

Building a bridge from the swamp to the ivory tower

Conducting randomised controlled trials in general practice

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Background

Primary care research is underfunded. Few randomised controlled trials (RCTs) are conducted in a primary care setting. However, it is important that clinical practice be informed by adequate primary care evidence so general practitioners (GPs) have tools and guidelines applicable to the patients they see.

Objective

The aim of this article is to describe and reflect on the experience of conducting five RCTs between 2003 and 2017 in a general practice setting with minimal funding, in North Queensland.

Discussion

Enabling factors include using grassroots research questions and engaging practice nurses. Barriers include ethics applications and insufficient funding. Recommendations to reduce study costs include compensating practice nurses rather than GP time. The findings are designed to encourage grassroots GPs to consider participating in pragmatic, feasible projects. The success of the projects was underpinned by the fact that they were established by a group of GPs who had interesting questions that were relevant to their clinical practice and not answered by current evidence.

PRIMARY HEALTHCARE SYSTEMS must be evidence-based in order to be both streamlined and effective and, therefore, must be supported by rigorous research. It is important that clinical practice be informed by adequate primary care evidence. Otherwise general practitioners (GPs), the end users of the research process, who attempt to practise evidence-based medicine, may have flawed tools, and the guidelines they use may not be applicable to the patients they see or the processes they use.^{1,2}

Medical research in Australia has mostly been conducted in tertiary hospital settings, but as the majority of illnesses are managed in primary healthcare settings,³ there is a need for a change in focus.⁴ Funding allocated to primary care research has a greater potential population impact, compared with research in other specialties,⁵ with 82% of the population visiting their GP in the past 12 months.⁶ There is compelling evidence that the strength of a primary care system in a region or country predicts the health status of the population.⁵ Studies suggest that stronger primary care systems, and investment in primary care research, lead to better health outcomes at a lower cost.⁷⁻⁹ However, despite outstripping other areas of research in value for money and clinical importance, funding for primary care research in Australia is disproportionately low, particularly when compared with the UK and the Netherlands, with only 2% of National Health and Medical Research Council (NHMRC) grants awarded to primary care research between 2000 and 2008.¹⁰

Primary care and general practice research in Australia have been criticised

for conducting mainly small-scale descriptive and survey-based studies.¹¹ Few large randomised controlled trials (RCTs) are conducted in a primary care setting;¹² RCTs comprised 5% of general practice research projects conducted in Australia in the 1990s.¹¹ RCTs have been reported as being methodologically and practically difficult to conduct in general practice.^{13,14}

Barriers to GP research participation include lack of training in research methods, absence of clearly defined clinical research career pathways, underdeveloped research infrastructure and inadequate project funding.¹⁵ While The Royal Australian College of General Practitioners (RACGP) and other professional bodies in Australia are working to overcome some of these barriers, there is a lack of government funding to support these activities.

Some specialist training programs mandate trainee research, but there are no specific requirements as part of current GP training. There does not appear to be a 'culture' of research in general practice, and GPs do not see themselves as potential researchers.¹⁶ Grassroots general practice research has been described as the 'swamp' and academia the 'ivory tower';¹⁷ as such, there is a need to bridge the gap between these two institutions in order to create a culture of research.

The aim of this review is to describe and reflect on the experience of conducting a series of five successful RCTs in a general practice setting, with minimal funding, in North Queensland, Australia.¹⁸⁻²¹ Enabling factors and barriers are identified (Tables 1, 2), as well as recommendations to reduce study costs (Table 3). The lessons learned from these experiences

will be useful to those conducting research in a practice-based setting. It is hoped that grassroots GPs are encouraged to consider participating in pragmatic, feasible projects, and that future research will bridge the gap between the 'swamp' and the 'ivory tower'.¹⁷

The research process

Background

Between 2003 and 2017, five randomised controlled trials were conducted in Mackay, North Queensland (Table 4). Mackay is a provincial town in tropical North Queensland with a population of 125,000. In 2017 there was a total of 104 GPs practising in the Mackay region. Between one and four general practices were involved in the five trials; one practice was involved in all five trials.

