

# Urban general practice and medical education: Academic outcomes from a unique urban, longitudinal integrated community-based program

Sarah Mahoney, Paul Worley, Helen Parry, Sally Clarke

## Background

In 2009, Flinders University established an urban, community-based, longitudinal integrated program providing medical students extended placements that offered continuities of patient care, clinical supervision and peer group.

## Objective

The aim of this research was to analyse academic outcomes of the new placement program.

## Method

The results of all students undertaking Year 3 exams from 2011 to 2014 were collected and analysed. The Years 1 and 2 exam results for students in the new program were also analysed.

## Results

Students in the new placement program achieved significantly higher grades than those who undertook the traditional rotations program, with average scores of 69.05, compared with 66.45 ( $P = 0.03$ ). Analysis of average class ranking for students who undertook the new program showed a statistically significant improvement from 59th in class to 48th in class ( $P = 0.03$ ).

## Discussion

This evaluation shows that an urban, community-based, longitudinal integrated clerkship centred in general practice provides at least academically equivalent outcomes to traditional rotations-based programs.

The Flinders University Medical School was established in 1975, and is co-located with the urban tertiary teaching hospital, Flinders Medical Centre (FMC), situated in Adelaide, the capital city of South Australia. The medical course is a four-year graduate entry program, with clinical immersion being the dominant feature of its third and fourth years.

Longitudinal integrated clerkships (LICs) provide medical students with clinical learning opportunities based on extended placements offering continuities of patient care, clinical supervision and peer group.<sup>1</sup> Early LICs were primarily based in rural general practice<sup>2</sup> with the specific aim of increasing the medical workforce in under-served areas.<sup>3,4</sup> While most LICs are still based in rural areas, new and innovative approaches<sup>5</sup> are being used to establish LICs in both urban tertiary hospitals and ambulatory clinics,<sup>6-8</sup> and urban general practice communities.<sup>9</sup> There is preliminary evidence suggesting that LICs may also confer educational and professional identity advantages to students and medical schools.<sup>10</sup>

In 2009, Flinders University established the Onkaparinga Clinical Education Program (OCEP), an urban, community-based, LIC program for Year 3 students. This built on Flinders' experience of developing non-tertiary settings for major clinical teaching in rural South Australia and the Northern Territory.<sup>11,12</sup> The OCEP is based in the extensive commuter belt of suburbs in the southern urban fringe of Adelaide, 15 km south of FMC. The program staff are co-located with the Noarlunga Health Services, a 100-bed secondary hospital and its associated community services that serve this area.

The OCEP offers a full-year LIC for Year 3 medical students undertaking their first principal clinical immersion year. After two pilot years with groups of six to eight students in 2009-10, it was decided to expand the program to cater for 24 students annually by creating a hybrid model: 20 weeks based predominantly in

general practice and the emergency department of the local hospital, and 20 weeks of five 4-week rotations in the core specialties of medicine, surgery, obstetrics and gynaecology, paediatrics and psychiatry. Three of these five rotations were undertaken in the local community hospital; because of service restrictions, two of the rotations were at FMC. Longitudinality with both peer group and clinical educator was maintained across the full year through the integrated academic program, with a senior general practitioner (GP) as clinical educator and mentor for each group of eight students. Flinders students who remained in the traditional block rotations at FMC for the full year had two 20-week semesters based on the five specialty rotations, and 10 days of general practice scattered through these rotations.

With its diverse approaches to Year 3 learning, Flinders University has a 'many paths to the same end' approach. Students are allocated to a Year 3 site on the basis of their preferences entered into a computerised allocation program. The curriculum content and assessment are identical for all students regardless of the site at which they undertake the year of study.

While the rationale for community-based LICs is consistent with government and community expectations for medical schools, it is important to ensure that students' academic progress is not being impaired by these social aspirations. Comparative assessment data have been published by some non-traditional clinical clerkship programs, including the Flinders rural and Northern Territory programs,<sup>4,13,14</sup> the Minnesota rural LIC program<sup>15</sup> and LICs in North Carolina.<sup>16</sup> No published data on academic outcomes exist for an urban LIC program in Australia. The aim of this study was to fill this evidence gap by determining if the 'primum non nocere' ('first, do no harm') hypothesis for academic performance in the standard Year 3 examinations was fulfilled for students who undertook a year-long urban, community-based LIC.

