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ESSENTIALS Human Immunodeficiency Virus—the global roll-out of antiretro- viral therapy has significantly improved survival for people living with HIV and reduced mother-to-child transmission, but HIV in- fection remains a leading cause of maternal mortality, infant death, and early childhood death. Most women with HIV infection are in sub-Saharan Africa, where the highest prevalence is among young women of reproductive age. Mycobacterium tuberculosis—a major cause of maternal mor- tality. Active tuberculosis also adversely affects pregnancy outcomes, with an increased risk of preterm delivery, growth restriction, and perinatal death. Malaria—a major cause of maternal and neonatal morbidity and mortality. Pregnant women are more susceptible to malaria, have more severe disease, and may deteriorate rapidly. In severe mal- aria, mortality is 15–20% in nonpregnant women, compared to 50% in pregnancy. Primigravidae are at highest risk of severe malaria and death. Introduction This chapter will consider infection with human immunodeficiency virus (HIV), tuberculosis, and malaria in pregnancy. HIV and pregnancy Vertical transmission of HIV In the absence of preventive measures, mother-to-child transmis- sion of HIV occurs in 30–40% of pregnancies in a breastfeeding population: • 10–25% of HIV-positive infants are infected in pregnancy • 30–40% are infected during labour and delivery: this is the period of highest risk • 35–40% are infected during breastfeeding; in resource-poor coun- tries women may breastfeed for up to two years Both antiretroviral therapy to the mother during pregnancy and breast- feeding, and post-exposure prophylaxis to the infant after delivery and during breastfeeding substantially reduce the risk of transmission. HIV counselling and testing During pregnancy, provider-initiated counselling and testing should be available at all maternity services, and all pregnant women offered testing at booking. However, seroconversion during preg- nancy and breastfeeding is high risk for vertical transmission due to the high maternal viral load, and the lack of preventive measures. In countries with effective ‘prevention of mother-to-child transmis- sion’ services, seroconversion in pregnancy contributes significantly to vertical transmission. The World Health Organization (WHO) therefore recommends testing during labour or shortly after de- livery. In countries with high HIV prevalence, for example South Africa, HIV testing is even more extensive: three-monthly during pregnancy, at delivery, and three-monthly during breastfeeding. Management of HIV-positive women during pregnancy Screening, diagnosis, and management

of opportunistic infections Opportunistic infections need prompt diagnosis and treatment in pregnant women. Treatment is the same as for the nonpregnant population. Co-trimoxazole is safe in pregnancy, both for prophy- laxis and treatment. High-dose (5 mg) folic acid should be given if co-trimoxazole is used in the first trimester. Screening for tuberculosis (TB) and cryptococcal disease is an important part of antenatal care. TB is a leading cause of ma- ternal death in countries with high HIV and TB burdens. Symptom screening should be performed at all maternity visits, asking about the presence of cough of any duration, fever, night sweats, or loss of weight. If positive for any symptom, TB investigation is necessary. If CD4 count is less than 200, serum screening for the cryptococcal antigen (CRAG test) should be performed. Antiretroviral treatment for pregnant and breastfeeding women WHO guidelines provide an evidence-based framework for coun- tries to use as a basis for their national guidelines. The WHO 14.15 Maternal infection in pregnancy Rosie Burton

