DOI: 10.1111/1471-0528.13820
www.bjog.org

Systematic Review

Antenatal care for healthy pregnant women: a mapping of interventions from existing guidelines to inform the development of new WHO guidance on antenatal care

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Accepted 16 October 2015. Published Online 23 December 2015.

Background The World Health Organization (WHO) is in the process of updating antenatal care (ANC) guidelines.

Objectives To map the existing clinical practice guidelines related to routine ANC for healthy women and to summarise all practices considered during routine ANC.

Search strategy A systematic search in four databases for all clinical practice guidelines published after January 2000.

Selection criteria Two researchers independently assessed the list of potentially eligible publications.

Data collection and analysis Information on scope of the guideline, type of practice, associated gestational age, recommendation type and the source of evidence were mapped.

Main results Of 1866 references, we identified 85 guidelines focusing on the ANC period: 15 pertaining to routine ANC and 70 pertaining to specific situations. A total of 135 interventions from routine ANC guidelines were extracted, and categorised as clinical interventions (n = 80), screening/diagnostic procedures (n = 47) and health systems related (n = 8). Screening interventions, (syphilis, anaemia) were the most common practices. Within the 70 specific situation guidelines, 102 recommendations were identified. Overall, for 33 (out of 171) interventions there were conflicting recommendations provided by the different guidelines.

Conclusion Mapping the current guidelines including practices related to routine ANC informed the scoping phase for the WHO guideline for ANC. Our analysis indicates that guideline development processes may lead to different recommendations, due to context, evidence base or assessment of evidence. It would be useful for guideline developers to map and refer to other similar guidelines and, where relevant, explore the discrepancies in recommendations and others.

Keywords Antenatal care, guidelines, pregnancy, routine care, World Health Organization.

Tweetable abstract We identified existing ANC guidelines and mapped scope, practices, recommendations and source of evidence.

Linked article This article is commented on by N van den Broek, p. 558 in this issue. To view this mini commentary visit http://dx.doi.org/10.1111/1471-0528.13937.

Please cite this paper as: Edgardo A, Monica C, Virginia D, Özge T, Metin GA. Antenatal care for healthy pregnant women: a mapping of interventions from existing guidelines to inform the development of new WHO guidance on antenatal care. BJOG 2016;123:519–528.

Introduction

Routine antenatal care (ANC) is defined as the care provided by health practitioners (or others) to all pregnant women to ensure the best health conditions for the women and their fetuses during pregnancy. The basic components of the ANC include risk identification, prevention and management of pregnancy-specific or concomitant diseases, education and health promotion. The goal-oriented approach with reduced number of visits, currently recommended by the World Health Organization (WHO),[1] was incorporated into WHO's Integrated Management of Pregnancy and Childbirth guidelines.[2] However, even though the number and content of antenatal visits have been appraised and summarised in systematic reviews during recent years,[3,4] an evaluation of the evidence is needed[5]

because recommendations may have changed over time in light of new and compelling evidence.[6]

As part of the WHO's normative work on supporting evidence-informed policies and practices, WHO is in the process of updating the ANC guidelines to provide a foundation for the strategic policy and programme development needed to ensure the sustainable implementation of effective interventions. To inform the development of these new guidelines, a mapping review was undertaken to provide an overview of all the interventions offered to healthy pregnant women that have been considered in clinical guidelines between 2000 and 2014.

This review has three aims: (1) to map the existing clinical practice guidelines related to routine ANC for healthy women; (2) to summarise all the procedures and interventions considered and recommended during routine ANC from both guidelines covering ANC in general, and from disease-specific (or procedure-specific) clinical guidelines aimed at the general ANC population; and (3) to assess the consistency of recommendations across the identified guidelines.

