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# Impact of the COVID-19 pandemic on student experiences during rural placements in Australia: findings from a national multi-centre survey

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## Abstract

**Background:** The aim of this national study was to explore the learning experiences of Australia's medical students who trained rurally during the COVID-19 pandemic in 2020.

**Methods:** A cross-sectional, national multi-centre survey was conducted in 2020, through the Federation of Rural Australian Medical Educators (FRAME). Participants were medical students who had completed an extended Rural Clinical School (RCS) training placement ( $\geq 12$  months). A bespoke set of COVID-19 impact questions were incorporated into the annual FRAME survey, to capture COVID-19-related student experiences in 2020. Pre-pandemic (2019 FRAME survey data) comparisons were also explored.

**Results:** FRAME survey data were obtained from 464 students in 2020 (51.7% response rate), compared with available data from 668 students in 2019 (75.6% response rate). Most students expressed concern regarding the pandemic's impact on the quality of their learning (80%) or missed clinical learning (58%); however, students reported being well-supported by the various learning and support strategies implemented by the RCSs across Australia. Notably, comparisons to pre-pandemic (2019) participants of the general RCS experience found higher levels of student support (strongly agree 58.9% vs 42.4%,  $p < 0.001$ ) and wellbeing (strongly agree 49.6% vs 42.4%,  $p = 0.008$ ) amongst the 2020 participants. Students with more than one year of RCS experience compared to one RCS year felt better supported with clinical skills learning opportunities ( $p = 0.015$ ) and less affected by COVID-19 in their exam performance ( $p = 0.009$ ).

**Conclusions:** This study has provided evidence of both the level of concern relating to learning quality as well as the positive impact of the various learning and support strategies implemented by the RCSs during the pandemic in 2020. RCSs should further evaluate the strategies implemented to identify those that are worth sustaining into the post-pandemic period.

**Keywords:** Rural placements, Clinical placements, COVID-19 pandemic, Medical education

## Introduction

Medical programs in universities across the world have had to respond to the COVID-19 pandemic by enacting changes to curricular delivery, clinical placements, and examinations [1–3]. It is envisaged that some of the

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learnings and program improvements induced by forced changes will be sustained into the post-pandemic period, as part of curricular reforms [3].

Internationally, disruptions to clinical training for medical students have stemmed from a climate of uncertainty around the risks of the COVID-19 pandemic leading to discontinuation of clinical placements either by the placement site or university [4, 5]. This discontinuation of placements meant that students were unable to practice applied skills or gain experience interacting with patients [5, 6]. Due to the stress of the pandemic coupled with significant restrictions to clinical placements, medical students world-wide felt the effects of the pandemic, which manifested as mental health and wellbeing challenges, significant disruptions to their learning and concerns about timely graduation and career progression [1, 7]. Information on challenges experienced by medical and nursing students undertaking rural placements in Canada [8] and nursing and allied health students undertaking clinical placements across rural Australia [9] has emerged. In contrast, limited information is currently available about the experience of medical students completing clinical placements in rural Australia.

Evidence of the value of rural medical education is growing, particularly to supplying the future rural medical workforce [10–12]. The continuation of rural clinical placements for medical students was not immune to the challenges induced by the pandemic. The Federation of Rural Australian Medical Educators (FRAME) [13] a peak body representing 19 universities with Rural Clinical Schools (RCS) funded by the Australian Government Rural Health Multidisciplinary Training (RHMT) Program [14], provided a platform for Australian rural medical educators to jointly problem-solve and work towards mitigating the adverse effects of the pandemic. Rural programs remained agile and creative, designing, and implementing a range of targeted initiatives to sustain the rural clinical placements. Adaptations implemented included online delivery of lectures using problem-based learning approaches, virtual student support groups, dedicated financial and administrative support from universities, shortened clinical placements, catch-up placements, student exposure to telehealth, and delaying and providing concessions to assessments (see examples in Fig. 1). Student experiences and the impact of these adaptations on student learning need to be investigated to inform future learning and support strategies [1].

