years belonging to ASA I and II under going elective gynaecological surgeries under combined spinal epidural technique.

Exclusion Criteria

Patients with severe or controlled systemic disease, metabolic disorders, neurological, congenital or cardiovascular diseases are excluded from this study.

Parameters Observed

1) Time of on set of analgesia.
2) Vital parameters like-pulse rate, blood pressure, respiratory rate, SPO2
3) Efficacy of analgesia based on visual analogue scale.
4) Side effects of the drugs.

Handout No-3, Stages in a research work

1. Stages in a research work

The large volume of numerical information gives rise to the need for systematic methods, which can be used to organize, present, analyze and interpret the information effectively. Statistical methods are primarily developed to meet this need.

According to the above definition, there are five stages in a statistical investigation.

i. *Collection*- Collection of data constitutes the first step in a statistical investigation. Utmost care must be exercised in collecting data because they form the foundation of statistical analysis. If data are faulty, the conclusion drawn can never be reliable. The data may be available from existing published or unpublished sources or else may be collected by the investigator himself. The first hand collection of data is one of the most difficult and important task faced by a statistician. Therefore, like all scientific pursuits, the investigator must take into account whatever data have already been collected by others. This would have the investigator from foreseeable pitfalls, unnecessary labour and duplication.

ii. *Organization*-Data collected from published sources are generally in organized form. However, a large mass of figures that are collected from a survey frequently needs organization. The first step in organizing a group of data is *editing.* The collected data must be edited very carefully so that the omissions, inconsistencies, irrelevant answers and worn computations in the returns from a survey may be corrected or adjusted. After the data have been edited, the next step is to classify these. The object of *classification* is to arrange the data according to some common characteristics possessed by the items constituting the data. The last step in organization is *tabulation*. The object of tabulation is to arrange the data in columns and rows so that there is absolute clarity in the data presented.

iii. *Presentation***-**After the data have been collected and organized they are ready for presentation. Data presented in an orderly manner facilitates statistical analysis. There are two different modes in which collected data may be presented these are-diagrams and graphs

iv. *Analysis*- After collection, organization and presentation the like next step is that of analysis. A major part of this text is devoted to the methods used in analyzing the presented data, mostly in a tabular form Methods used in analyzing the presented data are numerous ranging from simple observation of the data to complicated, sophisticated and highly mathematical techniques. However, in this text only the most common used methods of statistical analysis, such as measures of central tendency, measures of variation, correlation, regression, etc. are included.

v. *Interpretation*-The last stage in statistical investigation is interpretation, i.e., drawing conclusions from the data collected and analysed. The interpretation of data is a difficult task and necessitates a high degree of skill and experience. If the data that have been analysed are not properly interpreted, the whole object of the investigation may be defeated and fallacious conclusions be drawn. Correct interpretation will lead to a valid conclusion of the study and thus can aid one in taking suitable decisions.

Limitations of Statistical Methods

Despite the usefulness of statistics in many fields, impression should not be carried that statistics are like magical devices which always provide the correct solution to problems. Unless the data are properly collected and critically interpreted, there is every-likelihood of drawing wrong conclusions. Therefore, it is also necessary to know the limitations and the possible misuses of statistics. The following are the important limitation of the science of statistics:

i. *Statistics does not deal with individual measurements*-Since statistics deals with aggregates of facts, the study of individual measurements lies outside the scope of statistics. Data are statistical when they relate to measurement of masses, not statistical when they relate to an individual item or event as a separate entity. For example, the wage earned by an individual worker at any one time taken by itself is not a statistical datum. But the wages of workers of a factory can be used statistically. Similarly, the marks obtained by one student of a class or his height are not the subject matter of the study of statistics but the average mark or the average height has statistical relevance.

ii. *Statistics deals only with quantitative characteristics*-Statistics are numerical statements of facts. Such characteristics as cannot be expressed in numbers are incapable of statistical analysis. Thus, qualitative characteristics like honesty, efficiency, intelligence, blindness, and deafness cannot be studied directly. However, it may be possible to analyse such problems statistically by expressing them numerically. For example, we may study the intelligence of boys on the basis of the marks obtained by them in an examination.

iii. *Statistical results are true only on an average*- The conclusions obtained statistically are not universally true; they are only under certain conditions. This is because statistics as a science is less exact as compared to natural sciences.

