Management of Perinatal Infectio

Management of Perinatal Infections

AUSTRALASIAN SOCIETY FOR INFECTIOUS DISEASES 2022

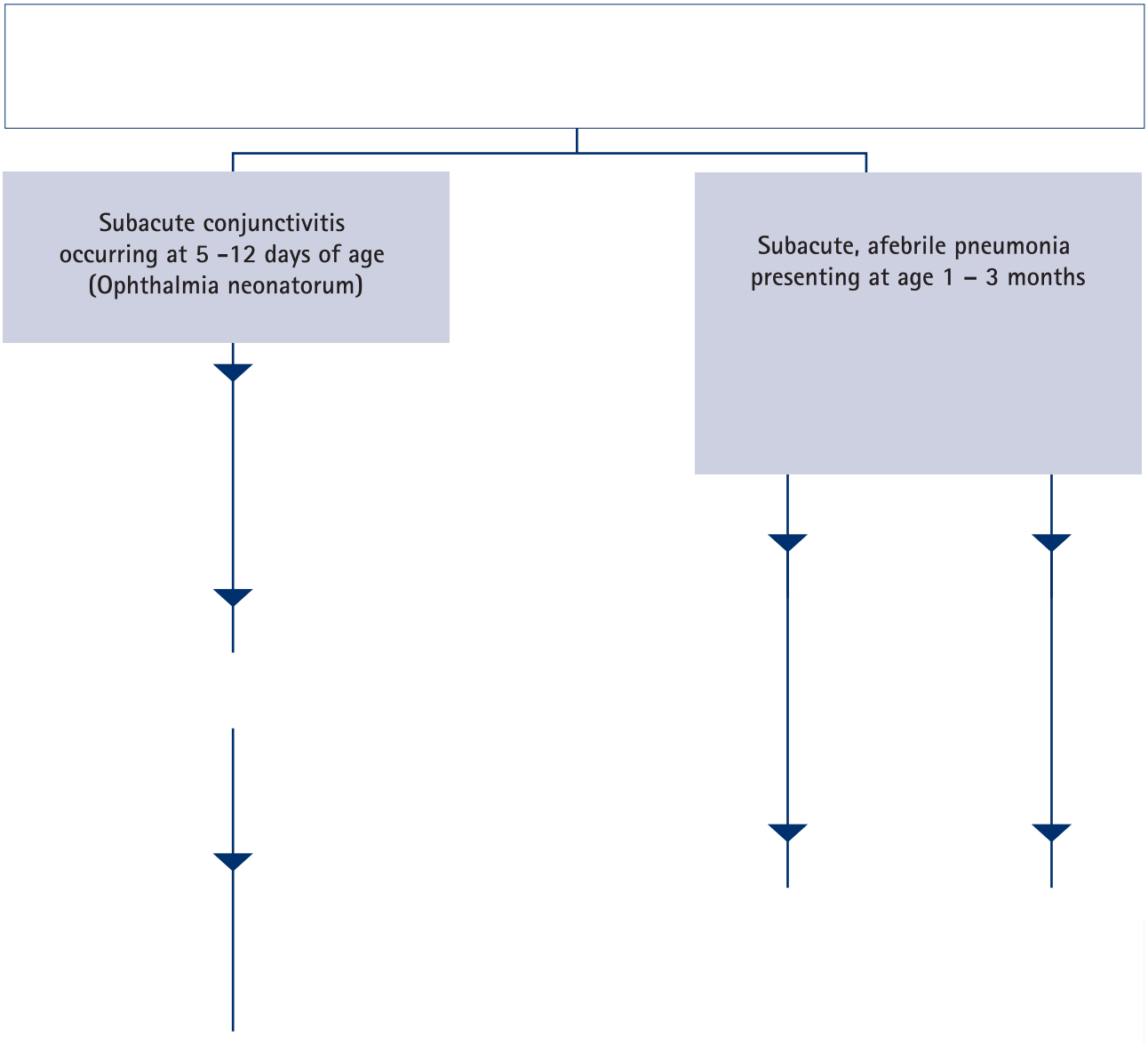
MANAGEMENT OF PERINATAL INFECTIONS

Chla

CHLAMYDIA – ALGORITHM 2

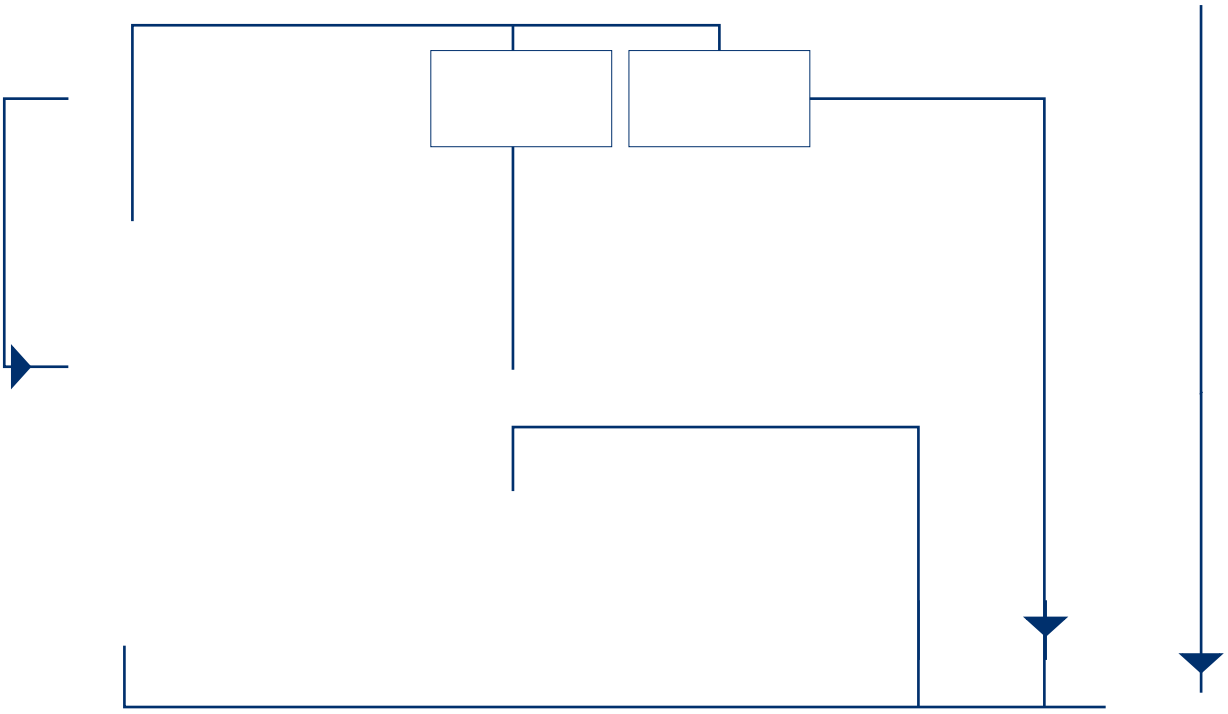
MANA EMENT F A NE NATE EXP SED T C AMYDIA TRAC MATIS INFECTI N

- Infants born to mothers with untreated *C.*



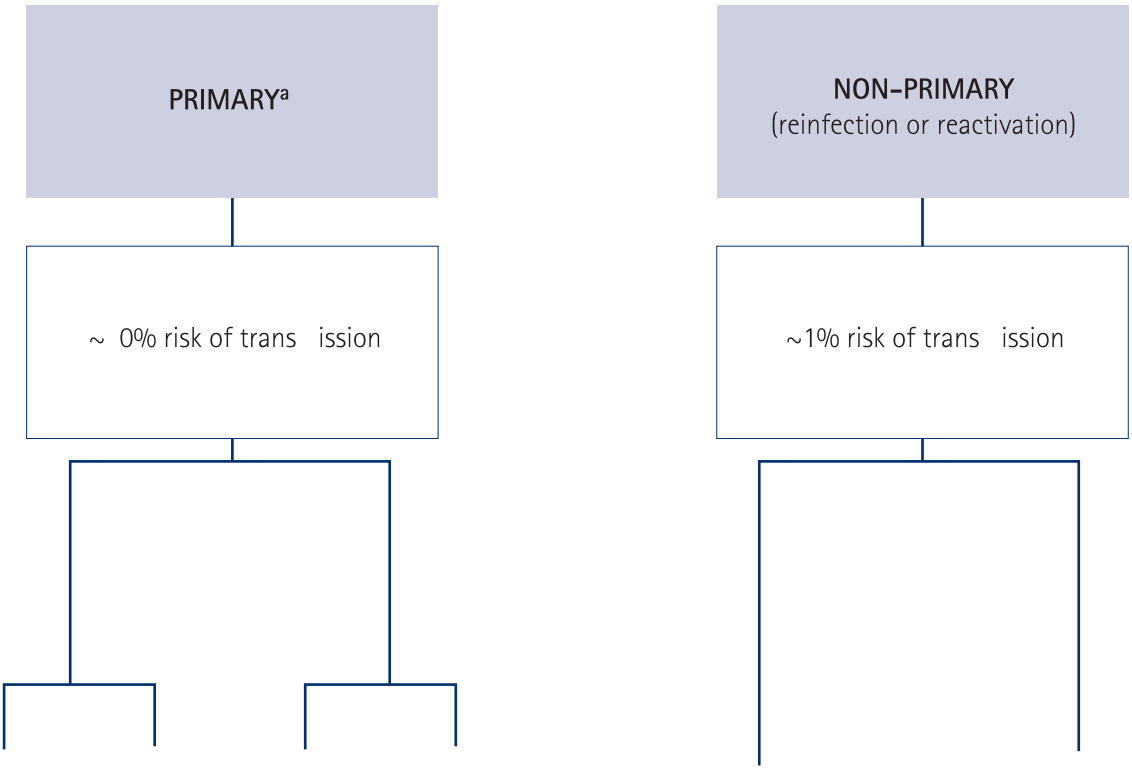
CHLAMYDIA TRACH MATIS APPENDIX AND RE ERENCES

1. RANZCOG. Routine antenatal assess ent in the absence of pregnancy co plications (C-Obs 3b). 2022. https://ranzcog.edu.au/wp-content/uploads/2022/05/Routine-antenatal-assess ent-in-the-absence-of-pregnancy-co plications.pdf
2. https://sti.guidelines.org.au/sexually-trans issible-infections/chla ydia/
3. https://sti.guidelines.org.nz/infections/gonorrhoea/
4. https://kirby.unsw.edu.au/report/asr2018
5. https://www.esr.cri.nz/our-services/consultancy/public-health/sti/
6. Hoover KW, Tao G, Nye MB



