

ORIGINAL RESEARCH

Formal assessment of the educational environment experienced by interns placed in rural hospitals in Western Australia

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ABSTRACT

Introduction: Increased numbers of rural hospital rotations for interns (first postgraduate year) are being created in Western Australia (WA). This study utilised the Postgraduate Hospital Educational Environment Measure (PHEEM), an internationally validated multidimensional questionnaire, to assess and compare the educational environment of five new or established rural sites and an urban teaching hospital.

Methods: The PHEEM was modified slightly: to make language appropriate for the WA context and to collect information about intern location. It was administered at the completion of each 10-week term over the first postgraduate year in 2009.

Results: A total of 147 completed PHEEM questionnaires were returned from 74 interns, evaluating a maximum of 210 individual 10-week terms (105 each from urban and combined rural). Average completion time was 6.4 minutes. The median score for teaching was 45.0 (interquartile range 39.0, 50.0) in rural locations and 43.0 (37.5, 46.0) in urban locations ($p=0.046$). The median scores for autonomy were 39.0 (35.0, 45.0) and 39.0 (36.0, 41.5) ($p=0.672$) and for support median scores 33.0 (28.0, 35.0) and 31.0 (28.0, 33.0) ($p=0.019$) in rural and urban locations respectively.

Conclusion: This study has utilised an Australian-appropriate version of the PHEEM and has provided the first confirmation that, in terms of educational environment, rural intern rotations compare favourably with those in urban settings in WA.

Key words: rural hospitals, educational environment, graduate medical education, internship and residency.



Introduction

In 1997–98 the Australian Medical Training Review Panel recommended that ‘all postgraduate medical officer training (should) include at least one rural ... term’¹ and in 2002 a national report commissioned by the Commonwealth Government reiterated this statement, further adding that state health departments should aim to locate rurally a minimum 20% of junior medical officer training positions, reflecting the distribution of the population¹.

In Western Australia (WA), only a small number of rural and remote hospitals receive interns (first postgraduate year, PGY1, prior to full registration with the Medical Board) on secondment from urban teaching hospitals. For a decade there have been three established rural sites, and in 2009 two new sites were added. It is likely however that rural allocation places for interns will continue to expand as the demand grows from those graduating from rural clinical schools, as rural postgraduate training pathways are created and as more placements are needed for the increasing number of graduates from local universities².

As these new sites open up it is imperative to demonstrate that the quality of the terms is comparable with more established teaching hospital rotations. This evidence may then encourage further initiatives and opportunities in country medical education, reassure junior medical staff of the value of rural allocations, support health services to achieve and maintain accreditation of training positions and develop partnerships between medical education research, administration and service delivery^{3,4}.

This research focuses on the ‘educational environment’ of the five rural and one comparator metropolitan hospital as experienced by interns in 2009. The educational environment is a way of portraying the combined factors that determine what it is like to be a learner in a particular organisation. It is considered in three parts:

- physical environment (eg facilities, safety, food, shelter)
- emotional climate (eg feedback, supported, presence/absence of bullying)
- intellectual tone (eg learning with patients, evidence-based care, planned education)⁵.

A robust clinical educational environment has been described as one in which good medicine is practised; which has teaching and learning opportunities that are patient-focused, well planned, reflective and motivating; which values professional behaviour; and which evaluates its teaching⁵. Problems in this environment may include lack of clear objectives and direction, passivity, poor clinical supervision, little time for reflection, and humiliation and bullying⁵.

One multidimensional tool created to measure this educational environment is the Postgraduate Hospital Educational Environment Measure (PHEEM). Its development by Roff, McAleer and Skinner in the UK was first reported in 2005⁶ and since then it has been utilised in a growing number of countries and clinical placements^{5,7}. The PHEEM has consistently demonstrated high levels of reliability (Cronbach’s alpha coefficient > 0.91) and acceptability to participants⁶⁻⁸. The global score is reported to provide a reliable measure of the overall learning environment⁶. It has three subscales measuring perceptions of teaching (scores indicative of a range from very poor quality through to model teachers), perceptions of role autonomy (very poor through to excellent perception of one’s job) and perceptions of social support (non-existent through to a good supportive environment)⁶.