iv. *Statistics is only one of the methods of studying a problem* **-**Statistical tools do not provide the best solution under all circumstances. Very often, it is necessary to consider a problem in the light of a country's culture, religion and philosophy. Statistics cannot be of much help in studying such problems. Hence statistical conclusions should be supplemented by other evidences.

v. *Statistics can be misused* -The greatest limitation of statistics is that it is liable to be misused. The misuse of statistics may arise because of several reasons. For example, if statistical conclusions are based in incomplete information, one may arrive at fallacious conclusions. Thus the arguments that "*drinking beer is bad for longevity since 99% of the persons who take beer die before the age of 70 years"* is statistically defective, since we are not told what percentage of persons who do not drink beer die before reaching that age. Statistics are like clay and they can be moulded in any manner so as to establish right or wrong conclusions.

Hand out No-4, Basic concepts in research

What is Research?

RESEARCH is the systematic collection, analysis, and interpretation of data to answer a certain question or solve a problem.

Characteristics of research

- It demands a clear statement of the problem;
- It requires a plan (it is not aimlessly “looking” for something in the hopes that you will “come across a solution”);
- It builds on existing data, using both positive and negative findings; and
- New data should be collected as required and be organized in such a way that they answer the original research question(s).

Purpose of research

Research serves two major purposes in acceleration of advances in health.

First, basic research is necessary to generate new knowledge and technologies to deal with major unresolved health problems.

Second, applied research is necessary to identify priority problems and to design and evaluate policies and programs that will deliver the greatest health benefit, making optimal use of available resources.

Handout No-5, formulation of study objectives

Objectives should be defined in clearest terms. Objectives indicate what a researcher will achieve at the end of the research study.

Characteristics of Objectives

These should be-

- Relevant- Based on research needs.
- Logical-Should be internally consistent.
- Un-equivocal-Clear to the researchers
- Feasible-Can be achieved within the constraints.
- Measurable-Indicators for measuring

Elements of a research objective

- Action verb- to list, to analyze, to grade, to measure, to compare, to test, etc.
- Contents- actual intention of the researcher.
- Conditions- under which the objectives will be achieved.
- Criteria- of measuring the achievement of the objectives.

Consider the following research objectives-

The researcher after the study should be able

To demonstrate the efficacy of drug-A over the drug-B in terms of significantly ($p<0.05$) higher number of patients suffering from the specified disease are cured after being given the drugs for three weeks.

Action verb is “to demonstrate”

Contents- “efficacy of drug-A over Drug-B for the treatment of the specified disease….”
Conditions- “ after giving drugs for three weeks “
Criteria- “significantly higher ($p<0.05$) number of patients cured (with drug-A).
To compare , the serum lipid profile of cricket players with sedentary shop keepers who are apparently healthy and have no complaints

Action verb- “to compare”
Contents- “serum lipid profile of cricket players and sedentary shop keepers..”
Conditions- “apparently health and have no complaints..”
Criteria- “ ? Statistically significant at $p<0.05$

To determine the prevalence of hypertension in healthy school going children in the urban public schools.

Action verb- “to determine”
Contents-” prevalence of hypertension in healthy school going children in the urban public schools.
Conditions- “? in healthy school going children in the urban public schools.

Criteria- “? Cutoff levels for blood pressure to define hypertension

Handout No-6 Identification of study variables.

What is a variable?

A VARIABLE is a characteristic of a person, object, or phenomenon that can take on different values.

Types of variables

Numerical Variables- A simple example of a variable is a person's age. The variable age can take on different values because a person can be 20 years old, 35 years old, and so on. Other examples of variables are:

- Weight (expressed in kilograms or in pounds);
- Distance between homes and clinic (expressed in kilometers or in minute walking distance); and

- Monthly income (expressed In dollars, rupees, or kwachas).

Because the values of all these variables are expressed in numbers, we call them NUMERICAL VARIABLES,

Categorical variables

The different values of a variable may also be expressed in categories. For example, the variable sex has two values male and female, which are distinct categories. Other examples are:

Examples of categorical variables

Variables	Categories
Color	• red • Blue • Green, etc.
Outcome of disease	• Recovery • Chronic illness • Death

Since the values of these variables are expressed in categories, we call them CATEGORICAL VARIABLES.

Dependent and independent variables

Because in research you often look for causal explanations, it is important to make a distinction between dependent and independent variables.