Methods

In December 2013, we conducted a systematic search for evidence-based guidelines in the following databases: PubMed, LILACS (the most important and comprehensive index of scientific and technical literature of Latin America and the Caribbean); TRIP (Turning Research into Practice) database,[7] a medical search engine with emphasis on evidence-based medicine and clinical guidelines and queries, and the Guidelines repository maintained by GFMER (Geneva Foundation for Medical Education and Research).[8] To identify as many relevant guidelines as possible, we chose a broad search strategy. In PubMed, we used the words 'pregnancy or prenatal or antenatal' and 'care or management or screening', selecting guideline/practice guideline (for article type), human (for species) and female (for sex) in the advanced search. In LILACS, we combined the words on the category DeCS N04.761.700.350.650 (clinical practice guidelines and all its synonyms in Portuguese, Spanish and English) and 'prenatal or antenatal or pregnancy'. In TRIP, we combined the words 'antenatal or prenatal or pregnancy' and 'clinical or practice' and 'guideline* or guidance* or recommendation* or advice'. Additionally, we checked all the references from the retrieved papers. We limited our search to all clinical practice guidelines published after January 2000.

Two researchers independently assessed the list of potentially eligible citations. Differences were resolved by discussion and consensus or the involvement of a third researcher. We excluded references based on titles and abstracts (when available) if the paper was one of the following: (1) not a guideline (as per the Institute of Medicine definition);[9] (2) related to interventions/procedures not applicable during the ANC period; (3) published before 2000; (4) related to interventions/procedures recommended for the management of a recognised illness during pregnancy such as diabetes or hypertension. The full-texts of the included guidelines were assessed for data extraction.

Two researchers independently extracted the information describing the guideline: title, year and country of publication, scope of the guideline (whether it covers full ANC or only a specific situation such as ultrasound in the first trimester of pregnancy or screening for infections during pregnancy). Each practice within the included guidelines was also described and characterised as follows: type of practice (screening/diagnostic test, clinical intervention or health system intervention), gestational age, whether or not it is recommended and the source of such recommendation. All the information was entered into a predesigned database, based on the categories described above.

Results

The database search for routine ANC guidelines and for guidelines containing interventions that can be offered during the ANC period returned 1866 results. The latter will be referred to as specific situations guidelines. After title and abstract review, 133 were included for full text assessment. Of these, 27 corresponded to potentially eligible ANC guidelines and 106 to potentially eligible specific situations guidelines. After removal of duplicates and ineligible papers, nine full ANC and 70 specific situations guidelines were included in the final database. Reference checking led to three additional ANC guidelines and participants at an ANC expert meeting held in Geneva in April 2014 contributed another three (Figure 1).

Overall, 15 guidelines make recommendations on routine ANC. Three of these were issued by WHO,[10–12] and the rest by governmental or nongovernmental organisations from the USA,[13–15] UK,[16,17] Canada,[18,19] Australia,[20] Hong Kong,[21] India,[22] Japan[23] and Poland.[24] All were published between 2005 and 2012. We also identified 70 specific situations guidelines published between 2002 and 2014. Of these, 91% were from the USA,[25–59] UK[60–76] and Canada.[77–88] The remaining were from Australia,[89] Brazil,[90] Mexico,[91] Poland,[92] Spain[93] and Uruguay.[94]

Routine ANC guidelines and identified interventions

We extracted 135 interventions from routine ANC guidelines, which were categorised as clinical interventions (n = 80), screening/diagnostic procedures (n = 47) and health systems recommendations (n = 8) (Table 1).

