Impact of a collaborative shared antenatal care program for urban Indigenous women: a prospective cohort study

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ABSTRACT

Objectives: To evaluate the impact of a community-based, collaborative, shared antenatal care intervention (the Mums and Babies program) for Indigenous women in Townsville.

Design and participants: Prospective cohort study of women attending Townsville Aboriginal and Islander Health Service (TAIHS) for shared antenatal care with a singleton Indigenous birth between 1 January 2000 and 31 December 2003 (456 women; the MB group), compared with a historical control group of 84 women who attended TAIHS for antenatal care before the intervention between 1 January 1998 and 30 June1999, and a contemporary control group of 540 women who had a singleton birth at Townsville Hospital between 1 January 2000 and 30 June 2003, but did not attend TAIHS for antenatal care.

Intervention: Integration of previously autonomous service providers delivering shared antenatal care from TAIHS.

Main outcome measures: Patterns of antenatal visits, proportion of women undertaking key antenatal screening, and perinatal outcomes.

Results: The number of Indigenous women who entered the MB program and gave birth at Townsville Hospital rose from 23.8% in 2000 to 61.2% in 2003. The number of antenatal care visits per pregnancy increased from three (interquartile [IQ] range, 2–6) in the historical control group to seven (IQ range, 4–10) in the MB group ($P < 0.001$). 88% of women in the MB group had at least one ultrasound. About 90% of all women attending for antenatal care were screened for sexually transmitted infections. In the MB group, there was a significant reduction in preterm births compared with the contemporary control group (8.7% v 14.3%, $P < 0.01$). There was no significant reduction in the prevalence of low birthweight births or perinatal mortality.

Conclusion: A community-based collaborative approach to shared antenatal care services increased access to antenatal care and was associated with fewer preterm births among Indigenous women in Townsville. The model may be adaptable in other urban centres with multiple antenatal care providers and significant numbers of Indigenous people across Australia.

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Births to women of Aboriginal or Torres Strait Islander descent represent about 3% of confinements in Australia each year, and the state of Queensland has the highest number of Indigenous births.[1,2] The poor health of the Indigenous population in Australia is well documented and is reflected in demoralising Indigenous perinatal statistics, with rates of preterm birth, low birthweight and perinatal mortality remaining more than twice that of the non-Indigenous population over the past decade.[1-3]

High quality antenatal care is seen as a fundamental right of all women to safeguard their health and that of their infants,[4] providing opportunities for risk factor intervention.[5] Previous research has shown that late antenatal attendance, maternal malnutrition and high rates of tobacco and alcohol use are associated with poor obstetric outcome.[6-9] Consequently, providing perinatal care services that are community-based has been advocated as fundamental to improving obstetric outcome in Indigenous communities.[10] There have been a small number of such programs, predominantly in more remote locations, showing some success.[11,12]

With an Indigenous population of 4369, Townsville had the largest Indigenous population (70% Aboriginal and 30% Torres Strait Islander descent) in Australia (5% of total population) at the last census.[13] Most Indigenous births in Townsville occur at Townsville Hospital, the tertiary referral centre for North Queensland. In 1998, data from Townsville Hospital showed that 64% of Indigenous women made fewer than four antenatal visits, and only 35% participated in shared antenatal care with a general practitioner, compared with 70% of non-Indigenous women (personal unpublished data). In response to this, and to poor local perinatal outcomes,[3] health service providers in Townsville have worked closely with the Indigenous community to improve antenatal services. This collaboration has produced an integrated model of antenatal shared care — the Mums and Babies program — delivered from the community-controlled Townsville Aboriginal and Islander Health Service (TAIHS), an Aboriginal Medical Service with an elected board and over 100 staff members.

We aimed to evaluate the effect of this new antenatal program on antenatal care and perinatal outcomes among the Aboriginal and Torres Strait Islander community in Townsville.