Establishment of research group

Before commencing the first project, there had been a long-established GPs' evidence-based medicine group, which met on a monthly basis. The history of how this group was established is unclear, although the group had existed since the early 1990s (Del Mar, personal communication). Around 15 GPs attended these meetings on a regular basis, with a rotating chairperson. The meeting room and catering were funded as in-kind support by the local private hospital. Meetings involved the delivery of conference reports, discussion of interesting cases, or presentation of evidenced-based medicine literature reviews, and GPs were awarded continuing professional development points for their attendance. Research questions were generated and GPs and general practices were recruited for the trials through these meetings. Unfortunately, the evidence-based medicine meetings ceased in 2014. However, the North Queensland Practice-Based Research Network evolved out of this group and still remains actively engaged in research in 2017.

Research career of principal author/investigator

The principal author/investigator of the RCTs first embarked on a research

project in 2000, shortly after gaining fellowship of the RACGP, with a Primary Health Care Research, Education and Development (PHCRED) novice research fellowship. She was awarded additional project funding from the RACGP registrar research fund. She then gained a fractional university position, and incorporated the first two of the five RCTs in her masters and PhD programs. She progressed to a full-time university position, and a promotional chair. The final three RCTs were conducted by medical students undertaking the Honours program under her supervision.

Choosing a research question generated by clinicians

Practical questions and clinically relevant questions were generated by grassroots GPs. The 'wetting sutures' research question evolved from two senior group members while driving to an evidence-based medicine meeting. A heated discussion ensued regarding the topic (whether wetting and uncovering sutures in the first 48 hours following minor excisions could increase infection rate) and gave rise to the first trial.¹⁹ The sterile gloves project evolved from doctors at a single medical centre differing in the type of gloves that they used for minor procedures, and wishing to resolve their disagreement.²⁰

For the AVALANCHE trial, local clinicians were first consulted to decide which antiseptics were most relevant to clinical practice. Most clinicians did not use betadine because of perceptions of 'messiness' and skin staining. Therefore, the investigators designed the project to examine the difference between alcoholic and aqueous chlorhexidine, rather than comparing the relative efficacy of chlorhexidine and betadine.²²

Choosing a unique research theme

Skin excisions form a large proportion of Australian GP workload and this is greater in Queensland, which has the highest incidence of skin cancer in the world.²³ This is further magnified in regional towns such as Mackay, where there are no permanent dermatologists or plastic surgeons. All of the trials focused on

management of skin excisions in general practice, which increased the feasibility of recruitment. Additionally, the high infection rate in the tropical setting meant sample size requirements were attainable.

Research funding

The projects received small grants from PHCRED or RACGP Research Foundation (Table 1). Funding was available quickly (within three months of application), in contrast to a possible 12-month turnaround for competitive grant schemes such as those of the NHMRC.

Ethics approval

Although ethics processes are becoming more streamlined, and ethics committees can now often give multicentre approval, ethics clearance still took a minimum of three months for each project.

Project planning and design

The research design and methods were developed by the group of co-investigators, including GPs and practice nurses, led by the principal author. Sometimes, the design was modified for the sake of pragmatism, and the protocol had to be acceptable to all practices involved. For instance, in the first trial¹⁹ doctors refused to use a random number table and opaque envelopes, perceiving the process as too complicated, so patients were consequently randomised by pulling labelled pingpong balls out of a bag.¹⁹

Minimise work for GPs

The studies involved very little extra work for participating GPs – they were not responsible for data collection, but were required to have knowledge of the process in order to answer any possible queries.

Use of practice nurses

Practice nurses were responsible for data collection, and were paid on a fee-for-service basis for each of the trials (\$5–10) to complete data on each patient.

Acknowledgement of all contributions

All contributors were acknowledged appropriately in the form of co-authorship or acknowledgements.

Reducing study costs

Tips for low-cost research are presented in Table 3, highlighting areas where costs can be saved without sacrificing rigour. For instance, self-made envelopes for randomisation rather than a telephone randomisation service were used in all five trials. Well-motivated medical students can provide an alternative to employing project officers and managers.

Conclusion

Grassroots GPs working in clinical practice have been shown to support the need for relevant clinical research.²⁴ However, in the past, many projects focused predominantly on health service organisation¹¹ rather than clinical problems. The success of the five RCTs we conducted was underpinned by the research questions being established by a group of GPs with an interesting series of questions relevant to their clinical practice and not answered by current evidence. In order to bridge the ‘swamp’ with the ‘ivory tower’, GPs should not merely collect data for large research projects designed by university academic departments. If GPs ‘own’ their research project, which is relevant to their clinical practice, it is more likely to succeed.