Several concerns have been raised about the consequences of missed learning opportunities during clinical placements undertaken throughout the pandemic, particularly once students transition to become junior doctors [15]. It has been widely acknowledged that lack of adequate in-person experiences can negatively impact

professional skills such as teamwork, communication, building rapport, empathy, and professionalism, in addition to clinical skills and knowledge [8, 16, 17]. These adverse impacts could be worse for medical students based in rural areas because of professional and social isolation and poor technical infrastructure as highlighted by recent studies from countries including Russia [18], India [19], and Canada [8], compounding the challenges already faced in rural areas.

To date, there is a distinct lack of evidence on the extent and nature of disruptions caused by the pandemic on rural student's learning, and their perceptions of the learning and support strategies implemented. This information is essential to not only guide the development of targeted strategies that can be implemented to support the emerging medical workforce, but also to guide rural medical training into the post-pandemic period, in relation to curricular and learning adaptations and approaches. With this background in mind, this national multi-centre study aimed to explore the learning experiences of Australia's medical students who trained rurally during the COVID-19 pandemic. Specifically, we sought to investigate the impact of the COVID-19 pandemic on the training quality of medical students and evaluate how effective the various supports and adjusted learning measures were in supporting students during this challenging time.

## Methods

A cross-sectional quantitative survey, including newly developed questions to assess the impact of the COVID-19 pandemic was administered between June and December 2020 with students from 17 Australian universities (464 respondents). The survey was distributed through FRAME's annual rural placement evaluation, with invitations distributed to all relevant students on exit from RCS at the end of the placement and in their year of graduation. Each university was responsible for local distribution of invitations and noting the number of eligible participants. Overall response rates were calculated assuming that all eligible participants in each university received an invite. Most students completed the survey towards the end of 2020, although students from two participating RCSs completed the survey in mid-2020 in line with their placements concluding. Participants were medical students who had completed an extended clinical training placement in a rural location of at least one academic year ( $\geq 12$  months), with some students having completed two consecutive years at an RCS.

In addition to FRAME's standard questions, a bespoke set of COVID-19 impact questions was designed and integrated to capture student experiences in 2020 in relation to the pandemic. These new questions related to

**Learning strategies**

1. Online lectures, workshops
2. Catch-up placements
3. Shortened (more flexible) clinical placements
4. Telehealth consultation skills teaching, including incorporation into simulation sessions
5. New near-peer teaching program - bedside tutorials at MM3-5 sites (as regional educators were unable to travel to students)
6. Online clinical skills and SIM sessions.

**Support strategies**

1. Virtual pizza nights to provide social peer support to students
2. Financial support
3. Near peer teaching program - formalising links with locally based junior doctors/General Practice registrars
4. Regular zoom catch ups with staff and students
5. Welfare check telephone calls - RCS staff were allocated a group of students to regularly call to check their welfare
6. RCS organised delivery of groceries to students in accommodation facilities.

**Fig. 1** Additional support and learning strategies implemented by RCSs during the pandemic

their views on learning adaptations and concessions made to assessments as a result of the pandemic, and other learning impacts resulting from the pandemic including on their work-readiness. FRAME's standard questionnaire includes information relating to the student's background and demographics, their plans for future medical practice, experience at the RCS and clinical placement environments, and student support and wellbeing. For this study, 2019 FRAME data were additionally used (668 respondents) to provide a pre-pandemic comparison point of student support and wellbeing. A complete copy of the 2019 and 2020 survey instruments can be found on the FRAME website (<https://ausframe.org/publications-and-resources/>). Ethics approval for this study was obtained through University of Notre Dame Human Research Ethics Committee (ref: 2020-196S).

**Statistical analyses**

Descriptive statistics (frequencies and proportions) were calculated, and Chi-Square (Yes/No responses)

and Mann–Whitney tests (Likert scale responses) were used for comparisons between groups. Demographic data and questions relating to student support and wellbeing were compared between the 2020 participants and 2019 (pre-pandemic) participants. Likert scales were not collapsed for data analysis but are presented in results tables as positive, negative, and neutral categories (Tables 2 and 3) or as the proportion who answered yes/agree, reported a negative impact, or felt well-supported (Table 4) for ease of interpretation. Comparisons between 2019 and 2020 are reported as strongly agree/strongly disagree, agree/disagree, and all other responses (Table 3) to demonstrate changes in the number of responses at the positive end of the scale. Comparisons were also made between data collected from students having completed their first RCS year and those who have completed more than one RCS year, as well as between participants completing the survey mid-year compared to the end of year. All data were cleaned, coded, and analysed in SPSS version 27.