CYTOMEGALOVIRUS – ALGORITHM 3

RIS ESTIMATES F FETA TRANSMISSI N

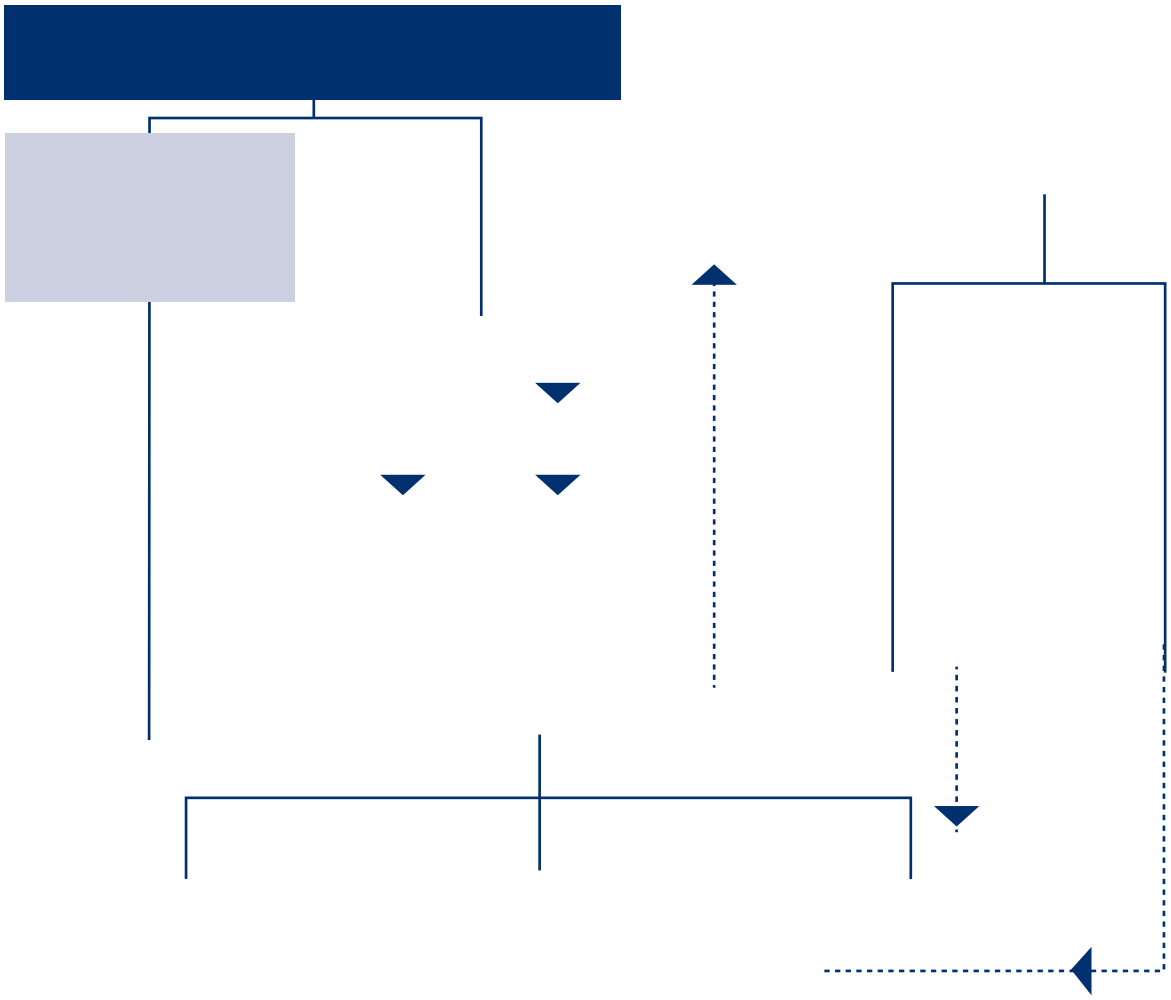


COMMENTS

a. Pri ary MV

CYTOMEGALOVIRUS – ALGORITHM 4

NE NATA DIAGN SIS AND MANAGEMENT[1,35]



CYT ME AL VIRUS RE ERENCES

R f r nc s

1. Rawlinson WD, Boppana SB, Fowler KB, et al. Congenital cyto egalovirus infection in pregnancy and the neonate: consensus reco endations for prevention, diagnosis, and therapy. The Lancet Infectious Diseases 2017; 17(6): e177-e88.
2. Dollard SC, Grosse SD, Ross DS. New esti ates of the prevalence of neurological and sensory sequelae and ortality associated with congenital cyto egalovirus infection. Reviews in Medical Virology 2007; 17(5): 355-63.
3. Kenneson A, Cannon MJ. Review and eta-analysis of the epide iology of congenital cyto egalovirus (CMV) infection. Rev Med Virol 2007; 17(4): 253-76.

4 d asu f B i p f d h K h h h B c p u C v - M

Entero

ENTER VIRUS AND PARECH VIRUS – PERINATAL IN ECTI N

Enteroviral infections generally cause insignificant illness, and perinatal trans ission of enteroviruses leading to significant sy pto atic disease in infants is rare. There are case reports of stillbirth related to aternal and/or fetal infection with coxsackieviruses, echoviruses, and enterovirus 71.

Cases of congenital ano alies such as urogenital ano alies, gastrointestinal tract ano alies, cardiovascular defects and pul onary hypoplasia have also been described after aternal and/or fetal infection with e

N onatal inf ctions

nt rovirus

- Wide spectru of clinical presentations, fro non-specific febrile illness to fatal ultisyste disease
- Fever, irritability, poor feeding, lethargy
- Maculopapular rash in 50%
- Respiratory sy pto s in 50%
- Gastrointestinal sy pto s in 20%
- Hepatitis in 50%
- Myocarditis, eningoencephalitis

HP V

- Often asy pto atic or ild sy pto s including gastroenteritis or in uenza-like illness.
- Fever, irritability +/- diffuse rash (described as "red, hot and angry" babies)
- Meningoencephalitis
- Sepsis-like presentation (incl. septic shock)
- Signs of surgical abdo en (unco on)
- Adverse neurodevelop ental outco es seen in 15-20%

Diagnosis

- Tissue culture is slow and requires expertise; it is now rarely used
- Serology is insensitive
- RT-PCR - rapid, sensitive and specific – separate assays are available for enterovirus and parechovirus
- Isolation fro stool is highly sensitive but not specific as virus is shed in stool for several weeks
- Detection in blood, CSF and tissue is ost reliable as follows:
  - Diagnosis in pregnancy - blood, a niotic uid, stool
  - Diagnosis in neonate - blood, CSF +/- stool
- Genotyping is possible by PCR sequencing of structural protein genes
- CSF pleocytosis and elevated CSF protein appear to occur ore co only in enterovirus infection than parechovirus infection

Tr atm nt in n onat s

- Although there is evidence for safety and possible efficacy of two antiviral agents, pleconaril and pocapavir, neither are currently available
- IVIG ay be of benefit – one s all RCT showed subtle clinical benefits and faster resolution of virae ia[1]

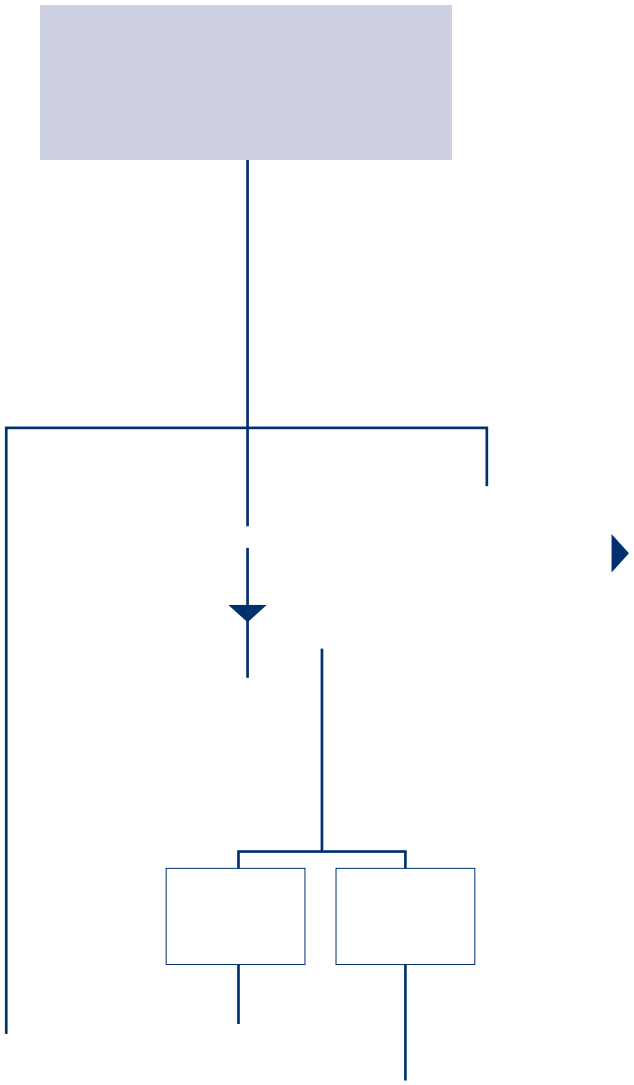
Pr v ntion

- Nursery epide ics have been described
- Handwashing/infection control contact precautions
- Prophylactic IVIG ay reduce disease severity in so e exposed neonates

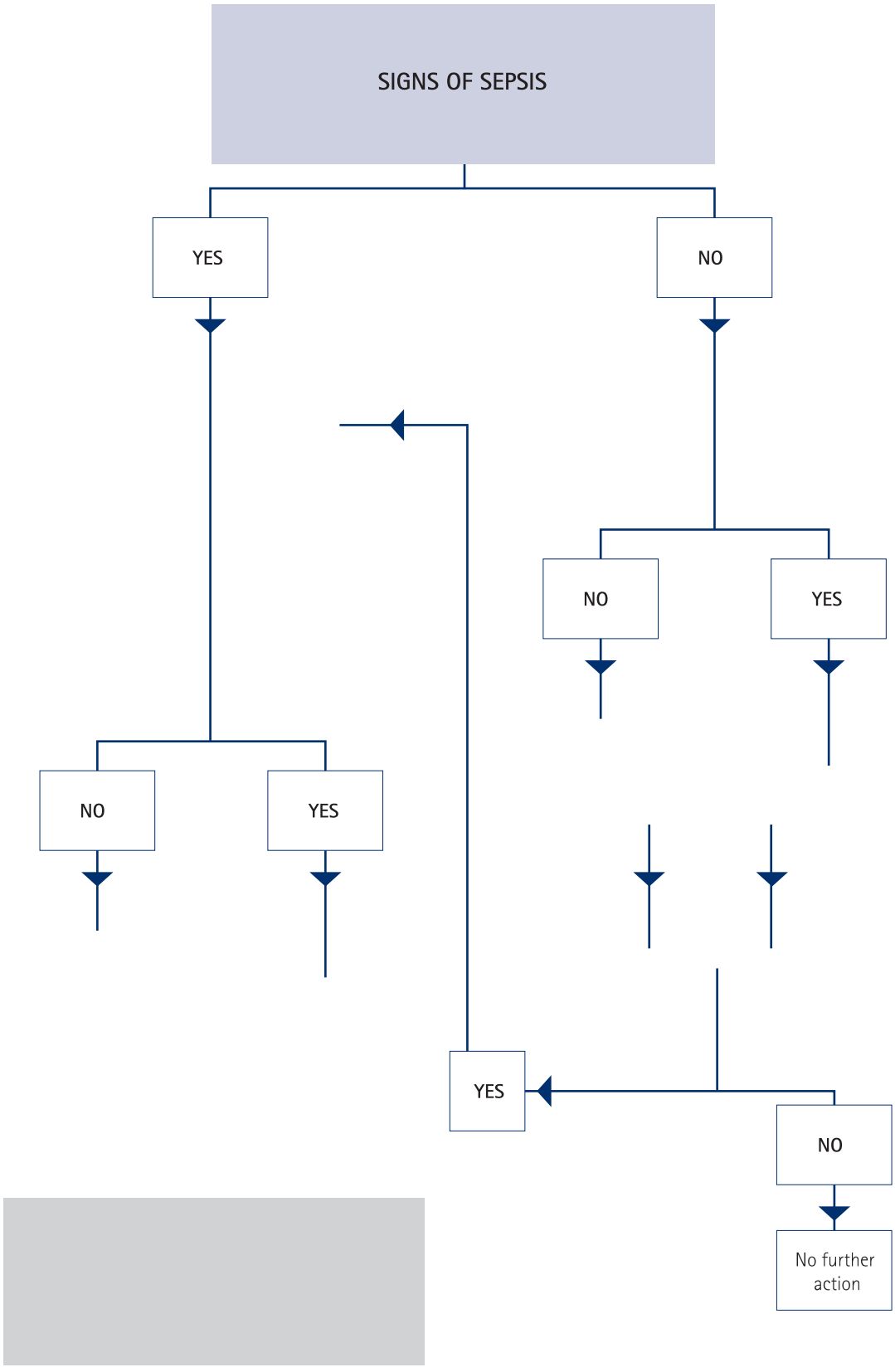
Group B

GROUP B STREPTOCOCCUS (GBS) – ALGORITHM 1

MANAGEMENT F PREGNANCY WIT RESPECT T GBS INFECTI N



GROUP B STREPTOCOCCUS –
MANAGEMENT F INFANT AT RISK F GBS SEPSIS



COMMENTS

- GBS has been cultured from breast milk, but the role of infected breast milk in neonatal infection is uncertain. It is difficult to make

