Hospital outpatient and emergency services in rural Victoria

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Abstract

Outpatient and emergency services in rural hospitals have rarely been studied. This paper analyses routinely collected data, together with data from a survey of hospitals, to provide a picture of these services in Victorian public hospitals. The larger rural hospitals provide the bulk of rural outpatients and emergency services, particularly so for medical outpatients. Cost per service varies with the size of the hospital, possibly reflecting differences in complexity. Funding policies for rural hospital outpatient and emergency services should be sufficiently flexible to take into account the differences between rural hospitals.

Introduction

Although hospital outpatient services account for a significant proportion of total hospital expenditure, description and analysis of outpatient activity in rural areas is poorly developed. A recent comprehensive review of ambulatory care found no papers that focussed on the role of outpatient services in rural Australia (Jackson et al. 1997). The reasons for this are easy to understand. The focus of attention has been on the largest area of expenditure: hospital inpatient services.

Further, to the extent there has been a focus on outpatient activity, the main attention has been directed towards outpatient activity in the larger hospitals (Wahlqvist and Wright, 1993). Here, a number of studies have been undertaken including development of casemix measures to describe hospital outpatient activity (e.g. Jackson and Sevil, 1997; Cleary 1998). There have also been studies of the importance of metropolitan hospital outpatient departments in terms of their relative role for lower socio-economic groups (Hill 1989). Although a study of outpatient and emergency departments commissioned as part of the National Health Strategy (1992) incorporated non-metropolitan hospitals into its sample, the five hospitals sample were all from larger regional centres (eg, Mackay, Tamworth, and Whyalla). To date there has been no report of non-inpatient activity in the full range of rural hospitals.

This study reports on non-inpatient activity provided in Victorian rural hospitals in 1997/98 using both administrative data reported by rural hospitals to the Victorian Department of Human Services (the Department) and data from a postal questionnaire of these hospitals conducted in July 1999.

Method

The Department provided electronic copies of expenditure and activity data reported by hospitals as part of their annual returns. For the purpose of this study, rural hospitals were defined as all hospitals in the five rural regions of Victoria. Kooweerup Hospital, which is located in the Department's South East Metropolitan Region, was also classed as a rural hospital. In all, 70 rural hospitals were identified in Victoria. Measures of

hospital inpatient activity including the number of weighted inlier equivalent separations, version 5 (WIES - the unit of hospital funding in Victoria), and hospital budgets were also obtained from the Department. In terms of more traditional measures of size, a 1000 WIES hospital is likely to have around 20-30 beds.

The major unit of measure of outpatient activity is the occasion of service, which is defined in the National Health Information Knowledgebase as follows:

> *The number of occasions of examination, consultation, treatment or other service provided to a patient in each functional unit of a health service establishment. Each diagnostic test or simultaneous set of related diagnostic tests for the one patient referred to a hospital pathology department consists of one occasion of service.*

As the dataset has not previously been analysed, hospitals were sent a copy of the data as recorded by the Department together with information on their activity level compared with all other Victorian rural hospitals in order to provide them with an opportunity to verify the dataset. Six hospitals provided amended data that have been incorporated in this analysis.

A postal questionnaire was sent to all rural hospitals in Victoria by the Department of Human Services requesting completion and return to the authors. A 70% response rate was achieved which was relatively even across all size ranges (except only one of the four largest hospitals responded). This response rate was deemed acceptable and hence there was no follow-up request.

Results

Rural hospitals are often the base for a range of activities in addition to traditional hospital outpatient services including community health services and the like. In Victoria, this results in the hospital receiving funds from a number of program areas in the Department including the Acute Health Division and the Aged, Community and Mental Health Division (including aged care, mental health and co-ordinated care funding streams).