## Methods

The final numerical grade for students in Year 3 of the medical course is a combined grade for all of the Year 3 topics. These topics are Clinical Performance 3A and 3B, and Health Professions and Society 3A and 3B. The final grade is calculated using the results of two major end-of-year written papers that consist of both multiple choice and short answer questions, and a centrally organised practical clinical examination that is predominantly an Objective Structured Clinical Exam (OSCE)-type examination. The medical school closely monitors these examinations for quality and consistency. Reliability for both the practical and written examinations is evaluated using the Cronbach alpha<sup>17</sup> test to compare performance across multiple items. The average Cronbach alpha score between 2011 and 2014 was acceptable or very acceptable for all examinations. The grades for two case-based presentations and two essays completed by students during the year also contribute to the final score. Non-graded assessments completed and monitored throughout the year include miniCEXs, clinical learning records and in-training progress reports. Although the students must also pass all of the non-graded assessments to pass the year, these assessments did not contribute to the numerical grades discussed in this paper.

The results of all students undertaking the whole-of-class Year 3 exams from 2011 to 2014 were collected and entered into Microsoft Excel spreadsheets. The previous results obtained during Years 1 and 2 by OCEP students were then sourced and likewise entered into the spreadsheets. Data from students undertaking rural and remote placements were excluded, enabling a direct comparison between the exam performance of OCEP students and students undertaking the traditional 'gold standard' rotations-based curriculum at the tertiary hospital (FMC). Analysis was undertaken using the raw exam results in Year 3, the Year 3 class ranking, and the

class ranking using combined Years 1 and 2 results, which were derived from actual exam results (where 1 = top-ranked student in the relevant cohort). Mean scores were compared using an independent sample t-test, linear regression modelling or the Wilcoxon signed-rank test.

## Results

Over the four years, 2011 to 2014 inclusive, there were 90 OCEP students and 236 FMC students. Data were available for all students (Table 1). OCEP students achieved significantly higher grades than students who undertook the FMC rotations program, with OCEP mean scores of 69.05 compared to 66.45 for FMC students ( $P = 0.03$ ).

These data were further analysed using a linear regression model to confirm that scores were significantly different between OCEP and FMC student groups (Table 2).

The performance of OCEP students compared to the rest of their respective year cohorts as shown by class ranking (where the student ranked 1 in class has achieved the highest score for the cohort) was then compared to their own performances in the assessment tasks in Years 1 and 2 combined. This analysis of average class ranking before commencing OCEP, compared with class ranking at end of Year 3 after completing OCEP, showed a statistically significant improvement in class ranking for OCEP students from a mean of 59th in class to a mean of 48th in class ( $P = 0.03$ ; Table 3).

## Discussion

Medical students are high performers, and it would be expected that these students would do well in their assessments and examinations. However, it is essential that any new clinical education program demonstrates academic equivalence with existing and traditional programs. The change from the pre-clinical years to the first year of full clinical immersion (Year 3 in this case), with a focus on workplace

experiences and fewer structured learning opportunities than in previous university studies, is challenging for medical students.

The traditional structure of clinical education involves rotations of various lengths, but typically between four and

eight weeks, through different specialty areas of a tertiary hospital, with general practice only contributing marginally to students' clinical learning. The rural clinical schools have demonstrated the ability of rural general practice to contribute significantly to undergraduate medical

education, but urban general practice has mostly retained its more restricted contribution. This analysis of assessment data for students who have undertaken an urban, community-based LIC (OCEP), where urban general practice plays a key role in the program, has confirmed at least academic equivalence with their peers from the traditional rotations-based Flinders Year 3 program. The statistically significant improvement in average class ranking for OCEP students, which compares students' own relative performances in Year 3 at OCEP to their previous relative performances in Years 1 and 2, suggests that the outcomes are related to the program rather than student selection bias.

Many respected medical educators are arguing for a change in the structure of clinical education away from rotations as the only structure for clinical learning. Holmboe et al<sup>18</sup> make a powerful argument for reconsidering the rotational structure, stating that 'The lack of ongoing supervision and longitudinal relationships with faculty profoundly conflict with growing evidence from the literature on the development of expertise', and arguing that students 'may acquire dysfunctional strategies to cope with and adapt to constant transitions'. Hodges<sup>19</sup> argues that 'Knowledge and skills should be integrated early and often, and both should be anchored to clinical, social, cultural and other contexts'; and Howe<sup>20</sup> claims that family practitioners 'with the daily experience of our patients' socioeconomic sufferings' are 'key to confronting the dehumanizing aspects of both medical care and medical education'.

