

# **Literature Review for Three Centres Antenatal Care Consensus Guidelines**

## **Number and timing of routine antenatal visits**

by: Clinical Practice Improvement Unit, The Royal Women's Hospital

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## Number and timing of routine antenatal visits

### Conclusion and recommendations

It is essential that routine antenatal care delivers effective and appropriate screening, preventive, or treatment interventions. Thus, the number of visits should ensure delivery of these interventions in a timely way during pregnancy, without any clinically important increase in the risk of adverse outcomes<sup>2</sup>.

Greer adds a cautionary note that if reduced antenatal visits are adopted for low risk women, a plan must be in place to direct the practitioner to early and prompt referral for departures from the low risk pathway<sup>22</sup>.

#### **In low risk pregnant women is a reduced schedule of visits as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes?**

In low risk pregnant women a reduced schedule of antenatal visits appears to be as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes.

In particular, there is no clinical difference when the number of antenatal visits was reduced with respect to preeclampsia, urinary tract infection, post partum anaemia, maternal mortality, antepartum haemorrhage, induction of labour, caesarean section, postpartum haemorrhage, small for gestational age, admission to NICU and low birth weight.

#### **Recommendation (A-B)**

The project team concurs with the RCOG recommendations of:

“A schedule of antenatal appointments should be determined by the function of the appointments. For a woman who is nulliparous with an uncomplicated pregnancy, a schedule of ten appointments should be adequate. For a woman who is parous with an uncomplicated pregnancy, a schedule of seven appointments should be adequate.”

“Early in pregnancy, all women should receive appropriate written information about the likely number, timing and content of antenatal appointments associated with different options of care and be given an opportunity to discuss this schedule with their midwife or doctor.”

“Each antenatal appointment should be structured and have focused content. Longer appointments are needed early in pregnancy to allow comprehensive assessment and discussion. Wherever possible, appointments should incorporate routine test and investigations to minimize inconvenience to women.”

An important caveat in the Australian care setting is that antenatal care must be individualized in particular for groups such as the indigenous community who may be at higher risk of adverse pregnancy outcomes.

#### **In low risk women is a reduced schedule of visits as effective as the traditional schedule in terms of women's satisfaction with care**

Evidence regarding women's satisfaction with care with a reduced schedule of visits is conflicting. In general, satisfaction appears to be reduced, and women in general prefer the traditional number of antenatal visits. However, factors including increased number of children and maternal age >35 years and unfortunate timing of pregnancy may result in a wish for fewer antenatal visits. A desire for more visits was associated with depression, previous miscarriage, previous stillbirth, previous negative birth experience and in primiparas maternal age <25 years and assisted conception.

## Literature Search and Appraisal

Continuity of care has consistently been identified as an important factor for maternal satisfaction with care.

In the largest study, women and providers accepted the new antenatal care model generally.

### **Recommendation (A-B)**

Women may be less satisfied with antenatal care when a reduced schedule of visits is implemented. However, the majority of women expressed satisfaction with antenatal care.

Particular attention should be paid to women with a previous stillbirth, miscarriage or a negative birth experience.

### **Is a reduced schedule of visits (<14) as effective in low risk primigravida as in low risk multigravidas in achieving positive perinatal outcomes and satisfaction with care?**

Primiparas were less likely to express a preference than multiparas for the model of antenatal care. Of those who expressed a preference the majority would opt for 'traditional' care. There is limited data comparing perinatal outcomes for primiparas versus multiparas.

### **Recommendation (B)**

Preferences regarding antenatal care schedule should be considered when individualizing antenatal care management.

### **In low risk women is a reduced schedule of visits (<14) more cost effective than the traditional schedule?**

Evidence regarding cost effectiveness of reduced schedule of visits is conflicting. Cost savings produced by reduced number of visits may be offset by a higher rate of neonatal admissions to SCN.

### **Recommendation (A)**

There is limited evidence regarding cost effectiveness of reduced schedule of antenatal visits.

# Literature Search and Appraisal

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## Literature Search and Appraisal

### 1. Introduction

The Three Centres Collaboration contracted the Royal Women's Hospital (RWH) Clinical Practice Improvement Unit to conduct a comprehensive search and critical appraisal of publications addressing the topic of the number and timing of routine antenatal visits between January 2000 and April 2005, to inform the proposed review of the 2001 Three Centres Consensus Guidelines on Antenatal Care.

### 2. Topics to be addressed

- 2.1 In low risk pregnant women is a reduced schedule of visits as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes?
- 2.2 In low risk women is a reduced schedule of visits as effective as the traditional schedule in terms of women's satisfaction with care?
- 2.3 Is a reduced schedule of visits (<14) as effective in low risk primigravida as in low risk multigravidas in achieving positive perinatal outcomes and satisfaction with care?
- 2.4 In low risk women is a reduced schedule of visits (<14) more cost effective than the traditional schedule?

### 3. Methods

#### 3.1 Search strategy

- The OVID interface was used to search the following electronic databases:
  - MEDLINE: 2000 – May 2005
  - CINAHL: 2000 – May 2005
  - EBM Reviews: January 2000 – May 2005
- Cochrane Database: 2005 Issue 2
- Review of article citations and Cochrane Library references for additional citations
- Guidelines developed by specific Colleges of Obstetricians and Gynaecologists were searched including:
  - Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)
  - Royal College of Obstetricians and Gynaecologists (RCOG), and
  - Society of Obstetricians and Gynaecologists Canada (SOGC).
- Guidelines developed by other groups were searched for via the internet, on the United States National Guidelines Clearinghouse.

#### 3.2 Search terms

Terms used to identify relevant citations are outlined in Appendix I. The search was conducted in three sections:

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### 4. Search findings

#### 4.1 Initial search

Two guidelines were retrieved. The AGREE tool was applied by the project team and as a result the first one was included as a key citation.

- Royal College of Obstetricians and Gynaecologists (RCOG). Clinical Guideline: Antenatal care: routine care for the healthy pregnant woman<sup>1</sup>.
- Institute for Clinical Systems Improvement (ICSI). Health Care Guideline: Routine prenatal care.

In addition to the guidelines, the initial search applied the following inclusion and exclusion criteria to retrieve 138 citations (Appendix II):

Inclusion criteria	Exclusion criteria
Antenatal	Postnatal
	Abortion
	Non-obstetric
	Maternal medical condition
	Preterm labour – prediction
	Antenatal visits and screening

#### 4.2 Key citation selection

All 140 citations identified in the initial search were triaged into those:

- Possibly containing relevant evidence or authoritative opinion (72 citations), and
- Unlikely to contain relevant evidence or authoritative opinion (68 citations). These citations were either too general or not relevant to the topics to be addressed and were not considered further.

The 68 citations (Appendix III) were retrieved and further screened to identify those studies with respect to quality of methodology and relevance to Australian obstetric practice. As a result of this exercise 21 articles were classified as key citations, and were subjected to systematic critical appraisal by the project team (Appendix IV) and those not meeting the criteria were discarded.

The evidence within these 21 key citations fell into the following levels (see Appendix IV for definitions):

Level I evidence: 2 publications

Level II evidence: 3 publications,

Level III evidence: 6 publications, and

Level IV evidence: 10 publications.

#### 4.3 Grading recommendations

The project team has adapted the Scottish Intercollegiate Guidelines Network (SIGN) system applying the NHMRC Levels of Evidence, to grade recommendations as follows:

- A At least one meta analysis, systematic review, or RCT directly applicable to the target population; or Levels I or II evidence.
- B A body of evidence including studies rated as Level III-1 or III-2, directly applicable to the target population and demonstrating overall consistency of results.
- C A body of evidence including studies rated as III-3 directly applicable to the target population and demonstrating overall consistency of results.
- D Evidence Level IV.

### 5. Results of the critical appraisal process; Commentary on and interpretation of publications reviewed

#### 5.1 In low risk pregnant women is a reduced schedule of visits as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes?

- **Reference**

Royal College of Obstetricians and Gynaecologists (RCOG). Evidence based guidelines Antenatal care: routine care for the healthy pregnant woman. 2003. (Level IV)

RCOG conclude that “a moderate reduction in the traditional number of antenatal visits is not associated with an increase in adverse maternal or perinatal outcome. However, a reduced number of appointments may be associated with a reduction in women’s satisfaction with their antenatal care. It is likely that routine antenatal care for women without risk or complications can be provided with fewer appointments<sup>1</sup>.” RCOG further comment that the key issue surrounding women’s satisfaction with care may rest on implementation of procedures that have been shown to be effective. The frequency of appointments can then be planned accordingly<sup>1</sup>.

RCOG recommendations:

“A schedule of antenatal appointments should be determined by the function of the appointments. For a woman who is nulliparous with an uncomplicated pregnancy, a schedule of ten appointments should be adequate. For a woman who is parous with an uncomplicated pregnancy, a schedule of seven appointments should be adequate<sup>1</sup>.”