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References

1. Steel N, Abdelhamid A, Stokes T, et al. A review of clinical practice guidelines found that they were often based on evidence of uncertain relevance to primary care patients. *J Clin Epidemiol* 2014;67(11):1251–57.
2. Scullard P, Abdelhamid A, Steel N, Qureshi N. Does the evidence referenced in NICE guidelines reflect a primary care population? *Br J Gen Pract* 2011;61(584):e112–17.

Table 1. Recommendations relating to enabling factors

Enabler	Recommendation
Research question	
Research topic devised and chosen by a group of clinicians	Grassroots questions are likely to be more clinically relevant and result in more commitment from clinicians than research topics imposed by ‘outsiders’
GPs ‘own’ projects, and are co-investigators and co-authors, not participants and data collectors	Facilitate ownership by local stakeholders. Be inclusive with co-authorship and acknowledgements
Research question was locally feasible because of high incidence of skin cancer	Build on unique local strengths
Funding	
Small RACGP foundation and PHCRED novice research grants	Category 1 grants are difficult to obtain and have a lengthy turnaround. Focus on smaller grant schemes that foster novice research
Research team	
Practice nurses as co-researchers	Engage practice nurses as co-researchers. Can lead to greater commitment to project and data collection rigour
Design and methods	
Project design and method developed by GPs as group of co-researchers, while involving a methodologist early in the study design.	Ensure that the project remains practice-based and clinically relevant, but also that it is methodologically sound
Project design always kept as simple as possible	Concentrate on important primary outcome
Data collection	
Work for participating GPs minimised	GPs time poor and unlikely to devote time to data collection
Practice nurses engaged to collect data collectors	Use and fund practice nurses to collect data
Analysis	
Principal researcher established local clinician with university appointment and long-term collaboration/mentorship from experienced statistician/epidemiologist/methodologist	Adequate academic support is required ‘Build bridge between the swamp and the ivory tower’ ¹⁷ ensures commitment to project and clinical relevance of question, methods and results.

GP, general practitioner; PHCRED, Primary Health Care Research, Education and Development; RACGP, The Royal Australian College of General Practitioners

Table 2. Recommendations relating to barriers

Barrier	Recommendations
Method	
Primary care research underfunded	See tips for low-cost research
It is difficult to 'sell' clinical rigour to GPs	Use pragmatic RCT ²⁵ – key RCT principles, but tailored to meet the reality of GP setting
Ethics process lengthy and onerous, particularly for high-risk projects	Know ethics committee requirements and ensure all information provided first time. Be prepared for at least eight week turnaround.
Analysis and publication	
There may be lengthy delays for journal decisions; rejection is common	Be aware of timelines, have realistic expectations regarding publication, be resilient
GPs may not see themselves as researchers	Build a culture of research in general practice that starts at registrar level Develop a research user culture, such as a GP journal club

GP, general practitioner; RCT, randomised controlled trial

Table 3. Tips for reducing costs

	Expensive option	Cheaper option
Randomisation	Randomisation service	Computer-generated random number tables, make up envelopes
Research support	Employ project officer, clinical trial staff	Engage medical students to complete honours projects
Obtaining trial medication	Use industry to make intervention and control medication	Use compounding pharmacists to make medications
Practice payments	Payment to GPs to compensate for time	Payment to practice nurses to compensate for time