Clinical interventions included a wide range of practices. One third (n = 27) were educational, such as advice for

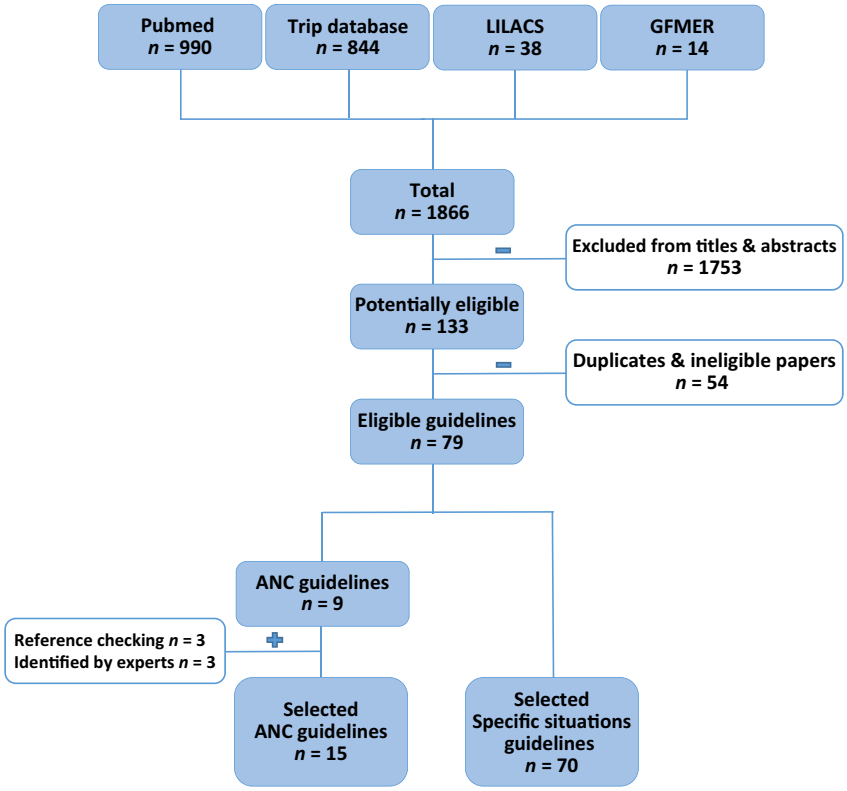

Figure 1. Flow diagram of article selection following literature searches in PubMed, LILACS, TRIP database, the GFMER guidelines repository, references check and contributions from experts. Date of last search April 2014.

Table 1. Types of interventions considered in routine ANC and specific situation guidelines

Routine ANC guidelines (*n* = 135)						
Screening / diagnostic procedures, *n* (%)			**Clinical interventions, *n* (%)**			**Health systems *n* (%)**
47 (35)			**80 (59)**			**8 (6)**
Laboratory	**Clinical**	**US/Mix**	**Educational**	**Prophylaxis**	**Management**	
21 (16)	18 (13)	8 (6)	27 (20)	26 (19)	27 (20)	8 (6)
Specific situation guidelines (*n* = 102)						
Screening / diagnostic procedures, *n* (%)			**Clinical interventions, *n* (%)**			**Health systems *n* (%)**
37 (36)			**60 (59)**			**5 (5)**
Laboratory	**Clinical**	**US/Mix**	**Educational**	**Prophylaxis**	**Management**	
22 (22)	6 (6)	9 (9)	22 (22)	18 (18)	20 (20)	5 (5)

breastfeeding, family planning or illicit drug or alcohol consumption reduction or cessation. Another third (n = 26) were prophylactic interventions recommended during routine ANC, including rhesus D (RhD) immunoprophylaxis, influenza immunisation or routine mineral/vitamin supplementation to prevent specific conditions. The remaining 27 interventions were about the management of conditions such as nausea and vomiting, constipation or commonly detected disorders such as anaemia or vaginal discharge.

