Introduction

Antenatal care (ANC), first promoted in the early twentieth century, has prompted constant debate as regards its frequency, content, continuity, quality and effectiveness in reducing maternal and neonatal mortality and morbidity. This debate has intensified over the last two decades, coinciding with the advent of primary health care (PHC) and global concern over safe motherhood [1]. The debate has focused on:

- reducing the number of ANC visits to an effective and efficient minimum;
- ensuring improved continuity of care by the same provider or a smaller group of providers throughout pregnancy and the postpartum period;
- ensuring satisfaction of providers and receivers of the new style of ANC provision;
- clarifying the appropriate policy, decision-making and programmatic implications of adopting and implementing the new ANC protocol.

As a result of the ANC debate, a few randomized controlled trials comparing the new protocol (fewer ANC visits) to the traditional one have been carried out in the United Kingdom (UK) [2,3] and Zimbabwe [4], and on an interregional scale by the World Health Organization [5]. The debate has also aroused the interest and concern of health authorities and scientific circles in re-thinking aspects of ANC and giving greater priority to women’s concerns [6]. The objectives of this paper are:

- To introduce the ANC debate.
- To summarize the results and conclusions of the four selected trials on the frequency, continuity and quality of ANC.
- To review available data on the prevailing ANC patterns in Arab countries.
- To discuss the policy, decision-making, and programme implications of adopting and implementing the new ANC schedule.

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• To disseminate information on the reduced schedule in order to enrich the debate.

Methods

Sources of materials included:

• Reports of two UK studies on ANC and one from Zimbabwe [2-4]
• Two Cochrane reviews [7,8]
• Other relevant research and documents in the last 10 years
• Related local [9,10] and external scientific activities
• Selected data on ANC in Arab countries [11-15].

Results

The British study [2]

The objective of this study was to compare traditional patterns of ANC with a reduced schedule of visits for women with low-risk pregnancies, by means of clinical data, and to assess the psychosocial effectiveness of and maternal and professional satisfaction with the care given. The schedule followed in this study required seven visits for primiparous and six visits for multiparous women. Its key messages were:

• Evaluation of changes in maternity services should include measures of psychosocial, organizational and clinical effectiveness.

• Both the traditional and reduced ANC groups had a similar rate of caesarean section for pregnancy-related hypertension.

• Fewer ANC visits resulted in fewer scans and ANC admissions.

• Fewer ANC visits led to poorer psychosocial outcomes and greater maternal dissatisfaction.

• If the number of ANC visits is reduced, more psychosocial support and assurance of fetal well-being are needed.

The Scottish study [3]

The objective of this study was to compare routine ANC provided by general practitioners and midwives with obstetrician-led care. The conclusion was that routine specialist visits for women at low risk of pregnancy complications offer little or no consumer benefit.

The Harare study [4]

The objective was to evaluate the effectiveness of a reduced goal-oriented ANC programme. Three clinics were to provide 14 visits and four clinics to provide 6 visits per pregnancy. In practice, however, the median number of visits in the traditional schedule was 6 and in the reduced schedule, it was 4. The conclusions on clinical outcomes were similar to those of the UK studies. More goal-oriented visits had no adverse effects on perinatal or maternal mortality, with fewer referrals to a high-risk unit and few preterm births. In both groups the average gestation time at which booking took place was 28 weeks. An expert commentary on the Harare study cautioned that ANC should not be standardized across the globe and research results should not be extrapolated [16]. The commentary also noted that the study showed
that high-quality trials could successfully be conducted in developing countries.