## Results

FRAME survey data were obtained from 464 students in 2020 (51.7% response rate), compared with available data from 668 students in 2019 (75.6% response rate), however some data are missing due to students not completing all the questions on the survey. Almost 60% ( $n=266$ ) of the respondents were female and 54% ( $n=252$ ) had a rural background. For 65% ( $n=294$ ) of the students, 2020 was their only RCS year. Further descriptive statistics for the 2019 and 2020 cohorts are presented in Table 1.

During the pandemic, 88% of respondents always felt safe in clinical training. Of the 33% of students who actively participated in clinical or administrative duties including screening, testing, or treating patients with COVID-19, 78% ( $n=111$ ) reported always feeling safe. Asked to compare their experience to the beginning of 2020, the majority of respondents (80%) reported a negative impact of COVID-19 on the quality of their learning (specifically on missed learning opportunities, reduced community placements, reduced breadth of cases, and being negatively impacted by travel restrictions). Although more than half (58%) the students were concerned about missed clinical learning, overall students were generally satisfied with adjusted learning methods and changes to assessments (Table 2). No

significant changes were noted between the cohorts in relation to their intentions to practice rurally following graduation.

Comparisons for student support and wellbeing between cohorts attending RCS training prior to or during the pandemic are provided in Table 3. Students felt better supported academically, financially, and overall, during 2020 compared to 2019 ( $P<0.001$ ) as well as being more likely to agree that their RCS placement positively impacted their wellbeing ( $P=0.008$ ). In 2020, students were also less likely to report feeling academically isolated compared to 2019 ( $P=0.023$ ). In fact, more of the 2020 cohort compared with the 2019 cohort agreed (in the positive direction) to all aspects of support and wellbeing.

Students who had completed one year at an RCS were more concerned about progressing to the next year of study ( $P=0.020$ ) and were more likely to agree that COVID-19 adversely affected their exam performance ( $P=0.009$ ) than students who had completed more than one year at an RCS (Table 4). Students who had completed just one year at an RCS reported more exposure to community placements ( $P=0.002$ ) and felt they were less supported in extra clinical skills learning opportunities ( $P=0.015$ ).

**Table 1** Participant demographics

Variable	Response	2019 (N [%])	2020 (N [%])
Gender	Male	278 (43.0)	182 (40.6)
	Female	366 (56.7)	266 (59.4)
	Other	2 (0.3)	0 (0.0)
Age	20–24	362 (57.0)	221 (50.3)
	25–29	198 (31.2)	170 (38.7)
	30+	75 (11.8)	48 (10.9)
Rural background	No	338 (51.1)	211 (45.6)
	Yes	323 (48.9)	252 (54.4)
Aboriginal/Torres Strait Islander	No	646 (97.9)	451 (97.4)
	Yes	14 (2.1)	12 (2.6)
Already have a health professional qualification	No	595 (90.2)	391 (84.4)
	Yes	65 (9.8)	72 (15.6)
First in family to attend university	No	553 (84.0)	393 (84.9)
	Yes	105 (16.0)	70 (15.1)
Speak a language other than English at home	No	537 (81.5)	378 (81.6)
	Yes	122 (18.5)	85 (18.4)
You and your parents immigrated to Australia	No	415 (62.7)	291 (63.1)
	Yes	247 (37.3)	170 (36.9)
Time of survey completion	Mid-year	Not analysed	64 (14.2)
	End of year	Not analysed	388 (85.8)
RCS year completed	First year at an RCS	Not analysed	294 (65.0)
	Second consecutive year at an RCS year	Not analysed	158 (35.0)