RCTs, randomised controlled trials

- Britt H, Miller GC, Henderson J, et al. General practice activity in Australia 2015–16. General practice series no. 40. Sydney: Sydney University Press, 2016.
- Winzenberg TM, Gill GF. Prioritising general practice research. *Med J Aust* 2016;205(11):529.
- Beasley JW, Starfield B, van Weel C, Rosser WW, Haq CL. Global health and primary care research. *J Am Board Fam Med* 2007;20(6):518–26.
- Australian Bureau of Statistics. Patient experiences in Australia: Summary of findings, 2016–17. Cat no. 4839.0. Canberra, ACT: ABS, 2017. Available at www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/398E27DFBF6DE8E2CA257952001C9AD9?opendocument [Accessed 23 August 2017].
- Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;83(3):457–502.
- Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. *Health Serv Res* 2003;38(3):831–65.
- Harris MF, Harris E. Facing the challenges: General practice in 2020. *Med J Aust* 2006;185(2):122–24.
- McIntyre EL, Mazza D, Harris NP. NHMRC funding for primary health care research, 2000–2008. *Med J Aust* 2011;195(4):230.
- Chew M, Armstrong RM. General practice research: In the big league at last? *Med J Aust* 2002;177(2):60–61.
- Mendis K, Kidd MR, Schattner P, Canalese J. A bibliometric analysis of Australian general practice publications from 1980 to 2007 using PubMed. *Inform Prim Care* 2010;18(4):223–33.
- Rendell JM, Merritt RD, Geddes JR. Incentives and disincentives to participation by clinicians in randomised controlled trials. *Cochrane Database Syst Rev* 2007;(2):MR000021.
- Brodady H, Gibson LH, Waine ML, Shell AM, Lilian R, Pond CD. Research in general practice: A survey of incentives and disincentives for research participation. *Ment Health Fam Med* 2013;10(3):163–73.
- Stange KC. Primary care research: Barriers and opportunities. *J Fam Pract* 1996;42(2):192–98.
- Glynn LG, O'Riordan C, MacFarlane A, et al. Research activity and capacity in primary healthcare: The REACH study: A survey. *BMC Fam Pract* 2009;10:33.
- Sturgiss L. Lets build a bridge from the swamp to the ivory tower. *Medical Observer* 1 February 2017. Available at www.medicalobserver.com.au/professional-news/let-s-build-a-bridge-from-swamp-to-ivory-tower [Accessed 10 January 2017].
- Heal C, Buettner P, Cruickshank R, et al. Does single application of topical chloramphenicol to

Table 4. RCTs conducted in general practice

Question/intervention	Funding	Outcome	Journal (impact factor)
Wetting of sutures ¹⁹	PHCRED Novice Researcher Fellowship \$20,000	931 patients; wetting equivalent to not wetting	<i>BMJ</i> (14)
Topical chloramphenicol ¹⁸	RACGP Chris Silagy Scholarship \$20,000	1000 patients; absolute reduction in infection rate after application of topical chloramphenicol was statistically but not clinically significant	<i>BMJ</i> (14)
Cephalexin 2 g for lower limb excisions ²¹	PHCRED funding \$15,000	72 patients; cephalexin significantly superior	<i>BMJ Open</i> (2.5)
Sterile versus non-sterile gloves ²⁰	RACGP Family Medicine Scholarship \$20,000	400 patients; non-sterile gloves non-inferior	<i>MJA</i> (4.5)
Alcoholic versus aqueous chlorhexidine ²²	RACGP Family Medicine Scholarship \$20,000	912 patients; alcoholic chlorhexidine not superior	<i>Canadian Medical Journal</i> (7)

BMJ, British Medical Journal, *MJA*, Medical Journal of Australia; *RACGP*, Royal Australian College of General Practitioners; *PHCRED*, Primary Health Care Research, Education and Development; *RCTs*, randomised controlled trials

- high risk sutured wounds reduce incidence of wound infection after minor surgery? Prospective randomised placebo controlled double blind trial. *BMJ* 2009;338:a2812.
19. Heal C, Buettner P, Raasch B, et al. Can sutures get wet? Prospective randomised controlled trial of wound management in general practice. *BMJ* 2006;332(7549):1053-56.
20. Heal C, Sriharan S, Buttner PG, Kimber D. Comparing non-sterile to sterile gloves for minor surgery: A prospective randomised controlled non-inferiority trial. *Med J Aust* 2015;202(1):27-31.
21. Smith SC, Heal CF, Buttner PG. Prevention of surgical site infection in lower limb skin lesion excisions with single dose oral antibiotic prophylaxis: A prospective randomised placebo-controlled double-blind trial. *BMJ Open* 2014;4(7):e005270.
22. Charles D, Heal CF, Delpachitra M, et al. Alcoholic versus aqueous chlorhexidine for skin antisepsis: The AVALANCHE trial. *CMAJ* 2017;189(31):E1008-16.
23. Buettner PG, Raasch BA. Incidence rates of skin cancer in Townsville, Australia. *Int J Cancer* 1998;78(5):587-93.
24. Robinson G, Gould M. What are the attitudes of general practitioners towards research? *Br J Gen Pract* 2000;50(454):390-92.
25. Roland M, Torgerson DJ. What are pragmatic trials? *BMJ* 1998;316(7127):285.

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