METHODS

We evaluated an intervention targeting all pregnant women who attended TAIHS for shared antenatal care. All women with an Indigenous singleton birth who made at least one antenatal visit within the Mums and Babies program between 1 January

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1 Outline of the integrated antenatal Mums and Babies program, Townsville Aboriginal and Islander Health Service (TAIHS)

- Delivered through daily maternal and child health clinics at TAIHS by staff from four previously independent providers of antenatal care — TAIHS, Queensland Health Services Child Health, the Aboriginal and Islander Health Program and the Women and Children's Institute at Townsville Hospital
- Integrated team approach with each patient seen by:
  - ⇨ Aboriginal health workers (TAIHS maternal and child health staff)
  - ⇨ Midwives/child health nurses (Community Health — Queensland Health)
  - ⇨ Doctors (TAIHS female doctors)
  - ⇨ Obstetric team (Townsville Hospital — Queensland Health)
  - ⇨ Indigenous outreach health worker (Community Health — Queensland Health)
- Pregnancy register (monthly recalls)
- Daily walk-in clinics
- Family orientation (playground, educational toys, weekly playgroup)
- Care plans emphasising essential elements of care (investigations, education, nutritional supplementation)
- Polymerase chain reaction (PCR) testing for sexually transmitted infections
- Lower vaginal swab for group B streptococcal infection
- Transport service
- Brief intervention for risk factors (smoking cessation, nutrition, antenatal education, breast feeding, sudden infant death syndrome)

2000 and 31 December 2003, form the intervention (MB) group.

We used two control groups. The "historical control group" comprised women who attended TAIHS for antenatal care and had a singleton birth at Townsville Hospital between 1 January 1998 and 30 June 1999. The "contemporary control group" comprised Aboriginal and Torres Strait Islander women who had a singleton birth at Townsville Hospital between 1 January 2000 and 30 June 2003 (the date of cessation of use of the obstetric database at Townsville Hospital) who did not receive care at TAIHS.

Staff asked all women presenting for antenatal care whether they and their partner identified as Aboriginal, Torres Strait Islander, both Aboriginal and Torres Strait Islander, or other ethnicity. A baby was identified as Indigenous if either parent identified as such. There was no significant difference in any study variable between births with a non-Indigenous mother and those with an Indigenous mother.

Intervention

The intervention was shared antenatal care through the Mums and Babies program, which commenced on 1 January 2000 (Box 1). The program is based on common sense, continuity of care, cultural currency and a family-friendly environment, and also capitalises on both the cultural safety aspects of an Aboriginal Medical Service and the collocation of mental health, dental and social support services.

The management of the MB group involved standard antenatal shared-care protocols based on Royal Australian and New Zealand College of Obstetricians and Gynaecologists guidelines,[14] as well as additional infection screening (self-administered sampling for sexually transmitted infection, group B streptococcus and repeated urine culture). All women unsure of their conception dates were referred for dating ultrasound. Patients with high-risk or complicated pregnancies were referred to Townsville Hospital. All babies were delivered at Townsville Hospital unless the mother was not a Townsville resident.

Data collection

MB group data were collected prospectively. A comprehensive, confidential record of each pregnancy was recorded in a secure database, including demographic data, the number and timing of antenatal visits, weeks' gestation at first visit, ultrasound scans performed, data relating to care activities such as clinical screening and education, pregnancy complications and pregnancy outcomes. Antenatal care visits were defined as any visits to TAIHS or other health care services for documented pregnancy-related care.

For the historical control group, available demographic and antenatal visit data were collected retrospectively by TAIHS chart audit. Women in this group were identified from the birth register at Townsville Hospital and the TAIHS clinic register. Birth outcome data for their pregnancies was extracted from the Obicare database, a comprehensive pregnancy record used by the Women and Children's Institute at Townsville Hospital from 1 January 1998 until 30 June 2003. The final 6 months of 1999, before the commencement of the Mums and Babies program, were omitted, as planning for the new program may have influenced the care of pregnant women attending TAIHS during this time. For the contemporary control group, demographic data, pregnancy complication and perinatal data for all births at Townsville Hospital between 1 January 2000 and 30 June 2003 were extracted retrospectively from the Obicare database.

