Antenatal transfer of rural women: how does the NSW Inpatient Statistics Collection compare with an audit of hospital records?

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Abstract

The aim of this study was to determine whether the NSW Inpatient Statistics Collection (ISC), a census of hospital admissions, could be used to estimate the magnitude of, and reasons for, antenatal transfer of rural women. Data from the ISC were compared with results of a clinical audit of all antenatal admissions of rural women to perinatal centres in NSW during 1997-1998. While the overall number of perinatal centre admissions identified by the ISC and the audit were similar, the ISC identified only about 70% of antenatal transfers. Rural hospitals identified 12% of women as indigenous compared with 9% at perinatal centres. The ISC showed 28% of rural women admissions and 42% of transfers were for threatened preterm labour compared with 21% and 30% respectively from the audit.

Background

For women living in rural or remote communities in Australia, access to the highest levels of obstetric and neonatal care requires either antenatal transfer of the mother or neonatal transfer of the infant to an urban perinatal centre. This is the situation for around 21,000 rural women who give birth each year in NSW (Roberts & Algert 2000; Australian Institute of Health and Welfare 1998). The High Risk Obstetric and Perinatal Advisory Working Group of the NSW Pregnancy and Newborn Services Network has identified antenatal transfer as an issue that needs addressing in NSW (NSW Centre for Perinatal Health Services Research 1998). However, the magnitude, reasons and trends in antenatal transfers in NSW are unknown.

The NSW Inpatient Statistics Collection (ISC) is a survey of all inpatients treated in NSW hospitals (NSW Health Department 1997, NSW Health Department 1999). It consists of de-identified demographic and clinical information collected on all inpatient separations (discharges, transfers and deaths) in public and private hospitals. However, because the data are based on separations and not individuals, it is not clear whether (say) 10 admissions represents 10 individuals, one person admitted ten times, or something between. The ISC provides information to assist in the planning of an efficient and equitable distribution of health services, indicators of health status, and statistical information to monitor the utilisation of NSW hospital services (NSW Health Department 1999). To June 30 1998, the reason for a hospital admission was coded according to the 9th revision of the International Classification of Diseases (ICD-9-CM) (National Coding Centre 1996). The principal diagnosis is the first ICD-9-CM coding variable reported on the hospital separation form and refers to the principal reason for admission. Up to 11 other diagnoses are recorded. The ISC is a financial year collection.

We compared the results of a clinical audit of pregnancy-related admissions of NSW rural women to the seven perinatal centres (tertiary obstetric hospitals) in NSW with an analysis of the NSW ISC. The aim was to ascertain whether the ISC can be used to estimate the magnitude of antenatal transfers of rural women, and whether it reflects the reason for antenatal transfer among the rural women admitted to perinatal centres.

Methods

The study population included all women resident in rural areas of NSW who received antenatal care and/or confinement at a perinatal centre in NSW from July 1 1997 to June 30 1998. Rurality was based on postcode of residence using the Rural, Remote and Metropolitan Area (RRMA) classification developed jointly by the Department of Primary Industries and Energy and the then Department of Human Services and Health (Department of Primary Industries and Energy 1994).

The methods and results for the clinical audit are briefly as follows. Rural women eligible for the clinical audit were those who were admitted antenatally to any of the seven perinatal centres in NSW from 1 July 1997 to 30 June 1998. This period was selected to ensure consistency in coding; NSW hospitals changed to ICD-10 coding on 1 July 1998.

Records for review were identified from the hospital's computerised medical records by selecting on maternal postcodes and the pregnancy/childbirth ICD-9-CM codes for pregnancies ≥20 weeks (641.0-676.9, V22-V23 and V27-V28). A computerised list of rural postcodes was supplied to each hospital to ensure uniform selection criteria. The medical records of the eligible women were examined and the relevant data abstracted. The audit was approved by the Ethics Committee of each perinatal centre.

Two populations from the ISC were selected for comparison with the clinical audit results. First, ISC-identified perinatal centre admissions (ISC-PCA) of rural women were selected using the same ICD-9-CM and postcode selection criteria that the hospitals used for identification of records for audit. We compared the audit and ISC-PCA for demographic characteristics, number and reasons for admission among the following groups:

       i) all antenatal admissions of rural women
       ii) those referred by a health service provider
       iii) those transferred from another hospital.