In terms of overall non-inpatient activity, rural hospitals provided 2.4 million occasions of service in 1997/98, about half of which (1.2 million) were funded from the Acute Health Division of the Department. In terms of acute health occasions of service, this represents about 23,000 visits per week or about 340 visits per week per hospital. On average, these services cost $22 per occasion of service (standard deviation 43.4). The hospitals reported spending a total of almost $70m in 1997/98 on acute non-inpatient expenditure.

Hospitals were asked to report on the accuracy of their inpatient-to-outpatient cost allocations in terms of possible percentage point differences (e.g. a true inpatient-to-outpatient split of 70:30 could be reported as 80:20 if there were a ten percentage point margin of error). 37% of hospitals suggested the error margin was less than five percentage points, 21% suggested more than ten percentage points (including 10% more than twenty percentage points). 42% of hospitals suggested the margin of error was in range of five to ten percentage points. The mean outpatient fraction (outpatient expenditure as percentage of inpatient expenditure) was 9% (range 1% to 23%; standard deviation, 6.2). Assuming a 10% outpatient fraction and a 10 percentage point margin of error, this could mean that the true cost per occasion of service is $44 not the $22 reported above.

Table 1 shows information on non-inpatient activity grouped by size of hospital (as measured by weighted inlier equivalent separations) and using hospital reported costs.

Table 1: Non-inpatient activity in Victorian rural hospitals, 1997/98, by size

	Hospital size in Weighted Inlier Equivalent Separations							
	1-499 (n=15)	500-999 (n=16)	1000-1999 (n=12)	2000-4999 (n=13)	5000-9999 (n=7)	10000-14999 (n=3)	15000+ (n=4)	All (n = 70)
Non-inpatient occasions of service (all fund sources)								
Mean	4517	10183	11877	32821	62077	110062	212319	34484
% all rural occasions of service	2.8	6.7	5.9	17.7	18.0	13.7	35.2	100
Acute health funded occasions of service								
Mean	1499	2720	4064	12732	35593	66064	114848	16957
% all rural occasions of service	1.9	3.7	4.1	13.9	21.0	16.7	38.7	100
Acute health non-inpatient expenditure								
Mean	28133	124563	72250	930077	1530714	1618667	9720250	997500
% all rural hospital non-inpatient expenditure	0.6	2.9	1.2	17.3	15.3	7.0	55.7	100

The distribution of activity and expenditure is somewhat different. Over half of all acute health non-inpatient expenditure is spent in the four largest hospitals, but these account for less than 40% of the occasions of service. As would be expected, activity levels increase with the size of the hospital as does mean expenditure (with the exception of the 500-999 WIES group where expenditure is outside the normal pattern, there is no immediate explanation for this aberration).

Non-inpatient activity varies significantly by size of hospital, with smaller hospitals providing both fewer services (non-parametric (Spearman's) regression of total non-inpatient occasions of service against size as continuous variable is statistically significant, ρ=.838, p<.001) and a narrower range of outpatient activity (see Table 2).

Table 2: Non-inpatient activity in Victorian rural hospitals in 1997/98 by type of activity and size

	Hospital size in Weighted Inlier Equivalent Separations							
	1- 499 (n=15)	500-999 (n=16)	1000-1999 (n=12)	2000-4999 (n=13)	5000-999 (n=7)	10000-14999 (n=3)	15000+ (n=4)	Whole population (n =70)
Total medical outpatient occasions of service								
Mean	719	866	678	1374	6168	6771	27386	19225
% of services	0.5	0.6	0.4	1.8	12.1	13.2	71.4	100
No. of hospitals providing this service	1	1	1	2	3	3	4	15
Pathology/radiology outpatients								
Mean	472	732	1109	3936	12331	66064	114848	16957
% of services	0.8	1.5	2.7	6.4	24.9	21.5	42.2	100
No. of hospitals providing this service	4	5	6	4	5	3	4	31
Pharmacy								
Mean			534	1813	2984	11026	10671	5254
%of services			0.5	10.3	17.0	31.5	40.6	100
No. of hospitals providing this service			1	6	6	3	4	20
Allied health and dentistry								
Mean	424	1125	1220	4996	7491	10667	14057	4436
% of services	1.7	4.4	4.2	24.5	22.0	15.7	27.6	100
No. of hospitals providing this service	8	8	7	10	6	3	4	46
Domiciliary								
Mean	12.33	10	99	124	1069	677	1524	468
% of services	0.2	0.3	2.6	7.2	41.5	8.8	39.4	100
No. of hospitals providing this service	3	5	4	9	6	2	4	33
Off campus								
Mean	153	291	85	599	1642	323	691	535
% of services	6.3	11.9	1.0	24.5	38.3	1.9	16.1	100
No. of hospitals providing this service	7	7	2	7	4	1	4	32