Table 2. Interventions considered in routine ANC guidelines and number of guidelines recommending each intervention

Screening / diagnostic procedures	Clinical interventions	Health systems	*n* (%)
STDs (syphilis)			14 (93)
STDs (HIV), anaemia and pre-eclampsia (BP + proteinuria)			13 (87)
Routine ABO, D Rhesus testing	*Supplementation:* folic acid		12 (80)
Weight and BMI, infections (rubella, hepatitis B)	*Advice:* nutrition, exercise and/or rest, smoking cessation		11 (73)
Early ultrasound (first and second trimester), GDM and asymptomatic bacteriuria	*Supplementation:* iron		10 (67)
Auscultation of fetal heart, symphysis-fundal height, Down syndrome	*Advice:* breastfeeding		9 (60)
Abdominal palpation, infections (bacterial vaginosis, *Chlamydia*)	*Advice*: alcohol intake, sexual intercourse, travelling. *Prophylaxis:* RhD		8 (53)
Infections (toxoplasmosis, hepatitis C), domestic violence	*Advice:* work. *Management:* nausea and vomiting		7 (47)
Substance use, for cervical cancer, group B streptococcus	*Supplementation:* vitamin D. *Vaccines:* tetanus		6 (40)
Breast and pelvic examination, preterm labour, postnatal depression	*Advice:* labour and delivery, illicit drug use and medications. *Supplementation:* vitamin A. *Vaccines:* influenza	Frequency of visits	5 (33)
Fetal movement count, pelvimetry, late ultrasound and/or Doppler. tobacco use and exposure, sickle cell and thalassaemia	*Advice:* information on pregnancy and family planning. *Management:* oral health, constipation, breech presentation		4 (27)
History and physical examination, evaluation of oedema. Risk profile, fetal wellbeing and fetal anomalies. Infections (CMV), alcohol abuse and thyroid dysfunction. Antenatal cardiotocography, urinalysis	*Advice:* warning signs, preterm labour, prenatal screening. *Prophylaxis:* anti-malarial drugs. *Supplementation:* calcium. *Management:* vaginal discharge	Care documents Place of delivery Provider of ANC	3 (20)
Infections (parvovirus B19)	*Advice*: course of care, hot tubs and saunas, hair treatments, HIV and other STD, vaginal birth after caesarean. *Prophylaxis:* steroids for women at risk of preterm birth. *Management:* haemorrhoids, varicose veins, backache, vaginal bleeding	First antenatal visit	2 (13)
Infections (candidiasis), psycho-social risk factors	*Advice*: healthy lifestyle, self-care, emotional wellbeing, tattoos in lower back, shaken baby syndrome, cystic fibrosis, warfarin use in pregnancy. *Prophylaxis:* low-dose aspirin, DVT/PTE, MTCH transmission of HIV. *Vaccines:* hepatitis B, rubella, varicella, pertussis, pneumococcus. *Supplementation:* vitamin B6, vitamin C, magnesium, zinc, multivitamins. *Management:* unintended pregnancy, late pregnancy symptoms, fever, swelling, heartburn, frequency of urination, palpitations, breathlessness, fatigability, syphilis, HSV, HBV, parasitosis, anaemia, carpal tunnel syndrome, depression, drug abuse, obesity, post-term pregnancy. Vision Care Follow-up of modifiable risk factors.	Antenatal classes Evaluation of satisfaction Place of ANC visit	1 (7)

BMI, body mass index; BP, blood pressure; CMV, cytomegalovirus; DVT/PTE, deep vein thrombosis/pulmonary thromboembolism; GDM, gestational diabetes mellitus; HBV, hepatitis B virus; HSV, herpes simplex virus; MTCH, mother-to-child; STDs, sexually transmitted diseases.

Regarding screening or diagnostic procedures, almost half (21 out of 47) were about laboratory procedures such as routine ABO, RhD testing or different laboratory tests to screen for diseases like diabetes, anaemia or infections. Eighteen were recommendations for clinical manoeuvres for screening, including symphysis–fundal height measure-

ment, blood pressure measurement or fetal movement count. Most of the recommendations for screening using images were on ultrasound (n = 8) alone or combined with laboratory tests if it was for a specific condition (e.g. screening for aneuploidy).

Recommendations about health systems organisation included indications on who should provide care, the use of incentives for use of ANC or on documentation of care provided during ANC.