“Early in pregnancy, all women should receive appropriate written information about the likely number, timing and content of antenatal appointments associated with different options of care and be given an opportunity to discuss this schedule with their midwife or doctor<sup>1</sup>.”

“Each antenatal appointment should be structured and have focused content. Longer appointments are needed early in pregnancy to allow comprehensive assessment and discussion. Wherever possible, appointments should incorporate routine test and investigations to minimize inconvenience to women<sup>1</sup>.”

#### 5.1.1 The following key citations include Level I and II evidence which directly address the question of number of antenatal visits and outcomes

- **Reference**

Carroli G, Villar J, Piaggio G, Khan-Neelofur D, Gulmezoglu M, Mugford M, et al. WHO systematic review of randomised controlled trials of routine antenatal care. *Lancet* 2001;357(9268):1565-70. (Level I)

This review included seven eligible randomised controlled trials. There was no clinical difference when the number of antenatal visits was reduced with respect to preeclampsia, urinary-tract infection, postpartum anaemia, maternal mortality, or low birth weight. There was no statistically significant difference in the rates of perinatal mortality. Some dissatisfaction with care, particularly among women in more developed countries, was observed with the new model. The cost of the new model was equal to or less than that of the traditional model<sup>2</sup>.

The authors conclude that a model with a reduced number of antenatal visits could be introduced into clinical practice without risk to mother or baby, but some degree of dissatisfaction by the mother could be expected. Lower costs can be achieved<sup>2</sup>.

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### Project team comment

This review drew on the search strategy developed for the Cochrane Pregnancy and Childbirth Group of the Cochrane Collaboration. Thus the possibility of publication bias is very low. The included trials were of acceptable quality.

It is important to note that the proportional reduction in the number of visits in the trials in more developed countries was very small. An absolute difference of two to three antenatal-care visits, in more developed countries, where the norm is 11 to 14 antenatal care visits, is unlikely to have any clinical significance. On the other hand, the two largest trials, which took place in less developed countries, achieved proportionately larger reductions in the number of visits which did not result in an increase in adverse maternal and perinatal outcomes.

The overall review was underpowered for any meaningful conclusions around perinatal mortality.

This is robust evidence but must be interpreted in the Australian clinical setting.

### • Reference

Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gulmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews* 2001(4):CD000934. (Level I)

This systematic review included ten trials involving over 60,000 women. Seven trials evaluated the number of antenatal clinic visits, and three trials evaluated the type of care providers. Most trials were of acceptable quality. A reduction in the number of antenatal visits was not associated with an increase in urinary tract infection, low birth weight, preeclampsia, severe postpartum anaemia, maternal mortality, antepartum haemorrhage, induction of labour, caesarean section, postpartum haemorrhage, preterm birth, small for gestational age, and admission to NICU<sup>3</sup>.

However, trials from developed countries suggest that women can be less satisfied with the reduced number of visits and feel that their expectations with care are not fulfilled. Antenatal care provided by a midwife/general practitioner was associated with improved perception of care by women. Clinical effectiveness of midwife/general practitioner managed care was similar to that of obstetrician/gynaecologist led shared care<sup>3</sup>.

Two trials reported evaluation of cost effectiveness. Costs per pregnancy to women and providers were lower in the reduced antenatal visits model in one trial. The other trial only considered costs to the National Health Services (NHS). This study reported an increase of costs due to a statistically non-significant higher rate of neonatal admissions to special care nursery (SCN) in the reduced number of antenatal visits model and a non-statistically significant increase in mean days of stay<sup>3</sup>.

The antenatal visits are provided by midwives, general practitioners or obstetricians / gynaecologists. This review found that each of these professional groups provide equally effective antenatal care to healthy low-risk pregnant women. Women are slightly more likely to be happy with midwifery or general practitioner care. The authors conclude that good health outcomes can still be achieved with fewer visits, but this might reduce women's satisfaction with their care<sup>3</sup>.

### Project team comment

The seven clinical trials included in the Carroli et al<sup>2</sup> systematic review are included in the ten trials considered in this Cochrane Review, published at a later date.

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In the discussion the authors comment that a routine number of pregnancy visits has developed, without evidence of how much care is necessary or helpful. These visits can include tests, education and other health checks.

There was significant heterogeneity between each of the trials in the review. In particular the primary outcomes were not always the same.

A limitation of the two trials considering economical evaluation was that costs to women associated with travel and child care, components that are more likely to be influenced by reducing antenatal care visits, were not included.

The agreed objective of antenatal care is to deliver effective appropriate screening or preventive or treatment interventions. The results of the systematic review indicate that these effective interventions can be provided within fewer visits than presently recommended without any clinically important increase in the risk of adverse outcomes. However a significant limitation of these studies is the questionable applicability to Australian care settings.

### • Reference

Villar J, Ba'aqeel H, Piaggio G, Lumbiganon P, Miguel Belizan J, Farnot U, et al. WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *Lancet* 2001;357(9268):1551-64. (Level II)

This multicentre randomised controlled trial (RCT) compared the standard model of antenatal care (~14 visits) with a new model that emphasises actions known to be effective in improving maternal or neonatal outcomes (including antenatal education) and has fewer clinic visits. The trial was conducted in antenatal clinics in four developing countries<sup>4</sup>.

Results included equivalent outcomes for both low birth weight and urinary-tract infections. Outcomes for preeclampsia were equivalent, but significant heterogeneity resulted in an increased risk of 2-56% in the new model when adjustment was made for confounders such as smoking, low education, previous preeclampsia and low birth weight, first trimester bleeding, booking after 28 weeks gestation, maternal age and nulliparity. For severe postpartum anaemia, there was a large protective effect of the new model in the country with the largest increment in the provision of iron supplementation<sup>4</sup>.

There was a significant reduction in the number of visits in the new model compared with the standard model, with one study site halving the number of visits.

The study also revealed a trend toward lower costs with the new model but this was not statistically significant. This study reported overall high satisfaction among women in both groups.

Authors conclude the provision of routine antenatal care by the new model seems not to affect maternal and perinatal outcomes. It could be implemented without major resistance from women and providers and may reduce cost<sup>4</sup>.

### Project team comment

This RCT was one of the trials included in the Carroli et al and Cochrane systematic reviews (see above)<sup>2,3</sup>.

There was significant heterogeneity among the four trial centres. The reviewers commented that this increased the external validity of the trial but the applicability to the Australian clinical setting may be limited. In particular, meaningful conclusions around risk of preeclampsia are limited by the significant heterogeneity. In addition,

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many of the confounders listed would preclude these women from low risk care in the Australian setting.

Perinatal mortality was not a primary outcome in this RCT.

### 5.1.2 The rest of the evidence in this section is comprised of published articles of reviews of existing evidence for number of antenatal visits (not primary research).

- **Reference**

Hunt JM, Lumley J. Are recommendations about routine antenatal care in Australia consistent and evidence-based? *Medical Journal of Australia* 2002;176(6):255-9.

This Australian study comparing the recommendations from local protocols, national guidelines and research pertaining to aspects of antenatal care including number of visits found that no national policies about the number of routine visits could be identified.

Of those protocols identified, eighty (75%) included a recommendation about the number and timing of visits for routine antenatal care. Most protocols described the "Standard" schedule of antenatal visits as every four weeks until 28 weeks' gestation, then every two weeks until 36 weeks, then every week until 40 weeks or delivery. Fewer visits or a more flexible approach were described in 12 protocols (15%), and extra routine visits, all relating to shared-care arrangements, were recommended in five (6%)<sup>5</sup>.

The source of Australia's predominant 'standard' schedule reported in this study is the 1929 policy statement from the United Kingdom.

#### **Project team comment**

Aspects of methodology are not explicit, including the selection criteria and process for the survey. Nevertheless, it provides an important description of current Australian practice including a historical perspective.

- **Reference**

Gerein N, Mayhew S, Lubben M. A framework for a new approach to antenatal care. *International Journal of Gynaecology & Obstetrics* 2003;80(2):175-82.

- **Reference**

Candy B, Clement S, Sikorski J, Wilson J. Antenatal visits. *Practising Midwife* 2000;3(3):21-4.

- **Reference**

Walker DS, McCully L, Vest V. Evidence-based prenatal care visits: when less is more. *Journal of Midwifery & Women's Health* 2001;46(3):146-51.

#### **Project team comment**

These three references are discussion papers detailing frameworks for new approaches to antenatal care. In establishing the optimal number of antenatal visits the papers referred to the Level I evidence discussed previously in this report. Candy et al commented that the studies included in the systematic reviews all suffered some methodological problems.

- **Reference**

Waters D, Picone D, Cooke H, Dyer K, Brodie P, Middleton S. Midwifery-led care: finding evidence for an antenatal model. *Australian Midwifery*; 2004;17(2): 16-20.

