Research Methodology Made Easy

A Beginner's Guide for Medical and Dental Students and Postgraduate Trainees

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Preface

Research is simply a careful, honest way of answering a question. If you can ask a good question and count carefully, you can do research.

Many students and young doctors fear research because it seems full of statistics and difficult words. This book removes that fear. It explains each step in plain language, with examples from everyday surgical practice.

Who this book is for

- MBBS and BDS students starting their first project
- House officers and postgraduate trainees writing a synopsis or dissertation (for example, for CPSP or a university)
- Any doctor who wants to read a research paper with confidence

How to use this book

1. Read the chapters in order the first time. Each one builds on the last.
2. At the end of each chapter, look at the "Remember" box. These are the points examiners and supervisors ask about most.
3. Use the glossary at the end whenever a word confuses you.
4. Try the self-assessment questions at the end before your viva or synopsis defence.

One running example. Throughout the book we follow one simple question so you can see every step applied: *"In patients with acute appendicitis, does laparoscopic appendicectomy lead to fewer wound infections than open appendicectomy?"*

Chapter 1: What Is Research?

Research is a systematic search for new knowledge, done in a planned way so that others can check and repeat it. "Systematic" is the key word: we follow fixed steps, not guesswork.

Why should a doctor do research?

- To find which treatment works better for our patients
- To learn to read journals critically, not blindly
- It is required for postgraduate training, promotion and teaching posts
- Local research gives answers for local patients; results from Europe may not apply in Lahore

Types of research (simple view)

Type	What it does	Example
Basic (laboratory)	Studies mechanisms in cells or animals	Effect of a drug on wound healing in rats
Clinical	Studies patients directly	Comparing two operations for piles
Epidemiological	Studies disease in populations	How common gallstones are in Punjab
Health systems	Studies how care is delivered	Waiting time in the surgical OPD
Qualitative	Explores feelings and experiences in words, not numbers	Why patients delay coming with breast lumps
Quantitative	Measures things in numbers	Mean hospital stay after surgery

The research process — ten steps

1. Identify a problem you see in practice
2. Read what is already known (literature review)
3. Write a clear research question and objectives
4. Choose the study design
5. Decide the population, sample size and sampling method
6. Prepare the data collection proforma
7. Get ethical approval
8. Collect the data
9. Analyse the data
10. Write and publish the results

Notice that data collection is step 8. Most of the work is in planning. A well-planned study almost writes itself; a badly planned one cannot be rescued by statistics.

> **Remember:** Research = a question + a plan + honest data + correct analysis + clear reporting.

Chapter 2: Choosing a Topic and Framing the Question

A good research question is the foundation of the whole study. A vague question gives a vague answer.

Where do topics come from?

- A problem you face in the ward or OT ("Why do so many of our hernia wounds get infected?")
- A controversy in the textbook or journals
- A new technique you want to compare with the old one
- The "recommendations for future research" at the end of published papers

Is my question good? Use FINER

Letter	Meaning	Ask yourself
F	Feasible	Do I have enough patients, time, money and skill?
I	Interesting	Does it interest me and my supervisor?
N	Novel	Does it add something new, at least locally?
E	Ethical	Will it harm or exploit patients?
R	Relevant	Will the answer change practice or policy?

Make it precise. Use PICO

Letter	Meaning	Running example
P	Population / Patient	Adults with acute appendicitis
I	Intervention	Laparoscopic appendicectomy
C	Comparison	Open appendicectomy
O	Outcome	Surgical site infection within 30 days

Sometimes a **T** (Time) is added, making it PICOT. Our question has T = 30 days.

Hypothesis

A hypothesis is a testable statement of what you expect.

- **Null hypothesis (H0):** there is no difference. *"There is no difference in wound infection rate between laparoscopic and open appendicectomy."*
- **Alternative hypothesis (H1):** there is a difference. *"Wound infection rate is lower after laparoscopic appendicectomy."*

Statistics always tests the null hypothesis. We try to reject it.

Objectives

Objectives are short statements of what you will do. Start with an action verb: *to compare, to determine, to assess.* Keep one main objective.