Section 14 Medical disorders in pregnancy 2672 guidelines are discussed here, but it is important that individual country guidelines are also consulted. People living with HIV should be provided with lifelong ART re- gardless of age, pregnancy, CD4 count or WHO stage. Newly diag- nosed pregnant and breastfeeding women, and women previously diagnosed but ART naïve or currently interrupted treatment should be offered same day initiation. It is not necessary to await CD4 count or other baseline investigations (e.g. creatinine). If clinical assessment raises concerns about TB or other opportunistic infec- tions, rapid investigation and management is necessary before ART is started. If HIV is newly diagnosed in labour, and for pregnant women not taking ART for any reason, the first dose should be given before delivery. Initiation of antiretroviral therapy in pregnancy The WHO recommends the same regimen for pregnant women and for nonpregnant adults (Fig. 14.15.1). Counselling and support are essential to optimize adherence and ensure this is maintained during pregnancy, breastfeeding, and beyond. WHO recommends fixed dose combination regimens for first line ART; either tenofovir/lamivudine or emtricitabine/efavirenz (TLE) or tenofovir/lamividine/dolutegravir (TLD). At the time of going to press, dolutegravir is not recommended for women of reproductive age who are not using reliable contraception; this is due to concerns about a possible increased risk of neural tube defects when taken during the first trimester of pregnancy. Women of reproductive age not using reliable contraception should therefore take efavirenz. Because neural tube closure occurs by 8 weeks of gestation, there is no benefit to switching to EFV for women who are already pregnant, however they should be changed after pregnancy if not using reliable contraception. More data are likely to be available in the near future; check the latest WHO guidelines for the most recent update. Viral load monitoring for pregnant women on antiretroviral therapy Virologic suppression prevents vertical transmission. Viral load monitoring in pregnant and breastfeeding women should be per- formed if available, and according to country guidelines. Some Not on ART:
• Newly diagnosed during pregnancy, in labour or while breastfeeding • Previously diagnosed HIV positive but not on ART for any reason Currently taking ART: • Assess adherence • Assess for virological suppression (VL < 1000 copies/ml): check previous viral load results. If results not available or VL testing not performed according to national programme, request targeted viral load.
• If viral load monitoring not available, assess for clinical or immunological failure3. • Same day initiation of ART
• First line regimen: TLE or TLD1, 2 • In labour, give first dose before delivery
• Change to second line ART if first line ART failure is proven (VL monitoring available) or suspected (if clinical or immunological failure)

• See latest WHO guidelines for second line regimens • Continue lifelong ART • Viral load monitoring according to National Guidelines: more frequent viral load monitoring may be possible for pregnant and breastfeeding women
1If tenofovir is contraindicated (creatinine clearance < 50ml/min), substitute with abacavir (ABC) or zidovudine (AZT).
Renal impairment is rare in women of reproductive age without a history of renal disease. Routine creatinine monitoring may not be available in many countries, and for this reason is not routinely recommended by WHO. 2If efavirenz contraindicated (psychosis) substitute with nevirapine if CD4 ≤ 250 cells/mm3, or a protease inhibitor (lopinavir/ritonavir or atazanavir/ritonavir) if CD4 > 250. There is a higher risk of nevirapine hypersensitivity in women if CD4 > 250 cells/mm3. 3Clinical failure: new or recurrent WHO stage 4 condition after 6 months of effective treatment. Immunological failure: CD4 count ≤ 250 cells/mm3 following clinical failure or persistent CD4 count < 100 cells/mm3. Notes: Fig. 14.15.1 Antiretroviral therapy for pregnant and breastfeeding women with HIV. TLE, tenofovir/lamivudine or emtricitabine/efavirenz; TLD, tenofovir/lamividine/dolutegravir.