Ethical approval

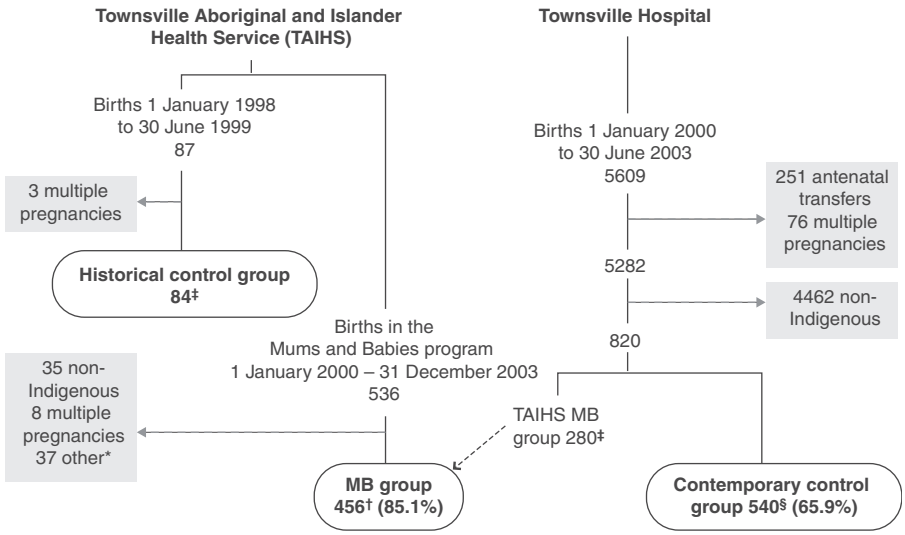
The program and evaluation has the full support of the community-elected Board of TAIHS. The ethics committee of the Townsville District Health Service approved the evaluation. All women participating in the Mums and Babies program were informed of data collection activities at TAIHS and gave verbal consent for participation in the program and evaluation at the time of the first visit. No women refused to participate.

Data analysis

Relevant antenatal care visit data were compared between the historical control and MB groups. Stratification by place of residence — Townsville-based (place of residence reported as a suburb of Townsville) or non-Townsville-based — was used where appropriate, as it was expected that women living in remote areas would make less use of a Townsville-based antenatal care service. In addition, the total number of antenatal care visits, gestation period at first visit, and attendance for screening tests was not certain for women living outside Townsville. Depending on their distribution, numerical data were described by means and 95% confidence intervals (95% CIs) or medians and interquartile range (IQ range). Bivariate associations were analysed by means of χ^2, Kruskal-Wallis and *t* tests as appropriate. Cycle-of-care and care-planning data for the intervention group only were examined by means of a χ^2 test for trend.

Results were also compared with published state[15] and national data.[16] All statistical tests were performed using SPSS software.[17] A two-tailed *P* value below 0.05 was regarded as significant.

2 Flow chart of the groups of Indigenous births included in this study



*Other: miscarriages (9), termination (8), private care (2), immediate referral to Townsville Hospital (18).
† Comprises 294 Townsville-residents and 162 non-Townsville residents. ‡ All Townsville residents. § Comprises 361 Townsville residents and 179 non-Townsville residents.

3 Demographic characteristics for women attending Townsville Aboriginal and Islander Health Service (TAIHS) for the Mums and Babies antenatal program between 1 January 2000 and 31 December 2003 (MB group), compared with a historical control group and contemporary control group

Maternal demographic characteristics	Historical control group ($n = 84$)	MB group ($n = 456$)	Contemporary control group ($n = 540$)
Age in years (mean [95% CI])	26 (24.8–27.2)	25 (24.5–25.5)	25.4 (24.9–25.9)
No. aged < 20 years	15 (17.9%)	92 (20.2%)	117 (21.7%)
Ethnicity			
Aboriginal and/or Torres Strait Islander	84 (100%)	425 (93.2%)	540 (100%)
Non-Indigenous	0	31 (6.8%)	0
Marital status (single, separated or divorced)	37 (44.0%)	155 (34.4%)	na
Residents of Townsville	84 (100%)	294 (64.5%)	361 (66.9%)
Tobacco use	50 (59.5%)	292 (64.0%)	270 (50.0%)
No. cigarettes per day (median [IQ range])	10 (5–20)	10 (5–15)	10 (6–15)
Alcohol use	na	123 (27.0%)	65 (12.0%)
Harmful/hazardous alcohol use	na	63/123 (51.2%)	na
Recreational drug use	na	63 (13.8%)	na
Cannabis	na	55/63 (87.3%)	na
Domestic violence	na	69 (15.1%)	na
Educational status (Year 10 or below)	na	144/230 (62.6%)	na
Parity* (median [IQ range])	2.5 (1–4)	1.0 (0–3)	na

na = not available.
* $P < 0.001$: Historical control group compared with MB group.
Missing data: Four cases for marital status, 226 for educational status (as this was added to data collection in late 2001).