At the time of the study, one group in Queensland had been using the PHEEM in the Australian context⁹, although there has since been one further publication from a group of nine metropolitan and regional hospitals in Victoria which confirmed the tool’s value in systematically collecting information about educational environment in Australia¹⁰.



Methods

The participants in this study were interns undertaking rotations in any rural hospital in WA and those based at a single urban teaching hospital in Perth in 2009. Information about the study, recruitment and signed informed consent was facilitated by staff from the Rural Clinical School of WA and by directors of clinical training who are local medical staff appointed to provide support, supervision and counsel to junior doctors.

At the end of each of the five 10-week terms in 2009, recruited interns were sent an email inviting them to fill in an online version of the PHEEM questionnaire. The PHEEM is a 40-item inventory utilising a five-point Likert scale with responses ranging from 'strongly agree' (4) to 'strongly disagree' (0). Four questions are negative statements and scored in reverse. The perceptions of teaching subscale contains 15 items with a maximum score of 60, perceptions of role autonomy subscale 14 items with maximum score of 56 and perceptions of social support subscale 11 items with a maximum score of 44. The summation of these scores has a combined maximum of 160 and minimum of zero. An approximate guide to interpreting these scores is given by the tool developers: global scores of 0–40 indicate a very poor educational environment, 41–80 indicate plenty of problems, 81–120 indicate more positive than negative but room for improvement, and 121–160 indicate an excellent educational environment⁶.

The PHEEM was slightly modified to suit the WA context (eg 'bleeped' was changed to 'paged' and 'the New Deal' to 'hospital contracts' (Appendix 1) and an associated database was created. Space for free text allowing comment on the questionnaire was added. Two reminder emails were sent if required. An administrative assistant de-identified the questionnaires upon receipt. Any one intern could complete a maximum of five questionnaires over the course of the study, dependent on their hospital location. Although the PHEEM's authors designed the questionnaire to generate responses that were normally distributed, there was a marked skew for

some scales for some sites, so the Kruskal–Wallis test was used in the most part to analyse the data, and representations were made using box plots. Differences between sites were identified using analysis of variance. Subscale scores were compared using the Chi square test with individual cell Chi square results identifying the influential cells. Changes over time were analysed using repeated measures analysis of variance. The data were analysed using SAS v9 (SAS Institute Inc.; <http://www.sas.com/software/sas9>).

Descriptive information about each rural site was collected through email and telephone conversations with each hospital's medical administration and director of clinical training (eg types of rotations offered, example rosters, facilities, length of time interns have been placed at the hospital, presence of a director of clinical training).

Ethics approval

The Ethics Committees of the University of WA, South Metropolitan Area Health Service and WA Country Health Service approved the study; ethics approval number RA/4/1/2271.

Results

Table 1 displays the characteristics of the rural hospitals compared with the teaching hospital comparator in the capital city, Perth.

PHEEM questionnaire responses

A total of 147 completed PHEEM questionnaires were returned from 74 interns, evaluating a maximum of 210 individual 10-week terms (105 each from urban and combined rural). Seventy-one responses came from rural locations and 76 from the urban site. The response rate over the full year was 72% for the urban hospital and 69% (range 56–93%) for the combined rural hospitals. Average completion time for the PHEEM (by self-report) was 6.4 minutes ($n=132$).



Table 1: Features of Western Australian country hospitals receiving interns in 2009

Location	Population*	Distance from Perth (km)*	ASGC-RA classification***	Number of interns at site	Years interns at site	Formal intern education program?	Terms offered
Perth	1 256 035	–	RA1 (major city)	21	Long standing	Yes	Tertiary hospital
Site 1	25 196	405	RA3 (outer regional)	3	First year	Yes	General medicine; general surgery; emergency department
Site 2	11 547	2370	RA4 (remote)	2	First year	Yes	General medicine; general surgery
Site 3	54 482	180	RA2 (inner regional)	9	Many	Yes	General medicine; general surgery; emergency department; orthopaedics
Site 4	28 242	595	RA3 (outer regional)	5	Many	Yes	General medicine/renal; general surgery; orthopaedics; emergency department; paediatrics
Site 5	11 557	1630	RA5 (very remote)	2	Many	Yes	General medicine; general surgery

* From Australian Bureau of Statistics Census data 2006; accessed 23 March 2010; available at: <http://www.censusdata.abs.gov.au>.