- Good: *"To compare the frequency of surgical site infection after laparoscopic versus open appendicectomy in adults."*
- Poor: *"To study appendicitis."* (Too broad, nothing measurable.)

Operational definitions

Define every key term so that anyone would measure it the same way. Example: *Surgical site infection = purulent discharge from the wound, or a positive wound culture, or wound opened by the surgeon for infection, within 30 days of surgery.*

> **Remember:** FINER tells you if the question is worth asking; PICO tells you exactly what you are asking.

Chapter 3: Literature Review

A literature review tells you what is already known, so you do not repeat old work and you can justify why your study is needed.

Why review the literature?

- To check that your question has not already been answered well
- To learn which methods and definitions others used
- To find the expected result (needed for sample size, Chapter 5)
- To compare your results in the Discussion later

Where to search

Source	Use it for
PubMed (free)	The main database of medical journals

Source	Use it for
Google Scholar (free)	Wide search, shows how often a paper is cited
Cochrane Library	Systematic reviews of treatments
PakMediNet / local journals (JCPSP, JPMA, etc.)	Pakistani studies, useful for local comparison
HEC Digital Library	Full-text access through your university

How to search PubMed — step by step

1. Break your PICO into keywords: *appendicitis, laparoscopic, open, wound infection.*
2. Add synonyms with OR: *wound infection OR surgical site infection.*
3. Join different concepts with AND: *appendicectomy AND laparoscopic AND surgical site infection.*
4. Use filters: last 10 years, human, English, study type (e.g. randomised controlled trial).
5. Read titles, then abstracts, then the full text of the most relevant papers.
6. Look at the reference list of good papers to find more ("snowballing").

Making notes

Keep a simple table for every paper you read: author and year, country, design, sample size, main result. This table becomes your literature review and saves weeks of work later.

Reference managers

Free software such as **Zotero** or **Mendeley** stores your papers and inserts references automatically in Vancouver style. Learn one early.

> **Remember:** Prefer recent papers, systematic reviews and randomised trials. Always read the full paper, not only the abstract, before quoting it.

Chapter 4: Study Designs

The study design is the plan for how you will answer your question. Choosing the right design is the single most important methodological decision.

The first big division

- **Observational study:** you only watch and record. You do not decide who gets which treatment.

- **Experimental (interventional) study:** you decide (ideally by random allocation) who gets which treatment.

Descriptive studies (no comparison group)

Design	What it is	Example
Case report	One unusual patient described in detail	A rare giant pilonidal sinus
Case series	A group of patients with the same condition or treatment	Outcome of 50 laser haemorrhoidoplasties
Cross-sectional	A "snapshot" at one point in time; measures prevalence	Frequency of H. pylori in patients with dyspepsia in OPD

Analytical observational studies (have a comparison)

Design	Direction	Measure	Example
Case-control	Starts with outcome, looks back for exposure	Odds ratio	Breast cancer cases vs controls: who used oral contraceptives?
Cohort (prospective or retrospective)	Starts with exposure, follows forward to outcome	Relative risk, incidence	Smokers vs non-smokers followed for wound dehiscence

Case-control is quick and good for rare diseases. Cohort is slower but better for showing that exposure came before outcome.

Experimental studies

- **Randomised controlled trial (RCT):** patients are randomly allocated to intervention or control. Randomisation balances known and unknown factors between groups. It is the best design to prove a treatment works.
- **Blinding:** single-blind (patient does not know the group), double-blind (patient and assessor do not know). Blinding reduces bias in measuring outcomes.
- **Non-randomised (quasi-experimental) trial:** groups are compared but not randomly allocated, for example alternate patients. Easier, but weaker.

Secondary research

- **Systematic review:** collects all studies on one question using a fixed, reproducible method.

- **Meta-analysis:** combines the numbers from those studies statistically to give one pooled result.