RESULTS

Box 2 shows how the study groups were derived. All multiple births were excluded. The historical control group included 84 births, the intervention group (MB group) 456 births, and the contemporary controls 540 births.

There were no statisitcally significant differences in demographic characteristics or in use of social drugs between the three groups (Box 3). The parity of historical controls was significantly greater than that of the MB goup ($P < 0.01$). A third of both the contemporary control group and MB group were non-Townsville residents (predominantly from North and Far North Queensland). The non-Townsville residents among both the MB group and contemporary control group were significantly younger ($P < 0.01$ and $P < 0.05$, respectively), and more likely to be Aboriginal than Torres Strait Islander (both $P < 0.05$); in the MB group the parity of non-Townsville residents was significantly lower than that of the Townsville residents ($P < 0.01$).

Access

Overall, 280 women attending TAIHS for antenatal care within the Mums and Babies program accounted for 43.7% of the 641 Townsville-based Indigenous women giving birth at Townsville Hospital, rising from 23.8% (45/189) in 2000 to 61.2% (63/103) in 2003 (trend, $P < 0.001$).

There were significantly more antenatal care visits, improved timeliness of the first visit, and fewer pregnancies with inadequate care among the MB intervention group (Box 4).

Quality of antenatal care

Among the MB group, there were significant positive trends in recorded care planning, smoking cessation advice and antenatal education activities (Box 5a).

Screening activities for all women in the MB group are shown in Box 5b; 260 (57.0%) had a dating scan and 418 (91.7%) had at least one ultrasound. The rising trends shown in Box 5b for the MB group were also seen in the Townsville-based subgroup, with slightly higher rates. Women missing out on either an ultrasound or sexually transmitted infection screen or minimum blood screen were significantly more likely to be non-Townsville residents (23.5% Townsville residents v 35.8% of non-Townsville residents; $P < 0.01$).

Perinatal outcome

There were significantly fewer preterm births in the MB group compared with the

4 Patterns of visits for women attending Townsville Aboriginal and Islander Health Service (TAIHS) for the Mums and Babies antenatal program between 1 January 2000 and 31 December 2003 (MB group), compared with a historical control group

	Historical control group ($n = 84$)*	MB group ($n = 456$)†
Total visits per pregnancy (median [interquartile range])		
Townsville-based	3 (2–6)	8 (5–11)‡
Non-Townsville-based		5 (3–8)
Total MB group	3 (2–6)	7 (4–10)‡
Total TAIHS antenatal care visits per pregnancy (median [interquartile range])		
Townsville-based		5 (3–8)
Non-Townsville-based		3 (2–4)
Total MB group		4 (2–7)
Weeks' gestation at first visit (median [interquartile range])		
Townsville-based	14 (7–22)	10 (7–15)§
Non-Townsville-based		19 (11–25)
Total MB group	14 (7–22)	12 (8–20)
Pregnancies with inadequate care		
Townsville-based (n = 294)	44 (52.4%)	42 (14.3%)‡
Total	44 (52.4%)	87 (19.1%)‡
Pregnancies with late first visit		
Townsville-based (n = 294)	15 (17.9%)	18 (6.2%)‡
Total	15 (17.9%)	50 (11.0%)§

* All Townsville-based. † 294 Townsville-based and 162 non-Townsville-based. ‡ $P < 0.001$. § $P < 0.05$.

historical and contemporary control groups (Box 6). Mean birthweight in the MB group improved compared with that in the historical controls ($P = 0.027$), but was not significantly different to the contemporary control group. There was no significant improvement in perinatal mortality.