The WHO trial [5]
This is the first large-scale randomized controlled trial to evaluate the impact of an improved and rational programme of care in pregnancy on the health of mothers and their newborns. The new schedule consisted of four visits during pregnancy, the first one early in pregnancy, then subsequent visits at 26, 32 and 36 weeks and a fifth visit at six weeks postpartum. A schedule of tasks to be carried out at each visit was prepared. The study was implemented in four countries: Argentina, Cuba, Saudi Arabia and Thailand. A pilot study and baseline survey were carried out and recruitment started on 1 May 1996. The study has a steering committee and a safety and data-monitoring committee (SDMC). Study materials include a protocol, manual of operations, manual of clinic activities and ANC content survey. Continuous monitoring has been performed. Adverse events such as maternal death, perinatal death or eclampsia have been recorded and ethical and safety issues reviewed. The economics of ANC, and women’s satisfaction with and acceptance of the new protocol, have also been assessed. By October 1998, 24,703 women had been recruited and 87% of the study forms had been received for cleaning of data and interim analysis. The detailed methodology of the WHO trial and its complementary substudies were published in a special supplement of Pediatric and perinatal epidemiology [5] which contains eight scientific papers and two commentaries on the status of ANC in industrialized and developing countries. The final results are awaited.

Cochrane reviews
One review assessed the pattern of routine ANC for low-risk pregnancies [7]. The review concluded that an apparently moderate reduction in visits, with increased emphasis on content, particularly goal-oriented activities, could be implemented without any adverse perinatal outcomes. Most women were satisfied, although some felt that their expectations of ANC were not fulfilled. In the other review, continuity of care was assessed and it was concluded the clinical effectiveness of midwife/general practitioner-managed care was similar to that of obstetrician/gynaecologist-led shared care, with fewer salary costs and enhanced satisfaction of the pregnant women [8].

Situation in Arab countries
Table 1 shows a case–control distribution of risk factors in Dammam city, Saudi Arabia [11]. Table 2 gives patterns of ANC in nine Arab countries [12], while Table 3 gives ANC data for Jordan for 1990 and 1997 [13]. Table 4 (final survey data, November 2000) shows the percentage of pregnant women in the member states of the Gulf Cooperation Council who had five antenatal visits or more [14]. Table 5 shows data from a hospital case–control study conducted in Jeddah [15]. Saudi Arabia in 1992 comparing the ANC attendance of women who experienced perinatal mortality (PNM) with controls (controls were selected as the two successive live births following each PNM case).

Discussion
There is an extensive amount of literature from industrialized and developing coun-
Table 1 Major risk factors in the current pregnancy in referred mothers and controls, Saudi Arabia

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Cases (n = 135)</th>
<th>Controls (n = 135)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Parity 5 or more</td>
<td>38</td>
<td>28.1</td>
<td>36</td>
</tr>
<tr>
<td>Age 35 years or more</td>
<td>17</td>
<td>12.6</td>
<td>12</td>
</tr>
<tr>
<td>Sickle-cell disease</td>
<td>8</td>
<td>5.9</td>
<td>7</td>
</tr>
<tr>
<td>Anaemia</td>
<td>7</td>
<td>5.2</td>
<td>6</td>
</tr>
<tr>
<td>Toxoplasmosis</td>
<td>5</td>
<td>2.7</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>60</td>
<td>44.4</td>
<td>59</td>
</tr>
</tbody>
</table>

Source: [13].

tries on patterns of ANC and its association with perinatal and maternal outcomes. The aim of these studies is to learn from worldwide experience, and where appropriate to replicate it: the UK and the Zimbabwe trials are examples.

National birth surveys of ANC conducted in the UK from the 1940s to 1970s showed that perinatal mortality rates were inversely related to the number of antenatal check-ups [6]. Similar associations have been reported from Africa [17], South America [18], and Asia [19]. The latter results were not, however, classified according to frequency of visits per se, their quality, or the number of visits with optimal effectiveness.

The Saudi study on perinatal mortality [16] unexpectedly showed no relationship between ANC and perinatal mortality. Although caesarean sections were excluded, the results must be considered with caution and cannot be extrapolated, as a more in-depth comparison of cases and controls for the common risk factors is required. Confounding factors cannot be excluded; e.g., extra care following a perinatal mortality event, or inaccessibility or delays in reaching care. It is anticipated that the WHO trial, also conducted in Jeddah, Saudi Arabia, will show that good ANC leads to reduced perinatal mortality [5].