The variable that is used to describe or measure the problem under study DEPENDENT variable.

The variables that are used to describe or measure the factors that are assumed to cause or at least, to influence the problem are called the INDEPENDENT variables.

For example, in a study of the relationship between smoking and lung cancer, "suffering from lung cancer" (with the values yes, no) would be the dependent variable and "smoking" (varying from not smoking to smoking more than three packets a day) the independent variable.

Whether a variable is dependent or independent is determined by the statement of the problem and the objectives of the study. It is, therefore, important when designing a study to clearly state which variable is the dependent and which are the independent ones.

If a researcher investigates why people smoke, “smoking” is the dependent variable and “pressure from peers to smoke” could be an independent variable. Note that in the lung cancer study ‘smoking” was the independent variable.

Although in everyday language we may speak of possible CAUSES of problems, in scientific language we prefer to speak of ASSOCIATIONS between variables, unless a causal relationship can be proven. If we find an association between smoking and cancer, we can conclude that smoking causes cancer only if we can both demonstrate that the cancer was developed after the patient started smoking and that there are no other factors that may have caused both the cancer and the habit of smoking. Nervous people, for example, may both smoke more and suffer more from cancer, than persons who are not nervous.

A variable that is associated with the problem and with a possible cause of the problem is a potential CONFOUNDING VARIABLE.

A confounding variable may either strengthen or weaken the apparent relationship between the problem and a possible cause.

Therefore, to give a true picture of cause and effect, the confounding variables must be considered, either at planning stage or while doing data ana1ysis.

For example:

A relationship is shown between the low level of the mother’s education and malnutrition in under-5s. However, family income may be related to the mother’s education as well as to malnutrition.

Family income is therefore a potential confounding variable. To give a true picture of the relationship between mother’s education and malnutrition, family income should also be considered and measured. This could either be incorporated into the research design, for example by selecting only mothers with a specific level of family income, or it can be taken into account in the analysis of the findings, with mother’s education and malnutrition among their children being analyzed for families with different categories of income.

Background variables

In almost every study, **BACKGROUND VARIABLES** appear, such as age, sex, educational level, “socioeconomic status, marital status, and religion. These background variables are often related to a number of independent variables, so that they influence the problem indirectly. (Hence they are called background variables.) If the background variables are important to the study, they should be measured. However, try to keep the number of background variables measure as few as possible, in the interest of economy. Background variables are notorious “confounders.”

Handout No-7, Identification of research design

Types of Research design

The type of study design chosen depends on:

- The type of problem,
- The knowledge already available about the problem, and
- The resources available for the study.

Types of Research designs

Several classifications of study types are possible, depending on what research strategies are used. Usually a combination of research strategies is used, including:

- **Nonintervention studies** in which the researcher just describes and analyzes researchable objects or situations but does not intervene; and

- **Intervention studies** in which the researcher manipulates objects or situations and measures the outcome of his manipulations (e.g. by implementing intensive health education and measuring the improvement in immunization rates).

I. Nonintervention studies

We will first concentrate on nonintervention studies :

- Exploratory studies,
- Descriptive studies, and
- Comparative (analytical) studies

Handout No-8, Tabulation of data

One of the simplest and most revealing devices for summarizing data and presenting them in a meaningful fashion is the statistical table. A table is a systematic arrangement of statistical data in columns and rows. Rows are horizontal arrangement, whereas column are vertical ones. The purpose of a table is to simplify the presentation and to facilitate comparisons. The simplification results from the clear-cut and systematic arrangement, which enables the reader to quickly locate desired information. Comparison is facilitated brining related items of information close together.

Classification is the first step in tabulation. Before, the data are put in tabular form they have to be classified, i.e., the different items having common characteristics must be brought together. It is only after this step that the data are displayed under different columns and rows so that their relationship can be easily understood. Tables make it possible for the analyst to present a huge mass of data in a detailed orderly manner within a minimum of space. Because of this, tabular presentation is the cornerstone of statistical reporting.