Table 2 shows that less than a quarter of the hospitals (15 out of 70) provide medical outpatient services (including paediatric, medical, surgical, obstetric, gynaecology and radiotherapy). However, this pattern is unevenly distributed with 10 of the 14 largest hospitals providing services in this area but only one of the 15 smallest hospitals providing medical outpatients. Similarly, services supporting medical diagnosis (pathology and radiology) are generally not provided in smaller hospitals but are available in the larger hospitals, and the same is true of pharmacy outpatients.

On the other hand, provision of allied health services is somewhat more evenly distributed (although skewed to have a greater likelihood of provision in the larger hospitals, as is also the case with domiciliary and other off campus services). About three-quarters of all medical services are provided in the four largest hospitals but in terms of allied health and domiciliary and other off campus services, these hospitals account for less than one-third of all activity. Allied health, domiciliary and group activity is probably lower cost than medical services, which in part accounts for the larger proportion of outpatient expenditure in the larger hospitals.

Most rural hospitals provide a space where medical staff can see patients privately for routine follow-up post-procedure (35 out of 52 respondents). These medical practitioners are usually not charged a facilities fee (only 8 of the 35 do). Ten hospitals count these patients in the statistical returns to the Department and so if an output based funding system were introduced for non-inpatient activity, these patients could attract a case payment. Many hospitals provide a base for allied health personnel to see patients privately (28 respondents) and in contrast to the situation with medical practitioners, generally charge a facilities fee (17 do so), but tend not to report this 'private' activity in departmental statistical returns (only 3 do so). Most rural hospitals (41 out of 52 respondents) are also the base for community health services in their area.

Emergency services

Table 3 shows indicators of acute health emergency service activity in rural hospitals. As would be expected, average emergency expenditure increases with the size of the hospital, (ρ=.704, p<.001), as does the mean number of emergency occasions of service per annum (ρ=.869, p<.001), emergency admissions to the hospital (ρ=.922, p<.001) and staffing ρ=.888, p<.001). As with non-emergency services, the larger hospitals dominate provision: 33% of all acute emergency occasions of service are in the three largest hospitals (accounting for 46% of expenditure). However, middle range hospitals are also important, the twenty hospitals in the range 2000 to 9999 WIES account for 37% of occasions of service.

Table 3 Acute health emergency service activity in Victorian rural hospitals, 1997/98