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This literature review examined previous studies of evidence based antenatal care and midwifery practice to identify specific variables within the care process; and to develop conceptual and operational definitions of those variables in order to categorise outcome data. The authors identified the Level I evidence discussed previously in this report. In addition an important note by the authors was that women living in Victoria express higher levels of satisfaction with specialist obstetric services or birth centre care because of the continuity provided<sup>9</sup>.

### Project team comment

This structured literature review was comprehensive.

### 5.1.3 The remainder of the evidence pertaining to this question involves studies describing various models of care which may be applicable to the Australian setting but do not directly evaluate a reduced number of antenatal visits.

#### • Reference

Homer CS, Davis GK, Brodie PM, Sheehan A, Barclay LM, Wills J, et al. Collaboration in maternity care: a randomised controlled trial comparing community-based continuity of care with standard hospital care. *BJOG: an International Journal of Obstetrics & Gynaecology* 2001;108(1):16-22.

1089 women were randomised to either the community-based model (n = 550) or standard hospital-based care (n = 539) prior to their first antenatal booking visit at St George Hospital, Sydney. The community-based care provided by midwives and obstetricians resulted in a significantly reduced caesarean section rate ie. caesarean section rates for the community based model were 13.3% and for the control group 17.8%. There were no other differences in clinical outcomes<sup>10</sup>.

Women in the community-based group attended 8.3 antenatal visits and women in the control group attended 7.4 antenatal visits.

### Project team comment

The trial was unblinded, thus allocation bias may have been a limitation of the study.

12% of women in the community-based group and 0.4% of women from the control group did not receive the model of care to which they were randomly allocated. As the analysis was by intention-to-treat this may have affected the results.

The study was underpowered to conclude that the model of care was as safe as standard care in terms of perinatal mortality.

This study adds weight to the body of evidence that a reduced number of antenatal visits in low risk women does not change important perinatal outcomes and may have a positive impact on caesarean section rates.

#### • Reference

Tasnim N, Mahmud G, Arif MS. Impact of reduced prenatal visit frequency on obstetric outcome in low-risk mothers. *Jcpssp, Journal of the College of Physicians & Surgeons - Pakistan* 2005;15(1):26-9.

This prospective cohort study, conducted in Pakistan evaluated the hospital case records of 1290 low risk women for number of antenatal visits. The main outcome measures were peripartum maternal complications, obstetric interventions and perinatal outcome<sup>11</sup>.

The median number of prenatal visits was 4. Women with less than 3 prenatal visits had significantly higher risk of antepartum complications, low birth weight neonates,

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pre-term deliveries, neonatal morbidity, and perinatal mortality. Compared with  $\geq 7$  visits, preterm birth was increased in the group with 3-6 visits<sup>11</sup>.

### Project team comment

The applicability of this study to the Australian setting is limited. In addition, the number of visits is significantly less than any maternity provider in a developed country would offer.

An apparent bias in the study arises due to the initiation of prenatal care being much later in gestation in the group with  $< 3$  visits. The group with  $\geq 7$  visits were more likely to be primiparous.

### • Reference

Tough SC, Newburn-Cook CV, White DE, Fraser-Lee NJ, Faber AJ, Frick C, et al. Do maternal characteristics and past pregnancy experiences predict preterm delivery among women aged 20 to 34? *Journal of Obstetrics & Gynaecology Canada: JOGC* 2003;25(8):656-66.

This case control study of 987 women in Canada examined the risk factors for preterm delivery. Women who had fewer than 10 prenatal visits, regardless of attending prenatal classes, were at highest risk of preterm delivery  $< 37$  weeks' gestation (OR 6.7)<sup>12</sup>.

### Project team comment

Much of this group had significant risk factors for preterm delivery, including poor past pregnancy outcome, antenatal haemorrhage and preeclampsia. The number of prenatal visits reflected this morbidity rather than a chosen pathway of antenatal care. As such, the relevance to low risk women with a program of reduced antenatal visits is limited.

### • Reference

Petrou S, Kupek E, Vause S, Maresh M. Antenatal visits and adverse perinatal outcomes: results from a British population-based study. *European Journal of Obstetrics, Gynecology, & Reproductive Biology* 2003;106(1):40-9.

This population based study retrospectively audited the casenotes of over 20,000 women in the United Kingdom. The study revealed an inverse association between the number of antenatal visits and delivery of a low birth weight infant, infant admission to a special care baby unit and perinatal mortality over the 4-14 antenatal visit range, which dissipated at higher levels of antenatal visits. The study also revealed a significant positive association between the number of antenatal visits and delivery by caesarean section ( $P < 0.01$ ). Similar trends in the probabilities of adverse outcomes were observed for low- and high-risk women within each parous group, with the exception of delivery by caesarean section and delivery of a low birth weight infant (no significant difference in the low risk primipara group)<sup>13</sup>.

### Project team comment

A major strength of this study is the utilisation of a comprehensive population-based data set. Nevertheless, the sample size still precluded examination of rare but serious obstetric events, such as eclampsia and maternity mortality.

The findings are relevant to the Australian antenatal care setting. The study suggests that provision of antenatal care within the 4-14 visit range does not alter significant perinatal outcomes. The level of evidence is low, and further experimental research is suggested by the authors.

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- **Reference**

Petrou S, Kupek E, Vause S, Maresh M. Clinical, provider and sociodemographic determinants of the number of antenatal visits in England and Wales. *Social Science & Medicine* 2001;52(7):1123-34.

This citation utilizes the data extracted in the study evaluated above. The number of antenatal visits was independently influenced by the planned pattern of antenatal care, number of carers seen, gestation at first presentation and maternal age. The study highlights the sizeable impact of non-clinical factors on the antenatal care delivery process and indicates ways in which variations in antenatal care might be reduced<sup>14</sup>.

**Project team comment**

The study was unable to determine from these data whether variations in antenatal visits had any significant impact on maternal or neonatal outcomes, or on maternal satisfaction. What the study does suggest is that antenatal management is likely to be influenced by the factors listed above. These factors will need to be taken into account when designing individual antenatal care plans.

- **Reference**

Jewell D, Sharp D, Sanders J, Peters TJ. A randomised controlled trial of flexibility in routine antenatal care.[see comment]. *BJOG: an International Journal of Obstetrics & Gynaecology* 2000;107(10):1241-7.

This study randomized 609 low risk women to a standard antenatal care schedule ('traditional care') or a schedule based on a minimum number of visits and additional visits with timing agreed between women and midwives ('flexible care'). The aim of the study was to assess changes in satisfaction associated with either care plan. There was no difference in the proportions of women reporting antenatal problems as soon as possible. Women receiving traditional care reported higher levels of satisfaction for the care provided by community midwives. Women receiving flexible care were more likely to report having a choice over the number and timing of their antenatal visits, but were also more likely to report that they would like to have been seen more often. There was no difference between the groups in rates of obstetric complications<sup>15</sup>.

**Project team comment**

The study was underpowered to detect a difference in obstetric complications such as perinatal mortality and hypertensive disorders of pregnancy.

The study is applicable to the Australian population. It provides important, robust evidence regarding satisfaction with care and suggests that successful implementation of alternative antenatal care to the traditional model may require careful attention to communication to meet the expressed needs of the pregnant woman.

- **Reference**

Gaff-Smith M. Antenatal attendance by Aboriginal women. *Birth Issues*; 9(4):118-22 2000.

This is a descriptive paper on issues surrounding antenatal attendance by Aboriginal women. It reviews evidence that Aboriginal women are eight times more likely to die around pregnancy and childbirth than non-aboriginal women. The perinatal mortality rate for babies is more than twice for Caucasian babies. The paper focuses on the need to promote and encourage access to antenatal care for Aboriginal women. It stresses the importance of antenatal care being culturally appropriate, flexible and acceptable<sup>16</sup>.

### **Project team comment**

Whilst not directly addressing the study question of number of antenatal visits, this is an important paper to the Australian antenatal care setting.

### **Project team overall conclusion**

In low risk pregnant women a reduced schedule of antenatal visits appears to be as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes.

In particular, there is no clinical difference when the number of antenatal visits was reduced with respect to preeclampsia, urinary tract infection, post partum anaemia, maternal mortality, antepartum haemorrhage, induction of labour, caesarean section, postpartum haemorrhage, small for gestational age, admission to NICU and low birth weight.

### **Recommendation (A-B)**

The project team concurs with the RCOG recommendations of:

“A schedule of antenatal appointments should be determined by the function of the appointments. For a woman who is nulliparous with an uncomplicated pregnancy, a schedule of ten appointments should be adequate. For a woman who is parous with an uncomplicated pregnancy, a schedule of seven appointments should be adequate.”

“Early in pregnancy, all women should receive appropriate written information about the likely number, timing and content of antenatal appointments associated with different options of care and be given an opportunity to discuss this schedule with their midwife or doctor.”

“Each antenatal appointment should be structured and have focused content. Longer appointments are needed early in pregnancy to allow comprehensive assessment and discussion. Wherever possible, appointments should incorporate routine test and investigations to minimize inconvenience to women.”