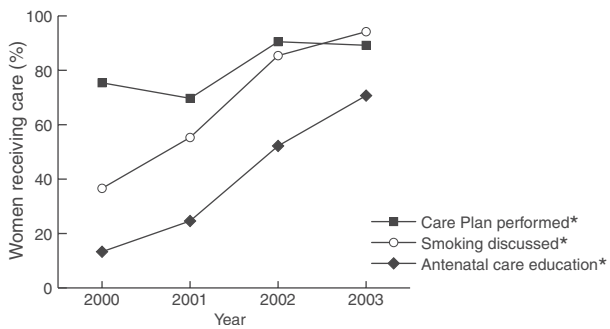
The proportion of preterm births in the MB group (8.7%; 95% CI, 6.2%–11.9%) was similar to that of non-Indigenous births in Queensland (8.0%) and Australia (7.0%). The mean birthweight for Indigenous Australian babies (3166 g) was significantly lower than the mean of the MB group (3239g; 95% CI, 3173g–3305g).

DISCUSSION

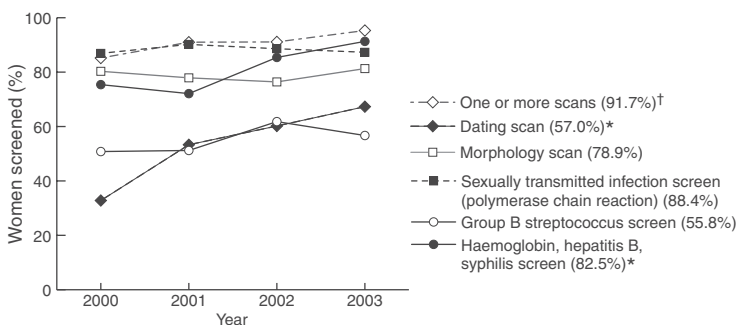
There is little evidence in the Australian Indigenous community to guide antenatal care planning. Reviews of Australian antenatal care protocols show that the number, timing and content of antenatal visits often remain based in tradition rather than evidence.[18,19] Recent World Health Organization (WHO) reviews suggest that no adverse outcomes are associated with a reduced schedule of four visits,[20,21] focusing on specific screening, therapeutic interventions and antenatal education.[22] The Mums and Babies program with a care plan focusing on screening, nutritional supplementation, education and monthly recalls is similar to the WHO strategy.

Evaluating and interpreting small community datasets and quality improvement initiatives at the primary health care level is difficult, and randomised controlled trials are not always feasible. The success of community-based programs is influenced by factors such as the strength of community relationships, the presence of energetic champions and tailoring the interventions to local context. Interventions such as the one described in this study are also long-term projects that are difficult to assess over short periods. Consequently, our study has limitations, and selection bias is a significant factor. Both the historical control and MB groups were self-selected, and a small number of high risk pregnancies were

5 Recorded planning activity and screening activity for all Indigenous women attending Townsville Aboriginal and Islander Health Service (TAIHS) for shared antenatal care in the Mums and Babies program between 1 January 2000 and 31 December 2003



(a) Proportion with recorded care planning activity.



(b) Screening activity, with total proportion of women screened for each activity over the study period given in the legend.

P value for trend: * $P < 0.001$; † $P < 0.05$.

6 Perinatal outcomes for Indigenous births to women attending Townsville Aboriginal and Islander Health Service (TAIHS) for shared antenatal care in the Mums and Babies program between 1 January 2000 and 31 December 2003 (MB group), compared with a historical control group, Indigenous births at the Townsville hospital to women who did not attend TAIHS for antenatal care (contemporary control group) and Indigenous births in Queensland in 2001

Perinatal outcome	Historical control group ($n = 84$)	MB group ($n = 456$)	P*	Contemporary control group ($n = 540$)	P†	Queensland Indigenous births in 2001 ($n = 2729$)
Preterm births	14 (16.7%)	37/423 (8.7%)‡	0.044	77 (14.3%)	0.002	336 (12.3%)
Low birthweight births (< 2500 g)	13 (15.5%)	46/413 (11.1%)	0.268	75 (13.9%)	0.067	327 (12.0%)
Small for gestational age	2 (2.4%)	34/410 (8.3%)	0.098			
Birthweight (95% CI)	3043 g (2864–3224 g)	3239 g (3170–3308 g)	0.027	3188 g (3124–3253 g)	0.28	
Perinatal deaths (perinatal mortality rate)	5 (60 per 1000)	10/423 (24 per 1000)	0.085	11 (20 per 1000)	0.864	58 (21 per 1000)