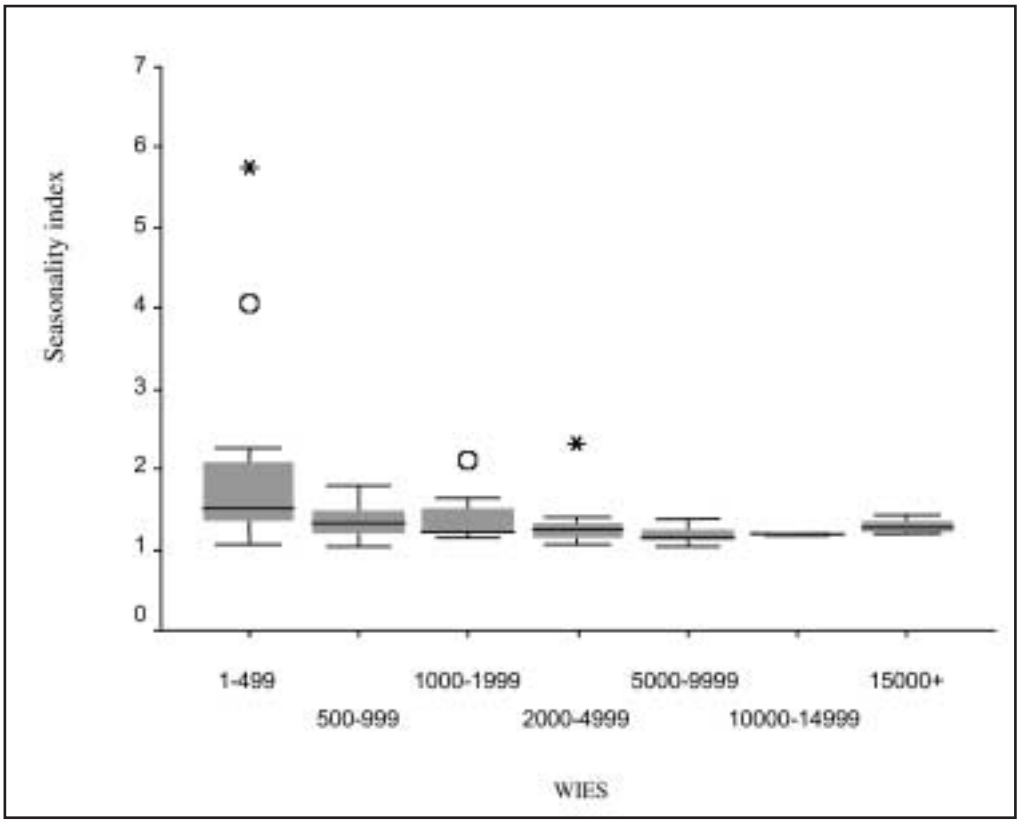
	Size (in WIES							
	1-499	500-999	1000-1999	2000-4999	5000-9999	10000-14999	15000+	Whole population
Average acute emergency expenditure $	39,733	86,313	130,333	339,692	1,397,000	3,228,000	5,764,250	721,100
Emergency occasions of service	800	1,721	2,779	5,895	10,753	19,287	34, 417	6,302
Mean % of services	2.9	5.5	6.8	18.7	18.4	14.1	33.6	100.0
Average number of emergency admissions (in WIES)	182	368	580	1207	3009	4559	8413	1377
Average emergency conversion rate (standard deviation) (3.82)	6.24 (5.20)	4.60 (4.16)	5.40 (3.12)	5.60 (3.81)	3.37 (1.32)	5.52 (3.17)	4.48 (1.70)	5.21 (1.70)
Average seasonality (standard deviation)	2.03 (1.31)	1.35 (.21)	1.37 (.30)	1.31 (.32)	1.18 (.11)	1.18 (.01)	1.30 (.12)	1.46 (.70)
Average cost per emergency occasion of service (standard deviation)	65 (49.7)	94 (121.5)	35 (40.6)	60 (60.7)	171 (132.5)	165 (60.4)	171 (58.2)	87 (92.1)
Average number of staff EFT specifically allocated to emergency service (standard deviation)	1.4 (2.0)	1.1 (1.5)	1.4 (1.2)	4.8 (3.5)	16.6 (6.2)	33.3 (9.3)	34.2	9.78 (12.2)

The emergency conversion rate (the ratio of emergency occasions of service to emergency admissions) is relatively stable across the size ranges (ρ=-.045, ρ=.731). This result is counter-intuitive. One might expect larger hospitals to attract more complex patients that have a greater likelihood of admission. A possible explanation is that admission thresholds vary by size of hospitals and that smaller hospitals are able to admit lower complexity patients who, if they had presented at larger hospitals, would not have been admitted. This

lower intensity admission pattern may reflect social needs (patients are more likely to live a longer distance from the hospital in rural areas) but it may also reflect financial incentives to admit.