An important caveat in the Australian care setting is that antenatal care must be individualized in particular for groups such as the indigenous community who may be at higher risk of adverse pregnancy outcomes.

## **5.2 In low risk women is a reduced schedule of visits as effective as the traditional schedule in terms of women’s satisfaction with care?**

### **• Reference**

Royal College of Obstetricians and Gynaecologists (RCOG). Evidence based guidelines Antenatal care: routine care for the healthy pregnant woman. 2003. (Level IV)

RCOG conclude that “a moderate reduction in the traditional number of antenatal visits is not associated with an increase in adverse maternal or perinatal outcome. However, a reduced number of appointments may be associated with a reduction in women’s satisfaction with their antenatal care. It is likely that routine antenatal care for women without risk or complications can be provided with fewer appointments<sup>1</sup>.” RCOG further comment that the key issue surrounding women’s satisfaction with care may rest on implementation of procedures that have been shown to be effective. The frequency of appointments can then be planned accordingly<sup>1</sup>.

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- **Reference**

Carroli G, Villar J, Piaggio G, Khan-Neelofur D, Gulmezoglu M, Mugford M, et al. WHO systematic review of randomised controlled trials of routine antenatal care. *Lancet* 2001;357(9268):1565-70. (Level I)

This review included seven eligible randomised controlled trials. Some dissatisfaction with care, particularly among women in more developed countries, was observed with the new model.

The authors conclude that a model with a reduced number of antenatal visits could be introduced into clinical practice without risk to mother or baby, but some degree of dissatisfaction by the mother could be expected<sup>2</sup>.

**Project team comment**

See comment in 5.1.1.

- **Reference**

Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gulmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews* 2001(4):CD000934. (Level I)

This systematic review included ten trials involving over 60,000 women. Trials from developed countries suggest that women can be less satisfied with the reduced number of visits and feel that their expectations with care are not fulfilled. Antenatal care provided by a midwife/general practitioner was associated with improved perception of care by women. The authors conclude that good health outcomes can still be achieved with fewer visits, but this might reduce women's satisfaction with their care<sup>3</sup>.

**Project team comment**

See comment in 5.1.1.

- **Reference**

Villar J, Ba'aqeel H, Piaggio G, Lumbiganon P, Miguel Belizan J, Farnot U, et al. WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *Lancet* 2001;357(9268):1551-64. (Level II)

This multicentre randomised controlled trial (RCT) compared the standard model of antenatal care (~14 visits) with a new model that emphasises actions known to be effective in improving maternal or neonatal outcomes (including antenatal education) and has fewer clinic visits. The trial was conducted in antenatal clinics in four developing countries<sup>4</sup>.

This study reported overall high satisfaction among women in both groups.

**Project team comment**

See comment in 5.1.1.

- **Reference**

Hildingsson I, Radestad I, Waldenstrom U. Number of antenatal visits and women's opinion. *Acta Obstetrica et Gynecologica Scandinavica* 2005;84(3):248-54.

This prospective cohort study of 2421 women who completed two questionnaires aimed to explore the factors associated with the number of antenatal visits and women's opinions about these visits. A secondary aim was to study the association between number of visits and satisfaction with antenatal care<sup>17</sup>.

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No association was found between number of visits and maternal satisfaction. 87% of women were satisfied with the number of visits to the midwife, and 11% thought they made too few visits than too many (2%). The majority was satisfied with the number of visits to the doctor (79%), but 13 % said they had too few visits and 4% too many. Depression and "major worries" was associated with more visits than the standard schedule for Sweden<sup>17</sup>.

Very few women were dissatisfied with the number of visits made as well as the antenatal care overall.

### **Project team comment**

Data on number of antenatal visits in this study were based on women's recall at 2 months after the birth, raising the possibility of recall bias.

The standard schedule of care was 14 visits. Two-thirds of the women did not follow the standard visiting schedule, with the majority of women making more visits. This limits the generalisability of the study.

The study did not evaluate women's satisfaction with a reduced schedule of care. Stratification into high and low risk groups was not explicit.

The project team had some concerns regarding the classification by the authors of this study as prospective, as it appears to include women from a similar study reported in 2002 (see below).

### **• Reference**

Hildingsson I, Waldenström U, Radestad I. Women's expectations on antenatal care as assessed in early pregnancy: number of visits, continuity of caregiver and general content. *Acta Obstetrica et Gynecologica Scandinavica* 2002;81(2):118-25.

This Swedish prospective cohort study examined 3061 questionnaires completed by women to explore women's expectations on antenatal care, preferences regarding number of visits and attitudes to continuity of midwife caregiver.

In primiparas a wish for more visits was associated with: maternal age < 25 years, a previous miscarriage and assisted conception. In multiparas a wish for more visits was associated with: previous miscarriage, previous stillbirth and a previous negative birth experience.

A desire for fewer antenatal visits was associated with maternal age >35 years of age and unfortunate timing of pregnancy. Multiparous women with more than 2 children were also more likely to prefer fewer antenatal visits.

One-third of the women wanted more or fewer visits than the standard schedule, and the authors concluded that special attention should be paid to women with a previous stillbirth, miscarriage or a negative birth experience<sup>18</sup>.

### **Project team comment**

Stratification into high and low risk groups was not explicit. The question of satisfaction with a reduced schedule of visits was not directly examined. Nevertheless this study provides important additional evidence surrounding the factors that may influence women's satisfaction with antenatal visit schedule.

### **• Reference**

Walker DS, Day S, Diroff C, Lirette H, McCully L, Mooney-Hescott C, et al. Reduced frequency prenatal visits in midwifery practice: attitudes and use.[see comment]. *Journal of Midwifery & Women's Health* 2002;47(4):269-77.

## Literature Search and Appraisal

This survey of 234 midwives was conducted at the 1999 Annual Meeting of the American College of Nurse-Midwives.

Midwives with a higher proportion of Medicaid patients reported greater satisfaction with the quality of care afforded by the reduced frequency prenatal visit schedules (RFVS). This group of midwives' considered women who followed the schedule was more empowered with better self-care skills. Midwives considered that a reduced frequency schedule might be easier for women using Medicaid to follow if there are barriers, such as transportation child care, or time constraints, in accessing prenatal care<sup>19</sup>.

Only 7.1% of midwives reported use of the reduced frequency schedule for multiparas and 5.5% for primiparas. The authors conclude that although most midwives surveyed were familiar with reduced frequency scheduling, they are not using it<sup>19</sup>.

### **Project team comment**

Although this study is of low level evidence, it raises a cautionary note regarding implementation of reduced care schedules.

#### **• Reference**

Langer A, Villar J, Romero M, Nigenda G, Piaggio G, Kuchaisit C, et al. Are women and providers satisfied with antenatal care? Views on a standard and a simplified evidence-based model of care in four developing countries. *BMC Womens Health* 2002;2(1):7.

This study is a nested cohort questionnaire based trial, located within the WHO RCT on evidence based antenatal care reported above.

1600 women were randomly selected to evaluate their satisfaction with an alternative model of antenatal care involving fewer visits. A further questionnaire was sent to 174 antenatal care providers<sup>20</sup>.

The majority of women in both arms expressed satisfaction with ANC. More women in the intervention arm were satisfied with information on labour, delivery, family planning, pregnancy complications and emergency procedures. More providers in the experimental clinics were worried about visit spacing, but more satisfied with the time spent and information provided. Women under the new ANC model were slightly less satisfied with the number of visits<sup>20</sup>.

The authors concluded that women and providers accepted the new ANC model generally. The safety of fewer visits for women without complications with longer spacing would have to be reinforced, if such a model is to be introduced into routine practice<sup>20</sup>.

### **Project team comment**

This was a high quality study. Methods and analysis were explicit and robust with a 96% response rate to the questionnaire. Women in this study were slightly better off than in the main trial regarding low birth weight (5.8% versus 4.0%), gestation at first visit (16 versus 13 weeks) and previous hospital admissions (1.4 versus 0.8). This may have influenced the level of satisfaction. However, the two arms of the study were equal in demographics.

### **Project team overall conclusion**

Evidence regarding women's satisfaction with care with a reduced schedule of visits is conflicting. In general, satisfaction appears to be reduced, and women in general prefer the traditional number of antenatal visits. However, factors including increased

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number of children and maternal age >35 years and unfortunate timing of pregnancy may result in a wish for fewer antenatal visits. A desire for more visits was associated with depression, previous miscarriage, previous stillbirth, previous negative birth experience and in primiparas maternal age <25 years and assisted conception.

Continuity of care has consistently been identified as an important factor for maternal satisfaction with care.

In the largest study, women and providers accepted the new antenatal care model generally.

### **Recommendation (A-B)**

Women may be less satisfied with antenatal care when a reduced schedule of visits is implemented. However, the majority of women expressed satisfaction with antenatal care.