** Obtained from http://www.westernaustraliaholidays.com.au/driving_distances/driving_distances.html.

*** Australian Standard Geographic Classification Remoteness Areas classifications obtained from <http://www.aihw.gov.au/ruralhealth/remotenessclassifications/index.cfm>.

Urban versus rural locations for the three PHEEM dimensions

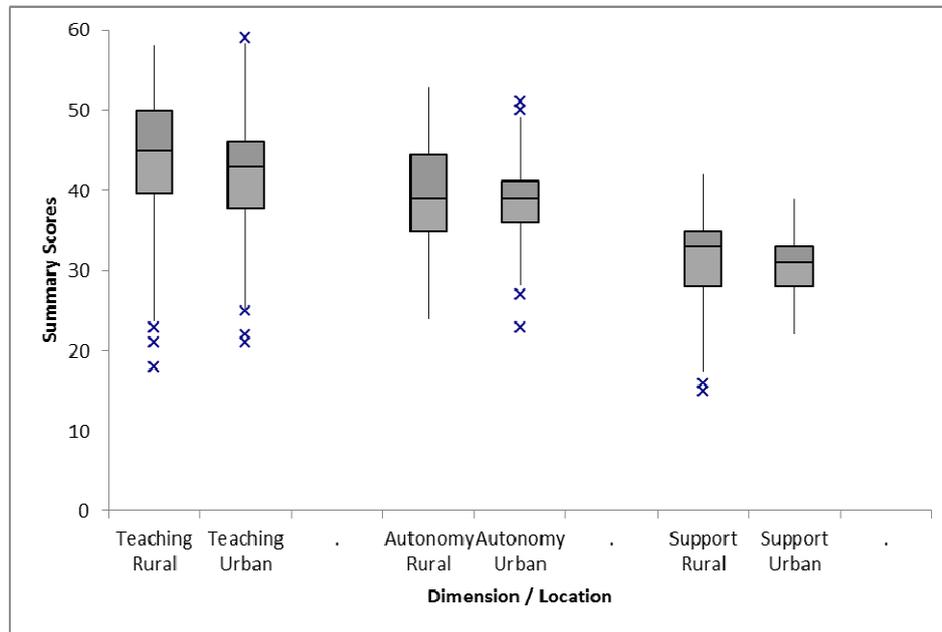
The median score for teaching was 45.0 (interquartile range 39.0, 50.0) in rural locations and 43.0 (37.5, 46.0) in urban locations ($p=0.046$). The median scores for autonomy were 39.0 (35.0, 45.0) and 39.0 (36.0, 41.5) ($p=0.672$) and for support 33.0 (28.0, 35.0) and 31.0 (28.0, 33.0) ($p=0.019$) in rural and urban locations respectively (Fig1).

Classifying the dimension scores into subscales shows a significant difference between the rural and metropolitan sites, with the rural locations performing better on the teaching ($p=0.039$), autonomy ($p=0.028$) and support subscales ($p=0.001$) as shown in Figure 1. No site scored in the worst category for any subscale.

Comparison of individual rural sites across the three dimensions

The differences seen in the teaching dimension total scores were not statistically significant from the urban site, except for site 2 ($p=0.016$). The subscale scores for site 2 'Model teachers' ($p=0.021$) and site 4 'Need retraining' ($p=0.045$) were significantly different from the other sites (Table 2).

The differences seen in the autonomy dimension total scores were not statistically significant from the urban site, except for site 2 ($p=0.023$). The subscale scores for site 2 'Excellent perception' ($p=0.031$) and site 5 'Negative view' ($p=0.001$) were significantly different from the other sites, with site 1 'Excellent perception' close to significance ($p=0.063$). These are summarised in Table 3.



Maximum scores: teaching = 60; autonomy = 56; support = 44.

Figure 1: Box plots of summary scores for the teaching, autonomy and support dimensions of the PHEEM at rural and urban locations.

The differences seen in the support dimension total scores were not statistically significant from the urban site, except for site 2 ($p=0.007$). The subscale scores for the urban site 'Supportive environment' (low, $p=0.031$) and site 4 'Not pleasant' ($p=0.004$) were significantly different from the other sites. These are summarised in Table 4.