Hierarchy of evidence (strongest at the top)

1. Systematic reviews and meta-analyses of RCTs
2. Randomised controlled trials
3. Cohort studies
4. Case-control studies
5. Cross-sectional studies
6. Case series and case reports
7. Expert opinion

How to choose the design — quick guide

- "How common is X?" → Cross-sectional
- "What is the outcome of my operation?" → Case series (descriptive)
- "What causes a rare disease?" → Case-control
- "What happens later to people exposed to X?" → Cohort
- "Is treatment A better than B?" → RCT

Our running example compares two treatments, so the ideal design is an **RCT**. If randomisation is not possible, a prospective cohort comparing the two groups is the next choice.

> **Remember:** Many postgraduate synopses use "descriptive case series" or "cross-sectional" designs. Use the term your examining body expects, and make sure the design truly matches your objective.

Chapter 5: Population, Sampling and Sample Size

We cannot study every patient in the world, so we study a sample and use it to say something about the whole population. The sample must be large enough and chosen fairly.

Key words

- **Target population:** everyone you want your result to apply to (all adults with appendicitis).
- **Study population:** those you can actually reach (patients admitted to your surgical unit).
- **Sample:** those you actually enrol.

- **Inclusion criteria:** who can enter (age 18–60, clinically diagnosed acute appendicitis).
- **Exclusion criteria:** who must be left out (appendicular mass, pregnancy, immunosuppression, diabetes if it affects infection).

Sampling methods

Type	Method	How it works
Probability (best)	Simple random	Every person has an equal chance, e.g. lottery or random number table
Probability	Systematic	Every k-th patient, e.g. every 3rd admission
Probability	Stratified	Divide into groups (male/female) then sample randomly from each
Probability	Cluster	Randomly select whole groups, e.g. villages or schools
Non-probability	Consecutive	Every eligible patient who comes during the study period
Non-probability	Convenience	Whoever is easily available; weakest
Non-probability	Purposive	Chosen for a reason; common in qualitative research

In hospital studies, **non-probability consecutive sampling** is the most common and acceptable method. Say so honestly in your methods.

Why sample size matters

Too small a sample may miss a real difference (a false negative). Too large wastes time and exposes more patients than needed. Sample size is calculated, never guessed.

What you need for the calculation

1. **Confidence level** — usually 95% (Z = 1.96)
2. **Power** — usually 80% (Z = 0.84); the chance of detecting a real difference
3. **Expected proportion or mean** — taken from a previous study (this is why you need the literature)
4. **Margin of error (d)** — how precise you want the answer, e.g. 5%

Formula 1: estimating one proportion (descriptive / cross-sectional)

```
n = \frac{Z^{2} \, p \, (1 - p)}{d^{2}}
```

Example: a previous study found wound infection after open appendicectomy in 10% (p = 0.10). With 95% confidence and d = 0.05: n = (1.96 × 1.96 × 0.10 × 0.90) ÷ 0.0025 = 138.3, so **139 patients**.

Formula 2: comparing two proportions (two groups)

```
n_{\text{per group}} = \frac{(Z_{\alpha/2} + Z_{\beta})^{2} \, [\, p_1(1-p_1) + p_2(1-p_2) \,]}{(p_1 - p_2)^{2}}
```

Example: infection 10% after open and 3% after laparoscopic surgery. $(1.96 + 0.84)^2 = 7.84$; p1q1 + p2q2 = 0.09 + 0.0291 = 0.1191; $(0.10 - 0.03)^2 = 0.0049$. So n = 7.84 × 0.1191 ÷ 0.0049 = 190.6, so **191 patients in each group**.

Add about 10% for patients lost to follow-up.

Easy tools. You do not have to calculate by hand. The free **WHO sample size calculator**, **OpenEpi** (openepi.com) or **G*Power** do it for you. Always write in your synopsis which tool and which values you used, with the reference for the expected proportion.

> **Remember:** Every sample size needs a reference. "Expected proportion = 10% (Author, year)" must appear in your synopsis.

Chapter 6: Variables and Data Collection

A variable is anything that can vary from one patient to another and that you will record. Knowing the type of each variable tells you how to present and analyse it.