Parts of a table, the number of parts of a table varies from cases to case depending upon the given data. However, the main parts of a table in general are -table number, tile of the table, caption, stub, body of the table, head note and footnote. Each table should be *numbered.* There are different practices with regard to the place where this number is to be given. The number may be given either in the center, at the top above the title or inside of the title at the top or in the bottom of the table on the left-hand side. Every table must be given suitable title. *The title* is a description of the contents of the table. A complete title has to answer the questions what, where and when in that sequence. *Caption* refers to the column's headings. It explains what the column represents. It may consist of one or more column's headings. Under a column heading there may be sub-heads. The caption of different columns are expressed in different units, the units should be mentioned with the captions. As compared with the main part of the table the caption should be shown in smaller letter. This helps in saving space. As distinguished from caption, *stubs* are the designations of the rows or row headings. They are at the extreme left and perform the same function for the horizontal rows of numbers in the table as the column headings do for the vertical columns of numbers. The stubs are usually wider than column headings but should be kept as narrow as possible without sacrificing precision and clarity of statements. *The body of the table* contains the numerical information. This is the most vital part of the table. Data presented in the body arranged according to description are classifications of the captions and stubs. *Head note* is a brief explanatory statement applying to all or a major part of the material in the table, and is placed below the point centered and enclosed in brackets. It is used to explain certain point relating to the whole table that have not been included in the title nor in the captions or stubs. For example, the unit of measurement is frequently written as a head-note, such as "in thousands" or "in million tons", or "in crore" etc. F*ootnote*-includes anything in a table which the reader may find difficult to understand from the title, captions and stubs should be explained in footnotes. If footnotes are needed they are placed directly below the body of the table

The following is a specimen of table indicating the above parts:

Table Number, Title, Head note

StubHeading	Caption
Stub entries	Body

Footnote, Sources

General rules of tabulation, It is difficult to lay down any hard and fast rules for tabulating data because much depends upon the given data and requirements of the survey. In fact, constructing a good table is an art and, therefore, practical experience is of immense help. How ever, the following general considerations may be kept in view while tabulating data:

i. The table should suit the size of the paper usually with more rows than columns. In making a suitable layout it may be necessary to alter the original design. The alteration often consists in changing the rows to columns or the other way round. For this reason it is desirable to make a rough draft of the table before the figures are entered in it. Space must be allowed for reference or any other matter which is to be included in the table.
ii. In all tables the captions and stubs should be arranged in some systematic order. It would make the table easier to read and allow more important items to be emphasized. The arrangement of items basically depends upon the type of data. However the principle basis for arranging items are – alphabetical, chronological, geographical, according to size of items etc.
iii. The unit of measurement should be clearly defined and given in the table, such as income in rupees or weight in pounds etc.
iv. Figures should be rounded off to avoid unnecessary details in the table and a footnote to this effect should be given. For example, the figures may be taken to the nearest rupees and paise be eliminated.
v. If certain figures are to be emphasized they should be in distinctive type or in a box or circle or between thick line.
vi. The table should not be overloaded with details. If many characteristics are to be shown it is not necessary to load them all in one table; rather a number of tables should be prepared, each table complete in itself and serving a particular purpose.
vii. A column entitled “miscellaneous column” should be added for data which do not fit in the classification made.
viii. The arrangement of the table should be logical and items related to each other should be placed near about and, if possible, in the same group.
ix. Percentages and ratios should be computed and shown, if necessary.
x. Where standard classifications have been prepared it is usually desirable to employ them, as they are superior to hastily constructed individual classifications.
xi. Indicate a zero quantity by a zero, and do not use zero to indicate that information which is not available. If it is not a available, show this fact by the letters N.A. or by dash (-).
xii. Abbreviations should be avoided especially in titles and headings. For example “yr.” should not be used for “year”.
xiii. Be explicit. The expression “etc.” is bad form in a table, since the reader may not readily discover what it refers to. In fact clarity is the most important feature of tabular presentation of any kind of statistical data.

Do not use ditto marks. If a figure is repeated, show it each time. A ditto mark may be mistaken for the figure “11”.

Handout No-9, Presentation of data

Diagrams and graphs are extremely useful because of the following reasons:

i. They give a bird's-eye view of the entire data and, therefore, the information presented is easily understood. It is a fact that as the number of magnitude of figures increases they become more confusing and their analysis tends to be more strenuous. Pictorial presentation helps in proper understanding of the data as it gives an interesting form to the data. The mind through the eye can more readily appreciate the significance of figures in the form of pictures than it can follow the figures themselves.
ii. They are attractive to the eye. Figures are dry but diagrams delight the eye. For this reason diagrams create greater interest than cold figures. Thus, while going through journals and newspapers the readers generally skip over the figures but most of them do look at the diagrams and graphs. Since diagrams have attraction value, they are very popular in exhibitions, fairs, conferences, board meetings and public functions.
iii. They have a great memorizing effect. The impressions created by diagrams last much longer than those created by the figures presented in a tabular form.
iv. They facilitate comparison of data relating to different periods of time or different regions. Diagrams help one in making quick and accurate comparison of data. They bring out hidden facts and relationships and can stimulate as well as aid analytical thinking and investigation.