Comparison of dimensions over time

There were no statistically different results for teaching or autonomy over time while controlling for rural or urban location using a repeated measures analysis ($p=0.413$ and $p=0.137$ respectively). However, there was a significant decrease of 0.6 in the score for support ($p=0.011$) per term overall.

Comparison of first rural and first urban terms

Seven interns were available to compare their perceptions across the three domains in their first rural and their first

metropolitan terms. Although in each domain the average scores were higher for first rural terms (teaching: 46.9 vs 42.9 ($p=0.38$); autonomy: 40.1 vs 39.4 ($p=0.78$); and support: 34.7 vs 30.6 ($p=0.015$)), only the support domain was statistically significant.

Comparison of different types of terms across rural and urban locations

Comparisons were made for urban and rural general medicine, general surgery, emergency department and surgical specialties terms. No differences were seen in the scores between urban and rural terms for teaching, autonomy or support except for the surgical specialties (orthopaedics in rural sites) where the rural interns rated the teaching significantly higher ($p=0.046$) and where there was a trend for the rural interns to rate the support higher ($p=0.075$).



Table 2: Teaching dimension across rural sites (and urban comparator)

Statistics and dimension descriptors	Urban	Site 1	Site 2	Site 3	Site 4	Site 5	<i>p</i> value overall
<i>N</i>	76	14	7	27	14	9	
Median	43	45	50	45	40	42	0.033
75th percentile	46	48	52	47	48	50	
25th percentile	37.5	42	47	41	27	31	
Model teachers	26.3%	42.9%	85.7%	40.7%	35.7%	33.3%	0.042
Right direction	64.5%	50.0%	14.3%	51.9%	35.7%	44.4%	
Need retraining	9.2%	7.1%	0.0%	7.4%	28.6%	22.2%	

Table 3: Autonomy dimension across rural sites (and urban comparator)

Statistics and dimension descriptors	Urban	Site 1	Site 2	Site 3	Site 4	Site 5	<i>p</i> value overall
<i>N</i>	76	14	7	27	14	9	
Median	39	39.5	45	39	39	38	0.260
75th percentile	41.5	46	50	41	40	43	
25th percentile	36	33	41	35	37	28	
Excellent perception	21.4%	42.9%	57.1%	14.8%	21.4%	33.33%	0.0005
More positive	78.6%	42.9%	42.9%	81.5%	78.6%	33.3%	
Negative view	0.0%	14.3%	0.0%	3.7%	4.0%	33.3%	

Table 4: Support dimension across rural sites (and urban comparator)

Statistics and dimension descriptors	Urban	Site 1	Site 2	Site 3	Site 4	Site 5	<i>p</i> value overall
<i>N</i>	76	14	7	27	14	9	
Median	31	33	38	32	29.5	30	0.0141
75th percentile	33	35	39	35	34	35	
25th percentile	28	33	31	30	23	26	
Supportive environment	35.7%	42.9%	71.4%	40.7%	35.7%	33.3%	0.0007
More positive	82.9%	57.1%	28.6%	51.9%	42.9%	55.6%	
Not pleasant	1.3%	0.0%	0.0%	7.4%	21.4%	11.1%	



'Red flagged' responses

In each of the domains of the PHEEM, there are scores that indicate an unsatisfactory result (Fig2), and so these cut-offs was looked at individually.

Of the 147 responses, 16 (10.9%) rated teaching less than 30. Of these, seven were from urban terms (9.2%), four from site 4 (28.6%), two from site 3 (7.4%), two from site 5 (22.2%) and one from site 1 (7.1%). Over half were in general surgical terms and 10 (62.5%) were female respondents.

Eight interns (5.4%) rated autonomy less than 28. Three of these were from urban terms, three from site 5 and one each from site 1 and site 3. There was no effect of gender or specialty.

Only five interns (3.4%) rated social support less than 22: three from site 4 (21.4%), one from site 3 (3.7%) and one from site 5 (11.1%). Four of these interns were female.

Within the PHEEM there are several questions that have also been flagged separately to ensure significant results were not lost:

- 'There is racism in this post' – four responders agreed (three from same rural site and one urban), two responders strongly agreed (urban)
- 'There is sex discrimination in this post' – three responders agreed (one each from three different rural sites)
- 'I feel physically safe in the hospital environment' – no responder disagreed or strongly disagreed.