Particular attention should be paid to women with a previous stillbirth, miscarriage or a negative birth experience.

### **5.3 Is a reduced schedule of visits (<14) as effective in low risk primigravida as in low risk multigravidas in achieving positive perinatal outcomes and satisfaction with care?**

The following studies are the only new studies to report differential outcomes for primiparas and multiparas. There is limited evidence regarding positive perinatal outcomes in primiparas versus multiparas.

#### **• Reference**

Jewell D, Sanders J, Sharp D. The views and anticipated needs of women in early pregnancy. *BJOG: an International Journal of Obstetrics & Gynaecology* 2000;107(10):1237-40.

This nested cohort involved a questionnaire within the context of the Bristol antenatal care study a RCT reported above.

Nulliparous women rated antenatal care higher than multiparous women. However, this was not associated with any difference between the two groups in their stated preference for traditional or flexible care. Furthermore, 47.5% of women reported that they did not have a preference for flexible or traditional care. Primiparas were less likely to express a preference (45%) than multiparas (54%). Of those who did express a preference, 61% would opt for 'traditional' care<sup>21</sup>.

#### **Project team comment**

See comment 5.1.3.

#### **• Reference**

Petrou S, Kupek E, Vause S, Maresh M. Antenatal visits and adverse perinatal outcomes: results from a British population-based study. *European Journal of Obstetrics, Gynecology, & Reproductive Biology* 2003;106(1):40-9.

This population based study retrospectively audited the casenotes of over 20,000 women in the United Kingdom. The study revealed an inverse association between the number of antenatal visits and delivery of a low birth weight infant, infant admission to a special care baby unit and perinatal mortality over the 4-14 antenatal visit range, which dissipated at higher levels of antenatal visits. The study also revealed a significant positive association between the number of antenatal visits and delivery by caesarean section (P<0.01). Similar trends in the probabilities of adverse outcomes were observed for low- and high-risk women within each parous group,

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with the exception of delivery by caesarean section and delivery of a low birth weight infant (no significant difference in the low risk primipara group)<sup>13</sup>.

### **Project team comment**

See comment 5.1.

This study provides evidence that low risk primiparas are not at increased risk of caesarean section and low birth weight infant, with a schedule of reduced visits.

### **• Reference**

Hildingsson I, Waldenstrom U, Radestad I. Women's expectations on antenatal care as assessed in early pregnancy: number of visits, continuity of caregiver and general content. *Acta Obstetrica et Gynecologica Scandinavica* 2002;81(2):118-25.

This Swedish prospective cohort study examined 3061 questionnaires completed by women to explore women's expectations on antenatal care, preferences regarding number of visits and attitudes to continuity of midwife caregiver<sup>18</sup>.

In primiparas a wish for more visits was associated with: maternal age < 25 years, a previous miscarriage and assisted conception. In multiparas a wish for more visits was associated with: previous miscarriage, previous stillbirth and a previous negative birth experience.

A desire for fewer antenatal visits was associated with maternal age >35 years of age and unfortunate timing of pregnancy. Multiparous women with more than 2 children were also more likely to prefer fewer antenatal visits.

One-third of the women wanted more or fewer visits than the standard schedule, and the authors concluded that special attention should be paid to women with a previous stillbirth, miscarriage or a negative birth experience<sup>18</sup>.

### **Project team comment**

See comment 5.2.

## **Project team overall conclusion**

Primiparas were less likely to express a preference than multiparas for the model of antenatal care. Of those who expressed a preference the majority would opt for 'traditional' care. There is limited data comparing perinatal outcomes for primiparas versus multiparas.

### **Recommendation (B)**

Preferences regarding antenatal care schedule should be considered when individualizing antenatal care management.

## **5.4 In low risk women is a reduced schedule of visits (<14) more cost effective than the traditional schedule?**

### **• Reference**

Royal College of Obstetricians and Gynaecologists (RCOG). Evidence based guidelines Antenatal care: routine care for the healthy pregnant woman. 2003. (Level IV) ([http://www.rcog.org.uk/resources/Public/Antenatal\\_Care.pdf](http://www.rcog.org.uk/resources/Public/Antenatal_Care.pdf))

The RCOG comment that "the cost of antenatal appointments is determined by the number of appointments overall, and the type and grade of health care provider. The cost effectiveness of the antenatal appointment schedule is determined by the primary outcomes of the antenatal care (preterm birth, low birth weight babies, maternal or infant mortality, birth complications and intensive care) and also

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secondary outcomes such as maternal and professional satisfaction with the package of care provided<sup>1</sup>.”

“The evidence to date on the optimum number of antenatal appointments is inconclusive. The majority of studies have not focused on the cost effectiveness or cost benefit of the number of antenatal appointments. The World Health Organisation (WHO) Antenatal Care Trial included an assessment of quality of care and economic evaluation. The authors concluded that the provision of routine antenatal care by the new model did not affect maternal and perinatal outcomes and therefore was more cost effective. However, the study setting of the trial was developing countries<sup>1</sup>.”

### • Reference

Carroli G, Villar J, Piaggio G, Khan-Neelofur D, Gulmezoglu M, Mugford M, et al. WHO systematic review of randomised controlled trials of routine antenatal care. *Lancet* 2001;357(9268):1565-70. (Level I)

This review included seven eligible randomised controlled trials. The cost of the new model was equal to or less than that of the traditional model.

The authors conclude that a model with a reduced number of antenatal visits could be introduced into clinical practice without risk to mother or baby, but some degree of dissatisfaction by the mother could be expected. Lower costs can be achieved.

### Project team comment

See comment 5.1.1.

### • Reference

Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gulmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews* 2001(4):CD000934. (Level I)

This systematic review included ten trials involving over 60,000 women. Seven trials evaluated the number of antenatal clinic visits, and three trials evaluated the type of care providers. Most trials were of acceptable quality<sup>3</sup>.

Two trials reported evaluation of cost effectiveness. Cost per pregnancy to women and providers were lower in the reduced antenatal visits model in one trial. The other trial only considered costs to the National Health Services (NHS). This study reported an increase of costs due to a statistically non-significant higher rate of neonatal admissions to special care nursery (SCN) in the reduced number of antenatal visits model as a non-statistically significant increase in mean days of stay<sup>3</sup>.

### Project team comment

An important limitation of one of the included trials was that it was a secondary economic analysis to the trial using cost data from a variety of external sources. Most importantly, costs to women such as travel and childcare – a significant confounder – were not included.

See comment 5.1.1.

### Project team overall conclusion

Evidence regarding cost effectiveness of reduced schedule of visits is conflicting. Cost savings produced by reduced number of visits may be offset by a higher rate of neonatal admissions to SCN.

### Recommendation (A)

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There is limited evidence regarding cost effectiveness of reduced schedule of antenatal visits.

### 6. **6. Conclusions and recommendations**

It is essential that routine antenatal care delivers effective and appropriate screening, preventive, or treatment interventions. Thus, the number of visits should ensure delivery of these interventions in a timely way during pregnancy, without any clinically important increase in the risk of adverse outcomes<sup>2</sup>.

Greer adds a cautionary note that if reduced antenatal visits are adopted for low risk women, a plan must be in place to direct the practitioner to early and prompt referral for departures from the low risk pathway<sup>22</sup>.

#### 6.1 **In low risk pregnant women is a reduced schedule of visits as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes?**

In low risk pregnant women a reduced schedule of antenatal visits appears to be as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes.

In particular, there is no clinical difference when the number of antenatal visits was reduced with respect to preeclampsia, urinary tract infection, post partum anaemia, maternal mortality, antepartum haemorrhage, induction of labour, caesarean section, postpartum haemorrhage, small for gestational age, admission to NICU and low birth weight.

#### **Recommendation (A-B)**

The project team concurs with the RCOG recommendations of:

“A schedule of antenatal appointments should be determined by the function of the appointments. For a woman who is nulliparous with an uncomplicated pregnancy, a schedule of ten appointments should be adequate. For a woman who is parous with an uncomplicated pregnancy, a schedule of seven appointments should be adequate.”

“Early in pregnancy, all women should receive appropriate written information about the likely number, timing and content of antenatal appointments associated with different options of care and be given an opportunity to discuss this schedule with their midwife or doctor.”

“Each antenatal appointment should be structured and have focused content. Longer appointments are needed early in pregnancy to allow comprehensive assessment and discussion. Wherever possible, appointments should incorporate routine test and investigations to minimize inconvenience to women.”

An important caveat in the Australian care setting is that antenatal care must be individualized in particular for groups such as the indigenous community who may be at higher risk of adverse pregnancy outcomes.

#### 6.2 **In low risk women is a reduced schedule of visits as effective as the traditional schedule in terms of women’s satisfaction with care**

Evidence regarding women’s satisfaction with care with a reduced schedule of visits is conflicting. In general, satisfaction appears to be reduced, and women in general prefer the traditional number of antenatal visits. However, factors including increased number of children and maternal age >35 years and unfortunate timing of pregnancy may result in a wish for fewer antenatal visits. A desire for more visits was associated with depression, previous miscarriage, previous stillbirth, previous negative birth experience and in primiparas maternal age <25 years and assisted conception.