Diagrams

General Rules for constructing Diagrams- The following general rules should be observed while constructing diagrams:

i. *Title*-Every diagram must be given a suitable title. The title should convey in as few a words as possible the main idea that the diagrams intend to portray. The title may be given either at the top of the diagram or below it.
ii. *Proportion between width and height*- A proper proportion between the height and width of the diagram should be maintained. If either the height or width is too short or too long in proportion, the diagram would give an ugly look. While there are no fixed rules about the dimensions, a convenient standard suggested is known as "Root-two", that is, a ratio of 1 (short side) to 1.414 (long side).
iii. *Selection of scale*-The scale showing the values should be in even numbers or in multiples of five or ten e.g., 25, 50, 75 or 20, 40, 60. Odd value like 1, 3, 5, 7 should be avoided. Again no rigid rules can be laid down about the number of rulings on the amount scale, but ordinarily it should not exceed five. The scale should also specify the size of the unit and what it represents.
iv. *Footnote*- In order to clarify certain points about the diagram, footnote may be given at the bottom of the diagram.
v. *Index*- In index illustrating different types of lines or different shades, colours should be given so that the reader can easily make out the meaning of the diagram.
vi. *Neatness and cleanliness*-Diagrams should be absolutely neat and clean.
vii. *Simplicity*- Diagrams should be as simple as possible so that the reader can understand their meaning clearly and easily. For the sake of simplicity, it is important that too much material should not be loaded in a single diagram otherwise it may become too confusing and prove worthless. Several simple charts are often better and more effective than one or two complex ones which may present the same material in a confusing way.

Types of Diagrams- n practice, a very large variety of diagrams are in use and new ones are constantly being added. For the sake of convenience and simplicity they may be divided as- one-dimensional diagrams, e.g., bar diagrams; two-dimensional diagrams, e.g., rectangles, squares and circles ;

three-dimensional diagrams, e.g., cubes, cylinders and spheres; pictograms and cartograms. Each of these types is discussed in detail as follows:

One-dimensional or bar diagrams- Bar diagrams are the most common type of diagrams used in practice. A bar is a thick line whose width is shown merely for attention. They are called one-dimensional because it is only the length of the bar that matters and not the width. When the number of items is large, lines may be drawn instead of bars to economise space. Bar diagrams can be -simple bar diagram, sub-divided bar diagrams, multiple bar diagrams, percentage bar diagrams and deviation bars. The special *merits* of bar diagrams are - they are readily understood even by those unaccustomed to reading charts or those who are not chart-minded; they possess the outstanding advantage that they are the simplest and the easiest to make; when a large number of items are to be compared they are the only form that can be used effectively. While constructing bar diagrams the following points should be kept in mind- the width of the bars should be uniform throughout the diagram; the gap between one bar and another should be uniform throughout; bars may be either horizontal or vertical. The vertical bars should be preferred because they give a better look and also facilitate comparison; while constructing the bar diagram, it is desirable to write the respective figure at the end of each bar so that the reader can know the precise value without looking at the scale. This is particularly so where the scale is too narrow, for example, “1” on paper may represent 10 crore people.

Two-dimensional diagrams- As distinguished from one dimensional diagrams in which only the length of the bars is taken into account, in two-dimensional diagrams the length as well as the width of the bars is considered. Thus the area of the bars represents the given data. Two-dimensional diagrams are also known as surface diagrams or area diagrams. The important types of such diagrams are-Rectangles, squares, and circles.

Three-dimensional diagrams- The three dimensional diagrams have the same features as the two dimensional diagrams and to an even greater degree. Thus the side of a cube must be proportionate to the cube-root of the magnitude to be represented. It is very difficult for the eye to read precisely such diagrams and hence they are not recommended for statistical presentation.