Preterm births = births prior to 37 weeks gestation. Perinatal mortality rate = perinatal (stillbirths + neonatal) deaths per 1000 births.
* MB v historical control. † MB v contemporary control. ‡ Significant at $P < 0.05$ for MB group v Queensland Indigenous births in 2001.
Data was incomplete for 43 MB group births (11%) — 9 Townsville based births (20.9%) and 34 births based elsewhere (79.1%) — which have been omitted.

referred directly to hospital clinics. The limited numbers of women using TAIHS for antenatal care before the program suggests that they were a different group of women, despite having similar demographic characteristics to the MB group. Also, little is known of the Indigenous women in Townsville in the contemporary control group who did not use the Mums and Babies program. Their demographic characteristics were also similar to those of the MB group, but they may have differed in other characteristics, such as education, employment and socioeconomic status. The data for both control groups were limited by what was available — educational status was missing in a signifcant proportion of records, and gestation, but not parity, was recorded in Obicare. The paper records and lack of antenatal care planning at TAIHS before computerisation in 2000 resulted in poor recording of clinical information. In spite of these limitations, this study does support some cautious conclusions.

Use of the Mums and Babies program antenatal care service increased significantly over time, with 60% of Townsville-based Indigenous women attending by 2003. The timeliness of the first visit and the number of antenatal care visits improved significantly. Although well short of the traditional antenatal care schedule, the median number of seven antenatal care visits does fall within the bounds of the WHO model, adapted for a developed country with ready access to ultrasound scanning. The use of the program by large numbers of women from outside Townsville, while not an aim, reflects both the mobility of Indigenous families and the ease patients experience in using the Mums and Babies program. This increased access to antenatal care represents an improved opportunity to establish a relationship with pregnant women that may endure through the early childhood years.

Indicators for measuring the quality of antenatal care are lacking for the shared care model. The WHO has recommendations about what constitutes good quality maternal health services, including criteria relating to access, cultural sensitivity, continuity of care, use of protocols and education,[4] but gives no specific indicators for evaluating the services. In this study, it appears that care planning, screening and educational activity performance have improved over the 4 years of the project, suggesting that health care workers are taking advantage of the contact these women are having with the health care system.

Ultrasound dates are more accurate than menstrual dates for determining the stage of a pregnancy, and hence for assessing prematurity.[23] During the study period, attendance for ultrasound scanning increased. This cohort of Aboriginal and Islander women will thus be one of the few in Australia with accurately dated pregnancies, which is vital to clinical decision making and perinatal research in the Indigenous community.

The significant reduction in preterm births among the MB group (compared with both control groups) is promising, even though the persistence of high mortality rates is disappointing. Encouragingly, the proportion of preterm births in the MB group was not only significantly lower than that for whole-of-population figures for Indigenous women in Queensland, but very similar to figures for non-Indigenous women in Queensland.[15] The non-significant trend to reduced low birthweight births in the MB group women may be the result of selection bias, with increased numbers of women with lower risk profiles attending TAIHS for antenatal care, improved infection screening and accurate dating of pregnancies, or differences in socioeconomic status of the Indigenous community in Townsville. This requires further exploration. The demographic profile does suggest that the women in the MB group carry a significant risk load, which may also explain why birthweight and perinatal mortality rate did not improve in tandem with the reduction in preterm births.

Although not a panacea for poor perinatal outcome, it is the right of the Indigenous community to obtain the same standard of antenatal care as the rest of the community. This study shows that integrated services delivered in a "safe" environment increase access to antenatal care in the Indigenous community. Increased access to antenatal care should afford the opportunity to establish programs that minimise risks such as tobacco and alcohol use, possibly leading to reductions in the prevalence of low birthweight and perinatal mortality in future, particularly if the reduction in preterm births can be sustained. This model may be be adaptable to other urban centres with significant Indigenous populations, community-controlled health services and multiple antenatal care service providers.

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COMPETING INTERESTS

None identified.

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