Independent and dependent variables

- **Independent variable:** the cause or exposure you compare (type of surgery).
- **Dependent (outcome) variable:** the effect you measure (wound infection).
- **Confounding variable:** a third factor linked to both, which can mislead you (diabetes, obesity). See Chapter 7.

Types of variables

Type	Sub-type	Meaning	Example
Qualitative (categorical)	Nominal	Categories with no order	Gender, blood group, infection yes/no
Qualitative (categorical)	Ordinal	Categories with an order	ASA grade I–IV, pain mild/moderate/severe

Type	Sub-type	Meaning	Example
Quantitative (numerical)	Discrete	Whole numbers, counted	Number of children, number of port sites
Quantitative (numerical)	Continuous	Any value, measured	Age, BMI, operating time, haemoglobin

Data collection tools

- **Proforma (data collection sheet):** a printed form you fill for every patient. Used in most clinical studies.
- **Questionnaire:** questions the patient answers. Prefer already validated questionnaires (e.g. a validated quality-of-life score) instead of making your own.
- **Interview:** structured (fixed questions) or unstructured (open conversation; qualitative).
- **Records review:** data taken from case files; used in retrospective studies, but files are often incomplete.

A good proforma

1. Has a serial number, not the patient's name, on each page (protects confidentiality)
2. Records only what your objectives need — not "everything"
3. Uses tick boxes and fixed units (kg, minutes, days)
4. Contains the operational definition of the outcome
5. Is tested on 5–10 patients first (a pilot) and corrected before the real study

Entering data

Enter data into SPSS or Excel daily. Use codes (1 = male, 2 = female), keep one row per patient and one column per variable, and keep a backup copy.

> **Remember:** The type of variable decides the statistics: categorical → frequencies and percentages; continuous → mean and standard deviation (or median if skewed).

Chapter 7: Bias, Confounding, Validity and Reliability

A study can give a wrong answer for three reasons: chance, bias or confounding. Good design protects against all three.

Chance (random error) is reduced by an adequate sample size and is measured by the p-value and confidence interval (Chapter 8).

Bias (systematic error) is a fault in the design or conduct that pushes results consistently in one direction. A bigger sample does not fix bias.

Bias	What happens	How to prevent it
Selection bias	The groups differ from the start (e.g. fitter patients get laparoscopy)	Randomisation; clear inclusion criteria
Measurement (observer) bias	The assessor judges the outcome differently in each group	Blinding; fixed operational definitions
Recall bias	Cases remember past exposures better than controls	Use records; structured questions
Loss to follow-up	Patients who drop out differ from those who stay	Collect phone numbers; plan follow-up visits
Publication bias	Positive results get published; negative ones do not	Register trials; publish all results

Confounding

A confounder is linked to both the exposure and the outcome and makes a false link appear.

Example: you find more wound infections after open surgery. But in your hospital, diabetic patients are more often operated open, and diabetes itself increases infection. Diabetes is a confounder.

Control confounding by:

- **Randomisation** (in RCTs; the best method)
- **Restriction** (exclude diabetics)
- **Matching** (pair each case with a similar control)
- **Stratification** (analyse diabetics and non-diabetics separately)
- **Multivariate analysis** (e.g. logistic regression, with a statistician's help)

Validity and reliability

- **Internal validity:** are the results true for the patients studied? (Threatened by bias and confounding.)
- **External validity (generalisability):** do the results apply to other patients and hospitals?

- **Reliability:** does the tool give the same answer when repeated? A weighing machine that shows different weights each time is unreliable.

A simple picture: shots that land close together are *reliable*; shots that land on the bull's-eye are *valid*. We want both.

> **Remember:** Chance → sample size. Bias → good design. Confounding → randomise, restrict, match, stratify or adjust.

Chapter 8: Basic Biostatistics for Beginners

You do not need to be a mathematician. You need to know which number to report and which test to use. Software (SPSS, or free tools like JASP and Jamovi) does the arithmetic.