## Literature Search and Appraisal

Continuity of care has consistently been identified as an important factor for maternal satisfaction with care.

In the largest study, women and providers accepted the new antenatal care model generally.

### **Recommendation (A-B)**

Women may be less satisfied with antenatal care when a reduced schedule of visits is implemented. However, the majority of women expressed satisfaction with antenatal care.

Particular attention should be paid to women with a previous stillbirth, miscarriage or a negative birth experience.

### **6.3 Is a reduced schedule of visits (<14) as effective in low risk primigravida as in low risk multigravidas in achieving positive perinatal outcomes and satisfaction with care?**

Primiparas were less likely to express a preference than multiparas for the model of antenatal care. Of those who expressed a preference the majority would opt for 'traditional' care. There is limited data comparing perinatal outcomes for primiparas versus multiparas.

### **Recommendation (B)**

Preferences regarding antenatal care schedule should be considered when individualizing antenatal care management.

### **6.4 In low risk women is a reduced schedule of visits (<14) more cost effective than the traditional schedule?**

Evidence regarding cost effectiveness of reduced schedule of visits is conflicting. Cost savings produced by reduced number of visits may be offset by a higher rate of neonatal admissions to SCN.

### **Recommendation (A)**

There is limited evidence regarding cost effectiveness of reduced schedule of antenatal visits.

## Literature Search and Appraisal

### Appendix I

#### Search framework

A structured approach was used to identify an appropriate search strategy for this topic. Using the Patient/Intervention/Compared with/Outcome (PICO) format search terms were listed and entered into the various electronic databases.

- P Low risk pregnant women  
 I Less than 14 scheduled antenatal visits  
 C At least 14 scheduled antenatal visits  
 O Preterm delivery (<37 weeks)  
 Low birth weight  
 Small for gestational age  
 Mean birth weight  
 Mean gestational age at birth  
 \*Perinatal mortality  
 \*Cost effectiveness  
 Variables demonstrating the:
- perceptions of care
  - preeclampsia
  - caesarean section
  - inductions of labour
  - antepartum haemorrhage
  - maternal mortality

\*The CCE could not identify any evidence that directly investigated issues of parity or cost effectiveness.

#### Search findings

Term	Medline	Premedline	CINAHL	EBM
Pregnancy / pregnancy / antenatal / prenatal / prenatal care / antenatal care / prenatal diagnosis + visit / schedule / consultation + outcome / pregnancy outcome / perinatal outcome	42/921	3/20	13/172	0/17
2.2 and 2.3 Pregnancy / pregnancy / antenatal / prenatal / prenatal care / antenatal care / prenatal diagnosis + visit / schedule / consultation + satisfaction / care satisfaction	32/297	0/7	13/110	0/1
2.4 Pregnancy / pregnancy / antenatal / prenatal / prenatal care / antenatal care / prenatal diagnosis + visit / schedule / consultation + cost effectiveness / cost / cost benefit analysis / cost analysis	8/168	1/3	2/54	0/7

#### Cochrane

	Systematic Review	Protocol	DARE
Antenatal* / pregnancy* / prenatal + visit* / schedule	1/306	0/7	5/231

## Literature Search and Appraisal

### Appendix II Results of Initial Search

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**Appendix IV  
Key Citations**

**Levels of Evidence Ratings**

- I** Evidence obtained from a systematic review of all relevant randomised controlled trials.
- II** Evidence obtained from at least one properly-designed randomised controlled trial.
- III-1** Evidence obtained from well-designed pseudorandomised controlled trials (alternate allocation or some other method).
- III-2** Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomised, cohort studies, case-control studies, or interrupted time series with a control group.
- III-3** Evidence obtained from comparative studies with historical control, two or more single arm studies, or interrupted time series without a parallel control group.
- IV** Evidence obtained from case series, either post-test or pretest/post test.

Source: NHMRC (1999)

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## 2.1 In low risk pregnant women is a reduced schedule of visits as effective as the traditional schedule of approximately 14 visits in achieving positive perinatal outcomes?

Study	Ref.	Population	Intervention	Outcomes	Results	Study type	EL
Carroli G, Villar J et al. 2001	2	Cochrane Pregnancy and Childbirth Group of the Cochrane Collaboration search strategy.  7 eligible RCTs.	Lower number of antenatal visits ± goal-oriented components.	Effectiveness in terms of: <ul style="list-style-type: none"> <li>• Clinical outcomes</li> <li>• Perceived satisfaction</li> <li>• Costs.</li> </ul>	<p>There was no clinically differential effect of the reduced number of antenatal visits when the results were pooled for:</p> <ul style="list-style-type: none"> <li>• Preeclampsia (typical odds ratio 0.91 [95% CI 0.66-1.26])</li> <li>• Urinary-tract infection (0.93 [0.79-1.10])</li> <li>• Postpartum anaemia (1.01)</li> <li>• Maternal mortality (0.91 [0.55-1.51])</li> <li>• Low birth weight (1.04 [0.93-1.17]).</li> </ul> <p>The rates of perinatal mortality were similar, although the rarity of the outcome did not allow formal statistical equivalence to be attained.</p> <p>There was some dissatisfaction with care, particularly among women in the new model in more developed countries.</p> <p>The cost of the new model was equal to or less than that of the standard model. An economic analysis on data from the trial by Sikorski and colleagues has been published demonstrating antenatal costs were lower with the new model than with the standard model (UK £224 versus £251) but there were higher costs related to length of stay of babies in the intensive care unit with the new model than with the standard model (£181 versus £126) as a result of a higher rate of neonatal admissions to special care in the new-model group than in the standard- model group.</p>	Systematic review	I
Villar J, Carroli G et al. 2001	3	10 trials involving over 60,000 women were included.	Reduction of the number of antenatal clinic visits.	<ul style="list-style-type: none"> <li>• Maternal and perinatal outcomes</li> <li>• Satisfaction.</li> </ul>	<p>Most trials were of acceptable quality.</p> <p>A schedule of reduced antenatal visits was not associated with an increase in any of the negative maternal and perinatal outcomes reviewed.</p> <p>Women in developed countries can be less satisfied with the reduced number of visits and feel that their expectations with care are not fulfilled.</p> <p>Antenatal care provided by a midwife/general practitioner was associated with improved perception of care by women. Clinical effectiveness of midwife/general practitioner managed care was similar to that of obstetrician/gynaecologist led shared care.</p>	Systematic review	I
Villar J, Ba'aqell	4	World Health Organisation - 53	New model for antenatal visits -	<ul style="list-style-type: none"> <li>• Low birth weight (&lt;2500</li> </ul>	<p>Women attending clinics assigned the new model (n=12568) had a median of five visits compared with eight within the standard model</p>	Multicentre	II

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H et al 2001		clinics in Argentina, Cuba, Saudi Arabia, and Thailand.  1 May 1996 – April 1998	median 5 visits  Standard model of 8 antenatal visits.	g), <ul style="list-style-type: none"> <li>• Preeclampsia / eclampsia,</li> <li>• Severe postpartum anaemia (&lt;90 g/L haemoglobin),</li> <li>• Treated urinary-tract infection.</li> </ul>	(n=11958). <p>More women in the new model than in the standard model were referred to higher levels of care (13.4% vs 7.3%), but rates of hospital admission, diagnosis, and length of stay were similar.</p> <p>The groups had similar rates of:</p> <ul style="list-style-type: none"> <li>• Low birth weight (new model 7.68% vs standard model 7.14%; stratified rate difference 0.96 [95% CI -0.01 to 1.92]),</li> <li>• Postpartum anaemia (7.59% vs 8.67%; 0.32), and</li> <li>• Urinary-tract infection (5.95% vs 7.41%; -0.42 [-1.65 to 0.80]).</li> <li>• Preeclampsia/eclampsia the rate was slightly higher in the new model (1.69% vs 1.38%; 0.21 [-0.25 to 0.67]).</li> </ul> <p>Adjustment by several confounding variables did not modify this pattern. There were negligible differences between groups for several secondary outcomes.</p> <ul style="list-style-type: none"> <li>• Women and providers in both groups were satisfied with the care received.</li> <li>• There was no cost increase, and in some settings the new model decreased cost.</li> </ul> <p>Authors conclude that the provision of routine antenatal care by the new model seems not to affect maternal and perinatal outcomes, and could be introduced without major resistance from women and providers and may reduce cost.</p>	RCT	
Homer CSE, Davis KG et al 2001	10	St George Hospital, Kogarah, Australia.  January 1997 – April 1998  Data analysed for 1089 antenatal women.	Community based antenatal care.	<ul style="list-style-type: none"> <li>• Onset and outcomes of labour</li> <li>• Complications antenatal, intrapartum, postnatal</li> <li>• Antenatal hospitalization</li> <li>• Neonatal mortality and morbidity.</li> </ul>	<ul style="list-style-type: none"> <li>• 550 women community based care group (8.3 antenatal visits) and 539 women in the control group (7.4 antenatal visits).</li> <li>• Caesarean section rate in the community based group was 13.3% (73/550) and 17.8% in the control group (96/539). This significant difference was maintained after controlling for known contributing factors to caesarean section (OR = 0.6, 95% CI 0.4-0.9, P = 0.02).</li> <li>• There were no other significant differences in the events during labour and birth.</li> <li>• 80 babies (14.5%) from the community-based group and 102 (18.9%) from the control group were admitted to the special care nursery, but this difference was not significant (OR 0.75, 95% CI 0.5-1.1, P = 0.12).</li> <li>• 8 neonatal deaths (4 from each group), for an overall perinatal mortality rate of 7.3 per 1000 births.</li> </ul> <p>Authors conclude the provision of community-based continuity of maternity care by midwives and obstetricians resulted in a significantly reduced caesarean section rate. There were no other differences in clinical outcomes.</p>	RCT	II