14.15 Maternal infection in pregnancy 2673 countries recommend more frequent viral load monitoring in preg- nant women. Women who are established on antiretroviral therapy prior to pregnancy should have a viral load measured at booking. Intrapartum care WHO guidelines state there is no HIV-related indication for cae- sarean section, which should be performed only for obstetric or medical indications. However, many resource-rich countries offer elective caesarean section to women with a raised viral load (>1000 copies/ml) close to term. Universal infection control precautions are necessary during labour and delivery, as for all pregnant women. Unnecessary instrumentation should be avoided (e.g. fetal scalp clips, fetal blood sampling, and instrumental delivery). Post-partum management It is important that there is continuity of antiretroviral therapy care and ongoing vigilance for opportunistic infections. The mother should be counselled regarding safe feeding, infant prophylaxis, adherence and viral load monitoring. The essential management steps are shown in Fig. 14.15.2. Safe infant feeding • National policy should promote either exclusive breast feeding1 or formula feeding. • In countries where diarrhoea, pneumonia and malnutrition remain significant causes of child mortality, breastfeeding is recommended. • Maternal virological suppression is critical to prevent vertical transmission throughout breastfeeding High risk infants: any of the above criteria • Zidovudine (AZT) plus Nevirapine for 6 weeks Breastfeeding infants: • Continue prophylaxis for a further 6 weeks; either AZT plus nevirapine or nevirapine alone Early infant diagnosis: • NAT2 at birth if available • NAT2 for all infants at 4–6 weeks • Early initiation of ART if positive
Final Infant diagnosis: • Antibody test at 9 months, PCR if positive • Antibody test at 18 months, and/or 3 months after cessation of all breastfeeding (whichever is the later)
• Early Initiation of ART if positive
Notes: 1Exclusive breastfeeding is recommended for the first 6 months of life, followed by continued breastfeeding with appropriate complementary foods for up to 2 years or beyond. Breastfeeding should stop only once a nutritionally adequate and safe diet without breast milk can be provided. 2NAT: Nucleic Acid Testing. Infant ART prophylaxis Is the infant high risk for HIV transmission? High risk infants are defined on basis of whether the mother is on ART and virologically suppressed: • born to women who have received less than 4 weeks of ART at the time of delivery • born to women with viral load > 1000 copies/ml in the 4 weeks before delivery if viral load available • born to women with incident HIV infection during pregnant or breastfeeding •

women identified HIV positive for the first time during breastfeeding, with or without a negative HIV test antenatally Low risk infants; none of the above criteria • Nevirapine for 6 weeks Fig. 14.15.2 Infant feeding, post-exposure prophylaxis, and HIV testing.

Section 14 Medical disorders in pregnancy 2674 Tuberculosis and pregnancy Risk of TB in pregnancy It is unclear whether there is an increased risk of TB in pregnant women, and whether TB is more severe. Published studies have differed in their findings, but in countries with a high prevalence of HIV infection there is also a high disease burden of TB. HIV is the major factor driving the high incidence of TB in these regions, and both disproportionately affect women of reproductive age. Resource-limited countries have the highest burden of TB. In low burden countries, immigrants from high prevalence countries and intravenous drug abusers are at increased risk of TB. In the United Kingdom, nonpulmonary TB makes up 50% of cases of TB diagnosed in pregnancy. Diagnosis of TB in pregnant women If TB is diagnosed and treatment initiated early in pregnancy, out- comes are good for both mother and infant. However, the diagnosis may be delayed or missed in pregnancy, for instance when pregnant women present with nonspecific symptoms such as tiredness and lethargy that may be mistaken for normal during pregnancy. This is especially so for HIV-positive women. Symptom screening for TB As described earlier, the WHO recommends symptom screening for TB at all antenatal visits in countries with a high TB burden. The presence of any relevant symptom requires sputum investigation for TB, according to country guidelines. In many resource-poor countries a rapid, automated polymerase chain reaction test for the detection of Mycobacterium tuberculosis and rifampicin resist- ance (Xpert MTB/RIF) is now available. Point of care testing for the presence of TB lipoarabinomannan (TB-LAM) in urine enables rapid diagnosis of TB in HIV positive patients with low CD4 counts (CD4 < 100 cells/mm3) or seriously ill; sensitivity is low at higher CD4 counts, and in HIV negative patients. Chest X-ray is indicated if there are abnormal findings on chest auscultation suggesting an additional or alternative diagnosis, such as community acquired pneumonia, Pneumocystis jirovecii pneumonia, or if a pleural ef- fusion is present. This should be done with abdominal shielding to ensure that the radiation exposure risk to the fetus is minimal. TB diagnosis in HIV-positive pregnant women may be challenging (Table 14.15.1). If TB is suspected but not confirmed on investiga- tion, and no other cause is found to explain the clinical presentation, empiric treatment should be considered. Delay in treatment initi- ation in pregnancy results in poor maternal and perinatal outcomes. HIV-positive patients with low CD4 counts may have a rapidly pro- gressive course and high mortality. TB treatment TB treatment is the same in pregnant women as in the nonobstetric population. The WHO first-line regimen for new or recurrent TB consists of two months' treatment with rifampicin, isoniazid, etham- butol, and pyrizinamide; followed by a four-month intensive phase of rifampicin and isoniazid. All of these drugs are considered safe in both pregnancy and breastfeeding. From an infection control per- spective, mothers with drug-sensitive TB can breastfeed. If they have pulmonary TB they should wear a surgical mask to prevent airborne transmission to the infant until they have been on treatment for two weeks, by which time drug-sensitive pulmonary TB is no longer considered transmissible. Drug-resistant TB (DRTB) and pregnancy DRTB is an increasing global problem, detection of which relies on the availability of drug sensitivity testing. Multidrug-resistant TB (MDRTB) is resistance to rifampicin and isoniazid, the most im- portant drugs for treatment of drug-sensitive TB. Extremely drug- resistant TB (XDRTB) is additional resistance to both a quinolone and aminoglycoside, which are the most important drugs for treat- ment of MDRTB. Outcomes for DRTB are generally poor, and there is little experience of DRTB regimens in pregnant women. Expert advice should be sought on both treatment and infection control.