Descriptive statistics — describing your data

- **Mean:** the average. Use for symmetrical (normally distributed) continuous data.
- **Median:** the middle value. Use when data are skewed (e.g. hospital stay, where a few patients stay very long).
- **Mode:** the most frequent value.
- **Standard deviation (SD):** how spread out values are around the mean. Report as mean ± SD (e.g. age 32.4 ± 9.1 years).
- **Interquartile range (IQR):** spread around the median.
- **Frequency and percentage:** for categorical data (e.g. infection in 12/150, 8%).

Normal distribution. A bell-shaped curve. About 68% of values lie within 1 SD of the mean and 95% within about 2 SD. Check normality (histogram or Shapiro-Wilk test) before choosing a test.

Inferential statistics — drawing conclusions

- **p-value:** the probability of getting a result at least this extreme *if the null hypothesis were true*. By convention, $p < 0.05$ is called "statistically significant". It does **not** tell you the size or clinical importance of the effect.
- **95% confidence interval (CI):** the range within which the true value probably lies. A narrow CI means a precise estimate. For a difference, if the CI includes 0 the result is not significant; for a ratio (RR, OR), if it includes 1 it is not significant.
- **Type I error (α):** saying there is a difference when there is none (false positive). Usually set at 5%.
- **Type II error (β):** missing a real difference (false negative). Power = 1 − β, usually 80%.

Which test? A simple guide

Your comparison	Data type	Test (normal data)	Test (skewed / small data)
Two groups	Categorical (yes/no)	Chi-square test	Fisher's exact test
Two independent groups	Continuous	Independent t-test	Mann-Whitney U test
Same patients, before and after	Continuous	Paired t-test	Wilcoxon signed-rank test
Three or more groups	Continuous	One-way ANOVA	Kruskal-Wallis test
Relationship between two continuous variables	Continuous	Pearson correlation	Spearman correlation
Several factors affecting a yes/no outcome	Mixed	Logistic regression	—

Running example. Wound infection (yes/no) in two groups → **chi-square test**. Operating time (minutes) in two groups → **independent t-test**, or Mann-Whitney if skewed.

Measures of risk

- **Relative risk (RR):** risk in exposed ÷ risk in unexposed (cohort studies, RCTs). RR = 1 means no effect.
- **Odds ratio (OR):** used in case-control studies; interpreted similarly.
- **Number needed to treat (NNT):** how many patients must be treated for one to benefit = 1 ÷ absolute risk reduction. If infection falls from 10% to 3%, NNT = 1 ÷ 0.07 ≈ 15.

Diagnostic test statistics

- **Sensitivity:** of those with the disease, how many test positive. ("SnNout": a highly Sensitive test, when Negative, rules out.)
- **Specificity:** of those without the disease, how many test negative. ("SpPin": a highly Specific test, when Positive, rules in.)
- **Positive predictive value (PPV):** of those testing positive, how many truly have the disease.
- **Negative predictive value (NPV):** of those testing negative, how many are truly free of it.

> **Remember:** Statistical significance is not the same as clinical importance. Always report the actual numbers, the CI and the p-value together.

Chapter 9: Research Ethics

The patient's safety, dignity and rights always come before the research. No result is worth harming a patient for.

Key documents to know

- **Nuremberg Code (1947):** written after Nazi experiments; voluntary consent is essential.
- **Declaration of Helsinki (World Medical Association, first 1964, revised several times):** the main ethical guide for medical research on humans.
- **Belmont Report (1979):** gave the three basic principles below.

Basic principles

Principle	Meaning in practice
Respect for persons (autonomy)	Informed consent; freedom to refuse or withdraw at any time without losing treatment
Beneficence	Maximise benefit; minimise risk
Non-maleficence	Do no harm
Justice	Fair selection; do not burden only the poor or vulnerable

Informed consent must include

1. The purpose of the study, in simple language (Urdu or the patient's own language)
2. What will be done and how long it takes
3. Possible risks and benefits
4. That participation is voluntary, and refusing will not affect their care
5. That their data will be kept confidential
6. Who to contact with questions

For children, consent comes from the parent or guardian, with the child's assent where possible. For patients unable to consent, follow your ethics committee's rules for a legally authorised representative.