R UP B STREPT C CCUS RE ERENCES

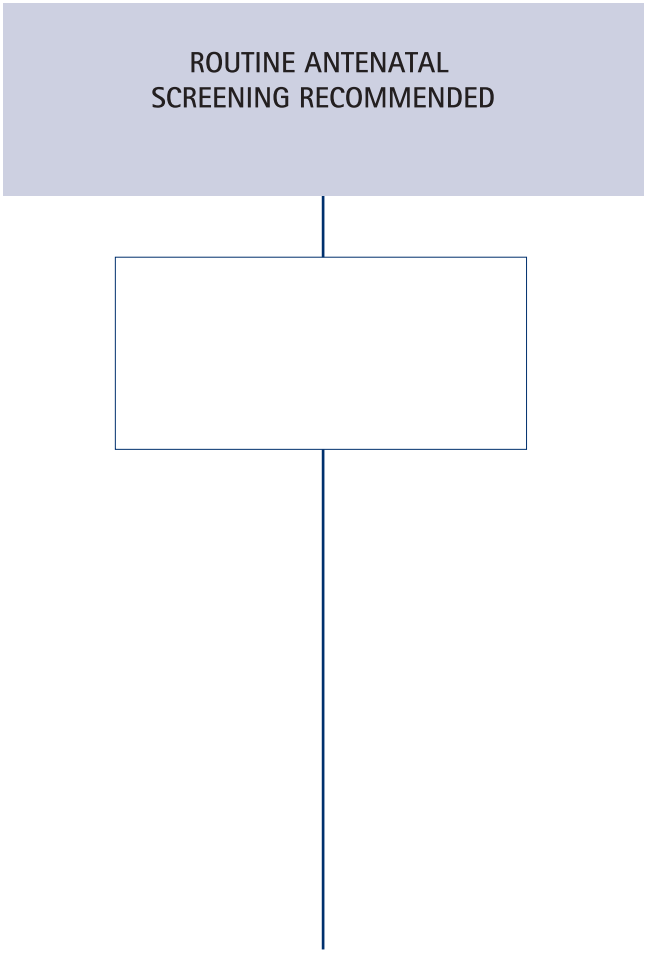
1. A

Hepatitis B virus

AUSTRALASIAN SOCIETY FOR INFECTIOUS DISEASES

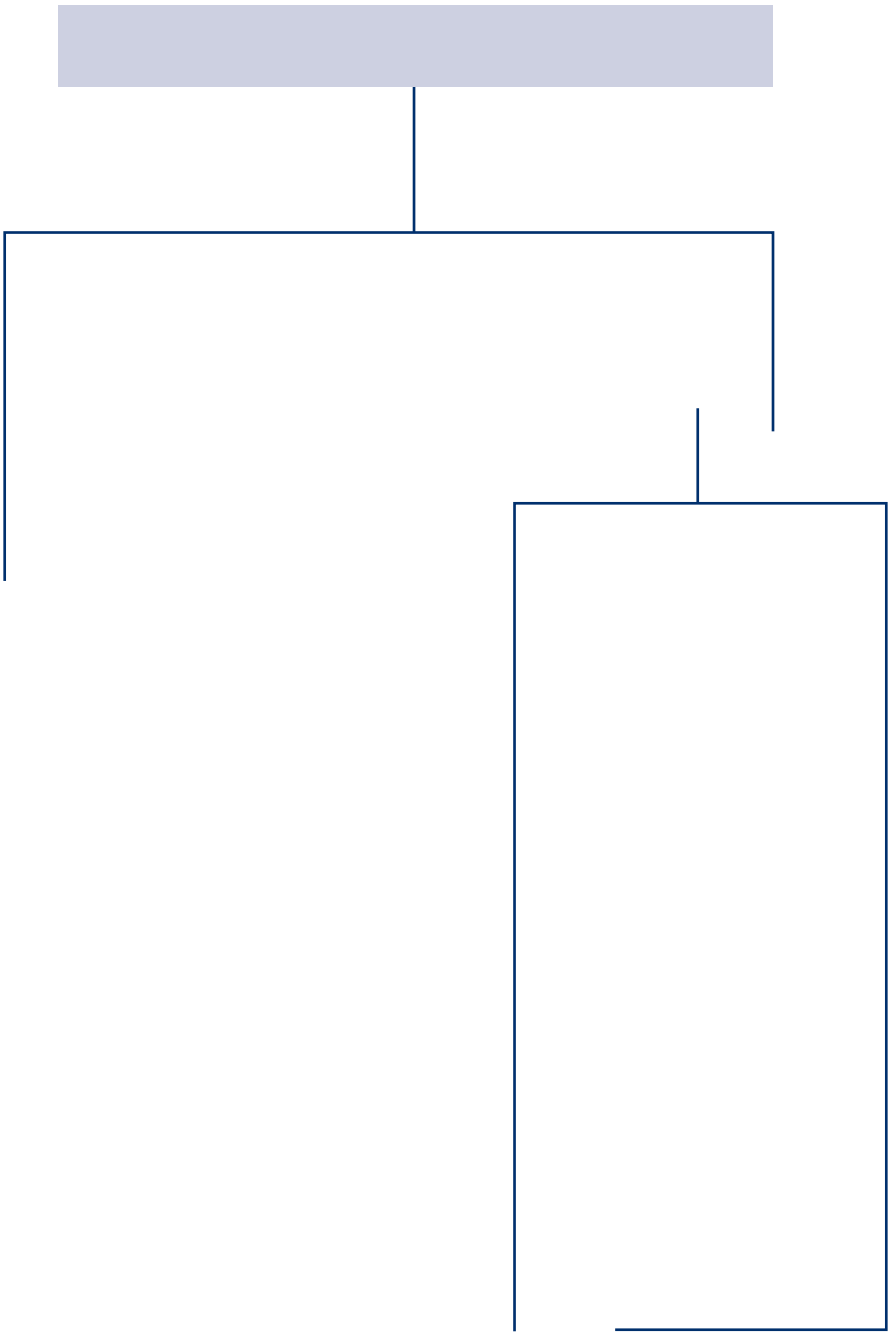
HEPATITIS B VIRUS – A GORITHM 1

MATERNA DIAGN SIS AND ASSESSMENT



HEPATITIS B VIRUS – ALGORITHM 2

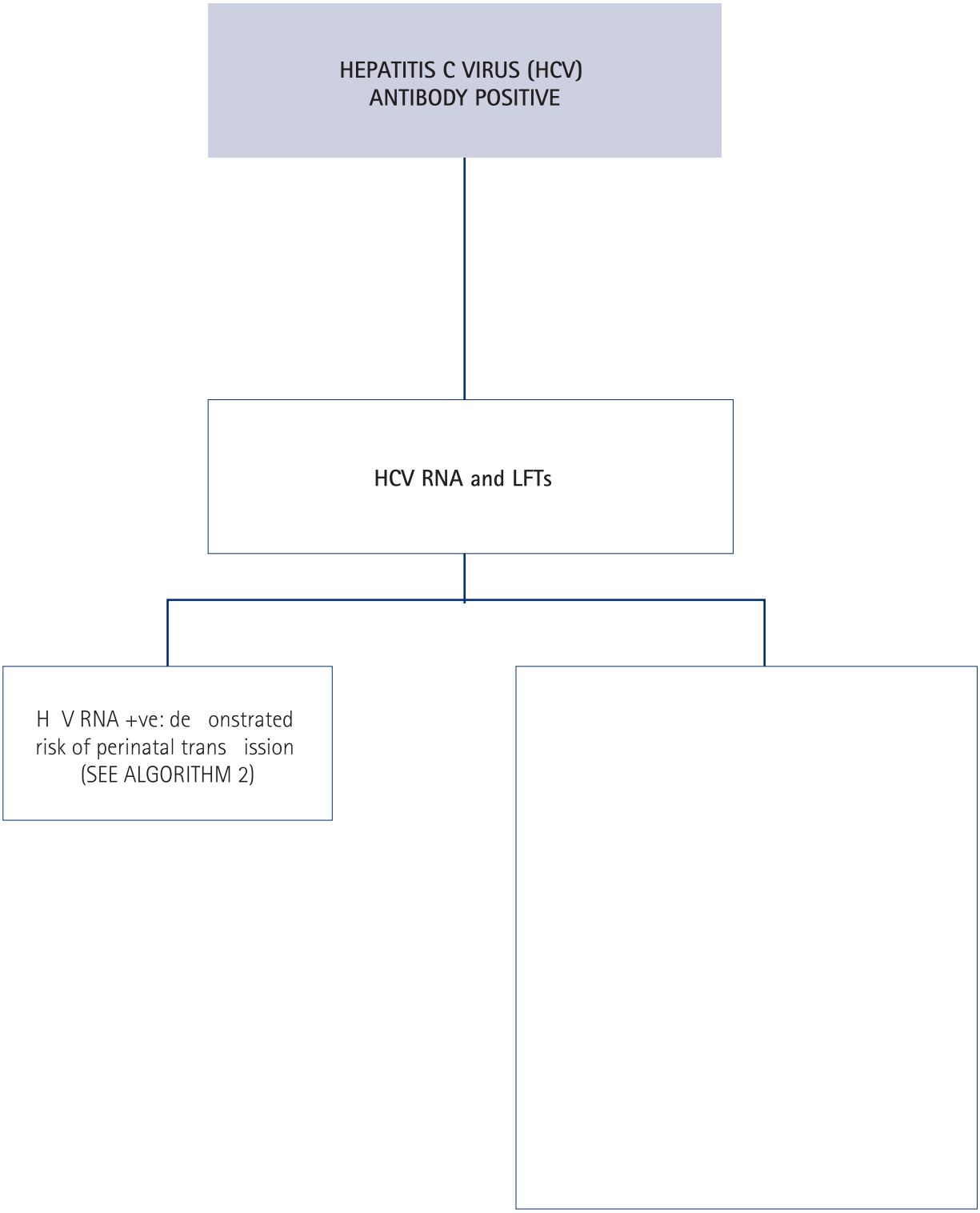
ANTENATAL MANAGEMENT OF HEPATITIS B INFECTION



H

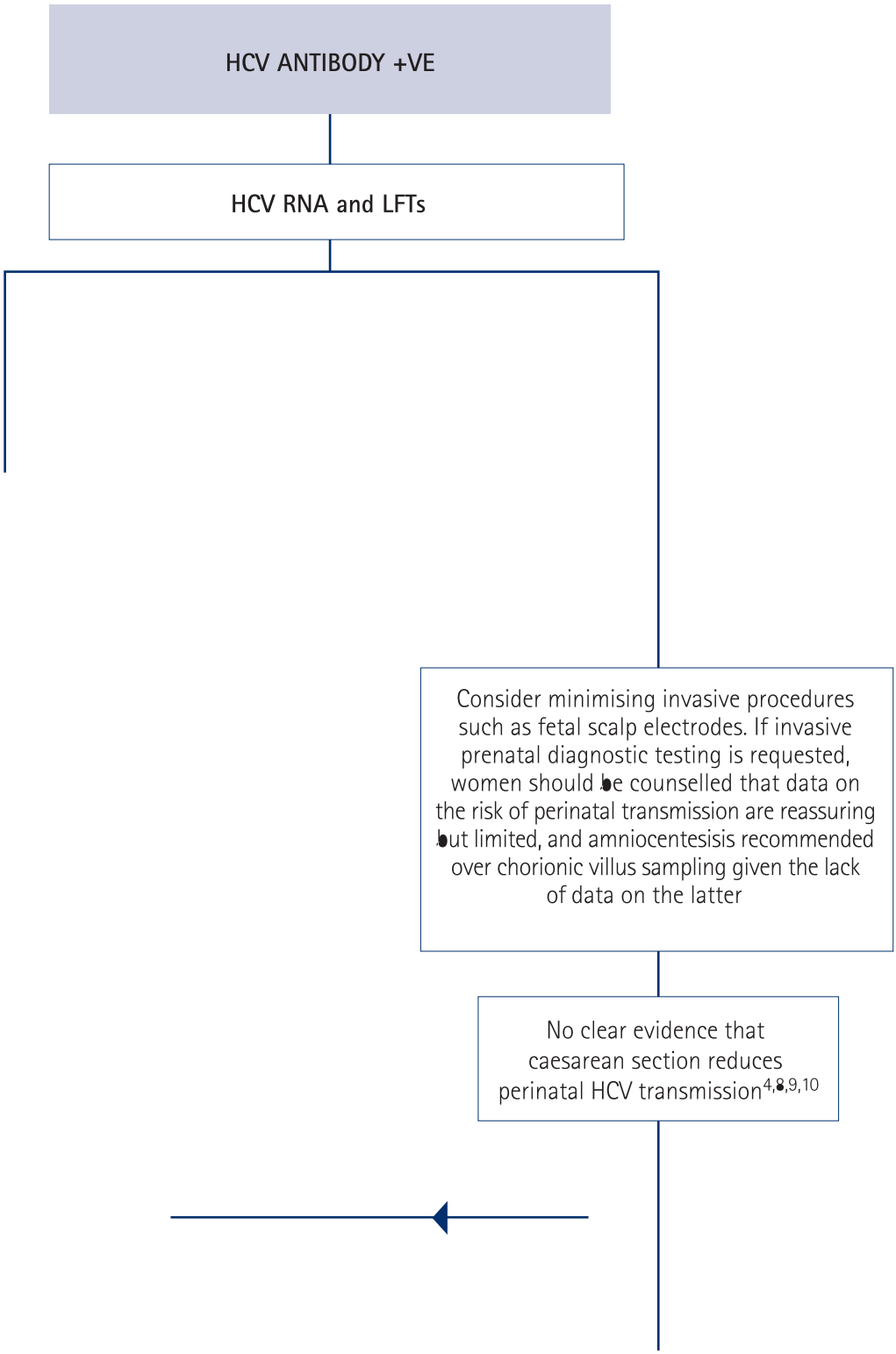
HEPATITIS C VIRUS – ALGORITHM 1

ANTENATA DIAGN SIS F EPATITIS C

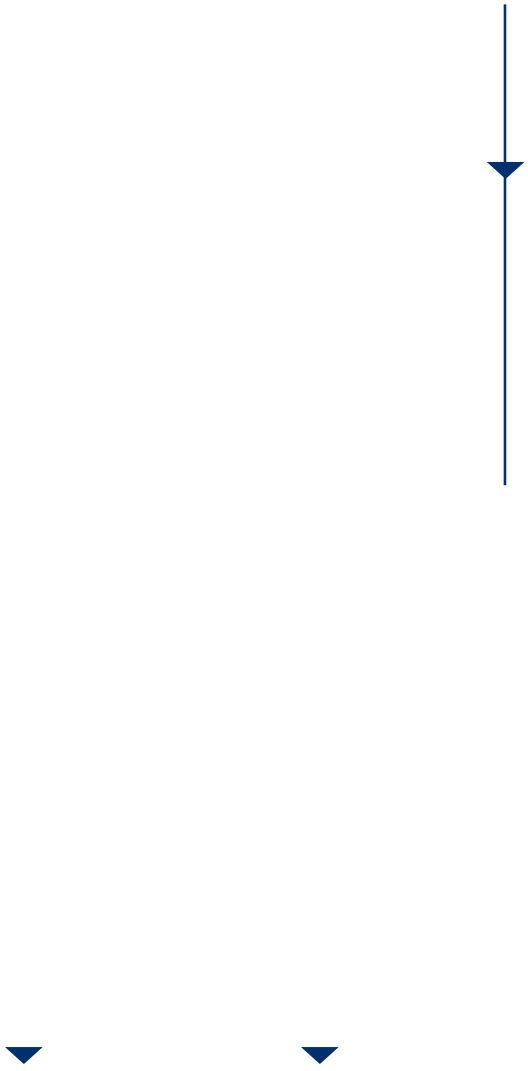


HEPATITIS C VIRUS – ALGORITHM 2

ANTENATA MANAGEMENT F EPATITIS C INFECTI N



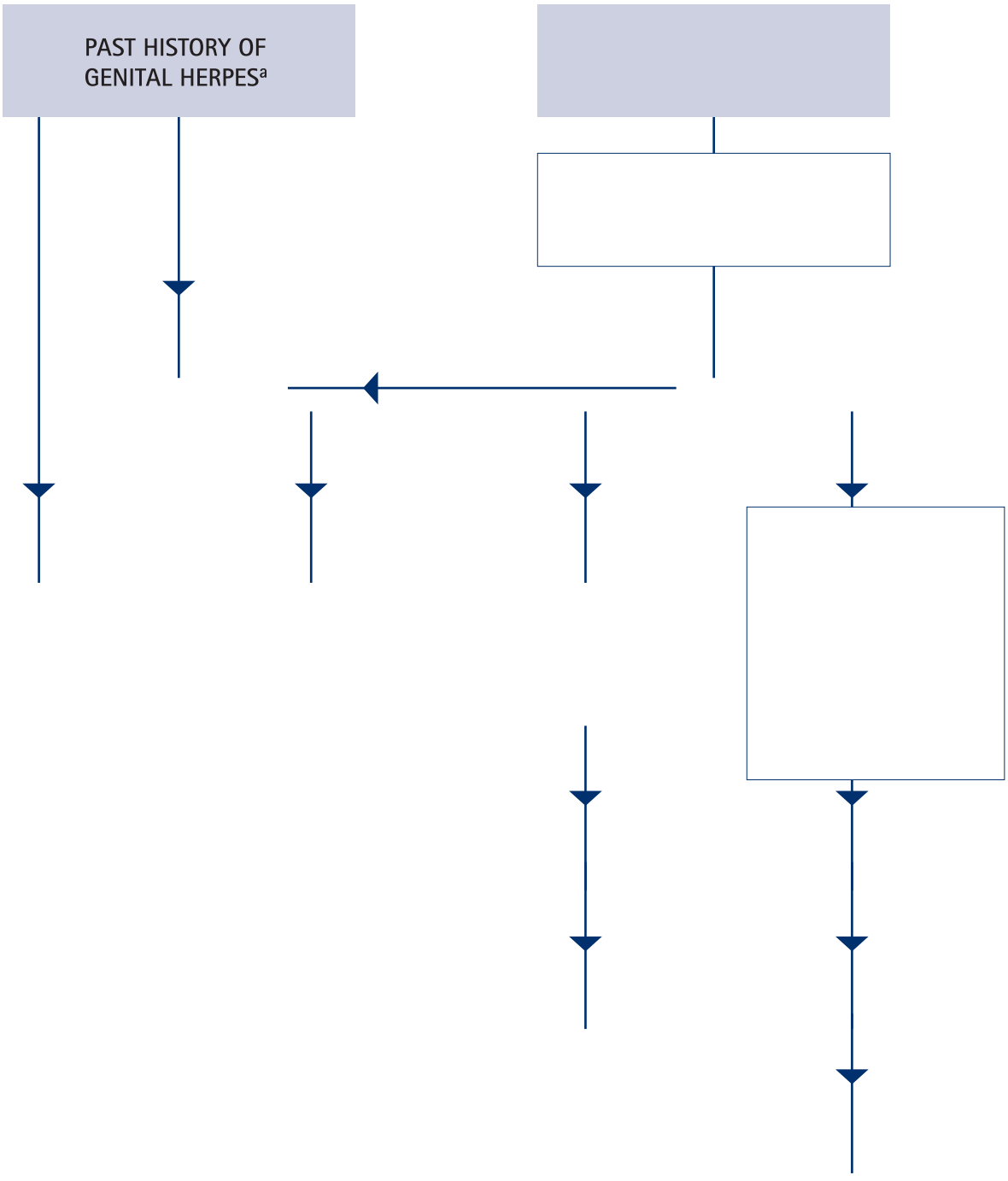
HEPATITIS C VIRUS – ALGORITH

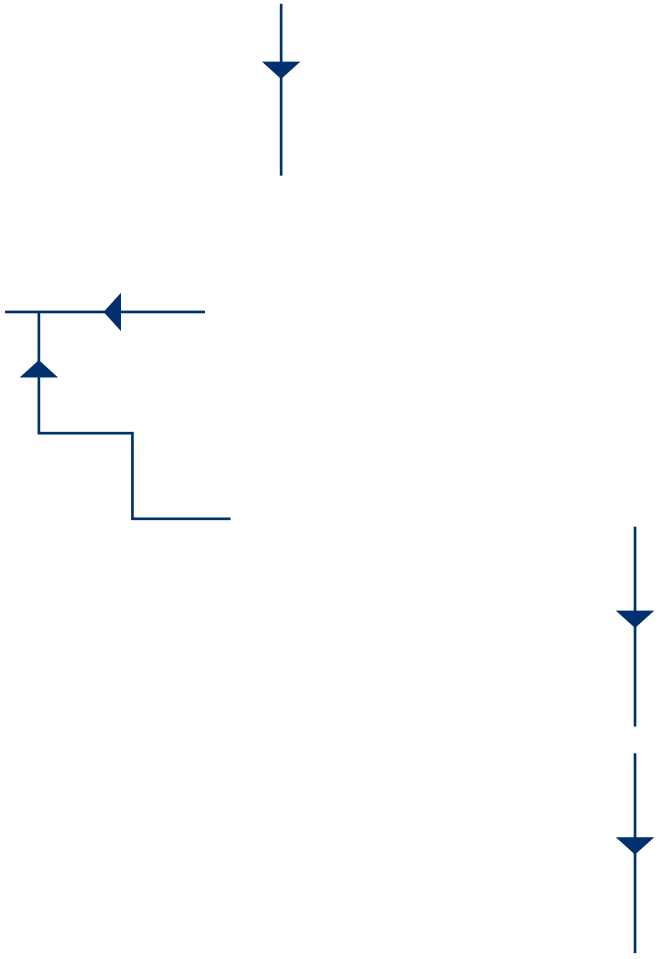


Herpes

HERPES SIMPLE VIRUS (HSV) – ALGORITHM 1

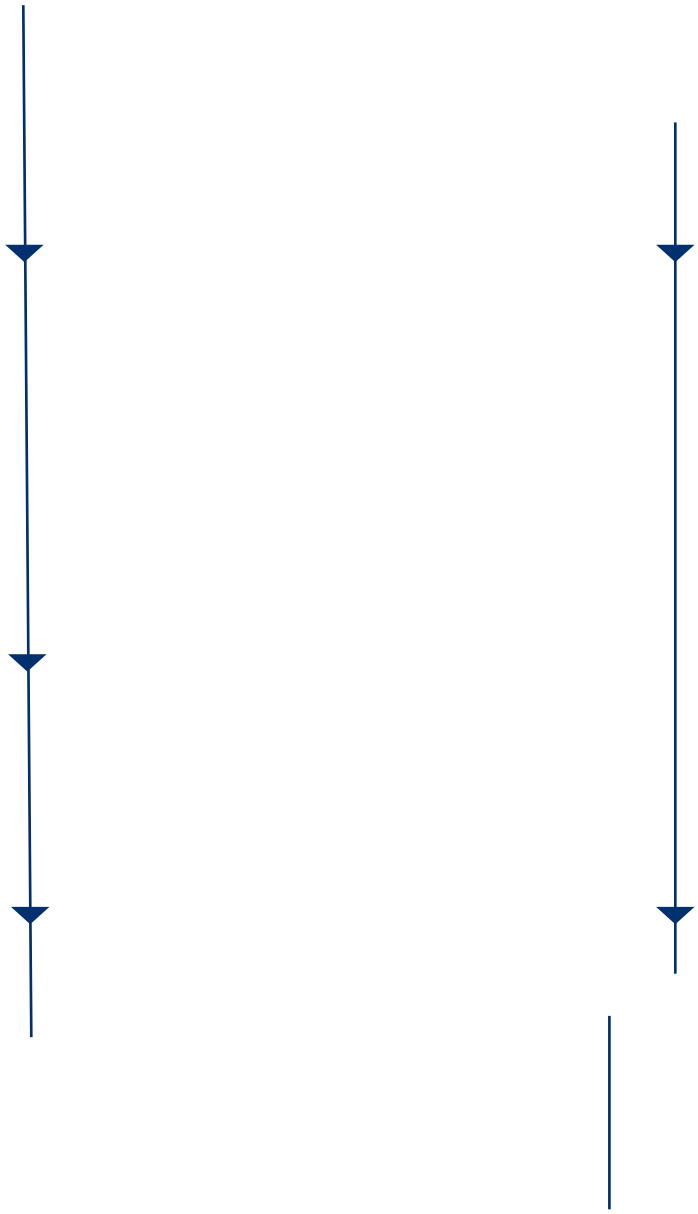
GENITAL V IN PREGNANCY: RI F M T ER T C ILD TRAN MI I N (MTCT)





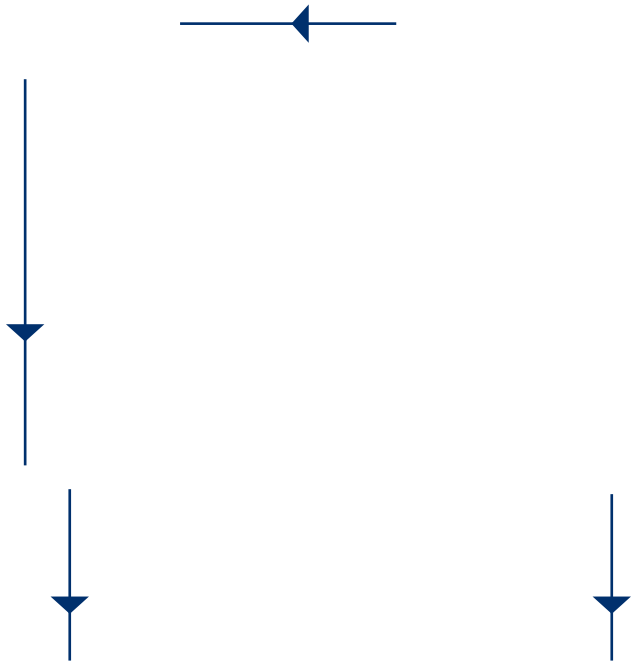