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Jewell D, Sharp D et al  2000	15  11 primary (midwifery) care centres in Avon, United Kingdom.  January 1996 – February 1997	“Flexible care” - minimum number of antenatal visits and additional agreed visits.	<ul style="list-style-type: none"> <li>• Women’s attitudes to pregnancy and motherhood</li> <li>• Satisfaction</li> <li>• Perception of speed of recognition of antenatal complications.</li> </ul>	<ul style="list-style-type: none"> <li>• No difference was found between the two groups in terms of attitudes to pregnancy and motherhood (mean difference on Maternal Adjustment and Maternal Attitudes scale -0.64, 95% CI -1.39 to 0.11, P = 0.068)</li> <li>• There was no difference in the proportions of women reporting antenatal problems as soon as possible (traditional group 74.5%, flexible group 76.4%, difference -2%, 95% CI -12.1 to 8.2, P = 0.70).</li> <li>• Women receiving traditional care reported higher levels of satisfaction for the care provided by community midwives (P &lt; 0.01).</li> <li>• Women receiving flexible care were more likely to report having a choice over the number and timing of their antenatal visits (P &lt; 0.001), but were also more likely to report that they would like to have been seen more often (P &lt; 0.01).</li> <li>• There was no difference between the groups in rates of obstetric complications.</li> </ul> <p>Authors conclude in this study, encouraging women to adopt a flexible approach to antenatal care resulted in increased dissatisfaction. Successful implementation of such approaches may depend on:</p> <ul style="list-style-type: none"> <li>• More careful selection of women who welcome such an approach</li> <li>• More encouragement to pregnant women to express their own needs, and</li> <li>• Greater feelings of commitment on the part of the care providers.</li> </ul>	RCT	II
Tasnim N, Mahmud G et al.  2005	Pakistan Institute of Medical Sciences, Islamabad, Pakistan.  2004  1290 women low risk at first antenatal visit.	Prenatal visits: <3 visits 3-6 visits ≥ 7 visits (controls).	<ul style="list-style-type: none"> <li>• Peripartum maternal complications</li> <li>• Obstetric interventions</li> <li>• Perinatal outcome.</li> </ul>	<ul style="list-style-type: none"> <li>• The median number of prenatal visits was 4, (range 1-14; lower quartile 2, upper quartile 6).</li> <li>• Women with &lt;3 prenatal visits had significantly higher risk of antenatal complications, low birth weight (&lt;2500 grams), pre-term births, neonatal morbidity, and perinatal mortality (OR: 2.58, 2.66, 6.3, 1.57 and 2.2 respectively). However, they were at equal risk of obstetric interventions and postnatal maternal morbidity.</li> <li>• No significant difference was found between 3-6 visits and ≥7 visits group, except significantly higher risk of preterm deliveries in the former group (OR: 2.84).</li> </ul>	Prospective cohort study	III-2
Tough SC, Vewburn-Cook CV et al.  2003	Alberta, Canada.  May 1999 – August 2000.  987 women aged	Preterm birth <37 weeks’ gestation.	Identify key demographic, lifestyle and medical indicators for preterm births.	<p>Significant risk factors for preterm delivery included:</p> <ul style="list-style-type: none"> <li>• Previous poor pregnancy outcome (odds ratio [OR] 6.4), poor emotional health (OR 1.8)</li> <li>• &gt;3 years or &lt;1 year between pregnancies (OR 1.4 and 1.9, respectively)</li> <li>• Polyhydramnios and oligohydramnios (OR 4.1)</li> </ul>	Case control study	III-2

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		20-34 years.			<ul style="list-style-type: none"> <li>• APH at &gt;20 weeks' gestation (OR 10.4)</li> <li>• Malpresentation (OR 2.9)</li> <li>• Gestational hypertension (OR 2.2)</li> <li>• Gestational hypertension with proteinuria (OR 4.4).</li> <li>• Women who had &lt;10 prenatal visits, regardless of attending prenatal classes, were at highest risk of preterm delivery (OR 6.7).</li> </ul> <p>Authors conclude that in this population of women aged 20 to 34 years, few prenatal visits, poor emotional health prior to pregnancy, and conditions of the current pregnancy were strongly associated with preterm singleton birth.</p>		
Hunt JM, Lumley J 2002	5	Australian public hospitals with >200 births per annum, all Divisions of General Practice  November 1999 – March 2000	Reviewer contact	Variability and evidence base of recommendations in Australian protocols and national policies for 6 aspects of routine antenatal care including number of routine visits.	<p>80 protocols (75%) included a recommendation about the number and timing of visits for routine antenatal care.</p> <ul style="list-style-type: none"> <li>• 63 recommend the “Standard” schedule of antenatal visits as every four weeks until 28 weeks’ gestation, then every two weeks until 36 weeks, then every week until 40 weeks or delivery.</li> <li>• 12 protocols describe fewer visits or a more flexible approach</li> <li>• 5 recommend extra routine visits, all relating to shared-care arrangements.</li> </ul> <p>Australia’s predominant ‘standard’ schedule is a 1929 policy statement from the United Kingdom.</p>	Survey	IV
Waters D, Picone D et al 2004	9			<p>Examine evidence for:</p> <ul style="list-style-type: none"> <li>• Nature and content of antenatal visits</li> <li>• Effectiveness of antenatal care</li> <li>• Persistent practices</li> <li>• Different models of care</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence demonstrates women are satisfied with receiving antenatal care from midwives.</li> <li>• Antenatal visit schedules can be made more flexible.</li> <li>• The literature assisted defining maternity outcome measures but did not provide a strong evidence base for all aspects of antenatal care.</li> </ul>	Review	IV
Petrou S, Kupek E et al 2003		9 representative maternity units in Northern England, and North Wales.  1 August 1994 – 31 July 1995	Review of case notes re: antenatal care and extraction of adverse perinatal outcomes.	Model the probability of adverse outcomes for primiparae and multiparae, and for low- and high-risk women within each parous group	<ul style="list-style-type: none"> <li>• An inverse association between the number of antenatal visits and delivery of a low birth weight infant, infant admission to a special care baby unit and perinatal mortality over the 4-14 antenatal visit range, which dissipated at higher levels of antenatal visits.</li> <li>• In addition there was a significant positive association between the number of antenatal visits and delivery by caesarean section (P&lt;0.01).</li> </ul>	Population based study	IV

