

Introduction to Research Methods in

Introduction to Research Methods in Anaesthesia

Designed as a quick-reference guide for students, trainees, and clinicians

1. Why Research Matters in Anaesthesia

Reason	Practical Impact
Evidence-based practice	Guides drug dosing, airway management, monitoring, and perioperative care.
Patient safety	Identifies risk factors for complications (e.g., awareness, postoperative nausea).
Innovation	Drives development of new techniques (e.g., regional blocks, total intravenous anaesthesia).
Policy & guidelines	Supplies data for national protocols and accreditation standards.

2. Core Concepts & Terminology

Term	Definition	Example in Anaesthesia
Population	The group of individuals a study aims to describe or affect.	Adults undergoing elective abdominal surgery.
Sample	Subset of the population actually studied.	120 patients recruited from one tertiary centre.
Variable	Measurable characteristic that can vary.	End-tidal CO ₂ , time to extubation, pain score.
Outcome (endpoint)	The primary result the study is designed to assess.	Incidence of postoperative nausea and vomiting (PONV).
Exposure / Intervention	The factor being investigated.	Use of propofol vs. sevoflurane for maintenance.
Confounder	Variable related to both exposure and outcome, potentially biasing results.	Age influencing both drug metabolism and PONV risk.
Bias	Systematic error that distorts true association.	Selection bias if only low-risk patients are enrolled.

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Statistical significance	Probability that an observed effect is not due to chance (commonly $p < 0.05$).	A p-value of 0.03 for reduced emergence delirium with dexmedetomidine.

Anaesthesia

3. Study Designs Frequently Used in Anaesthesia

Design	Key Features	Typical Use in Anaesthesia
Randomised Controlled Trial (RCT)	Participants randomly allocated to intervention or control; blinding possible.	Comparing two analgesic regimens for postoperative pain.
Crossover Trial	Same participants receive both interventions in random order, separated by a washout period.	Evaluating two inhalational agents on recovery times.
Cohort Study	Prospective or retrospective follow-up of exposed vs. unexposed groups.	Observing incidence of chronic pain after thoracic surgery.
Case-Control Study	Starts with outcome (cases) and looks back for exposure.	Identifying risk factors for malignant hyperthermia.
Cross-sectional Survey	Snapshot of variables at a single point in time.	Survey of anaesthetists' preferences for airway devices.
Systematic Review & Meta-analysis	Comprehensive literature synthesis; quantitative pooling of results.	Summarising evidence on the efficacy of ultrasound-guided nerve blocks.
Quality Improvement (QI) Project	Iterative cycles (Plan-Do-Study-Act) to improve local practice.	Reducing intra-operative hypothermia rates in a hospital.

4. Steps in Conducting a Research Project

1. Identify a clinically relevant question

- Use the **PICO** framework (Population, Intervention, Comparison, Outcome).
- Example: *In adult patients undergoing laparoscopic cholecystectomy (P), does low-dose ketamine infusion (I) compared with placebo (C) reduce postoperative pain

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