

Medical student interest and participation in research at one rural clinical school: Insights from the last six years

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Abstract

Introduction: Limited evidence is currently available relating to research activity of medical students training in regional or rural areas.

Objective: To describe medical student interest and participation in research at The University of Queensland Rural Clinical School (UQRCS).

Design: Annual student expression of interest surveys were collated with records of student research participation maintained at UQRCS from 2017–2022. Additionally, a systematic search was conducted to identify student outputs not captured in internal records. Frequencies and proportions were calculated for all descriptive data along with proportions of students who engaged with a project, and projects that led to a peer-reviewed publication.

Findings: At UQRCS commencement, 55% of research-interested students reported having basic research skills. Thirty-nine percent of research-interested students engaged with a project, most commonly literature reviews (47%) or audits (29%). Thirty-three percent of completed projects led to a peer-reviewed manuscript.

Discussion: Students who engage with a project are unlikely to receive a project in their preferred clinical area and should be informed about the transferrability of research skills. Most students have basic research skills when commencing a project and therefore require ongoing support and mentorship from staff/supervisors.

Conclusion: Publication rates of medical students in regional/rural areas are comparable to those reported by metropolitan medical schools (~30%).

KEYWORDS

medical education, medical training, publication rates, rural health, student research

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1 | INTRODUCTION

For medical students, developing fundamental research competencies facilitates a skillset in problem-solving, critical thinking and literature interpretation abilities that promote effective, evidence-informed practice following graduation.¹ Furthermore, research activity during medical school can positively impact academic performance,² guide specialty selection² and prepare students for mandatory research activity when they reach specialty training.³ Despite these benefits, the volume and nature of research activity embedded within the curriculum varies across medical schools. Research opportunities may be embedded in the core curriculum or available as optional unpaid work experience (i.e. extracurricular).^{4,5} For the latter, it is common for extracurricular research to be encouraged and supported by the medical school, often in partnership with local clinicians.

A number of barriers to student research have been previously reported including time constraints, lack of adequate supervision and limited baseline research skills.^{5,6} Alternatively, enablers to research participation often include monetary compensation⁷ and autonomy/choice of research projects.⁸ While limited literature is available on medical student research participation,² it is not specific to regional or rural areas. The aim of this research was to investigate medical students' interests and participation in research while training at the University of Queensland Rural Clinical School (UQRCS). Specifically, this study explored the cohort's research interests and skills at commencement of their clinical training year, the subsequent proportion that engaged with a project, and publication rates arising from these projects.

2 | MATERIALS AND METHODS

This project was granted an exemption from ethical approval by The University of Queensland University Human Research Ethics Committee (Ref: 2022/HE002061). Within the current Doctor of Medicine (MD) program, students have limited opportunities to participate in formal research activities embedded within the curriculum, excluding a short placement where a quality improvement activity is undertaken. Under the current MD structure, years three and/or four can be completed at a regional clinical unit of the UQRCS in Toowoomba, Rockhampton, Bundaberg or Hervey Bay. Such students have opportunities to undertake extracurricular research, beginning with an invitation to submit an expression of interest through a survey. Subsequently, they can be matched across the year with suitable clinical supervisors or academics in the local area, or at another regional site, where remote work is possible. In a few cases, research

What is already known on this subject:

- For medical students, fundamental research skills can facilitate effective evidence-informed practice following graduation
- Despite the benefits of research participation, the volume and nature of research activity embedded in the curriculum varies considerably across medical schools

What this paper adds:

- Students in regional and rural areas may not always be matched with a research project that is in their most preferred clinical area
- One in three students who complete their project goes on to publish their findings in the peer-reviewed literature
- Future research should explore barriers and enablers to medical student research in regional and rural areas, from the perspective of students and supervisors

is initiated by the student either by identifying a research project while on placement or by suggesting a project to a potential supervisor.

Since 2017, data relating to students' interest and participation in research while at the UQRCS have been collected in various formats. As part of internal quality assurance processes, students and supervisors are periodically contacted to determine project progress. It is common for project outputs (e.g. publications) to only be available after the students have graduated, which makes communication between UQRCS staff and students/supervisors crucial for record keeping. Data sources used for this project were as follows:

- *Survey*: Expression of interest survey completed by research-interested students at UQRCS commencement each year. Specific items include previous experience, self-assessed skills already possessed, skills/tasks requiring support and research areas of interest
- *Research participation*: Spreadsheet capturing students' project title, type of research (e.g. review and audit), supervisor, progress updates and project outputs (e.g. publications and presentations)
- *Literature search*: The Faculty of Medicine reports of students' publications and research achievements were searched by two authors (JC and KC). Additionally, all students and supervisors linked on a project were author

searched, using last name and first initial, in PubMed, Scopus and Web of Science. Results were cross-checked against project details.

Data were cleaned, coded and analysed using SPSS (v27). Data relating to research interests and project involvement are reported as frequencies and proportions. The proportions of projects that led to various outputs (i.e. manuscript, poster and conference presentation) are also reported.