However, the general principle is that the benefits of treatment out- weigh potential risks to the fetus. TB preventive therapy TB infection occurs via inhalation of mycobacterial spores and may remain latent for many years. In immunocompetent people, the risk of reactivation and developing active TB disease is 10–15% over a life- time. In HIV-positive patients the risk is up to 10% per year. Latent tuberculosis infection can be diagnosed by Mantoux tu- berculin skin testing; interferon-γ-release assays are a more expen- sive alternative. Active TB can be prevented by identifying people with latent tuberculosis infection and treating them with preventive therapy. Isoniazid is most commonly used (isoniazid preventive therapy) and is given together with pyridoxine to prevent periph- eral neuropathy. Active TB must be excluded by symptom screening prior to treatment initiation. Isoniazid preventive therapy should be offered to all HIV-positive pregnant women who have no symptoms of TB and no contra- indications to treatment (liver disease, alcohol excess, peripheral neuropathy). While antiretroviral therapy reduces the risk of TB, isoniazid preventive therapy has been shown to have an additive ef- fect. It is most effective in those with positive tuberculin skin testing, which should be done prior to starting isoniazid preventive therapy if available. If not, all HIV-positive pregnant women in whom TB has been excluded should be started on isoniazid preventive therapy for at least six months. Case reports have suggested that women starting isoniazid preventive therapy in pregnancy may be at in- creased risk of hepatotoxicity, but definitive evidence is lacking, and routine monitoring of liver function tests is not required. There is no published evidence from clinical trials to show when isoniazid pre- ventive therapy should be started in HIV-positive pregnant women, Table 14.15.1 Tuberculosis diagnosis in HIV-positive patients Pulmonary TB is more difficult to diagnose: • Sputum microscopy is more frequently negative • Xpert MTB/RIF has a lower sensitivity • Chest X-ray may be normal Extrapulmonary TB is more frequent. Common manifestations include: • TB meningitis • Cervical lymphadenitis • Pleural effusion • Pericardial effusion • Abdominal TB with ascites and lymphadenopathy Samples from these sites are helpful in TB diagnosis; for example, CSF, fine needle aspirates from lymph nodes, pleural aspirates TB, tuberculosis; MTB/RIF, Mycobacterium tuberculosis/resistance to rifampicin; CSF, cerebrospinal fluid.