Ethical approval

Every study involving patients or their records must be approved by the **Institutional Review Board (IRB) / Ethical Review Committee** of your hospital before data collection starts. Keep the approval letter; journals ask for its reference number.

Research misconduct (never do these)

- **Fabrication:** making up data
- **Falsification:** changing data or results
- **Plagiarism:** using others' words or ideas without credit
- **Gift authorship:** adding names of people who did not contribute
- **Duplicate publication:** publishing the same study twice

> **Remember:** No ethics approval and no consent = no study. This is the first thing journals and examiners check.

Chapter 10: Writing a Synopsis (Research Proposal)

A synopsis is the written plan of your study, prepared and approved before you collect any data. Examining bodies such as CPSP and universities have their own format, so always download the latest guidelines and template first; the outline below shows the usual parts.

Section	What to write	Common mistake
Title	Short, specific; include design, population, comparison and outcome	"Study of appendicitis" — too vague
Introduction	Background of the problem, what is known, the gap, and why your study is needed (with references)	Copying textbook paragraphs
Objective(s)	One main objective with an action verb	Several unrelated objectives
Hypothesis	Needed for comparative studies; not for purely descriptive ones	Writing a hypothesis for a descriptive study
Operational definitions	Exact definition of each key variable and outcome	Undefined outcomes like "good result"

Section	What to write	Common mistake
Materials and methods	Design, setting, duration, sample size (with reference), sampling technique, inclusion/exclusion criteria, data collection procedure, data analysis plan	Missing the reference for sample size
Data analysis	Software, descriptive statistics, test of significance, $p < 0.05$, stratification for confounders	Naming a test that does not fit the variable
References	Vancouver style, recent (mostly last 5–10 years)	Old or unrelated references
Annexures	Proforma and consent form (English and Urdu)	Forgetting the Urdu consent form

Example title

"Frequency of surgical site infection after laparoscopic versus open appendicectomy in adults with acute appendicitis: a randomised controlled trial."

Tips from the examiner's side

- The objective, design, sample size formula and statistical test must all match each other. This "alignment" is checked first.
- Write in the future tense ("Patients will be enrolled…"), because the study has not been done yet.
- Keep it short and clear. Long introductions do not earn extra marks.
- Ask your supervisor and a statistician to read it before submission.

> **Remember:** Synopsis = future tense, plan only. Dissertation/thesis = past tense, plan plus results and discussion.

Chapter 11: Writing and Publishing the Paper

Research is not complete until it is published. Most medical papers follow the **IMRaD** structure.

Part	Answers the question	Tips
Title and abstract	What is this paper about?	Abstract (usually 250 words): Objective, Methods, Results, Conclusion. Many readers read only this, so make it complete.
Introduction	Why did you do it?	3–4 short paragraphs ending with your objective.
Methods	How did you do it?	Enough detail that another surgeon could repeat it. Mention ethics approval and consent.
Results	What did you find?	Facts only, no opinions. Start with patient characteristics (Table 1), then the main outcome. Do not repeat table numbers in the text.
and **D**iscussion	What does it mean?	Main finding first, compare with other studies, explain differences, state limitations honestly.
Conclusion	So what?	One or two sentences that answer the objective. Do not claim more than your data show.

Tables and figures

Use a table for exact numbers and a graph for a trend or comparison. Each must have a clear title and be understandable on its own.

Reporting guidelines (checklists)

- **CONSORT** — randomised controlled trials
- **STROBE** — observational studies (cohort, case-control, cross-sectional)
- **PRISMA** — systematic reviews and meta-analyses
- **CARE** — case reports

Following the right checklist greatly improves your chance of acceptance.

Referencing

Most medical journals use the **Vancouver style**: references are numbered in the order they appear in the text.

Example: 1. Author AB, Author CD. Title of article. Journal Abbreviation. Year;Volume(Issue):Pages.

Plagiarism

Write in your own words and cite every source. Journals and HEC check similarity with software such as Turnitin; keep similarity low (many journals expect under about 19%, but check each journal's rule).