Pictographs and cartograms*-Pictographs* are very popularly used in presenting statistical data. They are not abstract presentations such as lines or bars but really depict the kind of data we are dealing with. Pictures are attractive and easy to comprehend and as such this method is particularly useful in presenting statistics to the layman. When pictographs are used data are represented through a pictorial symbol that is carefully selected. The merits of pictographs are- compared with other types of diagrams pictographs have a greater attraction value and stimulate interest in the information being represented; facts portrayed in pictorial form are generally remembered longer than facts presented in tables or in non-pictorial charts. However these are difficult to construct. Besides, it is necessary to use one symbol to represent a fixed number of units which may create difficulties. *Cartograms or statistical maps* are used to give quantitative information on a geographical basis. They are thus used to represent spatial distributions. The quantities on the map can be shown in many ways, such as through shades or colours, by dots, by placing pictograms in the geographical unit and by placing the appropriate numerical figure in each geographical unit. Statistical maps should be used only where geographic comparison are of primary importance and where approximate measures will suffice. For more accurate representation of size, bar charts are preferable. To be sure, maps are sometimes combined which are drawn in the appropriate areas.

Choice of a Suitable Diagram- Which diagram out of several ones to select in a given situation is a ticklish problem. The choice would primarily depend upon two factors, namely- the nature of the data and the type of people for whom the diagram is meant. On the nature of the data would depend whether to use one-dimensional, two-dimensional or three dimensional diagram, and it is one-dimensional, whether to adopt the simple bar or subdivided bar, multiple bar or some other type. As

already stated, a cubic diagram would be preferred to a bar if the magnitudes of the figures are very wide apart. The type of people for whom the diagram is intended must also be considered. For example, for drawing attention of an uneducated mass, pictographs and cartograms are more effective than cubes, circles, etc. *Simple bar charts* should be used where changes in totals are required to be conveyed. *Component bar charts* are more useful where changes in totals as well as in the size of component figures (absolute ones) are required to be displayed. *Percentage composition bar charts* are better suited where changes in the relative size of component figures are to be exhibited. *Multiple bar charts* should be used where changes in the absolute values of the components figures are to be emphasized and the overall total is of no importance. A *pie chart* is particularly useful where it is desired to show the relative proportions of the figures that go to make up a single overall total. *Cubes* should be used in those cases where the difference between the smallest and largest value to be represented is very large. *Pictographs and cartograms* are more informative and more effective than other forms for presenting data to the general public who, by and large, neither possess much ability to understand nor take interest in the less attractive forms of presentation. The pictograph is admirably suited to the illustrations of exhibits or articles in newspapers and magazines or for dressing up annual reports. Cartograms or statistical maps are particularly effective in bringing out the geographical pattern that may lie concealed in the data.

Graphs

A large variety of graphs are used in practice. Broadly, the various graphs can be divided under the following two heads- graphs of time series, graphs of frequency distributions.

Handout No-10, Organization of data

This has the following stages:

a). Editing of data

Once data have been obtained either from primary or secondary source, the next step in a statistical investigation is to edit the data, i.e., to scrutinize the same. The chief object of editing is to detect possible errors and irregularities. The task of editing is a highly specialized one and requires great care and attention. Negligence in this respect may render useless the findings of an otherwise valuable study. However, it should be noted that the work of editing data collected from internal records and published sources is relatively simple – it is the data collected from a survey that need extensive editing. While editing primary data the considerations which need attention are- data should be complete, data should be consistent, data should be accurate, and data should be homogeneous.

i. Editing for completeness-The editor should see that each schedule and questionnaire is complete is all respects, i.e., answer to each and every question has been furnished. If some questions have not been answered and those questions are of vital importance, the informants should be contacted again either personally or through correspondence. It may happen that in spite of best efforts a few questions remain unanswered. In such questions, the editor should mark 'No answer' in the space provided for answers and if the questions are of vital importance then the schedule or questionnaire should be dropped.
ii. Editing for consistency- While editing the data for consistency, the editor should see that the answers to questions are not contradictory in nature. If there are mutually contradictory answers, he should try to obtain the correct answers either by referring back the questionnaire of by contacting, wherever possible, the informant in person. For example, if amongst others, two questions in a questionnaire are - Are you married? State the number of children you have, and the reply to the former question is 'no' and to the latter 'three', then there is contradiction and it should be clarified.
iii. Editing for accuracy- The reliability of conclusions depends basically on the correctness of information. If the information supplied is wrong, conclusions can never be valid. It is, therefore, necessary for the editor to see that the information is accurate in all respects. However, this is one of the most difficult tasks of the editor. If the inaccuracy is due to arithmetical errors, it can be easily detected and corrected. But if the cause of inaccuracy is faulty information, it may be difficult to verify it, e.g., information relating to income, age, etc.
iv. Editing for homogeneity-By homogeneity is meant the condition in which all the questions have been understood in the same sense. The editor must check all the questions for uniform interpretation. For example, as to the question of income, if some informants have given monthly income, no comparison can be made. Similarly, if some persons have given the basic income whereas others the total income, no comparison is possible. The editor should check up that the information supplied by the various people is homogeneous and uniform.