Table 2 summarises the individual practices and how often they were considered in routine ANC guidelines. Overall, screening interventions were the most common practices taken into account in these guidelines. They include screening for syphilis, HIV, anaemia (haemoglobin levels) and pre-eclampsia (by measuring blood pressure and proteinuria) and routine ABO, RhD testing. Regarding educational activities, advice on nutrition during pregnancy, exercise and/or rest, tobacco smoking cessation or reduction were frequently considered. Advice on breastfeeding was included in only nine (out of 15) routine ANC guidelines. Folic acid and iron supplementation were the only two clinical interventions recommended in the majority of guidelines (12 and 10, respectively).

Specific situations guidelines and identified interventions

From 70 specific situations guidelines, 22 (31%) were related to infectious diseases. They included recommendations for the screening or management of viral hepatitis, group B streptococcus, syphilis, toxoplasmosis, rubella, herpes simplex virus, bacterial vaginosis, chlamydial infections, cytomegalovirus, HIV, influenza H1N1 virus and asymptomatic bacteriuria during pregnancy. The other 22 guidelines (31%) covered the detection or supervision of maternal conditions such as gestational diabetes mellitus, thrombophilia, mental illness, anaemia, asthma, thyroid disease, or haemoglobinopathies, the management of common conditions like nausea and vomiting during pregnancy, anti-RhD immunoprophylaxis or general recommendations for nutrition, oral health, alcohol intake or exercise in water geared towards the specific condition covered by the guideline. Thirteen guidelines (19%) targeted fetal screening for aneuploidy and/or neural tube defects, fetal growth restriction or preterm birth, prophylactic measures such as antenatal corticosteroids or cervical cerclage to prevent preterm delivery in women at risk and management of twin pregnancies. Seven guidelines (10%) were limited to the use of routine examinations and ultrasound in pregnancy and the remaining six (9%) were oriented to health system organisation for ANC including rural maternity care, preconception health care or ANC under complex social situations (Figure 2).

Overall, we extracted 102 interventions/recommendations from the specific situations guidelines (Table 1). They were also categorised as clinical interventions (n = 60), from which 22 and 18 were educational and prophylactic interventions, respectively, and the remaining 20 were related to the management of clinical conditions. Recommendations for screening or diagnosis included laboratory procedures (n = 22), clinical manoeuvres (n = 6), ultrasound (n = 3) and mixed methods (n = 6). Health systems recommendations (n = 5) included topics such as documentation of care, health insurance coverage or integration of services.

Recommendations extracted from the specific situations guidelines are directly related to the scope of each guideline. Hence, screening for fetal anomalies, screening for Down syndrome, early ultrasound (first and second trimester) and late ultrasound and/or Doppler were the most commonly included interventions under these guidelines.

Consistency of recommendations: agreement between guidelines

From both routine ANC guidelines and specific situations guidelines, we extracted 171 interventions. The fact that an intervention is mentioned in a given guideline does not necessarily mean a recommendation to use that specific practice. For example, vitamin C or magnesium supplementation were considered and not recommended for use in two guidelines.[10,20]

However, there are cases in which we could detect disagreement among different guidelines regarding the

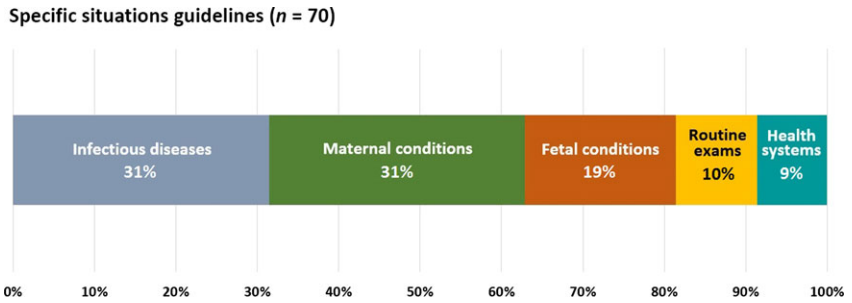

Figure 2. Main scope of the 'specific situation' guidelines (not related to full ANC) containing interventions that can be offered during the ANC period for low risk women.