Discussion

The national review of rural terms for junior doctors undertaken in Australia in 2002¹ highlighted a number of issues that appear to be well met in rural sites in WA. These include the requirement for an orientation program and term descriptions, management of workload, balance between service and training, provision of adequate levels of supervision, opportunities for professional

development, access to clinical information resources, satisfactory standard of accommodation and formal processes for assessment and feedback.

Teaching, autonomy and support all rated highly in the interns' responses and the rural rotations scored significantly higher in teaching and support when compared with urban rotations. Generally, established rural and new rural locations were equally successful in delivering well-rated intern terms; however, one of the new locations (site 2) scored significantly higher in all dimensions. Comparison across rotation types also reveals equality in the educational environments of specific disciplines in rural postings compared with urban ones except for teaching, which was rated significantly higher for the surgical specialties in the rural locations. There was a consistency of experience for interns independent of the specifics of how long interns had been within each hospital system.

Only one urban hospital was approached to be the comparator site as it was a significant provider of rural intern placements in WA and willing to be involved with the study. It is possible that interns at the other two tertiary hospitals had diverse experiences of the educational environments there; if included, comparisons across rural and urban may therefore have been different.

Eley and Morrissey's survey of pre-intern students in Queensland⁴ demonstrated that most felt they would have more responsibility for patients, feel more part of a team and have greater contact with senior staff as interns in a rural setting. This positive perception was felt to be important in recruitment to rural jobs and so it is significant that the present study's findings support this view.

A small number of interns indicated the experience of racism or sexual discrimination in their post. Unfortunately the design of the PHEEM makes interpretation of these results unclear: it is not possible to say whether the interns themselves experienced these occurrences, or whether they saw these attitudes being directed towards others (eg patients).

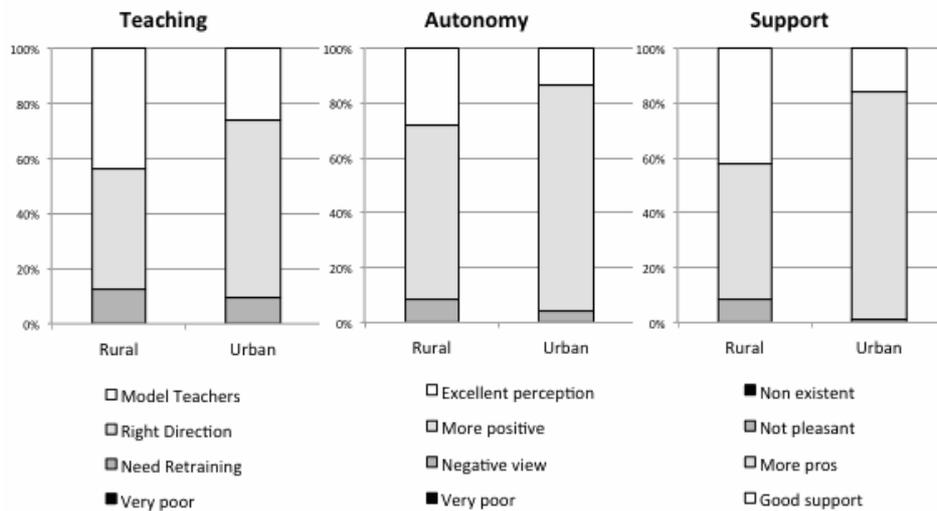


Figure 2: Subscales for the teaching, autonomy and support dimensions of the PHEEM at rural and urban locations.

Interestingly, the new sites that had been long-term rural clinical school locations and hence perhaps particularly orientated towards undergraduate curriculums seem to have adequately managed the transition to postgraduate teaching and learning. The only negative impact demonstrated on the autonomy experienced by interns was at a long established rural site (site 4). The interns at the new sites seem to have neither been ‘chucked in the deep end’ nor overly protected within their roles.

The results also demonstrate that all the sites are able to accommodate the changing intern requirements for supervision and independent practice as they progressed through their first year, with no change in interns’ perceptions of autonomy over time.

Additional useful results of this study include the development of a locally appropriate version of the PHEEM (and associated electronic template) and evidence that interns are able to complete it rapidly.