HERPES SIMPLE VIRUS – ALGORITHM 3

MANAGEMENT F ASYMPT MATIC NE NATE B RN T M T ER WIT ACTIVE GENITA ERPES[a] AT DE IVERY



HERPES SIMPLE VIRUS – ALGORITHM 4

SV INFECTI NS IN PREGNANCY: NE NATA MANAGEMENT



COMMENTS

a. Oral aciclovir therapy **is not** reco ended for therapeutic or pre-e ptive treat ent of HSV in the neonate . The role of oral valaciclovir ha not been evaluated in thi context

b. There are few data to guide anage ent of herpe recurrence after neonatal HSV di ea e. Mo t expert reco end perfor ing inve tigation for HSV di ea e including LP and HSV PCR and treating e pirically with IV aciclovir for the following: herpe recurrence (

HERPES SIMPLEX VIRUS
RE ERENCES

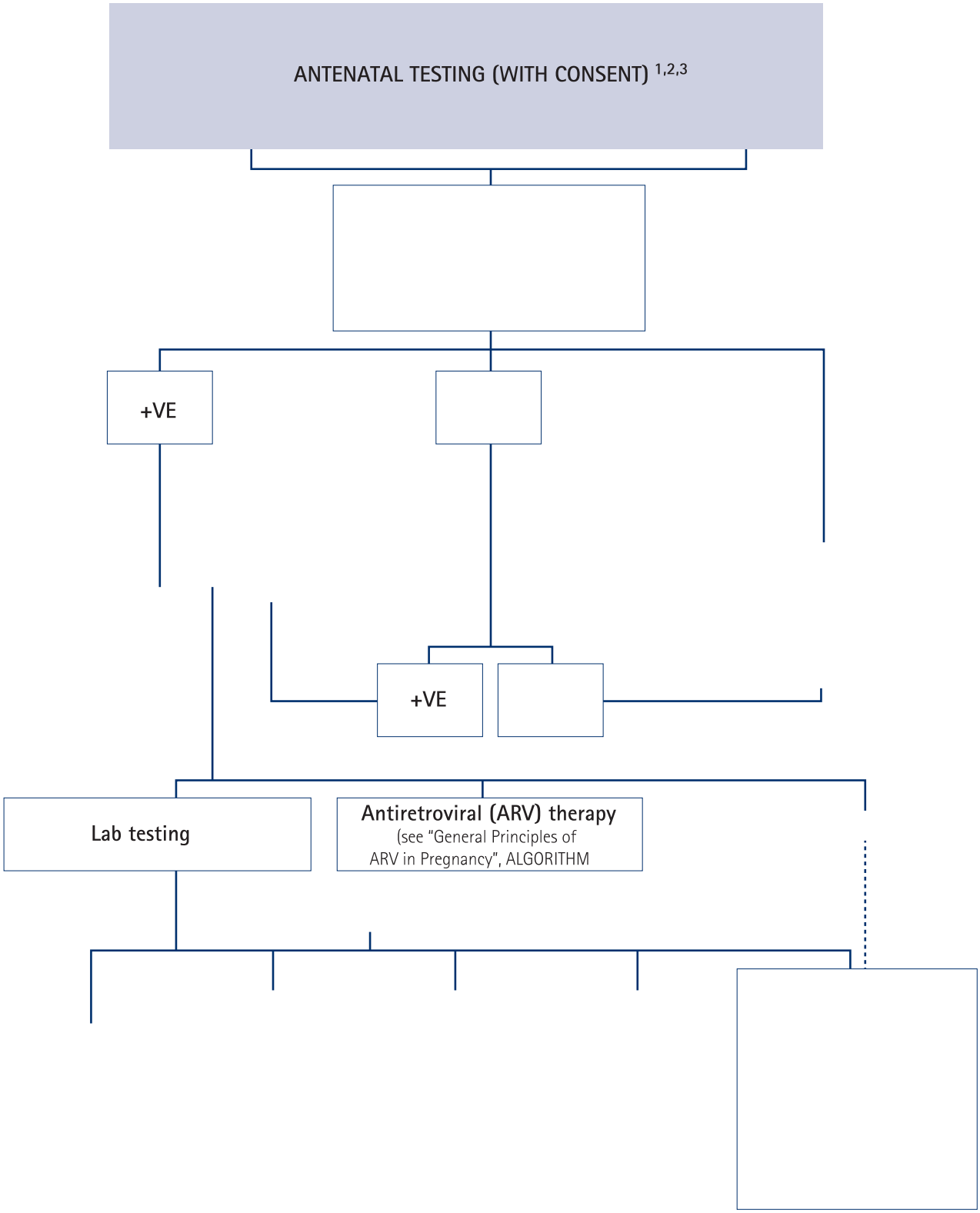
1. Jones CA, Raynes Greenow C, Isaacs D, on behalf of APSU HSV study tea and contributors. Population-based surveillance of neonatal HSV infection in Australia (1997-2011). Clin Infect Dis. 2014 Aug 15;59(4):525-31.
2. Brown ZA, Wald A, Morrow RA, Selke S, Zeh J, Corey L. Effect of serologic status and cesarean delivery on trans ission rates of herpes si plex virus fro other to infant JAMA.289(2):203-9, 2003.
3. Brown ZA, Benedetti J, Ashley R, et al. Neonatal herpes si plex virus infection in relation to asy pto atic aternal infection at the ti e of labour. New Engl J Med, 1991; 324: 1247-52.
4. Brown ZA, Selke A, Zeh J et al. The acquisition of herpes si plex virus during pregnancy. New Engl J Med, 1997; 337: 509-15.
5. Arvin AM, Hensleigh PA, Prober CG et al. Failure of antepartu aternal cultures to predict the infant's risk of exposure to herpes si plex virus at delivery. New Engl J Med, 1986; 315: 796-800.
6. Hollier LM, Wendel GD.p t d 7 i r K Mf A P - (i t 2 9 f 7 9 7 t d i i f c P v 2 p f t P (f a P v v v t 2 2 P - (i t 2 9 r 7