**Table 2** Satisfaction with adjusted learning and support provided during the pandemic (2020)

Question	No (N [%])	Yes (N [%])	
Participation with COVID-19 patients	292 (67.1)	Clinical: 114 (26.2) Administrative: 29 (6.7)	
Felt safe in clinical training during the COVID-19 pandemic	51 (11.8)	382 (88.2)	
COVID-19 impact on quality of learning in clinical placement	<b>Negative</b> 347 (80)	<b>Neutral</b> 53 (12.2)	<b>Positive</b> 34 (7.8)
I am concerned about having missed specific clinical learning	<b>Disagree</b> 125 (28.8)	<b>Neutral/Don't know</b> 58 (13.4)	<b>Agree</b> 251 (57.8)
I had exposure to an increased breadth of cases	299 (68.9)	78 (18.0)	57 (13.1)
I had more exposure to new models of care	67 (15.5)	55 (12.7)	311 (71.8)
I am worried about my progression into the next year of study	273 (63.0)	65 (15.0)	95 (22.0)
I had more exposure to community placements	274 (63.3)	78 (18.0)	81 (18.7)
Placements/learning opportunities affected by travel restrictions	186 (42.9)	42 (9.7)	205 (47.3)
COVID-19 adversely affected exam performance	107 (24.8)	150 (34.7)	175 (40.5)
Satisfaction with teleconferencing of tutoring/learning	<b>Dissatisfied</b> 99 (22.8)	<b>Neutral</b> 88 (20.3)	<b>Satisfied</b> 247 (56.9)
Satisfaction with online learning platforms	88 (20.3)	111 (25.6)	235 (54.1)
Satisfaction with self-directed learning	95 (21.9)	134 (30.9)	205 (47.2)
Satisfaction with collaborative learning	86 (19.9)	161 (37.3)	185 (42.8)
Satisfaction with lecture sharing with other universities	104 (24.0)	220 (50.7)	210 (25.3)
Satisfaction with video tutorials	89 (20.6)	136 (31.4)	208 (48.0)
Satisfaction with changes to written assessments	128 (29.7)	NA	303 (70.3)
Satisfaction with changes to case-based learning requirements	126 (29.2)	NA	306 (70.1)
Satisfaction with changes to clinical assessments	141 (32.6)	NA	291 (67.4)
Satisfaction with changes to competency assessments	118 (27.4)	NA	313 (72.6)
<b>How well do you feel you were supported in the following areas:</b>	<b>Poorly supported</b>	<b>Neutral/NA</b>	<b>Well supported</b>
Regular communication	52 (12.1)	43 (10.0)	335 (77.9)
Alternatives to clinical work	88 (18.1)	128 (29.8)	224 (52.1)
Q & A opportunities with RCS staff and faculty	55 (12.8)	60 (14.0)	314 (73.2)
Online learning/teaching	45 (10.5)	64 (14.8)	321 (74.7)
Simulation/extra clinical skills learning opportunities	106 (24.6)	75 (17.5)	249 (57.9)
Financial support	78 (18.2)	174 (40.8)	175 (41.0)

Students who completed the survey at the end of 2020 reported less participation with COVID-19 patients, and feeling safer in clinical training during the pandemic than those who completed the survey mid-year ( $P < 0.001$ ) (Table 4). Additionally, they reported exposure to an increased breadth of medical presentations overall ( $P = 0.034$ ), though the proportions were low in both groups (14% versus 8% respectively). Moreover, they expressed more concern over progressing to the next year of study ( $P = 0.029$ ) but felt that their placements/learning opportunities were less severely impacted by travel restrictions ( $P = 0.004$ ) and were less likely to agree that COVID-19 adversely affected their exam performance ( $P = 0.033$ ). Lastly, they felt better supported regarding regular communication ( $P < 0.001$ ), alternatives to clinical work ( $P = 0.032$ ), question and answer opportunities with RCS staff ( $P = 0.005$ ), online learning and teaching

( $P < 0.001$ ), extra clinical skills learning opportunities ( $P = 0.006$ ), and financial support ( $P < 0.001$ ).

## Discussion

This multi-centre national study comprehensively investigated the impact of the COVID-19 pandemic on rural clinical placement experiences of students from 17 Australian universities to elucidate the impact of the pandemic on rural medical students' clinical placements and learning quality and evaluate the support strategies implemented across rural Australia. Findings indicate that although students felt the COVID-19 pandemic negatively impacted their learning, they were generally satisfied with the academic, psychological, and social support provided by their RCS and approved of the adjusted learning methods implemented.