Handout No-11, Statistical fallacies

Statistics are convincing and this has led many people to believe that they can be accepted without question. However, this is a false notion as misuses are probably as common as valid uses of statistics. The figures provide only raw material for someone to reason from-they seldom, if ever, speak for themselves, i.e., they have to be interpreted. The interpretation of data is a very difficult task and requires a high degree of skill, care, judgment and objectivity. In the absence of these, there is every likelihood of the data being misused to prove things that are not at all true. In fact experience shows that the largest number of mistakes are committed consciously or unconsciously while interpreting statistical data and very often facts and figures are presented in such a manner that they are misinterpreted by most of the readers. Statistical fallacies may arise in collection, presentation, analysis and interpretation of data. The following are some of the specific examples illustrating how statistics can be misinterpreted or how fallacies arise in using statistical data and statistical methods:

i. *Bias-* Bias, conscious or unconscious, is very common is statistical work and it leads to false conclusions. For example, if an investigator wants to prove the level of wages in a factory is very low he may select the statistical information that is twisted in such a manner as to grind one's own axe. Unconscious bias is even more insidious. Perhaps, all statistical reports contain some unconscious bias, since the results of statistical work must be interpreted by human beings, each of whom can judge only in terms of his own experience and his attitude towards the problem at hand. The investigator must disregard his preconceptions and avoid wishful thinking in order to attain an objective conclusion.
ii. *Inconsistency in definitions-* Sometimes false conclusions are drawn because of failure to define properly the object being studied and hold that definition constant in making comparisons. For example, while comparing the national income figures of two countries, say, India and U.S.A., it is absolutely essential that the definition of national income is taken to be the same in both countries.
iii. *Faulty generalizations-* A basic error that is very often committed in statistical work is to jump to conclusions or generalization on the basis of either too small a sample or a sample that is nor representative of the population to which the conclusions are applied.
iv. *Faulty deductions*- If we apply a general rule erroneously to a specific case, it would lead to faulty deduction.
v. *Inappropriate comparison*- In order to draw conclusions from the data it is necessary to make comparisons. However, comparisons between two things cannot be made unless they are really alike. Unfortunately, this point is generally forgotten and comparisons are made between two dissimilar things, thereby leading to fallacious conclusions.
vi. *Misuse of various tools of analysis like mean, median, mode, dispersion, correlation, etc.*- The various tools of analysis are very often misused to present information in such a manner as to deceive the public.
vii. *Faulty interpretation of trend, seasonal and cyclical variations, etc.*- The various components of time series may be incorrectly analyzed and interpreted.
viii. *Technical errors*- Many types of technical errors are possible in statistical work which would have the effect of arriving at wrong conclusions from the data. For example, errors may be committed in the choice of a suitable formula, such as arithmetic mean may be used in a situation where harmonic mean is more appropriate. Similarly arithmetical errors may also be committed while classifying the data or analysis the data. Errors in units of measurement are also common.
ix. *Failure to comprehend the total background of the data*- Very often figures are interpreted without comprehending the total background of the data, leading to wrong conclusions.

Handout No-12, Guidelines for writing thesis/dissertation

Research shall form an integral part of the education programme of all candidates registered for Diplomat of NB degrees of the Board. The Basic aim of requiring the candidates to write a thesis/ dissertation is to familiarize him/her with research methodology. The members of the faculty guiding the thesis/dissertation work for the candidate shall ensure that the subject matter selected for the thesis/dissertation is **feasible, economical** and **original**.

Guidelines

I. The thesis may be normally restricted to the size to 100 pages. To achieve this, following points may be kept in view;

(i) Only contemporary and relevant literature may be reviewed.

(ii) The techniques may not be described in detail unless any modification/innovations of the standard techniques are used and reference may be given.