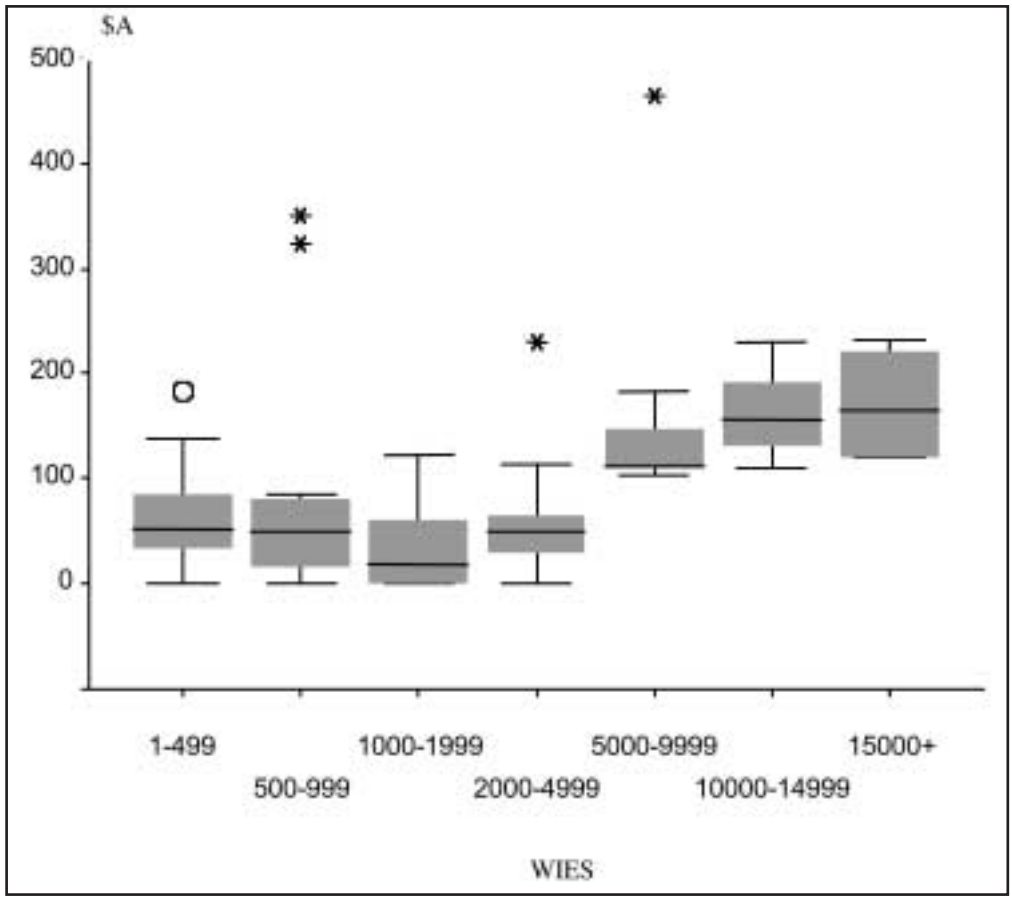
Seasonality of admissions was measured by comparing the pattern of emergency admissions (in WIES) over the four quarters of 1997/98 (Jun-Sep 1997, Sep-Dec 1997 etc). The 'seasonality index' is the ratio of the number of admissions in the quarter with the most admissions to the number in the quarter with the fewest admissions. This measure of seasonality, based on quarters in a financial year, probably underestimates 'true' seasonal patterns. On average, there are almost 50% more admissions in the 'heaviest' quarter relative to the 'lightest' quarter (see Table 3). Seasonality varies with size of the hospital (ρ=-.409, p=.001), with smaller hospitals exhibiting higher levels of seasonality (see Figure 1 box plot: 50% of observations in box; heavy line indicates median; circles indicates 'outliers', asterisks 'extremes'). A small number of hospitals have very high seasonality indexes, in part reflecting seasonal tourism patterns.