In the 1980s and 1990s the debate focused on the cost-effectiveness of ANC in reducing maternal mortality, a neglected tragedy [1, 20]. Established ANC interventions were revised [21]. Risk assessment was described as ineffective [22] and traditional birth attendant (TBA) training received less support.

Content, frequency, and continuity were questioned by the UK Short report [23] which stated, "while we unhesitatingly accept the often reiterated aim of antenatal care as a means of reducing perinatal and neonatal mortality, what antenatal care consists of and how it works is not clear to us." Fourteen ANC visits per pregnancy have been found to be remarkably unproductive, inconvenient to all concerned and costly to both the health service and the mother, arousing unnecessary anxiety [6]; women sometimes attended solely for socialization. Fewer visits, with more time for pregnant women to feel at ease and ask questions, would thus be an improvement.
Table 2: Antenatal check-ups received by mothers during the 5 years preceding the PAPCHILD surveys in 9 Arab countries

<table>
<thead>
<tr>
<th>Antenatal check-ups</th>
<th>Algeria</th>
<th>Egypt</th>
<th>Lebanon</th>
<th>Libyan Arab Jamahiriya</th>
<th>Mauritania</th>
<th>Sudan</th>
<th>Syrian Arab Republic</th>
<th>Tunisia</th>
<th>Republic of Yemen</th>
<th>Mean ± standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of women having check-up in first trimester</td>
<td>60.6</td>
<td>63.3</td>
<td>83.2</td>
<td>55.2</td>
<td>67.0</td>
<td>43.0</td>
<td>66.3</td>
<td>60.8</td>
<td>48.5</td>
<td>61.4</td>
</tr>
<tr>
<td>Mean no. of check-ups</td>
<td>3.5</td>
<td>4.5</td>
<td>6.8</td>
<td>5.6</td>
<td>2.8</td>
<td>5.1</td>
<td>4.8</td>
<td>4.0</td>
<td>3.6</td>
<td>4.6 ± 3.3</td>
</tr>
<tr>
<td>Mean no. months at first check-up</td>
<td>3.3</td>
<td>3.3</td>
<td>2.3</td>
<td>3.5</td>
<td>3.6</td>
<td>4.1</td>
<td>3.1</td>
<td>3.3</td>
<td>4.3</td>
<td>3.5 ± 2.0</td>
</tr>
<tr>
<td>% of women having no check-up*</td>
<td>58.4</td>
<td>65.8</td>
<td>58.5</td>
<td>79.5</td>
<td>39.6</td>
<td>49.1</td>
<td>74.9</td>
<td>53.1</td>
<td>37.1</td>
<td>59.6 ± 17.2</td>
</tr>
</tbody>
</table>

Source: [14].

*Because there were no problems in the previous pregnancy.
Table 3 Percentage of children born during the 5 years before the PAPCHILD survey whose mothers had antenatal check-ups: Jordan, 1990 and 1997

<table>
<thead>
<tr>
<th>No. of antenatal check-ups</th>
<th>1990</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>19.8</td>
<td>4.1</td>
</tr>
<tr>
<td>1</td>
<td>3.4</td>
<td>2.5</td>
</tr>
<tr>
<td>2–4</td>
<td>9.4</td>
<td>7.0</td>
</tr>
<tr>
<td>4</td>
<td>67.1</td>
<td>86.2</td>
</tr>
<tr>
<td>Not available</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Total%</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Median</td>
<td>7.5</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Source: [15].