Conclusion

This study has been important in formally evaluating the educational environment of rural intern rotations in WA and has provided the first confirmation that, in terms of this measure, rural intern rotations compare favourably with those in urban settings in WA.

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Appendix 1: Postgraduate Hospital Educational Environment Measure used in this study⁶

Identifying Number: _____ Must be completed

Sex	<input type="checkbox"/> Male	<input type="checkbox"/> Female	
Specialty	<input type="checkbox"/> General Surgical <input type="checkbox"/> Surgical Specialities	<input type="checkbox"/> General Medical <input type="checkbox"/> Med Specialities	<input type="checkbox"/> ED <input type="checkbox"/> Psychiatry

Hospital *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Term	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

The following items relate to your current experience. Please read each statement and rate it as it applies to your own feelings about your present position in this hospital. It is about your personal perceptions of the current post.

Please tick the appropriate box:

		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	I have a contract of employment that provides information about hours of work	<input type="checkbox"/>				
2	My clinical teachers set clear expectations	<input type="checkbox"/>				
3	I have protected educational time in this post	<input type="checkbox"/>				
4	I had an informative orientation programme	<input type="checkbox"/>				
5	I have the appropriate level of responsibility in this post	<input type="checkbox"/>				
6	I have good clinical supervision at all times	<input type="checkbox"/>				
7	There is racism in this post	<input type="checkbox"/>				
8	I have to perform inappropriate tasks	<input type="checkbox"/>				
9	There is an informative Junior Doctors handbook / Intern 'Survival guide'	<input type="checkbox"/>				
10	My clinical teachers have good communication skills	<input type="checkbox"/>				
11	I am paged or called inappropriately	<input type="checkbox"/>				
12	I am able to participate actively in educational events	<input type="checkbox"/>				
13	There is sex discrimination in this post	<input type="checkbox"/>				
14	There are clear clinical protocols in this post	<input type="checkbox"/>				
15	My clinical teachers are enthusiastic	<input type="checkbox"/>				
16	I have good collaboration with other interns	<input type="checkbox"/>				
17	My hours conform to my hospital contract	<input type="checkbox"/>				
18	I have the opportunity to provide continuity of care	<input type="checkbox"/>				
19	I have suitable access to careers advice	<input type="checkbox"/>				
20	This hospital has good quality accommodation for junior doctors, especially when on call	<input type="checkbox"/>				
21	There is access to an educational programme relevant to my needs	<input type="checkbox"/>				
22	I get regular feedback from seniors	<input type="checkbox"/>				
23	My clinical teachers are well organised	<input type="checkbox"/>				
24	I feel physically safe within the hospital environment	<input type="checkbox"/>				
25	There is a no-blame culture in this post	<input type="checkbox"/>				
26	There are adequate catering facilities when I am on call	<input type="checkbox"/>				
27	I have enough clinical learning opportunities for my needs	<input type="checkbox"/>				
28	My clinical teachers have good teaching skills	<input type="checkbox"/>				



29	I feel part of a team working here	<input type="checkbox"/>				
30	I have opportunities to acquire the appropriate practical procedures for my internship	<input type="checkbox"/>				
31	My clinical teachers are accessible	<input type="checkbox"/>				
32	My workload in this job is fine	<input type="checkbox"/>				
33	Senior staff utilise learning opportunities effectively	<input type="checkbox"/>				
34	The training in this post makes me feel ready to be an RMO	<input type="checkbox"/>				
35	My clinical teachers have good mentoring skills	<input type="checkbox"/>				
36	I get a lot of enjoyment out of my present job	<input type="checkbox"/>				
37	My clinical teachers encourage me to be an independent learner	<input type="checkbox"/>				
38	There are good counselling opportunities for junior doctors who fail to complete their training satisfactorily	<input type="checkbox"/>				
39	The clinical teachers provide me with good feedback on my strengths and weaknesses	<input type="checkbox"/>				
40	My clinical teachers promote an atmosphere of mutual respect	<input type="checkbox"/>				

Time taken to complete questionnaire _____minutes

Comments about questionnaire:

* The names of the urban and rural hospitals have been removed for publication. ED, emergency department; RMO, resident medical officer.