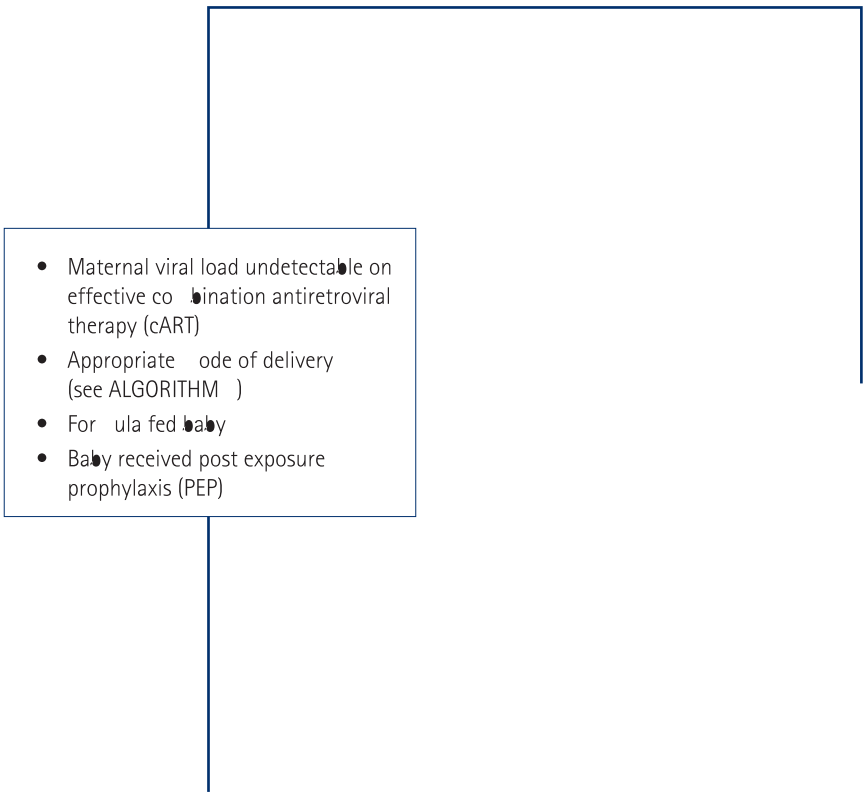
Human

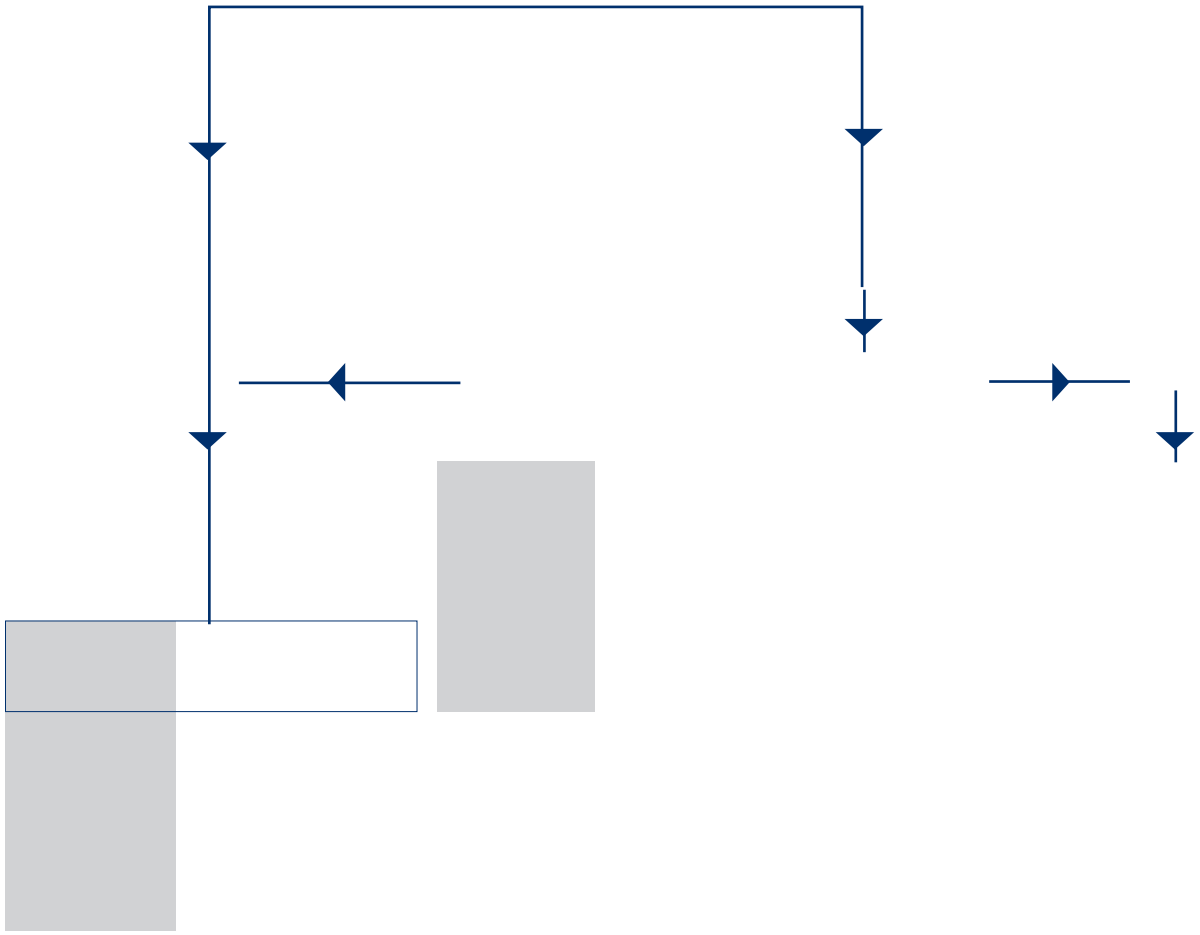
i

HUMAN IMMUNO EFICIENCY VIRUS (HIV) – ALGORITHM 1

DIAGN SIS F IV INFECTI N IN PREGNANCY




• Maternal viral load undetectable on effective co bination antiretroviral therapy (cART)
• Appropriate ode of delivery (see ALGORITHM)
• For ula fed baby
• Baby received post exposure prophylaxis (PEP)



HUMAN IMMUNODEFICIENCY VIRUS – ALGORITHM 4

HUMAN IMMUNODEFICIENCY VIRUS – ALGORITHM 4

MANAGEMENT F INFANT AT RISK F MTCT IV [11,12]

HUMAN IMMUN DE ICIENCY VIRUS RE ERENCES

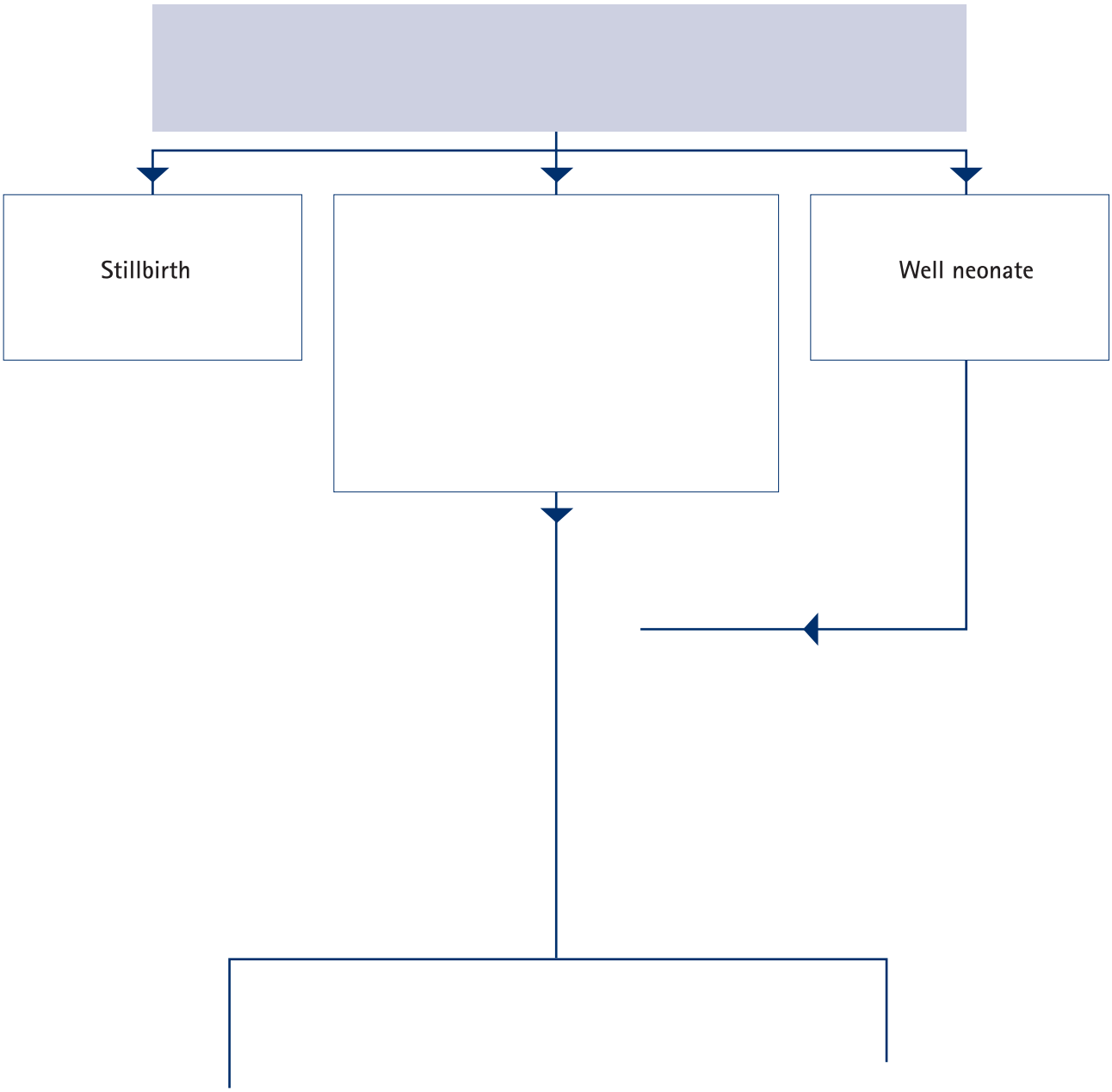
1. RANZCOG. Routine antenatal assess ent in the absence of pregnancy co plications. C-Obs 3b. 2022. https://ranzcog.edu.au/wp-content/uploads/2022/05/Routine-antenatal-assess ent-in-the-absence-of-pregnancy-co plications.pdf
2. Australian Govern ent Depart ent of Health. Fourth National Sexually Trans issible Infections Strategy. 2018-2022.
3. ASHM. National HIV testing policy. 2017.
4. Townsend CL, Cortina-Borja M, Peckha CS, de Ruiter A, Lyall H, Tookey PA. Low rates of other-to-child trans ission of HIV following effective pregnancy interventions in the United Kingdo and Ireland, 2000-2006. Aids. 2008;22(8):973-81.
5. Rollins N, Mahy M, Becquet R, Kuhn L, Creek T, Mofenson L. Esti ates of peripartu and postnatal other-to-child trans ission probabilities of HIV for use in Spectru and other population-based odels. Sex Trans Infect. 2012;88(2):2012-050709.
6. Nduati R, John G, Mbori-Ngacha D, Richardson B, Overbaugh J, Mwatha A, et al. Effect of breastfeeding and for ula feeding on trans ission of HIV-1: a rando ized clinical trial. Ja a. 2000;283(9):1167-74.
7. White AB, Mirjahangir JF, Horvath H, Angle yer A, Read JS. Antiretroviral interventions for preventing breast ilk trans ission of HIV. Cochrane Database Syst Rev. 2014(10):CD011323.
8. Coovadia HM, Rollins NC, Bland RM, Little K, Coutsoudis A, Bennish ML, et al. Mother-to-child trans ission of HIV-1 infection during exclusive breastfeeding in the first 6 onths of life: an intervention cohort study. Lancet. 2007;369(9567):1107-16.
9. Bispo S, Chikhungu L, Rollins N, Siegfried N, Newell ML. Postnatal HIV trans ission in breastfed infants of HIV-infected wo en on ART: a syste atic review and eta-analysis. Journal of the International AIDS Society. 2017;20(1):21251.
10. Flynn PM, Taha TE, Cababasay M, Fowler MG, Mofenson LM, Owor M, et al. Prevention of HIV-1 Trans ission Through Breastfeeding: Efficacy and Safety of Maternal Antiretroviral Therapy Versus Infant Nevirapine Prophylaxis for Duration of Breastfeeding in HIV-1-Infected Wo en With High CD4 Cell Count (IMPAACT PROMISE): A Rando ized, Open-Label, Clinical Trial. Journal of Acquired I une Deficiency Syndro es: JAIDS. 2018;77(4):383-92.
11. Panel on Treat ent of Pregnant Wo en with HIV