Figure 1: Seasonality of emergency admissions, 1997/98



The average cost per emergency visit is around $65 per occasion of service for hospitals with less than 500 WIES with the mean for hospitals in the 500 -999 WIES range being $94 and those in the 1,000-1,999 range, $35. Overall, there is a statistically significant trend of increasing cost per visit with increasing size of the hospitals (ρ=-.325, p<.01), despite the considerable variation in cost per visit around the averages. Figure 2 shows a box plot of the average cost per Emergency Department occasion of service ('ED visit') grouped by hospital size.

Figure 2: Cost per Emergency Department Occasion of service by size



Hospitals with more than 5,000 WIES have an average cost per occasion of service about $100 greater than the smaller hospitals, a significant difference both statistically (Mann-Whitney U = 87, p<.001) and in policy terms. Some of the difference in cost may reflect a different incidence of medical costs: patients paying in smaller hospitals while medical costs in larger hospitals are incorporated in the hospital's budget. Patients presenting for emergency care in 38 hospitals (out of 47 respondents) may be billed privately by the attending medical practitioner, in 21 of these hospitals all emergency presentations seen by a medical practitioner are privately billed. The likelihood of being billed varies with size of the hospital with billing occurring in all very small hospitals (< 999 WIES, 21 respondents), most mid-range hospitals (1,000 - 4,999 WIES, 13 out of 17 respondents) and almost half of the larger hospitals (> 5,000 WIES, 4 out of 9 respondents). Hospitals generally do not charge medical practitioners a facilities fee (only 4 out of the 38 responding hospitals where billing occurs do so) but do count these patients in statistical returns to the Department (26 respondents).

Some of the difference in cost per occasion of service may also reflect differences in complexity of patients or a different role of the hospital emergency service. The postal questionnaire to hospitals asked questions about staffing and facilities, which allowed allocation of hospitals to 'levels' according to the New South Wales role delineation guidelines (see Table 4).

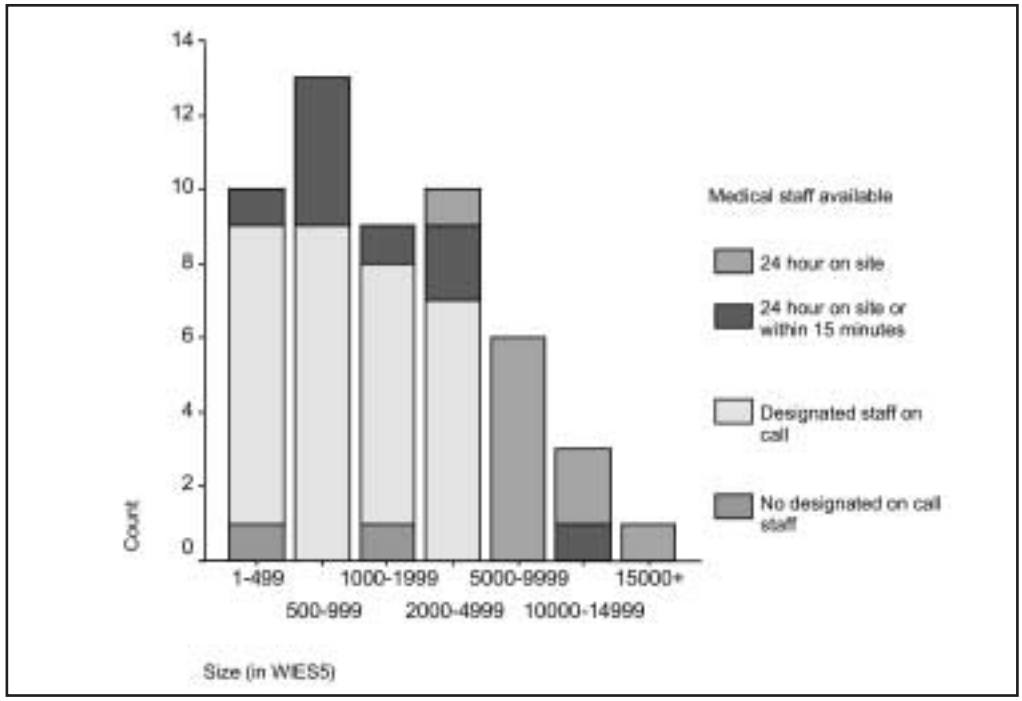
Table 4: Victorian rural hospitals classified by level of emergency service