Second, as the principal reason for admission to a perinatal centre may differ from the reason a woman was originally transferred, we selected an additional population from the ISC for comparison. This included all rural women with pregnancy-related admissions to any hospital in NSW who were undelivered during that admission and whose mode of separation was transfer to a perinatal centre in NSW. These ISC-identified hospital antenatal transfers were compared with the audit admissions for demographic characteristics, number and reasons for admission.

Data on admissions, rather than women, were compared as this is what is available in the ISC. Frequency tabulations and contingency table analyses with χ^2 tests for significance were be used to assess differences in the ISC and audit results for maternal factors and the reasons for admission or transfer. The significance level for statistical testing was set at $p<0.05$.

Results

The audit of NSW perinatal centres identified 522 women who met the study selection criteria and these women had 591 admissions to perinatal centres. Of these admissions, the source of referral was a health service provider for 436 (73.8%) including 379 (64.1%) who were transferred from another hospital. Using the same criteria the ISC-PCA identified 625 admissions of which 395 (63.3%) were referred by a health service provider and 266 (42.6%) were transferred from another hospital. These differences in proportions between the two data sets are significant ($p<0.001$).

During the study period, the ISC recorded 7,683 admissions of rural women to any hospital in NSW for a pregnancy-related condition where the women did not deliver during that admission and 1,036 (13.5%)

resulted in transfer to another hospital. Of the 1,036 transfers, 1,008 (97.3%) records indicated the hospital to which the woman was transferred. It was a NSW perinatal centre for 278 (26.8%) of the hospital antenatal transfers (ISC-HAT). Of these 278 transfers, 266 (96%) were from rural hospitals.

Table 1 shows the comparison of maternal characteristics, the reason for admission and the length of stay for both ISC populations and the comparable audit populations. There were no significant differences in the age, indigenous status or place of residence distribution between the audit and any ISC data set.

Although it did not reach statistical significance, women recorded on the ISC as being transferred from (mainly) rural hospitals tended to be more frequently identified as Aboriginal or Torres Strait Islanders. Importantly, in the audit, indigenous status could not be determined for 40% of perinatal centre admissions.

The reason for admission, whether identified in the ISC-PCA or the ISC-HAT, differed significantly from the principal reason for transfer identified by clinical audit. The ISC over-represented threatened preterm labour and under-represented preterm prelabour rupture of the membranes. Limiting the analyses to women transferred from another hospital both the ISC-PCA and the ISC-HAT over-estimated birth management. The results for referral by any health service provider (data not shown) were similar to those for hospital transfer. The audit results are similar when analysed for women, instead of by admission, as the majority of women (91%) had only one admission.

Median length of stay was the same using both the audit and the ISC-PCA (Table 1). Most of the women (81%) admitted to rural hospitals and then transferred to a perinatal centre (ISC-HAT) were transferred within 24 hours.

Table 1: Comparison of antenatal admissions of rural women: according to ISC-identified perinatal centre admissions (ISC-PCA), ISC-identified hospital antenatal transfers (ISC-HAT) and women identified by clinical audit of perinatal centres (Audit).

	All admissions		Transferred from a hospital		
	ISC-PCA	Audit	ISC-PCA	ISC-HAT	Audit
	N=625	N=591	N=266	N=278	N=379
	%	%	%	%	%
Maternal age					
<20 years	9.8	9.2	11.7	10.0	12.4
20-34 years	74.1	74.7	75.2	76.7	74.3
(35 years	16.2	16.1	13.2	13.3	13.2
Aboriginal/Torres Strait Islander	6.7	7.3	9.4	12.2	9.2
Place of residence					
Large rural centre	14.4	14.2	20.7	19.4	18.7
Small rural centre	37.4	40.7	38.7	40.5	39.8
Other rural area	41.9	38.8	35.3	35.5	35.0
Remote area	5.6	6.3	4.9	4.7	6.4
Reason for admission/transfer*					
Threatened preterm labour	28.0	21.2	42.5	44.6	30.3
Prelabour rupture of membranes	12.0	19.3	19.2	16.9	29.0
Birth management	12.0	14.9	4.9	1.9	0.5
Pregnancy-induced hypertension	10.9	11.7	8.3	13.3	14.5
Fetal problems	14.7	11.5	6.8	4.3	8.7
Antepartum haemorrhage	9.3	9.1	11.7	14.4	10.3
Medical conditions	9.1	6.6	3.4	5.0	4.2
Other	4.0	5.8	1.1	0.0	2.4
Length of Stay (in days)					
Median (range)	6 (1-194)	6 (1-157)	8 (1-59)	1 (1-27)	8 (1-85)
Mode	1	4	2	1	3

* Significant differences between the ISC and audit findings: for all admissions, ISC-PCA vs audit (χ^2 with 7 df=25.0, p<0.001), for transfers from a hospital ISC-PCA vs audit (χ^2 with 7 df=33.1, p<0.001) and for ISC-HAT vs audit (χ^2 with 7 df=34.0, p<0.001).