**Table 3** Support and wellbeing comparisons between pre-pandemic (2019) and mid-pandemic (2020) participants

Support and wellbeing comparisons							
Question	2019 (N [%])			2020 (N [%])			Statistical significance
	Strongly agree	Agree	All other responses	Strongly agree	Agree	All other responses	
I felt well supported academically by my RCS	298 (47.5)	212 (33.8)	117 (18.7)	271 (60.8)	111 (24.9)	64 (14.3)	$P < 0.001$
I felt well supported financially by my RCS	218 (34.7)	161 (25.6)	250 (39.7)	215 (48.0)	93 (20.8)	140 (31.3)	$P < 0.001$
My RCS informed me of health and counselling services	169 (27.0)	258 (41.1)	200 (31.9)	147 (32.9)	160 (35.8)	140 (31.3)	$P = 0.132$
Overall, I felt well supported by my RCS	266 (42.4)	248 (39.6)	113 (18.0)	264 (58.9)	120 (26.8)	64 (14.3)	$P < 0.001$
My RCS placement impacted positively on my wellbeing	264 (42.4)	203 (32.6)	156 (25.0)	222 (49.6)	139 (31.0)	87 (19.4)	$P = 0.008$
I have a rural-based clinician as a mentor	177 (28.3)	176 (28.1)	273 (43.6)	173 (38.6)	116 (25.9)	159 (35.5)	$P = 0.003$
	<b>Strongly disagree</b>	<b>Disagree</b>	<b>All other responses</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>All other responses</b>	
I felt academically isolated during my rural placement	112 (17.9)	186 (29.7)	329 (52.5)	103 (23.0)	137 (30.6)	207 (46.3)	$P = 0.023$
I felt socially isolated during my RCS placement	140 (22.4)	162 (25.9)	324 (51.8)	116 (26.0)	113 (25.3)	218 (48.8)	$P = 0.312$

Although students expressed increased concerns about the quality of learning across all RCSs, the proportion concerned about their learning progression was relatively small. This suggests that the learning adaptations and support strategies implemented by the RCSs (Fig. 1) were helpful in mitigating student concerns about their learning experiences triggered by the pandemic. This is a positive reflection of the RCS program, demonstrating that RCSs across the country have been successful in responding to the pandemic.

Comparisons of the 2019 and 2020 FRAME survey data indicate an unexpected result, that students felt more supported by their RCS after commencement of the pandemic compared to the preceding year's RCS cohort. This suggests that the disruptive impact of the pandemic may have triggered new ways in which RCS placement experiences can be enhanced. Internationally, the COVID-19 pandemic led to alternative means of academically and socially supporting students such as online discussion forums [20], peer mentoring [21, 22], virtual case-based learning [21], more frequent communication from staff [22], and virtual social support sessions for students [23]. As with the rest of the world, it will be vital for Australian RCSs to continue to evaluate the different learning and support strategies they have implemented (see Fig. 1), to determine which ones are important to sustain into the post-pandemic period. As noted previously, the pandemic has provided medical schools an opportunity

to examine all aspects of their medical programs, and to review the suitability of curriculum for future doctors, so that the future medical workforce can be better trained and prepared to meet the health needs of communities they serve [2, 16, 24, 25].

Students who had completed only one RCS year expressed a need for more support when compared to students who had completed more than one RCS year. Whilst those with one RCS year's experience may not have been new to clinical training, they were new to their placement community. This suggests that students undertaking RCS placements over two years had increased connectedness with the community, enabling increased resilience to some of the training uncertainty that resulted from the pandemic. In another COVID-19 study conducted in the United States, students that were newer to clinical learning environments had expressed greater concern around the impact of the pandemic on their medical education [26]. The literature also suggests that students that desire increased support may benefit from peer mentoring from more senior medical students, in addition to other learning and support strategies implemented by their medical schools [27].

Many differences emerged between the time of year students completed the survey, with those earlier in the year noting more negative experiences in relation to support questions. Mid-year respondents were likely in the midst of changes as RCSs were adjusting and trialling