Listeria

AUSTRALASIAN SOCIETY FOR INFECTIOUS DISEASES 2022

LISTERIA – ALGORITHM 2

DIAGN SIS AND MANAGEMENT F INFANT AT RIS F PERINATA ISTERI SIS

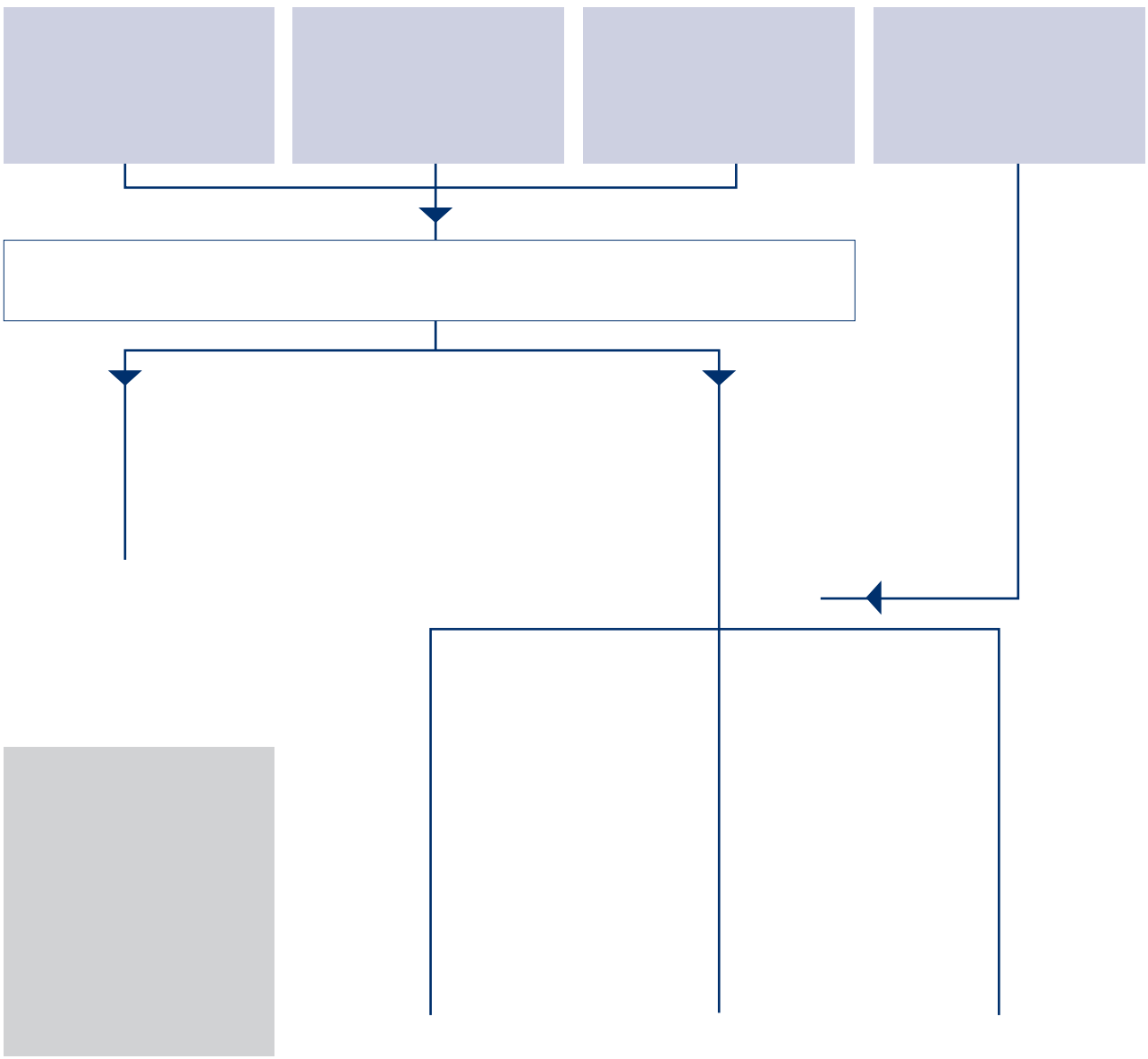


COMMENTS

- Preter delivery is co on. Mortality rates range fro 20-60% in infected neonates born alive [2,6]
- Perinatal listeria infection can present as **early onset disease** (within 7 days of birth, ean 1.5 days) often associated with pre aturity

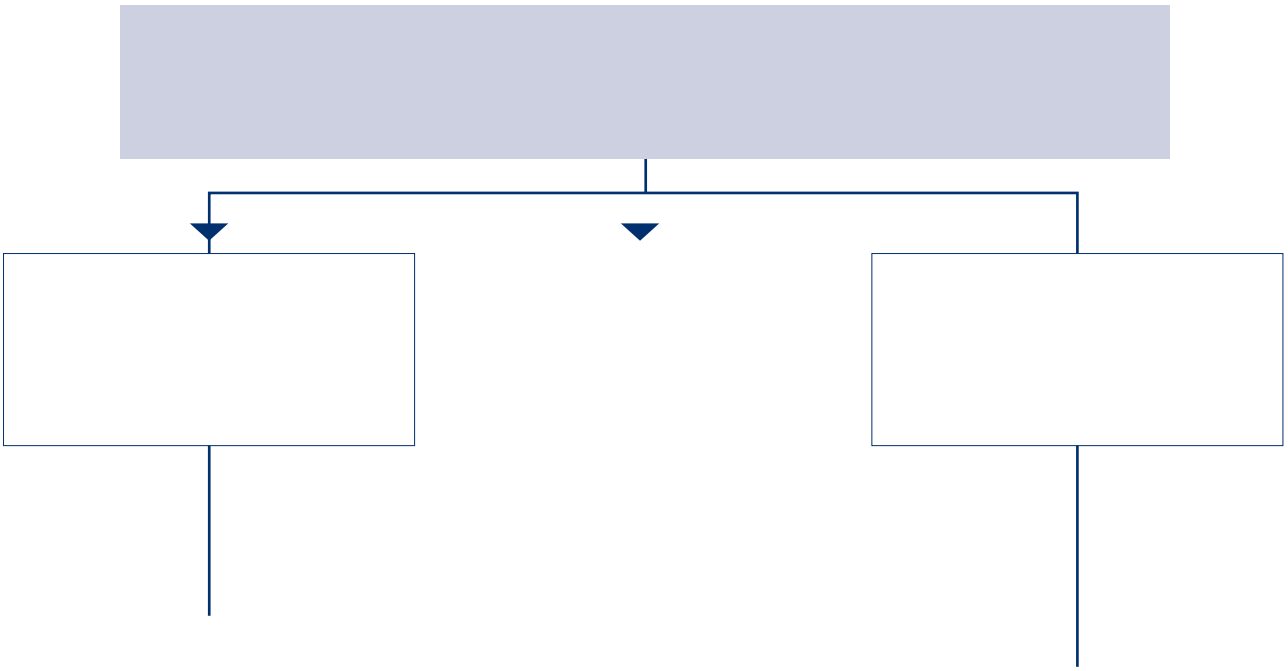
MYCOBACTERIUM TUBERCULOSIS [MTB] – ALGORITHM 1

ANTENATAL DIAGN SIS: MANAGEMENT ⁄ PREGNANT W MAN

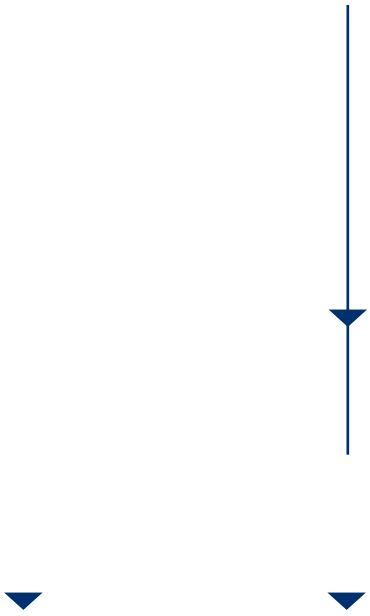


MYCOBACTERIUM TUBERCULOSIS – ALGORITHM 2

MANAGEMENT F PR VEN MATERNA TB



MY



MYC BACTERIUM TUBERCUL SIS RE ERENCES

1. A

GUIDE TO INTERPRETATION OF THE TST			
	LOW RISK	MODERATE RISK	HIGH RISK
	No risk factors	• Ethnic origin from high prevalence population • Locally identified high risk populations • Adult HIV patient with CD4 count >500/mL • Children aged 1-5 years	• Recent close contact with infectious TB • HIV-infected or other immunosuppression (including steroids, equivalent of >1mg/kg/day for >4 weeks) • CXR: fibrotic changes suggestive of past TB • Children under 1 year
0-4 mm	Negative	Negative	Negative
5-9 mm	Negative	Negative	**Positive**
10-14 mm	Negative	**Positive**	**Positive**
15 mm	**Positive**	**Positive**	**Positive**