 both in relation to initiation of antiretroviral therapy and gestation; country guidelines should be followed. Malaria and pregnancy Plasmodium falciparum is the major cause of severe malaria and will be discussed here. Pathogenesis of placental malaria Malaria-infected erythrocytes have malarial antigens on the surface (variant surface antigens), which bind to specific receptors. In nonpregnant patients, these antigens bind to two common recep- tors, CD36 and ICAM-1, on endothelial cells, causing sequestration of infected erythrocytes in the microvasculature, causing organ dys- function. In pregnant women, a specific subset of variant surface antigens is expressed, which adhere to chondroitin sulphate A in the intervillous space of the placenta, resulting in placental sequestration of infected erythrocytes. Women in areas of high transmission with pre-existing immunity do not have immunity to pregnancy-specific variant surface antigens with their first pregnancy. Antibodies to the pregnancy-specific variant surface antigens are not found in men, in- crease with parity, and are associated with good pregnancy outcomes. Severe malaria in pregnancy: Who is most at risk? Severe malaria occurs in three groups of pregnant women: • Pregnant women living in areas of low and unstable malaria transmission • Pregnant women from nonendemic areas who travel to malaria areas • Pregnant women originally from countries with high malaria trans- mission now residing in nonendemic countries and returning home to visit friends and relatives; immunity is lost over time In women living in areas of moderate or high transmission, pla- cental malaria is common;

however, most infections are asymp- tomatic. Severe anaemia is the most common symptom and is more common in primigravidae. Fetal growth restriction is also common. Clinical presentation of malaria There are no specific symptoms or signs of malaria. The differential diagnosis is wide, including infectious diseases, medical problems, and pregnancy-related causes. In the early stages it may present as a flu-like illness. Jaundice, respiratory, or gastrointestinal symp- toms may be the presenting complaint. Failure to diagnose malaria is one of the common errors resulting in mortality. Symptoms and signs of malaria are shown in Table 14.15.2. A high clinical sus- picion is essential. In nonendemic areas, a travel history must be taken for all pregnant women presenting with fever or other com- patible symptoms or signs. Malaria may still occur despite taking chemoprophylaxis. Definitions Severe malaria is acute malaria with major signs of severity or vital organ dysfunction (Table 14.15.3). It can occur without high parasit- aemia due to sequestration of infected erythrocytes. Uncomplicated malaria is symptomatic parasitaemia with no signs of severity or evi- dence of vital organ dysfunction. However, these criteria are a guide, and healthcare workers should have a low threshold for intravenous treatment even if they are not met or laboratory results are awaited. Diagnosis of malaria Two diagnostic tests are commonly available: • Microscopy of thick and thin blood films—this is the gold standard test for peripheral blood. It allows identification of the malaria species and estimation of the degree of parasitaemia. Response to treatment can be monitored by repeated daily blood films. In a febrile patient, the presence of three negative malaria films 12–24 hours apart rules out the diagnosis of malaria. • Rapid detection tests—these identify circulating malaria antigens. They have lower sensitivity than malaria blood films and cannot determine parasitaemia. However, they are simple to perform and do not require a laboratory. They stay positive for around four weeks after clearance of parasites and cannot be used to monitor response to treatment. In pregnant women, placental histology is the gold standard for diagnosis of malaria. Parasitaemia in peripheral blood may be very low in pregnant women from malaria-endemic areas, with parasites sequestered in the placenta. The peripheral blood film may be nega- tive, and unexplained severe anaemia the only marker of malaria. Obstetric complications There are two processes contributing to adverse obstetric outcomes. First, the effect of a severe febrile illness in pregnancy, which con- tributes to maternal and fetal mortality, miscarriage, stillbirth, and Table 14.15.2 Clinical presentation of malaria Symptoms Signs • Fever • Chills, sweats • General malaise • Headache • Muscle pain • Nausea, vomiting, diarrhoea • Cough, dyspnoea • General malaise • Pyrexia • Sweating • Pallor • Jaundice • Respiratory distress • Splenomegaly Table 14.15.3 Clinical and laboratory features of severe malaria Clinical features • Impaired consciousness: Glasgow coma score less than 11 • Prostration: generalized weakness, unable to sit, stand, or walk without assistance • Multiple convulsions: more than two episodes within 24 hours • Respiratory distress: (acidotic breathing or respiratory rate >30 breaths/min) • Hypotension (systolic BP <80 mm Hg) • Jaundice • Abnormal bleeding Laboratory features • Hypoglycaemia: (<2.2 mmol/litre or <40 mg/dl) • Pulmonary oedema: radiological diagnosis • Metabolic acidosis: plasma bicarbonate less than 15 mmol/litre • Hyperlactataemia: lactate more than 5 mmol/l • Acute kidney injury: serum creatinine more than 265 µmol/l or blood urea more than 20 mmol/l • Severe anaemia: haemoglobin less than 7 g/dl, or packed cell volume less than 20% • Jaundice: bilirubin more than 50 µmol/l (3 mg/dl) • Hyperparasitaemia: more than 4% parasitaemia