**Table 4** Support and wellbeing comparisons by timing of survey completion and length of RCS placement

Question	Timing of survey completion comparisons			RCS year comparisons		
	Yes: Mid-year (N [%])	Yes: End of year (N [%])	Statistical significance	Yes: 1 year (N [%])	Yes: > 1 year (N [%])	Statistical significance
Participation with COVID-19 patients	39 (61.9)	104 (28.0)	$P < 0.001$	97 (33.8)	46 (31.0)	$P = 0.649$
Felt safe in clinical training during the pandemic	44 (69.8)	338 (91.4)	$P < 0.001$	97 (33.8)	46 (31.1)	$P = 0.323$
COVID-19 impact on quality of learning during placement	<b>Negative impact: Mid-year</b> 50 (79.3)	<b>Negative impact: End of year</b> 297 (80.1)	$P = 0.231$	<b>Negative impact: 1 year</b> 232 (80.8)	<b>Negative impact: &gt; 1 year</b> 115 (78.2)	$P = 0.357$
I am concerned about having missed specific clinical learning	<b>Agree: Mid-year</b> 33 (52.4)	<b>Agree: End of year</b> 218 (58.7)	$P = 0.419$	<b>Agree: 1 year</b> 176 (61.4)	<b>Agree: &gt; 1 year</b> 75 (51.0)	$P = 0.079$
I had exposure to an increased breadth of cases	5 (7.9)	52 (14.0)	$P = 0.034$	47 (16.4)	10 (6.8)	$P = 0.317$
I had more exposure to new models of care	46 (73.0)	265 (71.70)	$P = 0.140$	208 (72.7)	103 (70.1)	$P = 0.361$
I am worried about my progression into the next year of study	6 (9.7)	89 (24.0)	$P = 0.029$	68 (23.8)	27 (18.4)	$P = 0.020$
I had more exposure to community placements	11 (17.7)	70 (18.9)	$P = 0.806$	67 (23.4)	13 (9.6)	$P = 0.002$
Placements/learning opportunities affected by travel restrictions	38 (60.3)	167 (45.1)	$P = 0.004$	137 (47.7)	68 (46.6)	$P = 0.552$
COVID-19 adversely affected exam performance	31 (49.2)	144 (39.0)	$P = 0.033$	127 (44.4)	48 (32.9)	$P = 0.009$
<b>Level of support:</b>	<b>Well supported: Mid-year</b>	<b>Well supported: End of year</b>		<b>Well supported: 1 year</b>	<b>Well supported: &gt; 1 year</b>	
Regular communication	33 (52.4)	302 (82.3)	$P < 0.001$	221 (78.1)	114 (77.6)	$P = 0.620$
Alternatives to clinical work	26 (41.3)	198 (54.0)	$P = 0.032$	148 (52.3)	76 (51.8)	$P = 0.162$
Q & A opportunities with RCS staff and faculty	35 (55.6)	279 (76.2)	$P = 0.005$	204 (72.4)	110 (74.8)	$P = 0.161$
Online learning/teaching	35 (55.6)	286 (78.0)	$P < 0.001$	209 (73.9)	112 (76.2)	$P = 0.256$
Simulation/extra clinical skills learning opportunities	28 (44.4)	221 (60.2)	$P = 0.006$	154 (54.4)	95 (64.7)	$P = 0.015$
Financial support	14 (22.5)	143 (39.2)	$P < 0.001$	116 (41.5)	59 (40.2)	$P = 0.598$

different learning and support strategies, whereas end-of-year respondents were more likely, with time, to be settled into adaptations, especially once the initial fear of the unknown passed. It is noted that experiences of the group that completed the survey mid-year relate to two specific RCSs only, but it is not possible to determine

whether this cohort effect contributes to the observed differences.

As the pandemic continues to evolve and the medical education landscape continues to adapt with it, the lingering impacts of lockdowns, isolation while infectious, travel restrictions and the ‘new normal’ ways of teaching,

learning, and living for medical students in rural locations requires monitoring. The mental health and well-being of these students also need to be watched. The importance of continuing provision of high-quality learning experiences for the future rural medical workforce cannot be underestimated.

### Limitations

This study reports a one-off survey that was conducted at the completion of extended RCS placements, but participants were not given any opportunity to further qualify their responses such as via open text. The survey will be re-administered 12 months later (with a different set of students) as a follow-up to the 2020 survey, to continue investigation of the ongoing impact of the COVID-19 pandemic on rural medical education in Australia. State comparisons were not permitted under the FRAME data sharing agreement to preserve anonymity, so this study could not investigate the possible impact of local acute events or varying pandemic severity and lockdown rules in different states on student learning experiences. The analysis of differences in survey timing is potentially confounded by differences between the RCSs (e.g., location of the university), not the timing itself.

