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Developing a research idea: Guidance for anaesthesia investigators

August 2025

Purpose of document:

This document provides guidance for ANZCA fellows, trainees, and emerging investigators to help turn those "thought bubbles" into viable, fundable clinical trials. It draws on real life experience, especially through ANZCA CTN processes, and is tailored for anaesthesia, perioperative and pain medicine research.

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Developing a research idea: Guidance for anaesthesia investigators

Adapted from Professor Tomas Corcoran's presentation at the ANZCA CTN Research Workshop 2020.

1. Introduction

Research ideas often begin as passing thoughts during clinical work. This guidance document helps you transform those "thought bubbles" into viable, fundable clinical trials. It draws on real-life experience, particularly through ANZCA CTN processes, and is tailored for anaesthesia, perioperative, and pain medicine research.

Some of the best research questions arise when a clinician asks, "Why do we do this?" If the answer is not clear, there likely is not a clear one. Anaesthetists, in general, tend to be "early adopters." Early adopters are individuals who embrace new technologies, products, or ideas before they become widely popular or mainstream. However, there is a risk in using a new intervention simply because it seems like a "good idea" without rigorously evaluating safety first.

This leads to the concept of "apophenia," which is common among early adopters. Apophenia is the tendency to perceive meaning in noise, a form of positivity bias, or the belief that a specific intervention "seems to make sense, works, and also seems to be safe." Unfortunately, humans often subscribe to the law of small numbers, whereby they mistakenly believe that small samples are representative of the greater population from which they are drawn. This tendency can lead to "anecdote-based" medicine rather than "evidence-based medicine."

Consequently, many important research questions have arisen from efforts to unravel seemingly beneficial interventions. Consider, for example, goal-directed fluid therapy, beta-blockade for myocardial protection, higher oxygen concentrations to reduce SSI risk, continuation of aspirin at the time of surgery, and many others. Many of our research questions, therefore, challenge dogma or common practices, sometimes with surprising results.

2. Generating research ideas

- Identify key patient groups you work with or have an interest in:
    - Location based (e.g. neuro, ward, theatres, pre-admissions, ICU).
    - Diagnosis based: e.g. cancer surgery, day surgery, cardiac surgery, stage of surgical journey – pre-operative/post-operative, demographically (gender, culture, religion).
    - List other key groups you work with or have an interest in e.g. new graduates, students, junior doctors, surgeons, nurses, carers, parents specialist groups.
- Interventions:
    - List key assessment skills or tools/techniques you use or have an interest in (related to your key population): e.g. pressure injury assessment, ultra sound, medication, lectures, clinical supervision.
- List key outcomes you think are important (related to your key population) e.g. pressure injury incidence, falls, weight, quality of life outcomes.
- Complications:
    - What are the most common complications in your population? E.g. postoperatus ileus, falls, urinary retention, infection.
- What are your key frustrations in your population? e.g. bowel management, nausea and vomiting, nil by mouth, issues with medications, junior medical officer knowledge, referral pathways.

- Evidence:
    - What is the current evidence that your population is at risk? e.g. rates of pressure injury, falls, intake data, re-admissions, longer rate of stay.
    - What is the evidence for using specific assessment/intervention in your population? e.g. randomised controlled trial (RCT), scoping reviews, guidelines.
    - What is the evidence that your interventions can improve outcomes/complications in your population? e.g. specific education, success in other institutions, consumer feedback.

3. Asking the right research question

Ask yourself:

- Is the problem relevant? Is it a known issue, or one perceived in practice?
- Will solving it have impact? Consider patient outcomes, cost to society, or health system efficiency.
- Is it biologically plausible? Can you link it to a known mechanism?
- Is it feasible and testable? Could you introduce the intervention in real-world settings? Would it change practice?

Use the PICO format (Population, Intervention, Comparator, Outcome) to refine your question.

4. From concept to clinical question

- Float the idea widely among trusted peers, subject matter experts, theatre teams, and research groups.
- Refine the concept based on early feedback.
- Find a mentor who are critical for refining your question, avoiding common pitfalls, and identifying opportunities. Tip: check out ANZCA CTN Mentorship program.
- Join ANZCA CTN workshops or mentoring sessions for early-stage feedback.
- Patient involvement in trial development is crucial for creating more relevant and patient-centered research.
- Present your idea at an ANZCA CTN Strategic Research Workshop.

5. Develop a line of investigation

a. Build your case

Construct a compelling narrative that justifies the trial:

- Summarise what research or data is already published? Or lack there of?
- Publish case reports, retrospective analyses, or small cohort studies.
- Undertake mechanistic/volunteer studies if biologically relevant.
- Conduct surveys or audits to assess current practice or variation.
- Seek wide and early input from patient advocates and consumers in the development of the research question, taking care to ensure outcomes of proposed study align with what is most important to the cohort in question.
- Engage with stakeholders early and frequently. If successful how will the outcomes be translated and who/how will that happen?
- Perform a systematic review or meta-analysis to summarise existing evidence.
- Propose pilot or feasibility trials (e.g., PADDI Pilot study conducted before the PADDI trial).

b. Consult methodology experts

- Engage statisticians and epidemiologists early to define outcomes and power calculations.
- Include health economists if planning cost-effectiveness components.
- If relevant, consult basic scientists (e.g., for pharmacogenomics, biomarker studies).
- Seek out collaborations with subject matter experts for both protocol development and funding applications.