3 | RESULTS

At UQRCS commencement, most preferred research areas were surgery (26%), medical specialties (16%) and critical care (11%) (Table 1). Most rated their initial skill level as basic (i.e. just starting out; 55%), rather than intermediate (e.g. conducting critical appraisal, literature reviews and clinical audits; 40%), with few at the advanced level (e.g. designing research, developing protocols and writing manuscripts; 5%). Students reported already possessing skills in conducting basic statistics (85%), creating reports based on research findings (71%) and critically appraising the literature (69%). They reported requiring support to identify funding opportunities (83%), prepare ethics applications (80%) and write publications (71%) (Table 2).

From 285 research-interested students (~40% of the entire UQRCS cohort), 39% ($N = 111$) engaged with a project. For students who engaged with a project, general medicine (38%) and obstetrics and gynaecology (14%) were the most common research areas, and projects were generally literature reviews (47%) and audits (29%). Most projects (83%) were extracurricular research, defined as research completed outside course requirements or other structured research programs, and 96% were unpaid (Table 3). Of the students who engaged with a project, 19% worked on a project in their most preferred clinical area, and 53% in one of their top three preferred clinical areas.

At the time of data analysis (October 2022), 36% ($N = 40$) of projects were in progress, 25% ($N = 28$) had insufficient information to determine project status and 20% ($N = 22$) had led to an identified output (manuscript, poster or conference presentation). When considering only completed projects (i.e. excluding those in progress or with insufficient information), 51% ($N = 22$) led to an output, and 33% ($N = 14$) led to a published manuscript, noting that some students had multiple outputs from their project(s).

4 | DISCUSSION

This study investigated medical students' interest and participation in research at the UQRCS and associated

TABLE 1 Student's research areas of interest at UQRCS commencement.

Research interests	Responses	Frequency (N [%])
Anaesthetics	First preference	8 (3.4)
	Second preference	7 (2.9)
	Third preference	6 (2.5)
Critical care	First preference	26 (10.9)
	Second preference	37 (15.5)
	Third preference	33 (13.9)
Emergency medicine	First preference	13 (5.5)
	Second preference	8 (3.4)
	Third preference	14 (5.9)
General practice	First preference	6 (2.5)
	Second preference	15 (6.3)
	Third preference	14 (5.9)
Medical specialties	First preference	39 (16.4)
	Second preference	25 (10.5)
	Third preference	32 (13.4)
General medicine	First preference	24 (10.1)
	Second preference	39 (16.4)
	Third preference	28 (11.8)
Mental health	First preference	8 (3.4)
	Second preference	14 (5.9)
	Third preference	8 (3.4)
Obstetrics and gynaecology	First preference	22 (9.2)
	Second preference	17 (7.1)
	Third preference	13 (5.5)
Paediatrics	First preference	10 (4.2)
	Second preference	12 (5.0)
	Third preference	11 (4.6)
Public health	First preference	13 (5.5)
	Second preference	13 (5.5)
	Third preference	27 (11.3)
Orthopaedics	First preference	2 (0.8)
	Second preference	7 (2.9)
	Third preference	5 (2.1)
Rural and remote medicine	First preference	5 (2.1)
	Second preference	18 (7.6)
	Third preference	22 (9.2)
Surgery	First preference	61 (25.7)
	Second preference	21 (8.9)
	Third preference	19 (8.0)

Note: Due to variations in research expression of interest survey instruments over the last 6 years, total frequency counts may be <285.

outputs. Students were most interested in research relating to surgery, medical specialties or critical care. However, only half the students who engaged with a

TABLE 2 Student's research skills and skills requiring training and support at UQRCS commencement.

	Frequency of yes responses (N [%])
Current skills at RCS commencement	
Comfortably do literature reviews	138 (60.3)
Critically appraise the literature	158 (69.0)
Identify data collection methods	129 (56.3)
Design/develop data collection tools (e.g. survey questionnaires)	99 (43.2)
Manage data (e.g. code, deidentify and/or store)	65 (28.4)
Do basic statistics (e.g. averages and proportions)	194 (84.7)
Do intermediate/advanced statistics (e.g. regression analyses)	57 (24.9)
Do qualitative data analyses (based on interviews or text data)	53 (23.1)
Create/write reports based on research findings	162 (70.7)
Know where to find funding or support for research	6 (2.6)
Skills/activities requiring training and support	
Literature searching	66 (28.8)
Critical appraisal	97 (42.4)
Ethics clearance and application preparation	184 (80.3)
Identifying funding opportunities for research	190 (83.0)
Data collection methods	118 (51.5)
Developing data collection tools	140 (61.1)
Data management	143 (62.7)
Quantitative research (crunching numbers and statistics)	158 (69.0)
Qualitative research (interviews/focus groups)	134 (58.5)
Academic writing and publication	162 (70.7)
Conference presentation	160 (70.2)

Note: Due to variations in research expression of interest survey instruments over the last 6 years, total frequency counts may be <285.

project received one of their three preferred clinical areas, and <20% got their first preference of clinical areas. The substantial proportion of students who were not matched to their preferred research area may partly explain why only 39% of students who expressed an interest went on to engage with a project. It could be that students opt not to participate in research if the clinical area on offer is not of interest. As such, students should be educated about the transferability of research skills and knowledge across different areas and encouraged to actively embrace opportunities available in rural/regional health care settings. It

TABLE 3 Details of student research projects and outputs.