Authorship

By ICMJE criteria, an author must have contributed substantially to the work, helped write or critically revise it, approved the final version, and agreed to be accountable for it. Others are thanked in the Acknowledgements.

Choosing a journal and submitting

1. Choose a journal that publishes your type of study; check it is genuine (indexed in PubMed/Scopus or recognised by HEC/PMDC).
2. Avoid **predatory journals** — those that promise quick publication for a fee with little or no real peer review.
3. Follow the journal's "Instructions to Authors" exactly.
4. Write a short cover letter to the editor.
5. Expect peer review. Reply to every reviewer comment politely, point by point, and show where you changed the manuscript.
6. Rejection is common; improve the paper and submit elsewhere.

> **Remember:** IMRaD + the right checklist + honest limitations + a genuine journal = a publishable paper.

Glossary

Term	Simple meaning
Abstract	Short summary of a paper
Bias	Systematic error that distorts results in one direction
Blinding	Hiding group allocation from patient and/or assessor
Confidence interval	Range likely to contain the true value
Confounder	Third factor linked to both exposure and outcome
Cohort	Group followed over time
Incidence	New cases in a period

Term	Simple meaning
Prevalence	All existing cases at one time
Null hypothesis	Statement that there is no difference
p-value	Probability of the result if the null hypothesis were true
Power	Chance of detecting a real difference (usually 80%)
Randomisation	Allocation by chance so groups are comparable
Sample	The patients actually studied
Variable	Any characteristic that can change between patients

Self-Assessment Questions

Choose the single best answer.

1. A trainee wants to know how common gallstones are among adult women attending the surgical OPD this month. The most suitable design is: A. Case-control B. Cohort C. Cross-sectional D. Randomised controlled trial E. Case report
2. Researchers compare 100 patients with colorectal cancer and 100 without, asking both groups about past red-meat intake. This design is: A. Prospective cohort B. Case-control C. Cross-sectional D. Case series E. RCT
3. In a trial, open surgery was more often done on diabetic patients, and diabetes itself increases wound infection. Diabetes here is best described as a: A. Dependent variable B. Confounder C. Selection criterion D. Outcome E. Random error
4. The main purpose of randomisation in a clinical trial is to: A. Blind the surgeon B. Increase sample size C. Make groups comparable for known and unknown factors D. Reduce loss to follow-up E. Avoid the need for consent
5. ASA grade (I to IV) recorded for each patient is an example of which type of variable? A. Nominal B. Ordinal C. Discrete D. Continuous E. Ratio
6. Wound infection (yes/no) is compared between two groups of 150 patients each. The appropriate test is: A. Paired t-test B. Independent t-test C. Chi-square test D. Pearson correlation E. One-way ANOVA
7. Hospital stay is strongly skewed by a few patients who stay very long. The best summary is: A. Mean and SD B. Median and IQR C. Mode only D. Range only E. Percentage

8. A study reports a relative risk of 0.70 with 95% CI 0.45 to 1.10. The correct interpretation is: A. Significant reduction in risk B. Significant increase in risk C. Not statistically significant D. Study is biased E. Sample size is too large
9. Infection falls from 10% with treatment A to 5% with treatment B. The number needed to treat is: A. 2 B. 5 C. 10 D. 20 E. 50
10. The reporting checklist recommended for a randomised controlled trial is: A. STROBE B. PRISMA C. CARE D. CONSORT E. STARD

Answers

Q	Answer	Why
1	C	Prevalence at one point in time = cross-sectional
2	B	Starts with outcome (cancer) and looks back for exposure
3	B	Linked to both exposure (type of surgery) and outcome
4	C	Randomisation balances known and unknown confounders
5	B	Ordered categories
6	C	Categorical outcome in two independent groups
7	B	Median and IQR for skewed data
8	C	The CI for a ratio includes 1
9	D	ARR = 0.05; NNT = 1 ÷ 0.05 = 20
10	D	CONSORT is for RCTs (STARD is for diagnostic accuracy studies)

JazakAllah. For guidance on research and surgical training: Prof. Zahid Mahmood, Professor of Surgery, Lahore Medical and Dental College · professorzahid.com