direction of the recommendation. Hence, for 33 (out of 171) interventions there were conflicting recommendations provided by different guidelines. As an example, routine screening for toxoplasmosis is mentioned in ten guidelines, seven routine ANC and three specific situations (one related to routine examinations during ANC and the other two specifically oriented to toxoplasmosis detection and management). Routine screening is not recommended in six of these guidelines (five ANC, one specific situations) and is recommended in four (two of routine ANC and two specific situations). Guidelines recommending screening for toxoplasmosis were published between 2005 and 2013 and those recommending no screening were published between 2005 and 2011. We have not evaluated the quality of the evidence supporting conflicting recommendations, as making judgements for individual interventions was not the objective of this mapping. Interested readers should refer to the Supplementary material (Table S1), which summarises the inconsistent recommendations across the included guidelines.

Discussion

Main findings

Our review identified a total of 85 guidelines focusing on the ANC period—15 routine ANC and 70 specific situations relevant to the ANC period. As described by others,[95] this overview shows a wide disparity among ANC and specific situations guidelines on both the number and types of interventions proposed for routine ANC. From the 135 interventions identified in routine ANC guidelines, 64 were also considered in other specific situation guidelines, due mainly to the scope of the latter. Seven specific situation guidelines were limited only to ultrasound in pregnancy. On the other hand, we could identify 37 interventions from disease-specific (or procedure-specific) clinical guidelines aimed at the general ANC population, not considered in any of the 15 identified ANC papers, such as screening for thrombophilia or herpes simplex virus, or advice for oral health.

Screening for infectious diseases was the most frequently endorsed intervention among the included ANC guidelines, as well as the majority of the identified specific situations guidelines. Syphilis, HIV, asymptomatic bacteriuria, hepatitis B and rubella were in the top of the list, with strong agreement. Other infections such as toxoplasmosis, group B streptococcus, herpes simplex virus or cytomegalovirus were less consistently considered and sometimes recommendations were in opposite directions, as also reported by Piso et al.[96]

Strengths and limitations

This was an extensive search to inform the development of WHO guidelines. We limited our search to four of the most popular sources of potentially eligible guidelines (PubMed, LILACS, TRIP and the GFMER guideline repository), reference searches and expert panel advice. Citations of guidelines published in medical journals are increasingly searchable through Medline, which has developed a comprehensive search engine for guidelines search[97] and related articles such as impact or economic evaluations of guidelines. LILAC contains nearly 800 000 records including theses, chapters of theses, books, chapters of books, congress and conference proceedings, technical and scientific reports, government publications and articles from more than 900 journals from Latin America and the Caribbean in both Spanish and Portuguese. The TRIP database allows the user to search several electronic evidence resources at once, such as Bandolier, Evidence-Based Medicine, MeReC (UK National Prescribing Centre), Rapid clinical query answer for GPs (formerly ATTRACT), National Library for Health, Primary Care Question-Answering Service, Cochrane Database of Systematic Reviews, Swedish Council on Technology Assessment, Agency for Health Care Research and Quality: Evidence-Based Practice, National Guideline Clearing House (USA), Scottish Intercollegiate Guidelines Network (UK), Royal Colleges, PRODIGY (UK) and textbooks from eMedicine and GPnotebook.[98] However, some local/national guidelines available in other specific sites such as Ministries of Health web pages, other professional associations or the grey literature, not referenced in these databases may have been missed and this is a major limitation of this review. We consider that, despite these limitations, the likelihood that we missed an important intervention or procedure is very unlikely.