### Conclusion

This national multi-centre survey of medical student experiences across most of rural Australia during the pandemic has provided evidence of both the impact on rural students' clinical placements and learning quality as well as the positive impact of the various learning and support strategies and adaptations implemented by the RCSs across Australia. Students overall felt safe and well-supported academically, psychologically, and socially. RCSs will need to continue to evaluate and strengthen the positive strategies implemented during the pandemic that resulted in greater student support. This study has highlighted the need to provide more support to students who are newer to rural training environments. Future research could incorporate qualitative and longitudinal studies to further understanding of the continued impacts of the pandemic on rural medical education and the pandemic-trained generation of the medical workforce.

### Abbreviations

FRAME: Federation of Rural Australian Medical Educators; RCS: Rural Clinical School.

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### Authors' contributions

All authors contributed to study conceptualisation, planning of the analysis, and interpretation of the findings. PM and RO led study design with inputs from all the other authors; ZD led data collection, with RO, PM and JF also obtaining data. JF and MM analysed the data and contributed to interpretations with all other authors. PM and MM reviewed the literature. PM, JF and MM led the manuscript writing, with all authors contributing to the final draft. The author(s) read and approved the final manuscript.

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5. Dr Zeldia Doyle is the research co-ordinator and rural epidemiologist at the University of Notre Dame, Australia. She runs the FRAME survey and undertakes research on issues which impact rural communities.
6. Professor Denese Playford (posthumous) was Unit co-ordinator for the Western Australia RCS (RCSWA), ensuring a coherent and integrated year of rural medical education for penultimate year students from Western Australia's three medical schools, and researching the long-term work outcomes of the program.
7. Ms Jessica Beattie is a researcher at Deakin University, Rural Community Clinical School. She provides support in program development and undertakes research in rural medical education and rural workforce.
8. Dr Vivian Isaac is a senior lecturer at Rural and Remote Health, Flinders University. Dr Isaac contributes to the rural community-engaged medical education program in Renmark, South Australia particularly in regard to mental health clinical education and research.
9. A/Prof Lara Fuller is Director of the Rural Community Clinical School, the Longitudinal Integrated Clerkship Program within Deakin University's Doctor of Medicine. As an academic General Practitioner her interests are in curriculum design for rural medical education, learning in Longitudinal Integrated Clerkships, rural clinical training pathways and rural workforce outcomes.
10. Dr Penny Allen is Senior Research Fellow at the Rural Clinical School, University of Tasmania. Penny's background is in epidemiology and statistics and has extensive experience in health service outcomes research and rural medical training evaluations. Penny has ongoing research collaborations with rural ophthalmologists, mainly focussed on the evaluation of innovative surgical technologies and procedures.
11. A/Prof Srinivas Kondalsamy-Chennakesavan is Director of Research at the University of Queensland Rural Clinical School. His areas of research expertise include translational research, public health, developing sustainable health care interventions, health services evaluation and medical epidemiology. He is trained in medicine and public health and has been in senior leadership roles for over 20 years.

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### Availability of data and materials

Data are protected by ethics. All reasonable requests to access de-identified data can be made in writing to the corresponding author.

### Declarations

#### Ethics approval and consent to participate

Ethics approval for this study was obtained through University of Notre Dame Human Research Ethics Committee (ref: 2020-196S).

Informed consent was waived by the University of Notre Dame Human Research Ethics Committee (ref: 2020-1965). Participants provided implied consent by completing the survey. All methods were carried out in accordance with relevant guidelines and regulations.

#### Consent for publication

Not applicable.

#### Competing interests

All authors declare no competing interests.