(iii) Illustrative material may be restricted.

(iv) Since most of the difficulties faced by the residents relate to the work in clinical subject or clinically oriented laboratory subjects the following steps are suggested:

- For prospective study, as far as possible, the number of cases should be such that adequate material, judged from the hospital attendance, will be available and the candidate will be able to collect the case material within a period of 6-12 months so that he/she is in a position to complete the work within the stipulated time.
- The objectives of the study should be well defined.
- As far as possible, only clinical or laboratory data of investigations of patients or such other material easily accessible in the existing facilities should be used for the study.
- Technical assistance, wherever necessary, may be provided by the department concerned. The resident of one speciality taking up some problem related to some other speciality should have some basic knowledge about the subject and he/she should be able to perform the investigations independently, wherever some specialised laboratory investigations are required a co-guide may be co-opted from the concerned investigative department, the quantum of laboratory work to be carried out by the candidate should be decided by the guide and co-guide by mutual consultation.
- The Clinical residents may not ordinarily be expected to undertake experimental work or clinical work involving new techniques, not hitherto perfected or the use of chemicals or radio isotopes not readily available. They should however, be free to enlarge the scope of their studies or undertake experimental work on their own initiative but all such studies should be feasible within the existing facilities.
- The residents should be able to use freely the surgical pathology/autopsy data if it is restricted to diagnosis only, if however, detailed historic data are required the resident will have to study the cases himself with the help of the guide/co-guide. The same will apply in case of clinical data.
- Statistical methods used for analysis should be described in detail.

Rules for Submission of Thesis/ Dissertation by candidates for DNB

(i) The protocol of Thesis/ Dissertation should be submitted to the office of the NBE through head of the institutions within three (3) months of joining the training in Medical college/ university/DNB accredited institution.

(ii) No correspondence will be made in regard to acceptance of the protocol except only in the case of rejected protocols for which individual will be informed by office through mail/website.

(iii) The guide will be a recognized PG teacher in Medical college or university or NBE Accredited institutions. The teacher should have the experience of 5 years in speciality after obtaining the post graduate degree. The certificate of PG teaching and being Guide recognized by University/NBE must be enclosed alongwith thesis/dissertation. The Guide can guide one MD/MS candidate and one university diploma candidate desirous of taking the DNB examination, or one direct NBE candidate. Total number of candidates should be two including all sources.

(iv) Candidates who will be appearing in the subject under the heading Super Speciality (like Cardiology & Cardio Thoracic Surgery etc.) need not write their thesis/dissertation if they have already written their thesis during their MD/MS/NBE examinations. However they have to submit a proof in support of their having written thesis during their MD/MS examination.

(v) If the candidates appearing in the broad specialities have already written their thesis in the MD/MS examination, they need not submit the thesis/dissertation. However they are required to submit a copy of the letter accepting the thesis by the University.

(vi) If thesis is rejected or needs to be modified for acceptance, the Board will return it to the candidate with suggestion of assessors in writing for modification. The result of such candidate will be kept pending till the thesis is modified or rewritten, accordingly as the case may be and accepted by the assessors of the Board.

(vi) If any unethical practice is detected in work of the Thesis, the same is liable to be rejected. Such candidates are also liable to face disciplinary action as may be decided by the Board.

(vii) The thesis is to be submitted 6 MONTHS before the commencement of the DNB examination. Theory result of the candidates whose thesis/dissertation are accepted by the Board will be declared.

Guidelines for Writing of Thesis/Dissertation

Title - Should be brief, clear and focus on the relevance of the topic.

Introduction – Should state the purpose of study, mention lacunae in current knowledge and enunciate the Hypothesis, if any.

Review of Literature – Should be relevant, complete and current to date.

Material and Methods- Should include the type of study (prospective, retrospective, controlled double blind) details of material & experimental design procedure used for data collection & statistical methods employed; statement of limitations ethical issues involved.

Observations– Should be Organized in readily identifiable sections Having correct analysis of data be presented in appropriate charts, tables, graphs &

diagram etc. These should be statistically interpreted.

Discussion- Observations of the study should be discussed and compared with other research studies. The discussion should highlight original findings and should also include suggestion for future.

Summary and Conclusion

Bibliography - Should be correctly arranged in Vancouver pattern.

Appendix—All tools used for data collection such as questionnaire, interview schedules, observation check lists etc should be put in the annexure.