The enthusiasm and dedication of clinical supervisors is an important factor in medical education that clearly contributes to the success of any program and to positive student experiences. The GPs who have provided the longitudinal clinical placements for this program have been key contributors to the program, which is also supported by community-based private specialists and community hospital clinicians. Further development

**Table 1. Mean scores (SD) for OCEP and FMC groups across 2011–14 (n = 326)**

Year	FMC (n = 236)		OCEP (n = 90)		P value*
	n	Mean (SD)	n	Mean (SD)	
2011–14	236	66.45 (9.41)	90	69.05 (9.47)	0.03
2011	64	64.76 (7.92)	23	66.01 (7.96)	0.52
2012	52	63.48 (6.90)	22	67.35 (9.10)	0.049
2013	56	66.81 (8.40)	22	70.40 (7.93)	0.09
2014	64	70.24 (11.94)	23	72.43 (11.56)	0.45

\*P values are based on independent sample t-test

FMC, Flinders Medical Centre; OCEP, Onkaparinga Clinical Education Program

**Table 2. Linear regression model of scores for OCEP and FMC during 2011–14**

Group and year	Regression coefficient (β)	95% CI	P value
MMED8303 score			
<b>Group</b>			
FMC	Reference		
OCEP	2.69	0.46–4.91	0.02
<b>Year</b>			
2011	Reference		
2012	-0.55	-3.39–2.29	0.71
2013	2.68	-0.12–5.48	0.06
2014	5.73	3.01–8.45	<0.001

Dependent variables, MMED8303 score; independent variables are group and year

CI, confidence interval; FMC, Flinders Medical Centre; OCEP, Onkaparinga Clinical Education Program

**Table 3. OCEP students' class ranking between Years 1–2 and Year 3**

Year	n	Median	25th–75th percentile	Min–max	P value*
Years 1 and 2	90	59	25–98	1–145	0.03
Year 3	90	48	21–94	1–145	

\*P value is based on Wilcoxon signed-rank test

of this and similar programs will require adequate support and faculty development for clinical supervisors.

This paper, by demonstrating at least academic equivalence between students undertaking a community-based LIC, where GPs give students longitudinal learning opportunities, and students undertaking their learning in a standard rotational structure, may provide reassurance to medical schools wishing to change the structure of their programs to include LICs as a necessary component of early clinical learning. These results should also provide reassurance to urban GPs about the value of their teaching, and their ability to be core contributors to medical education.

This assessment of program outcomes is limited to considerations of the numerically graded final Year 3 assessment that includes two written papers of both multiple choice and short answer questions, a centrally organised practical clinical examination, two case presentations and two essays as described earlier. Satisfactory results for the non-numerically graded assessments provided by clinical supervisors throughout the year, miniCEXs, clinical learning records and in-training progress reports are all requirements for students to pass Year 3, but as non-graded assessments these results could not contribute to the numerical grades comparison discussed in this paper. Thus any comparison of narrative assessments is not included. Nor can the humanistic benefits of LICs be captured in routine assessment data. It is hoped that by removing academic considerations as a barrier to LICs, more LICs will be developed irrespective of geography, enabling further research into both the humanistic and student wellbeing aspects of such programs.

## Conclusion

General practice is an ideal setting for LICs that enable students to learn clinical medicine in a supportive environment with valuable student–teacher and student–patient relationships that contribute

positively to professional development, empathy and wellbeing. This evaluation of Flinders University's OCEP shows that an urban, community-based LIC centred in general practice and designed for medical students in the early stages of clinical learning provided at least academically equivalent outcomes when compared to traditional rotations-based programs in a tertiary hospital.

## Authors

Sarah Mahoney MBBS, MRACGP, Academic Coordinator, Onkaparinga Clinical Education Program, Flinders University, Adelaide, SA; General Practitioner, Blackwood, SA. sarah.mahoney@flinders.edu.au

Paul Worley MBBS, DRANZOG, FRACGP, FACRRM, MBA, AICD, Dean, School of Medicine, Flinders University, Adelaide, SA

Helen Parry MBBS, MPH, FRACGP, Clinical Educator, Flinders University, Adelaide, SA; General Practitioner, Seacombe Gardens, SA

Sally Clarke BSc, BMBS, Clinical Educator, Flinders University, Adelaide, SA; GP registrar, Adelaide, SA

Competing interests: None.