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#### References

- Ardekani A, Hosseini SA, Tabari P, et al. Student support systems for undergraduate medical students during the COVID-19 pandemic: A systematic narrative review of the literature. *BMC Med Educ.* 2021;21:352.
- Lee IR, Kim HW, Lee Y, et al. Changes in undergraduate medical education due to COVID-19: A systematic review. *Eur Rev Med Pharmacol Sci.* 2021;25(12):4426–34.
- Torda AJ, Velan G, Perkovic V. The impact of the COVID-19 pandemic on medical education. *Med J Aust.* 2020;213(7):334–334.e1.
- Ohta R, Ryu Y, Sano C. The uncertainty of COVID-19 inducing social fear and pressure on the continuity of rural, community-based medical education: A thematic analysis. *Healthcare.* 2021;9(2):223.
- Ahmed H, Allaf M, Elghazaly H. COVID-19 and medical education. *Lancet Infect Dis.* 2020;20(7):777–8.
- Yang D, Cheng S, Wang S, et al. Preparedness of medical education in China: Lessons from the COVID-19 outbreak. *Med Teach.* 2020;42(7):787–90.
- Gupta P, Anupama BK, Ramakrishna K. Prevalence of depression and anxiety among medical students and house staff during the COVID-19 health-care crisis. *Acad Psychiatry.* 2021;45(5):575–80.
- Jackman D, Konkin J, Yonge O, et al. Crisis and continuity: Rural health care students respond to the COVID-19 outbreak. *Nurse Educ Pract.* 2020;48:102892.
- Bourke L, Hellwege B, Jessup B, et al. The impact of COVID-19 on student placements facilitated by University Departments of Rural Health. Australian Rural Health Education Network. 2021. <https://www.arhen.org.au/research/papers-and-reports/>. Accessed on 11/10/2021.
- Kondalsamy-Chennakesavan S, Eley DS, Ranmuthugala G, et al. Determinants of rural practice: positive interaction between rural background and rural undergraduate training. *Med J Aust.* 2015;202(1):41–6.
- McGirr J, Seal A, Barnard A, et al. The Australian Rural Clinical School (RCS) program supports rural medical workforce: evidence from a cross-sectional study of 12 RCSS. *Rural Rem Health.* 2019;19:4971.
- O'Sullivan BG, McGrail MR. Effective dimensions of rural undergraduate training and the value of training policies for encouraging rural work. *Med Educ.* 2020;54(4):364–74.
- [FRAME]. Federation of Rural Australian Medical Educators. <https://ausframe.org/>. Accessed on 26/11/2021.
- [DoH] Department of Health, Australian Government. Rural Health Multi-disciplinary Training (RHMT) Program. 2020 <https://www1.health.gov.au/internet/main/publishing.nsf/Content/rural-health-multidisciplinary-training>. Accessed on 20/10/2021.
- Kotta PA, Elango M. A guide for final year medical students: transitioning to foundation training during the covid-19 pandemic. *BMJ.* 2021;18(375):n2287.
- Southworth E, Gleason SH. COVID 19: A cause for pause in undergraduate medical education and catalyst for innovation. *HEC Forum.* 2021;33(1–2):125–42.
- Triemstra JD, Haas MRC, Bhavsar-Burke I, et al. Impact of the COVID-19 pandemic on the clinical learning environment: Addressing identified gaps and seizing opportunities. *Acad Med.* 2021;96(9):1276–81.
- Mukharyamova L, Ziganshina A, Zhidjaevskij A, et al. Medical students in Russia evaluate the training during the COVID-19 pandemic: A student survey. *BMC Med Educ.* 2021;21(1):560.
- Lawande NN, Kenkre TD, Mendes NA, et al. Perspectives of Indian medical students on e-learning as a tool for medical education in the country: A quantitative study. *International J Comm Med Pub Health.* 2020;5.17(9):3610–6.
- Huddart D, Hirniak J, Sethi R, et al. # MedStudentCovid: How social media is supporting students during COVID-19. *Med Educ.* 2020;54(10):951–2.
- Lee IC, Koh H, Lai SH, et al. Academic coaching of medical students during the COVID-19 pandemic. *Med Educ.* 2020;54(12):1184–5.
- Ashokha B, Ong SY, Tay KH, et al. Coordinated responses of academic medical centres to pandemics: Sustaining medical education during COVID-19. *Med Teach.* 2020;42(7):762–71.
- Stetson GV, Kryzhanovskaya IV, Lomen-Hoerth C, et al. Professional identity formation in disorienting times. *Medical Education.* 2020;54(8):765–6.
- Cairney-Hill J, Edwards AE, Jaafar N, et al. Challenges and opportunities for undergraduate clinical teaching during and beyond the COVID-19 pandemic. *J Royal Soc Med.* 2021;114(3):113–6.
- Sandhu P, de Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. *Med Educ Online.* 2020;25(1):1764740.
- Harries AJ, Lee C, Jones L, et al. Effects of the COVID-19 pandemic on medical students: A multicenter quantitative study. *BMC Med Educ.* 2021;21:14.
- Tabari P, Amini M. Educational and psychological support for medical students during the COVID-19 outbreak. *Med Educ.* 2020;55:125–7.

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