Project details	Categories	Frequency (N [%])
Research/clinical area	Anaesthetics	1 (1.0)
	Critical care	8 (8.1)
	Emergency medicine	3 (3.0)
	General practice	2 (2.0)
	General medicine	38 (38.4)
	Mental health	3 (3.0)
	Obstetrics and gynaecology	14 (14.1)
	Paediatrics	2 (2.0)
	Public health	4 (4.0)
	Orthopaedics	4 (4.0)
	Rural and remote medicine	3 (3.0)
	Surgery	6 (6.1)
	Renal medicine	8 (8.1)
Urology	3 (3.0)	
Research type	Literature review	36 (47.4)
	Audit	22 (28.9)
	Editorial	1 (1.3)
	Original research	10 (13.2)
	Case study	7 (9.2)
Research program	Extracurricular research	90 (83.3)
	Other unpaid research activity	14 (13.0)
	Paid research activity	4 (3.7)
Project status	Completed projects	43 (38.7)
	Student assisted with part of the project	2 (1.8)
	Project not started	7 (6.3)
	Project led to an output (manuscript, conference poster, or conference presentation)	22 (19.8)
	Discontinued	12 (10.8)
	In progress	40 (36.0)
	Insufficient information	28 (25.2)
Project outputs (excluding projects still in progress or with insufficient information available)	Peer-reviewed manuscript	14 (32.6)
	Conference poster	6 (14.0)
	Presentation	4 (9.3)
	Any output (manuscript, conference poster, or conference presentation)	22 (51.2)

Note: Some projects led to multiple outputs; total frequency counts vary due to missing project information; editorial has been captured in the data set as it includes data collected and analysed by the student.

may be valuable for future research to expand our findings by exploring reasons for interested students not engaging with projects and the experiences of students who

complete research activity which falls outside of their preferred clinical areas.

Most students reported possessing basic research skills and indicated they would need support in many areas ranging from ethics to manuscript preparation. Therefore, success of extracurricular research programs such as this may depend upon university staff and local clinicians continuing to support students in various areas, going above simply matching students to projects and coordinating administrative processes. It is also important that from the outset, potential supervisors understand the baseline skills of students, and the mentoring and support required to successfully supervise medical students' projects.

An important finding from this research is that 33% ($N = 14$) of completed projects led to a peer-reviewed publication, and 51% ($N = 22$) led to any identified output (publication, poster or conference presentation). It is reassuring that students' research projects completed in rural and regional areas have comparable publication rates to an average 30% reported by metropolitan medical schools.² Although existing evidence found that extracurricular research led to lower publication rates (17%)⁹ than paid summer research programs (24%),⁷ this study shows that it is possible to achieve higher than cited rates. These numbers, however, do not include projects in progress or with outcomes and progress unknown, with 36% of projects in progress despite many of these students having graduated. Rates of project completion may be improved by having students complete their projects before leaving the UQRCS. To achieve this, students could be recruited to support only a single phase of the project (e.g. data collection or article screening); however, this limited contribution will in all likelihood reduce opportunities for authorship, often a significant motivator for students' research participation. Therefore, expectations from students and supervisors should be clearly articulated prior to project commencement, including students' willingness to continue project work after they leave the UQRCS and/or complete medical school.

This study adds important evidence to the literature pertaining to medical student research participation in regional and rural areas. It is limited by the small data set, and missing data. A substantial proportion of projects were in progress at the time of data analysis, which may have skewed the calculation of publication rates. It is noteworthy that most research projects take more than 12 months to complete making it difficult to accurately determine publication rates at any given time point. In addition, the self-reported nature of the data relating to project status/outcomes could mean that students and supervisors neglect to report projects finished but without an output, or that they may consider the project to be 'in progress' or 'discontinued' unless a publication has been

achieved. For this reason, projects which could be considered completed but not published may be hidden within other project status categories and thus publication rates of completed projects should be interpreted with caution.

5 | CONCLUSION

This is the first known study of medical students' participation in extracurricular research in regional and rural Australia, informed by 6 years of data. Despite most students possessing basic research skills at UQRCS commencement, publication rates of completed projects were similar to those previously reported by metropolitan-based programs. Future research should explore student and supervisor perspectives on barriers and enablers to medical student research participation in rural and regional areas.

AUTHOR CONTRIBUTIONS

Jordan Fox L: Conceptualization; writing – original draft; methodology; formal analysis; data curation. **Jacky Cribb:** Conceptualization; data curation; writing – review and editing; methodology. **Kaye Cumming:** Conceptualization; methodology; data curation; writing – review and editing. **Priya Martin:** Conceptualization; writing – review and editing; methodology; data curation; supervision.

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CONFLICT OF INTEREST STATEMENT

All authors have no conflicts of interest to declare.

ETHICAL APPROVAL

This project was granted an exemption from ethical approval by The University of Queensland University Human Research Ethics Committee (Ref: 2022/HE002061).

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