Provenance and peer review: Not commissioned, externally peer reviewed.

## References

1. Ellaway R, Graves L, Berry S, Myhre D, Cummings BA, Konkin J. Twelve tips for designing and running longitudinal integrated clerkships. *Med Teach* 2013;35(12):989–95.
2. Thistlethwaite JE, Bartle E, Chong AA, et al. A review of longitudinal community and hospital placements in medical education: BEME guide no. 26. *Med Teach* 2013;35(8):e1340–64. doi:10.3109/0142159X.2013.806981.
3. Verby JE. The Minnesota Rural Physician Associate Program for medical students. *J Med Educ* 1988;63(6):427–37.
4. Worley P, Strasser R, Prideaux D. Can medical students learn specialist disciplines based in rural practice: Lessons from students' self reported experience and competence. *Rural Remote Health* 2004;4(4):338. Available at [www.rrh.org.au/publishedarticles/article\\_print\\_338.pdf](http://www.rrh.org.au/publishedarticles/article_print_338.pdf) [Accessed 15 August 2016].
5. Worley P, Couper I, Strasser R, et al. A typology of longitudinal integrated clerkships. *Med Educ* 2016;50(9): 922–32.
6. Ogur B, Hirsh D, Krupat E, Bor D. The Harvard Medical School–Cambridge Integrated Clerkship: An innovative model of clinical education. *Acad Med* 2007;82(4):397–404.
7. Poncelet A, Bokser S, Calton B, et al. Development of a longitudinal integrated clerkship at an academic medical center. *Med Educ Online* 2011;16. doi:10.3402/meo.v16i0.5939.
8. Heddle W, Robertson G, Mahoney S, Walters L, Strasser S, Worley P. Challenges in transformation of the 'traditional block rotation' medical student clinical education into a longitudinal integrated clerkship model. *Educ Health (Abingdon)* 2014;27(2):138–42.
9. Mahoney S, Walters L, Ash J. Urban community based medical education – General practice at the core of a new approach to teaching medical students. *Aust Fam Physician* 2012;41(8):631–36.
10. Hirsh D, Walters L, Poncelet AN. Better learning, better doctors, better delivery system: Possibilities from a case study of longitudinal integrated clerkships. *Med Teach* 2012;34(7):548–54.
11. Morgan S, Smedts A, Campbell N, Sager R, Lowe M, Strasser S. From the bush to the big smoke – Development of a hybrid urban community based medical education program in the Northern Territory, Australia. *Rural Remote Health* 2009;9(3):1175. Available at [www.rrh.org.au/publishedarticles/article\\_print\\_1175.pdf](http://www.rrh.org.au/publishedarticles/article_print_1175.pdf) [Accessed 15 August 2016].
12. Walters LK, Worley PS, Mugford BV. The parallel rural community curriculum: Is it a transferable model? *Rural Remote Health* 2003;3(3):236. Available at [www.rrh.org.au/publishedarticles/article\\_print\\_236.pdf](http://www.rrh.org.au/publishedarticles/article_print_236.pdf) [Accessed 15 August 2016].
13. Worley P, Silagy C, Prideaux D, Newble D, Jones A. The parallel rural community curriculum: An integrated clinical curriculum based in rural general practice. *Med Educ* 2000;34(7):558–65.
14. Worley P, Esterman A, Prideaux D. Cohort study of examination performance of undergraduate medical students learning in community settings. *BMJ* 2004;328(7433):207–09.
15. Zink T, Power DV, Finstad D, Brooks KD. Is there equivalency between students in a longitudinal, rural clerkship and a traditional urban-based program? *Fam Med* 2010;42(10):702–06.
16. Latessa R, Beaty N, Royal K, Colvin G, Pathman DE, Heck J. Academic outcomes of a community-based longitudinal integrated clerkships program. *Med Teach* 2015;37(9):862–67.
17. Tavakol M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ* 2011;2:53–55.
18. Holmboe E, Ginsburg S, Bernabeo E. The rotational approach to medical education: Time to confront our assumptions? *Med Educ* 2011;45(1):69–80.
19. Hodges B. Medical education and the maintenance of incompetence. *Med Teach* 2006;28(8):690–96.
20. Howe A. Twelve tips for community-based medical education. *Med Teach* 2002;24(1):9–12.

correspondence [afp@racgp.org.au](mailto:afp@racgp.org.au)