Size (WIES)	NSW level 1	NSW level 2	NSW level 3	Total
1-499	9	5		14
500-599	13	2	1	16
1000-1999	7	3		10
2000-4999	5	6	2	13
5000-9999			5	5
10000-14999			3	3
15000+			4	4
TOTAL	34	16	15	65
Mean size (WIES)	**1033**	**1371**	**11032**	**3424**

Smaller hospitals are generally assigned to the least complex role levels, while the larger hospitals all have the facilities and staffing enabling assignment to (at least) level 3 (The differences in size are statistically significant on ANOVA with size as a continuous variable, F = 32.726, p<.001.).

More detailed analysis of staffing patterns further illustrates the differences between the larger and smaller hospitals. Larger hospitals (> 5,000 WIES) have more staff (see Table 3) and are more likely to have 24-hour access to on-site medical staff, or medical staff available within 15 minutes rather than the pattern in smaller hospitals which is simply to have medical staff on-call for emergency presentations (see Figure 3, χ^2= 39.9, p<.001; statistical significance calculated by dichotomising both variables because of small expected cell size). Larger hospitals probably also have access to a wider range of diagnostic and other technology, which is likely to increase cost per occasion of service.

Figure 3 Availability of medical staff for emergency presentations



Medical staff in hospitals in the largest three size groups are more likely to be remunerated on a salary or sessional basis compared to fee-for-service or 'private' arrangements common in smaller hospitals (χ^2= 21.8, p<.001). Nursing staffing patterns also differ: larger hospitals having nursing staff designated to the emergency service whereas smaller hospitals tend to call nurses, many of whom do not have Advanced Life Support Accreditation, from wards when necessary (See Table 5; χ^2= 24.6, p<.001)

Table 5 Nurse staffing patterns by hospital size

	Size (in WIES)							
	1-499	500-999	1000-1999	2000-4999	5000-9999	10000-14999	15000+	TOTAL
Nursing staff called from ward, generally without Advanced Life support accreditation	8	9	6	1				24
Nursing staff called from ward, generally with Advanced Life support accreditation	2	3	3	4				12
Designated nursing staff available on 24 hour basis	1	1		5	6	3	1	17
TOTAL	**11**	**13**	**9**	**10**	**6**	**3**	**1**	**53**

Emergency services in larger hospitals also tend to have more specialties available on a 24 hour, on-call basis (ρ=.697, p<.001). Table 6 shows data for individual specialties.

Table 6 Availability of specialists on a 24-hour on-call basis by size of hospital (WIES)

Specialty	Mean size of hospitals with specialty available	Mean size of hospitals without specialty available	Largest hospital without available specialist
General surgery	4936	752	2870
Anaesthetics	4721	645	2062
Medicine	5229	1104	5674
Orthopaedics	6329	1468	7642
Intensive care	5524	2104	10849
Psychiatry	5764	1322	5803
Paediatrics	6231	1105	3306
Physiotherapy	4963	2401	14701
Social Work	6523	1895	10849

This list of specialties shown in Table 6 was derived from those specified as being necessary for different levels of emergency departments according to the New South Wales' Department of Health role delineation guidelines. It can be seen that even some large hospitals do not have the full range of available specialties.