6. Build your profile

Visibility enhances credibility:

- Present at conferences (offer talks to convenors, they welcome new speakers!).
- Publish narrative reviews or position pieces in your field.
- Write for professional bulletins, newsletters, or CTN updates.
- Volunteer as a peer reviewer (e.g., *Anaesthesia and Intensive Care* (AIC)) to understand publishing standards.
- Act as an associate investigator on CTN trials or other studies.
- Reach out to other researchers in your department or other departments and network.
- Engage with the CTN concept development process and present your ideas at a CTN Strategic Research Workshop.

7. Prepare for funding

- Keep funding in mind from day one. Align your case with National Health and Medical Research Council (NHMRC), Medical Research Future Fund (MRFF), or industry funding criteria, and/or priorities.
- Grant reviewers ask:
    - Is the research question important?
    - Can it be answered via the proposed methodology?
    - Will it change practice?
    - Does it align with consumer priorities?
- A strong line of preliminary investigation can convince funders that the question is worth investment.

8. Expect rejection and build resilience

- Manuscripts and grant applications are often rejected, not because they're unworthy, but due to timing, politics, or reviewer bias.
- The PADDI pilot study (largest in its field at the time) was rejected 8 times before acceptance to publication.
- Learn to accept critical feedback and persist with refining and resubmitting.

9. Case Study: The PADDI trial journey

A stepwise approach:

1. Clinical query raised in theatre about dexamethasone use.
2. Published small case-control and cohort studies (*Anaestheisa and Intensive Care* (AIC), 2010).
3. Mechanistic studies in healthy volunteers and surgical patients.
4. Conducted national practice survey via CTN.
5. Led a systematic review and meta-analysis (2015).
6. Conducted a propensity-matched substudy of Enigma-II dataset.
7. Completed PADDI pilot study RCT of >300 patients published 2021.
8. Secured full NHMRC funding.
9. PADDI trial conducted, completed and published (*NEJM* 2021)

10. Common pitfalls and how to avoid them

- Overly broad scope: Focus on a single question.
- No feasibility data: Conduct pilot work or audits.
- Ignoring consumers: Embed Consumer and Community Involvement (CCI) early.
- Poor implementation planning: Consider research translation from the beginning.
- Lack of supporting department ownership and conducting your research into stakeholder involvement early on.

- Planning how to facilitate the study at your site:
    - Consider the logistics and the day to day operation of the trial and discuss with the key players.
    - Studies with large data collection, who is doing it, who is checking the data, is it electronic or paper data collection?

11. Embedding consumer involvement

- Involve consumers from the very beginning in question refinement, protocol review, and dissemination.
    - Consumers provide a valuable patient and community perspective, but also consider other stakeholders & end users (e.g. research coordinators, other departments).
- Use available toolkits online (e.g. ACTA, Monash Partners, Telethon Kids etc.).
- Review funding body requirements and guidance on consumer engagement (e.g. NHMRC).
- Offer compensation and clear roles for consumers.

12. Ethics and governance planning

- Understand Human Research Ethics Committees (HREC) vs. Research Governance Office (RGO) responsibilities.
- Map out approval timelines for multicentre studies.
- Prepare early: protocol, Human Research Ethics Application (HREA), site feasibility, data agreements, data management plan, identify Associate Investigators, identify any required equipment or resources (e.g. study drug, pumps).

13. Health economics and implementation science

- Consult a health economist for trial-based economic evaluations.
- Use Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) or Consolidated Framework for Implementation Research (CFIR) frameworks to plan implementation.
- Embed resource-use or cost-effectiveness endpoints.

14. Trial methodology essentials

Understand and explore to consider the best research design to help fill the knowledge gap:

- Superiority vs. non-inferiority trials.
- Randomisation strategies (minimisation, block).
- Adaptive and platform designs.
- Cluster randomisation or crossover studies.
- Data Safety and Monitoring Committee (DSMC) setup and roles.

15. Trial coordination realities

- Identify your resources early on e.g. ethics contact, database contact and training, lead trial research co-ordinators.
- Consider workload, logistics and competing priorities at sites.
- Engage with site research co-ordinators early.
- Conduct site feasibility assessments before including them.

16. ANZCA CTN endorsement pathway

- Submit a CTN concept proposal form.
- Present at CTN workshop for feedback.
- If endorsed: access statistical input, multisite support, and credibility for grants.

17. Getting started as an Early Career Researcher (ECR)

- Apply for ANZCA ERR grants, MRFF, REDI programs.
- Propose substudies or nested projects within larger CTN trials.
- Register trials on a clinical trial registry such as ANZCTR or clinicaltrials.gov with lay summaries.
- Join CTN mailing list for opportunities (ctn@anzca.edu.au) .

18. From trial to Impact: Measuring what matters

- Track uptake of findings in guidelines or clinical practice.
- Report knowledge translation outputs: presentations, policy briefs, hospital change.
- Use tools like the Translational Research Impact Scale (TRIS).

19. Key resources and opportunities

- CTN Workshops (in-person) for networking, mentoring and peer review feedback.
- ANZCA Bulletin publishing opportunities.
- AIC journal peer reviewer sign-up.
- CTN Mailing lists.
- NHMRC and MRFF Grant Guidelines.

20. Final tips

- Pursue your thought bubbles. Many great ideas originate in clinical moments.
- Seek help early. Mentorship and collaboration are invaluable.
- Engage with the CTN. It provides structure, feedback, and endorsement pathways.
- Prepare to iterate. Concepts evolve over time, expect revisions.
- Keep funding top of mind. Design with feasibility and budget justification in mind.