 premature labour. Secondly, the effects of placental parasitaemia: this causes fetal growth restriction, maternal and fetal anaemia. Management of malaria in pregnancy Malaria in pregnancy is a medical and obstetric emergency.

All pregnant women with symptomatic malaria should be admitted to hospital, and those with severe malaria to an intensive care unit. Table 14.15.4 shows recommended treatments for malaria. Intravenous artensunate is the treatment of choice for severe malaria in all trimesters of pregnancy. Treatment should be initiated immediately on diagnosis: delay increases mortality. If artesunate is not available, intravenous quinine should be used, with an ini- tial loading dose to ensure therapeutic levels are reached as soon as possible, although WHO guidelines no longer recommend intra- venous quinine for severe malaria in adults, which causes severe hypoglycaemia secondary to hyperinsulinaemia. Prolonged and profound hypoglycaemia is a severe complication of malaria in pregnancy, hence intravenous quinine is particularly hazardous in pregnant women. • Plasmodium vivax can occasionally cause severe malaria. This is treated as for severe Plasmodium falciparum malaria, with the addition of a 14-day course of primaquine to eradicate the hypnozoite (liver) stage and prevent relapse. • Primaquine is contraindicated during pregnancy and breast-feeding. Weekly chloroquine should be given until pregnancy and breastfeeding are completed to prevent relapse; the course of primaquine should then be given. Complications of malaria should be treated aggressively. In par- ticular, fluid balance can be challenging, with fluid overload re-sulting in refractory pulmonary oedema due to capillary leak, which has an 80% mortality. Obstetric complications may also need specific management. Saving the mother’s life is the priority, and prompt antimalarial treatment will improve the outcome for the fetus. If spontaneous labour does not occur, there is no indication for delivery during the acute stages of malaria. Preventing malaria in pregnancy In regions of moderate and high transmission in Africa, the WHO recommends the use of insecticide treated bed nets and inter- mittent preventive treatment with sulfadoxine-pyrimethamine to prevent malaria in pregnancy. This reduces maternal and pla- cental parasitaemia, maternal and fetal anaemia, low birth weight. and neonatal deaths. It should be given to all pregnant women in endemic regions, starting in the second trimester, with at least three doses at least one month apart in total. Sulfadoxine-pyri- methamine should not be given to HIV-positive women taking co-trimoxazole prophylaxis due to shared mechanisms of action and an increased risk of adverse drug reactions. Co-trimoxazole prophylaxis also prevents malaria, in addition to preventing HIV- related opportunistic infections. Pregnant women residing in nonendemic regions should be advised to avoid travel to malaria areas. Malaria prophylaxis is not 100% effective, hence there is a risk of severe malaria even with complete adherence. There is limited experience of drugs for prophylaxis in pregnant women. Should travel be essential, mefloquine is the recommended drug in second and third tri- mesters; it can be used in the first trimester if travel to an area of high falciparum transmission cannot be avoided or postponed. Malaria in HIV-positive pregnant women Many countries with high transmission of malaria also have a high HIV prevalence. HIV-positive women have a lower level of acquired immunity to malaria and are at higher risk of symp- tomatic malaria, irrespective of parity. There is an increased risk Table 14.15.4 Treatment of severe (A) and uncomplicated (B) malaria in pregnancy, and when breastfeeding (C) A—Severe malaria All trimesters, Preferred treatment • Intravenous or intramuscular artesunate
2.4 mg/kg at 0, 12, 24 hours, and daily thereafter • Treat for at least 24 hours, or until able to tolerate oral medication • Complete treatment with 3 days of artemisinin- based combined therapy (ACT) If artesunate is not available • Intramuscular artemether • 3.2 mg/kg as loading dose, followed by 1.6 mg/kg daily until able to tolerate oral medication • Complete treatment with three days of artemisinin-based combined therapy (ACT) If both artesunate and artemether are unavailable Intravenous quinine plus clindamycin • IV quinine: loading dose of 20 mg/kg in 5% dextrose over 4 hours, then 10 mg/kg over hours every 8 hours. Maximum dose of quinine 1.4 g •