Discussion and conclusions

Hospital outpatient and emergency services play an important role in rural communities. There is a significant variation in the roles of these hospitals across different size ranges. Currently hospital outpatient and emergency services in rural Victoria are funded on the basis of their historic allocation. As the Department of Human Services moves toward a more 'output' basis for this funding, it needs to take account of the patterns revealed in this study. This analysis suggests that there are two major groups of hospitals in rural Victoria that should be dealt with separately for funding purposes. The first group is the fourteen largest hospitals that together

provide two-thirds of all non-inpatient occasions of service and emergency medical occasions of service in rural Victoria. These are reasonably large hospitals with a range of non-inpatient activity, often including medical outpatient clinics. Non-inpatient services in these hospitals should be funded in the same way as services in metropolitan hospitals.

The remaining 56 hospitals form the second group. The funding arrangements which should apply to these hospitals need to address issues of equity with the metropolitan areas but at the same time recognise that the rural hospitals do not have the same level of infrastructure as metropolitan hospitals and so complex data recording systems should not be implemented. There are few medical outpatient services in the smaller rural hospitals and non-emergency services provide a range of services similar to that found in community health services. An appropriate policy direction for the smaller rural hospitals would be to fund non-emergency services as if they were community health activities.

Provision of emergency services raises important policy questions. Patients presenting at most rural hospitals for emergency care (especially smaller hospitals) often incur out-of-pocket costs from a medical practitioner's bill. This is not like the situation in metropolitan hospitals where emergency services are funded from within the hospital's budget. If the larger rural hospitals are funded within the metropolitan emergency service funding arrangements, there should be no charges to patients.

The situation for smaller hospitals is more complex. Billing patients for emergency services appears to breach the Australian Health Care Agreements which proscribe billing for 'public hospital services' (Clause 56). However, medical practitioners in small towns have significant leverage and hospitals may be forced to allow them to charge patients in order to retain the practitioner's services. Patients, presenting in an emergency, may not be able to exercise their right to obtain free services for fear that the medical practitioner may refuse to treat them.

The reality of emergency service provision in small rural hospitals is that general practitioners often negotiate by telephone whether local residents will present at the hospital or in the doctor's rooms or whether the doctor will visit the patient in his/her home. Further, the doctor is on-call 24 hours per day both for 'hospital care' and for care at home. In such circumstances, it makes little sense to distinguish two different sets of payment rules under Medicare for out-of-hospital work and through state hospital payment arrangements for in-patient care. The disjunction between Commonwealth and state funding arrangements for medical services in small country towns is one of the most obvious anomalies of all the frictional problems of Commonwealth-State relations in the health sector. The same service delivered by the same doctor to the same patient is subject to very different payment arrangements depending on location.

A more fundamental reform of payment arrangements for 'emergency services' in very small hospitals (the 56 in this study) seems to be appropriate. Under this more radical option, the Commonwealth would assume responsibility for all medical services provided to non-inpatients in particular towns. Patients would have access to Medicare rebates regardless of location of service delivery and whether the service was seen as a 'hospital' or a 'community' service. Such an arrangement would help to clarify and regularise the existing anomalous arrangements and provide a sounder basis for the further development of rural medical practice.

The tentative policy directions proposed here are probably not affected by the limitations of this study, particularly the accuracy of inpatient-to-outpatient cost allocation ratios noted above. The reported results could also be affected by different reporting conventions (eg, different ways of counting occasions of service) and practices about reporting occasions of service that have attracted a bill from a private practitioner. Although there could be significant change in reported costs with more accurate reporting, the differences in costs reported here were reflected in differences in staffing patterns and roles that are not affected by those reporting issues.

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