ANC was less liked by women; in 62% of consultations the women asked no questions, while in 64% of consultations there was no education, health promotion or explanation. Women’s satisfaction with the reduced ANC schedule has been investigated [28,29]. Exit questionnaires, focus group discussions or mini-surveys are simpler approaches that can be performed using the WHO Safe Motherhood Needs Assessment document [30]. The unwarranted dislike of some pregnant women for the reduced ANC schedule [31] must be averted by appropriate education and psychosocial support. Literacy is the most important determinant of compliance with the set ANC; thus while literate women attended public hospitals, illiterate ones bypassed them to see their TRA 15 kilometres away [32]. Community and home-based care, however, face cultural and logistical problems, although tracing defaulters has been facilitated by improved communication facilities.

Reducing the number of ANC visits means that the quality of the visit must be assured. In 1980 Mellwine in the Short report said [23] wrote that he was amazed that women came for prenatal care at all.
They sat there in clinics for two hours to be seen for two minutes with someone laying his hands on them and then they left. He believed that the fact that they came at all should be investigated. Thus ANC standards and the corresponding indicators should be defined, disseminated, monitored, audited and evaluated. Training in the ANC protocol, supportive supervision and further on-the-job training are prerequisites for success [9]. In the case of poor compliance by healthcare workers, materials must be revised in collaboration with hospital consultants [33].

Female health workers are better providers of ANC and can ensure continuity. The contribution of male workers may be limited by cultural factors or legal implications. However, there is a general shortage of female physicians. Sri Lanka is an exception where 80% of health workers and 50% of physicians are women [34]. Carefully controlled trials have not shown any differences in pregnancy outcome after care by either midwives or physicians [35]. Care for low-risk pregnancies by midwives in midwifery clinics has proved economical and acceptable [36]. General practitioners may be ready to deliver maternity services [37], but midwifery services should also receive due attention.

The importance of organization for the successful implementation of ANC was emphasized in a study from Finland that stressed the need for a division of labour between primary and secondary care [28]; PHC centres may need to be upgraded to provide continuous maternity care. The contribution of optimal ANC organization to the decline in perinatal mortality has been reported from France [38]. In developing countries, adopting the district health system for essential obstetric care will improve ANC accessibility. Other structural standards to be met include appropriate reception and clinic facilities, and support services such as laboratory services. Ultrasound scanning attracts women to early ANC in addition to its other benefits, such as reducing the number of induced births [6]; its usefulness has nevertheless been questioned [39]. The results of the controlled trials cited here revealed no major differences in maternal and baby outcomes as regards the use of ultrasound scans. The association between the frequency of ANC visits and reduced maternal mortality was rarely assessed, especially since maternal mortality is relatively uncommon. The effect of reduced ANC visits on the magnitude of maternal mortality can however be assessed in retrospect, as 24% of maternal deaths occur during pregnancy, 16% during labour and 60% in the postpartum period [40]. A national Saudi maternal mortality study [41] showed that in 61% of 155 maternal deaths, the patient had no ANC. As mortality is the extreme tip of the iceberg, measuring morbidity could be more informative. However, national morbidity data may be inadequate, invalid and unreliable, and therefore are often not used. A more useful assessment of maternal morbidity may come from studying “near-miss” cases [42]. For infants, postneonatal mortality is less closely related to ANC than is neonatal mortality, while perinatal mortality is a better measure of the association between ANC and outcome. It is not however easy to obtain reliable data on perinatal mortality, as mothers and newborns may leave hospital within a few hours of the birth, may not attend postnatal care, and may not be seen until the next pregnancy. Routine reporting is unreliable while surveys are costly and require special expertise.

**Conclusion**

The results of the cited trials provide good scientific evidence that reduced visits do
not have an untoward effect on the outcome of pregnancy, compared to the traditional number of visits. In practice while the frequency of visits is less, the new schedule emphasizes quality of care. Women’s dissatisfaction with reduced visits can be averted by appropriate education and clarification. The economic benefit of reduced visits is being studied and is expected to show cost savings [43] in addition to reductions in time and effort. Competent midwives in midwifery clinics, with or without physicians, can provide economical and acceptable maternity services; midwifery care should therefore be strengthened. Thus, the reduced protocol is recommended for universal adoption and may put an end to the long debate on ANC.

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