IV clindamycin 450 mg every 8 hours When able to take oral medication: • Oral quinine 600 mg three times daily to complete 5–7 days, plus oral clindamycin 450 mg three times daily to complete 7 days B—Uncomplicated malaria First trimester • Either artemether + lumefantrine (AL) for 3 days, or oral quinine and clindamycin for 7 days • WHO recommendations to avoid ACTs in the first trimester were updated in 2015, following updated evidence showing no increase in the risk of miscarriage, stillbirths, or major congenital malformations compared to quinine. Most of the evidence relates to AL, therefore this should be the preferred ACT.a Second and third trimesters Use one of the recommended ACTs for 3 days: • Artemether + lumefantrine • Artesunate + amodiaquine • Artesunate + mefloquine • Dihydroartemisinin + piperaquine • Artesunate + sulfadoxine +pyrimethamine C—Breastfeeding Safe • Artemisinin-based combination therapy • Quinine Contraindicated • Doxycycline Complicated malaria • As for treatment of complicated malaria during pregnancy Uncomplicated malaria • Artemisinin-based combination therapy • Quinine plus clindamycin is an alternative a WHO Evidence Review Group. Malaria in pregnancy. Malaria Policy Advisory Committee Meeting. September 2015. Available at: http://www.who.int/malaria/mpac/ mpac-sept2015-erg-mip-report.pdf. Last accessed 30 July 2017.

14.15 Maternal infection in pregnancy 2677 of severe anaemia, growth restriction, preterm labour, and low birth weight infants. In areas of low or unstable transmission, HIV-infected pregnant women have an increased risk of severe malaria and death. FURTHER READING HIV and pregnancy World Health Organization (WHO) (2016). Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach. http://www.who.int/hiv/pub/arv/arv-2016/en/ World Health Organization (WHO) (2016). Guideline: updates on HIV and infant feeding. The duration of breastfeeding, and support from health services to improve feeding practices among mothers living with HIV. http://www.who.int/maternal_child_adolescent/documents/ hiv-infant-feeding-2016/en/ World Health Organization (WHO) (2018). Interim guidance: update on antiretroviral regimens for treating and preventing HIV infection and update on early infant diagnosis of HIV. http://www.who.int/hiv/pub/guidelines/ARV2018update/en/ Tuberculosis and pregnancy World Health Organization (WHO) (2010). Guidelines for the Treatment of Tuberculosis, 4th edition. World Health Organization, Geneva. http://www.who.int/tb/publications/2010/9789241547833/en/ World Health Organization (WHO) (2015). Guidelines on the Management of Latent TB Infection. World Health Organization, Geneva. http://www.who.int/entity/tb/publications/latent-tuber- culosis-infection/en/ Malaria and pregnancy Royal College of Obstetricians and Gynaecologists (RCOG) (2010). Malaria in Pregnancy, Diagnosis and Treatment (Green-top Guideline No. 54B). Royal College of Obstetricians and Gynaecologists, London. https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg54b/ World Health Organization (WHO) (2013). Management of Severe Malaria: a Practical Handbook, 3rd edition. World Health Organization, Geneva. http://www.who.int/entity/malaria/publica- tions/atoz/9789241548526/en/ World Health Organization (WHO) (2015). Guidelines for the Treatment of Malaria, 3rd edition. World Health Organization, Geneva. https://www.who.int/entity/malaria/publications/atoz/ 9789241549127/en/

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