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	20,771 women with a singleton pregnancy who delivered a liveborn or stillborn baby.		Number of antenatal visits	<ul style="list-style-type: none"> <li>Similar trends in the probabilities of adverse outcomes were observed for low- and high-risk women within each parous group.</li> </ul> <p>Authors conclude that further experimental research is required to ascertain whether there is a causal relationship between antenatal visiting schedules and adverse perinatal outcomes.</p>		
Petrou S, Kupek, E et al. 2001	9 representative maternity units in Northern England, and North Wales.  1 August 1994 – 31 July 1995  20,771 women with a singleton pregnancy who delivered a liveborn or stillborn baby.	Number of antenatal visits.	<ul style="list-style-type: none"> <li>Effects of clinical factors and non-clinical factors</li> </ul>	<ul style="list-style-type: none"> <li>After controlling for non-clinical factors, primiparous women identified as high risk at booking made 1.0% more visits than primiparous women identified as low risk at booking (<math>p = 0.196</math>).</li> <li>Multiparous women identified as high risk at booking made 3.5% more visits than their low risk counterparts (<math>p &lt; 0.001</math>).</li> <li>High risk-defining criteria during antenatal care led to a 0.3% weekly increase in the number of antenatal visits amongst primiparous women (<math>p &lt; 0.001</math>) and a 0.4% weekly increase in the number of antenatal visits amongst multiparous women (<math>p &lt; 0.001</math>).</li> <li>After all independent variables were controlled for, women who were booked into urban teaching hospitals made 10% fewer antenatal visits than the women who were booked into the urban non-teaching hospitals.</li> <li>Women of Pakistani origin made 9.1% fewer antenatal visits than women of white British origin. Similar results were revealed for women of Indian origin and women from other ethnic groups.</li> <li>Non-smokers made 6.0% more antenatal visits than smokers.</li> <li>The planned pattern of antenatal care, number of carers seen, gestation at first presentation and maternal age also had significant independent impacts on the number of antenatal visits.</li> <li>The study highlights the sizeable impact of non-clinical factors on the antenatal care delivery process and indicates ways in which variations in antenatal care might be reduced.</li> </ul>	Population based study	IV
Gaff Smith M. 2000	Wagga Wagga, Australia.  Indigenous population			<p>Background to the initiation of four projects targeting antenatal care and education:</p> <ul style="list-style-type: none"> <li>Aboriginal women are eight times more likely to die around pregnancy and childbirth than non-Aboriginal women</li> <li>Babies of Aboriginal mothers have a higher percentage of stillbirths and neonatal deaths than non-Aboriginal mothers</li> <li>Perinatal mortality rate for Aboriginal babies is more than twice that for Caucasian babies.</li> <li>Focus on promotion and encouragement of pregnant Indigenous women to access antenatal care, and for women Aboriginal Elders to be involved in determining what type of care is culturally appropriate and acceptable.</li> </ul>	Descriptive paper	IV

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### 2.2 In low risk women is a reduced schedule of visits as effective as the traditional schedule in terms of women's satisfaction with care?

Study	Ref.	Population	Intervention	Outcomes	Results	Study type	EL
Carroli G, Villar J et al.					See 2.1 Evidence table.		I
2001							
Villar J, Carroli G et al					See 2.1 Evidence table.		I
2001							
Villar J, Ba'aqell H et al					See 2.1 Evidence table.		II
2001							
Hildingsson I, Radestad I et al.		Sweden. 1999 – 2000	Two questionnaires.	<ul style="list-style-type: none"> <li>Factors associated with number of antenatal visits</li> <li>Women's own opinions about antenatal visits</li> <li>Satisfaction of antenatal care</li> </ul>	<ul style="list-style-type: none"> <li>~69% of all women booked in antenatal care were recruited.</li> <li>2421 (83%) completed the two questionnaires.</li> <li>~25% followed the standard visiting schedule for a normal pregnancy, 57% made more visits, and 17% fewer visits.</li> <li>The number of visits made was associated with parity, medical diagnosis, depressive symptoms, level of education, and women's preferences in early pregnancy.</li> <li>Women's opinion that they made too few visits was associated with a preference for more visits in early pregnancy, and receiving fewer visits than the standard schedule.</li> <li>Women's opinion that they made too many visits was associated with a previous negative birth experience, a wish for fewer visits, having a medical diagnosis, many children, and major worries.</li> <li>87.6% of women were satisfied with antenatal care overall but less with emotional (76.9%) than with medical (82.3%) aspects.</li> <li>There was no association found between number of visits made and satisfaction, but women's own opinion that they had too few visits was associated with dissatisfaction with medical as well as emotional aspects of care and the opinion that they made too many visits with the emotional aspects of care.</li> </ul>	Prospective cohort study	III-2
2005		Pregnant women who booked with a midwife at one of the 593 participating antenatal clinics.					
Hindlingsson I, Waldenstrom U et al.		Sweden. 1999 – 2000	Questionnaire	<ul style="list-style-type: none"> <li>Expectations on antenatal care</li> <li>Preferred number of visits</li> </ul>	<ul style="list-style-type: none"> <li>3061 women completed the questionnaire</li> <li>Expectations were: <ul style="list-style-type: none"> <li>Checking the baby's health (most important aspect)</li> <li>Checking the mother's health</li> <li>Making the partner feel involved.</li> </ul> </li> <li>70% preferred to follow the standard schedule of antenatal visits</li> </ul>	Prospective cohort study	III-2
2002		Pregnant women who booked with a					

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	midwife at one of the 593 participating antenatal clinics.		<ul style="list-style-type: none"> <li>Attitudes to continuity of midwife care</li> </ul>	<ul style="list-style-type: none"> <li>23% preferred more and 7% fewer visits.</li> <li>In primiparas, age &lt; 25 years, a previous miscarriage and assisted conception were associated with a wish for more visits</li> <li>In multiparas, previous miscarriage, previous stillbirth and a previous negative birth experience.</li> <li>Preference for fewer antenatal visits was associated with age over 35 years and unfortunate timing of pregnancy.</li> <li>Most women (97%) saw continuity of midwife caregiver during pregnancy as important.</li> </ul>		
Langer A, Villar J, et al 2002	World Health Organisation RCT involving 53 clinics in Argentina, Cuba, Saudi Arabia, and Thailand.  1 May 1996 – April 1998  174 providers and 1600 pregnant women	Reduced schedule of antenatal visits	Satisfaction	<ul style="list-style-type: none"> <li>The majority of women in both arms expressed satisfaction with antenatal care.</li> <li>More women in the intervention arm were satisfied with information on labor, delivery, family planning, pregnancy complications and emergency procedures.</li> <li>More providers in the experimental clinics were worried about visit spacing, but more satisfied with the time spent and information provided.</li> </ul> <p>Authors conclude women and providers accepted the new antenatal care model generally. To introduce the model into routine practice, the safety of fewer visits for women without complications with longer spacing would have to be reinforced.</p>	Nest cohort study	III-2
Walker DS, Day S et al. 2002	USA  1999  234 midwives at an Annual Meeting of American College of Nurse-Midwives	Survey	Midwives attitudes to reduced frequency of antenatal visits.	<ul style="list-style-type: none"> <li>72% (n = 170) stated they were familiar with the reduced frequency visit schedule.</li> <li>Of those: <ul style="list-style-type: none"> <li>71% agreed that they could give effective prenatal care by using reduced frequency scheduling</li> <li>17% reported using the reduced frequency scheduling.</li> </ul> </li> <li>Differences in perceptions were found between those familiar versus those unfamiliar with the visit schedule along themes of: <ul style="list-style-type: none"> <li>Quality of care of the RFVS</li> <li>Women's empowerment or self-care with the RFVS</li> <li>Ability to manage practice</li> <li>Patient satisfaction, and</li> <li>Barriers to the use of RFVS.</li> </ul> </li> </ul> <p>Providers' responses to the use of RFVS have been mixed:</p> <ul style="list-style-type: none"> <li>Successful integration of this schedule may require more than knowledge of its safety for low-risk women.</li> <li>Careful selection of women for the schedule</li> <li>Commitment from midwives to tailor prenatal care to the individual women's needs.</li> </ul> <p>Authors recommend further research to evaluate the barriers that</p>	Descriptive correlational study	IV

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prevent midwives from using a reduced frequency visit schedule for the prenatal care of low-risk clients.

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### 2.3 Is a reduced schedule of visits (<14) as effective in low risk primigravida as in low risk multigravidas in achieving positive perinatal outcomes and satisfaction with care?

Study	Ref.	Population	Intervention	Outcomes	Results	Study type	EL
Jewell D, Sanders J. et al. 2000		11 primary (midwifery) care centres in Avon, United Kingdom.  January 1996 – February 1997  593 pregnant women at low risk of obstetric complications	“Flexible care” - minimum number of antenatal visits and additional agreed visits	Comparison between nulliparous and multiparous women views on: <ul style="list-style-type: none"> <li>• Antenatal care</li> <li>• Stated preference for package of care</li> </ul>	<ul style="list-style-type: none"> <li>• No difference in their views of pregnancy as an event entailing risk.</li> <li>• Nulliparous women rated antenatal care higher than multiparous women (P = 0.0001), when measuring women's perceptions of factors which might affect their babies' health</li> <li>• Approximately half of the women expressed no preference, and of those who did 61% would opt for traditional care.</li> <li>• ~20% of the sample welcomed the idea of flexible care.</li> </ul> <p>Authors concluded that data indicates there remains a strong desire among pregnant women to receive a 'traditional' pattern of care, even among those who have previously experienced normal pregnancy. However, there are women who may welcome a change to a more flexible pattern of care.</p>	Nested cohort study	III-2
Petrou S, Kupek E et al. 2003					<i>See 2.1 Evidence table.</i>		IV
Hindlingsson I, Waldenstrom U et al. 2002					<i>See 2.2 Evidence table.</i>		III-2

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### 2.4 In low risk women is a reduced schedule of visits (<14) more cost effective than the traditional schedule?

Study	Ref.	Population	Intervention	Outcomes	Results	Study type	EL
Carroli G, Villar J et al.					See 2.1 Evidence table.		I
2001							
Villar J, Carroli G et al					See 2.1 Evidence table.		I
2001							