Discussion

This comparison of a clinical audit and the data recorded in the ISC found the overall number of admissions of rural women to perinatal centres similar in both data sources. However, the ISC under-estimated transfers from health service providers and especially those transferred from another hospital. This was true whether the transfer was identified at the sending rural hospital or the receiving perinatal centre. It appears that both the source of referral and the mode of separation are poorly reported in the ISC and thus the ISC does not reliably determine the source of perinatal transfers to urban perinatal centres.

All data sources reported similar age and place of residence for rural women admitted to perinatal centres. However, rural hospitals appear to identify more women as Aboriginal or Torres Strait Islanders than admission records at urban perinatal centres. Perinatal centre hospitalisations of rural indigenous women are likely to be under-estimated as it was often difficult to identify indigenous status in the audit of clinical records. Underreporting of indigenous status in hospital morbidity data has been previously identified as a problem, particularly in metropolitan Sydney (NSW Health Department 1997). Reluctance of hospital staff to ask patients about indigenous status and unwillingness of indigenous people to identify themselves, owing to fear of discrimination, are thought to contribute to this underreporting (NSW Health Department 1997). The indigenous identification question for NSW hospital admissions is intended to be asked of the patient, not presumed by someone else, although this may sometimes be the case (Australian Bureau of Statistics 1997). Staff at rural hospitals may be more familiar with the background of the members of the local community, or community members may be more likely to identify themselves as indigenous in rural settings. For indigenous women and families from rural and remote areas, many aspects of the care for women with high-risk pregnancies are particularly frightening and often intolerable (NHMRC 1997). The burden of antenatal transfer for indigenous women in NSW is likely to be under-represented if the data source is a perinatal centre.

Some differences between the reason for admission and the reason for transfer were expected because the principal admission and stay diagnoses in a perinatal centre may be different to the reason for transfer. For example, if a woman were transferred for preterm contractions who had an antepartum haemorrhage (APH) after transfer requiring emergency delivery at the perinatal centre, the APH would be the main reason for admission to the perinatal centre. Similarly, women who have not given birth (antenatal transfers) will not have a birth management issue such as failed forceps or long labour as the reason for transfer.

We had hypothesised that the reason for admission to a rural hospital where the outcome was transfer to a perinatal centre would better reflect the reason for transfer. However, this was not the case; the reason for admission to rural hospitals where the outcome was transfer to a perinatal centre did not reflect the reasons for transfer identified by audit any better than the ISC-PCA data. This may indicate that the coding of hospital separation data differs from a clinical assessment or that identification of transfer separations is biased towards certain diagnoses.

Although the ISC over-represented threatened preterm labour and under-represented preterm prelabour rupture of the membranes in all comparisons, these conditions may be closely linked. Combining the proportions of both conditions gives the same results in all data sets; about 40% of admissions and 60% of transfers are for management of possible preterm birth.

This study is not a true validation study; the records from each data source could not be individually matched and compared as both data sets were de-identified. The audit data may be considered the gold standard as they were collected specifically for the purpose of determining the magnitude and reasons for antenatal transfer of rural women to perinatal centres, but the information collected is only as good as that recorded at perinatal centres (Roberts et al 2000b). While the ISC provides information by hospital admissions and not by individual patients, this comparison suggests that analyses of individual women would not be very different as the majority of women had only one admission. More important issues affecting the reliability and interpretation of ISC data include the completeness of the information supplied on the discharge summary and the accuracy of coding (NSW Health Department 1997). Finally, the ISC does not record gestational age for pregnancy-related admissions, thus making it impossible accurately to assess the impact of preterm birth as a factor in antenatal admission and transfer using routinely collected data.

Conclusions

The overall number of perinatal centre admissions identified by the ISC and by each hospital's records department were similar. However, the ISC underestimated admissions associated with antenatal transfer and poorly reflected the specific reasons for antenatal transfer/admission of rural women to perinatal centres. Although the ISC correctly identified that at least 40% of admissions of rural women to perinatal centres were associated with possible preterm birth, it is of limited usefulness in evaluating the antenatal transfer of rural women in NSW.

Acknowledgments

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