We have not assessed the guidelines' methodological rigour and transparency by using tools such as the Agree II[99] or other instruments. Our main interest was to identify the individual interventions considered in these documents so that important or relevant manoeuvres, tests and procedures were not omitted. Our aim was not to guide clinical practice for individual practitioners.

Interpretation

It is worth noting that health promotion (one of the core contents of routine ANC for healthy women) was not consistently addressed in the included guidelines. Advice regarding nutrition during pregnancy, exercise and/or rest and tobacco smoking cessation or reduction was an explicit recommendation in 11 (out of 15) documents, and breastfeeding advice was considered in nine, family planning in four, and prevention of and protection from HIV and other sexually transmitted diseases only in two.

Supplementation with iron and/or folic acid, RhD immunoprophylaxis and management of nausea and vomiting were the only clinical interventions for routine ANC included in more than 50% of the guidelines. Among this

group, those related to vitamin and/or mineral supplementation were the ones with contradictory recommendations. Nearly half of guidelines considering iron, calcium and vitamins A and D recommended for supplementation, whereas the other half recommended against.

The source of such heterogeneity is uncertain and maybe difficult to identify as it may relate to multiple causes. We included guidelines published between 2000 and 2014; newer guidelines may contain more up-to-date evidence. It was stated that, as a rule, guidelines should be reassessed for validity every 3 years.[100] However, in some cases, the references on which the authors based their recommendations (when published) were contemporary, yet from different sources. Although not always explicit, different approaches for appraising and grading the evidence and for making the recommendation, such as the more or less liberal use of expert consensus or the choice of alternative grading systems, may explain such differences.

Setting is another issue to take into account when analysing the frequency with which some interventions were considered in different guidelines. Three (out of 15) ANC guidelines were multinational (WHO), one was from a lower-middle-income country (India) and another from an upper-middle-income country (Poland). The remainder came from high-income countries.[101] As previously stated, 91% of the specific situations guidelines were issued in the USA, UK and Canada, so it is not surprising that screening for fetal anomalies (including genetic testing for Down syndrome) and ultrasound at different timeframes during pregnancy were commonly included. It is possible that guidelines from other countries considered this level of investigation to be out of scope (for a variety of reasons including infrastructure constraints or cultural values). The low representation of low- and middle-income countries in this mapping could be explained by the databases searched, but may also have been a result of the prespecified timeframe limit. It should be noted that clinical practice guidelines from low- and middle-income countries were identified; however, some were excluded because they were published before 2000, and others, especially those from the Commonwealth were excluded because they fully adhered to British guidelines, which were included as part of this analysis.

Conclusion

This overview is not intended to inform clinical practice. By mapping the current guidelines and included practices related to routine ANC, this review informed the scoping phase of the new WHO ANC guideline update process. Guideline development, be it national or international in scope, relies on the synthesis of the existing body of evidence. Our analysis indicates that this process may lead to different recommendations, due to context, evidence base and/or assessment and grading of evidence. Therefore, it would be useful for guideline developers to map and refer to other similar guidelines and, where relevant, explore the discrepancies in their recommendations and those of others.

Disclosure of interests

Full disclosure of interests available to view online as supporting information.

Contribution of authorship

EA, AMG and OT conceived the mapping overview. All authors developed the methodology. VD and MC performed the literature search and prepared the vital registration data. VD, MC and EA considered papers for inclusion and extracted the data. EA, VD, MC and OT drafted the text and tables. All authors reviewed and approved the manuscript.

Details of ethics approval

Not required.

Funding

This review was funded by Grant Number OPP1084319 from the Bill & Melinda Gates Foundation.

Acknowledgements

This paper was written as part of the Adding Content to Contact project, which was made possible by Grant Number OPP1084319 from the Bill & Melinda Gates Foundation, and was a collaboration between the Maternal Health Task Force and 361 Department of Global Health and Population at the Harvard T.H. Chan School of Public Health, HRP/WHO, and ICS Integrare.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Interventions with recommendations in opposite directions among different guidelines. ■

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