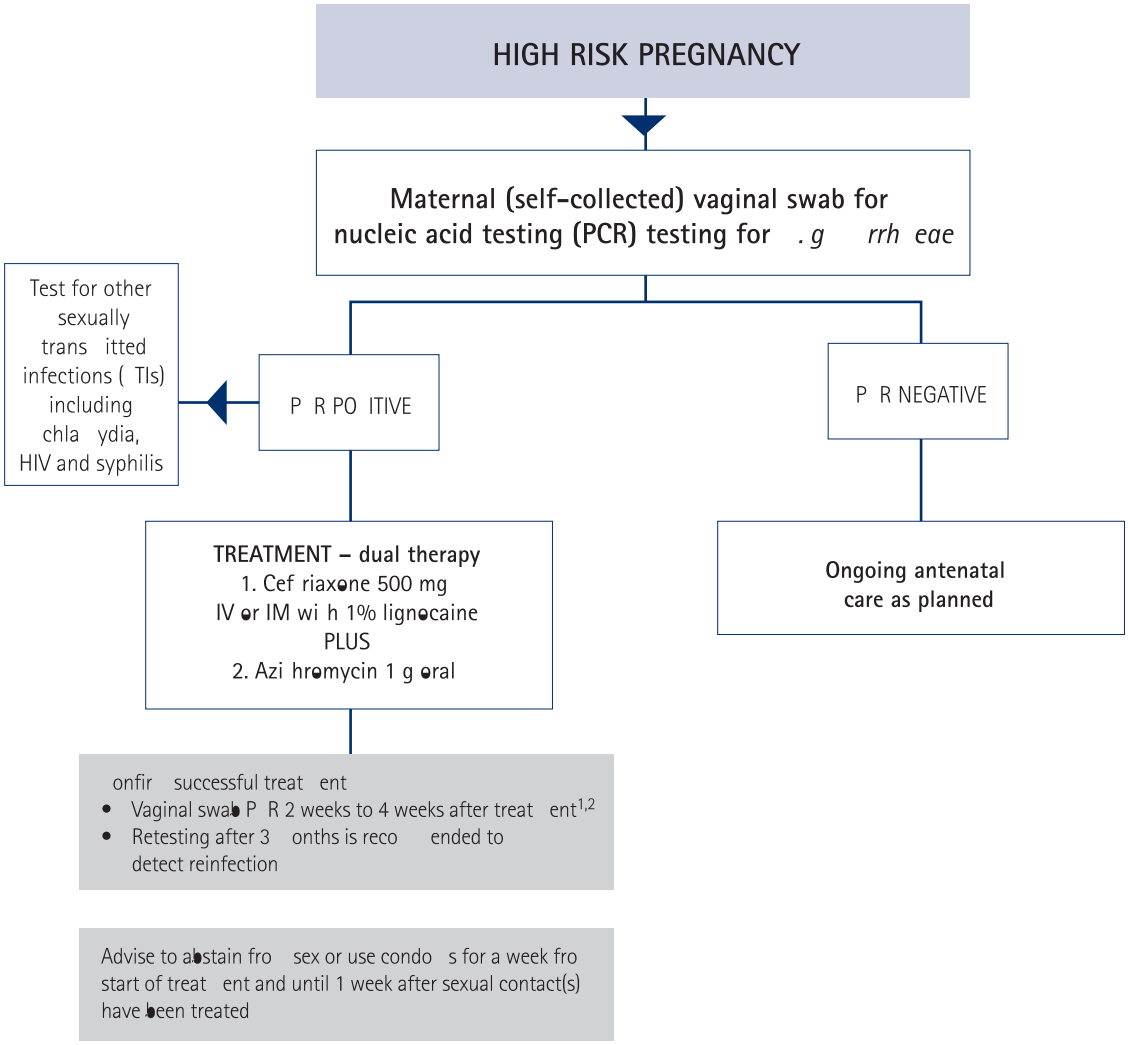
NEISSERIA GONORRHOEAE – ALGORITHM 1

MANAGEMENT OF WOMAN WITH SUSPECTED MATERIAL NEISSERIA GONORRHOEAE INFECTION

Routine antenatal testing in pregnancy is not recommended[1] but is sometimes done in high risk or high prevalence settings in Australia and New Zealand[1,2] Almost all infections are asymptomatic in women.

Risk factors for *N. gonorrhoeae* infection include:

- Age < 30 years
- High risk sexual contacts (e.g. multiple partners, consistent non-use of condoms)
- Sexually active women of reproductive age residing or returning from a high prevalence country
- Aboriginal or Torres Strait Island or Maori or Pacific peoples population



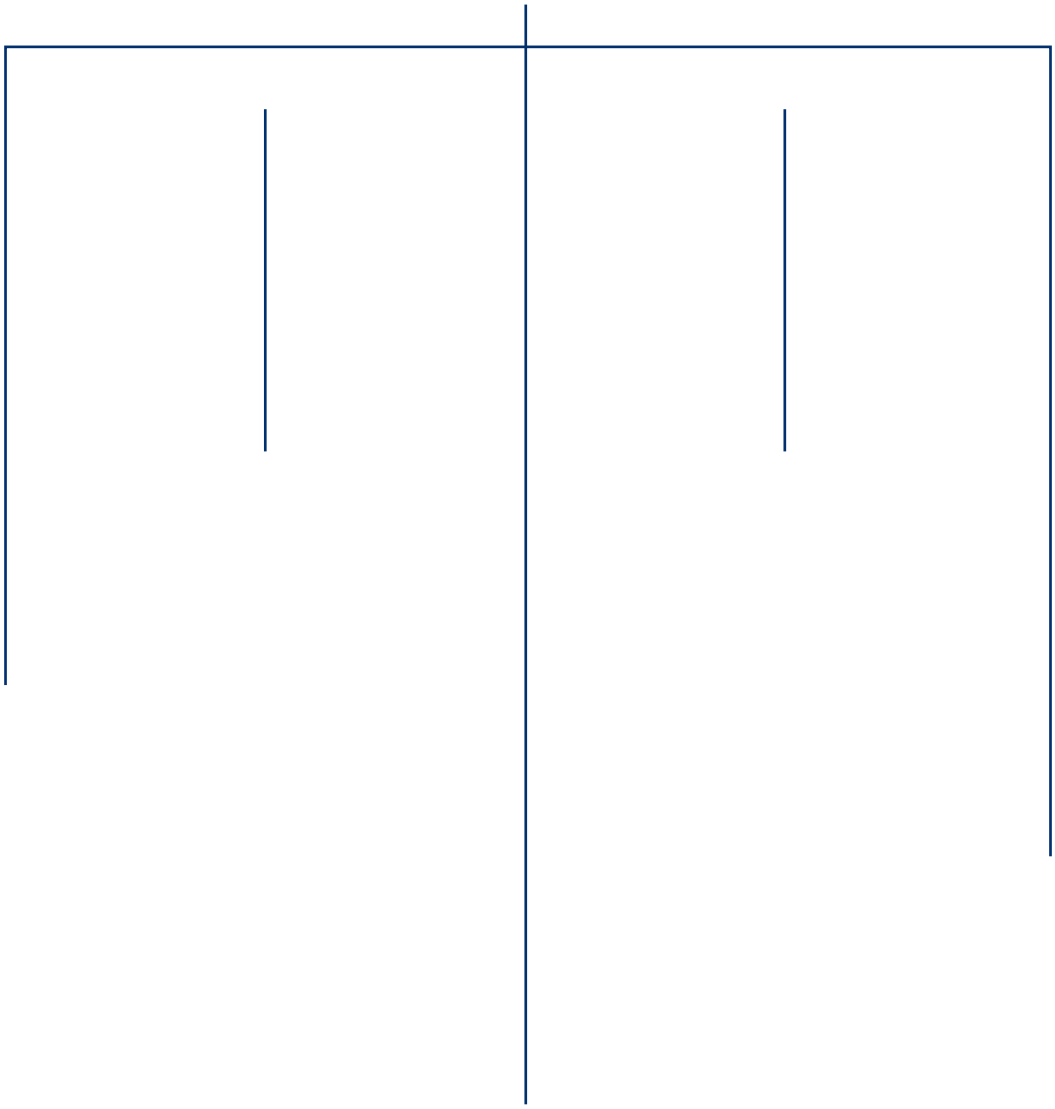
Confirm successful treatment

- Vaginal swab PCR 2 weeks to 4 weeks after treatment[1,2]
- Retesting after 3 months is recommended to detect reinfection

Advise to abstain from sex or use condoms for a week from start of treatment and until 1 week after sexual contact(s) have been treated

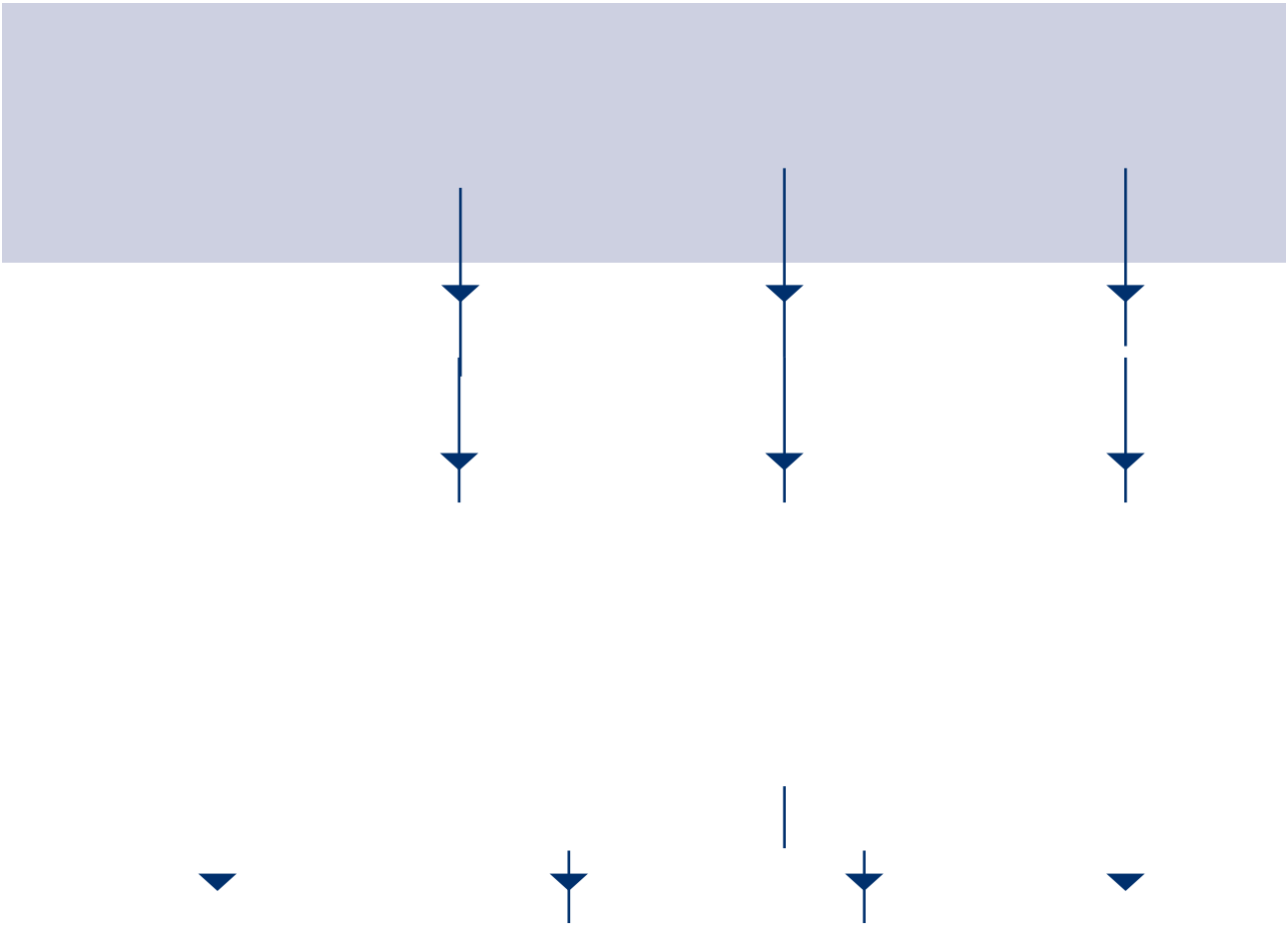
COMMENTS

- Dual therapy is recommended due to the changing patterns of antimicrobial resistance in *N. gonorrhoeae*
- Urogenital gonococcal infections have been associated with chorioamnionitis, premature rupture of membranes and premature, low birth weight infants, and spontaneous abortions in pregnant women
- The risk of these complications in the setting of gonococcal infection is 2-5 times greater than in uninfected controls
- Transmission of *N. gonorrhoeae* from an untreated infected mother to her baby may occur in 30-50% of cases
- Chlamydia and *N. gonorrhoeae* infections are the commonest STIs in Australia. The prevalence of *N. gonorrhoeae* infections in women of child bearing age in Australia is about 10 times less than *Chlamydia trachomatis* infections (data: https://data.kirby.unsw.edu.au/ STIs)[3] and similarly in NZ[4]



PARVOVIRUS – ALGORITHM 1

RIS ASSESSMENT

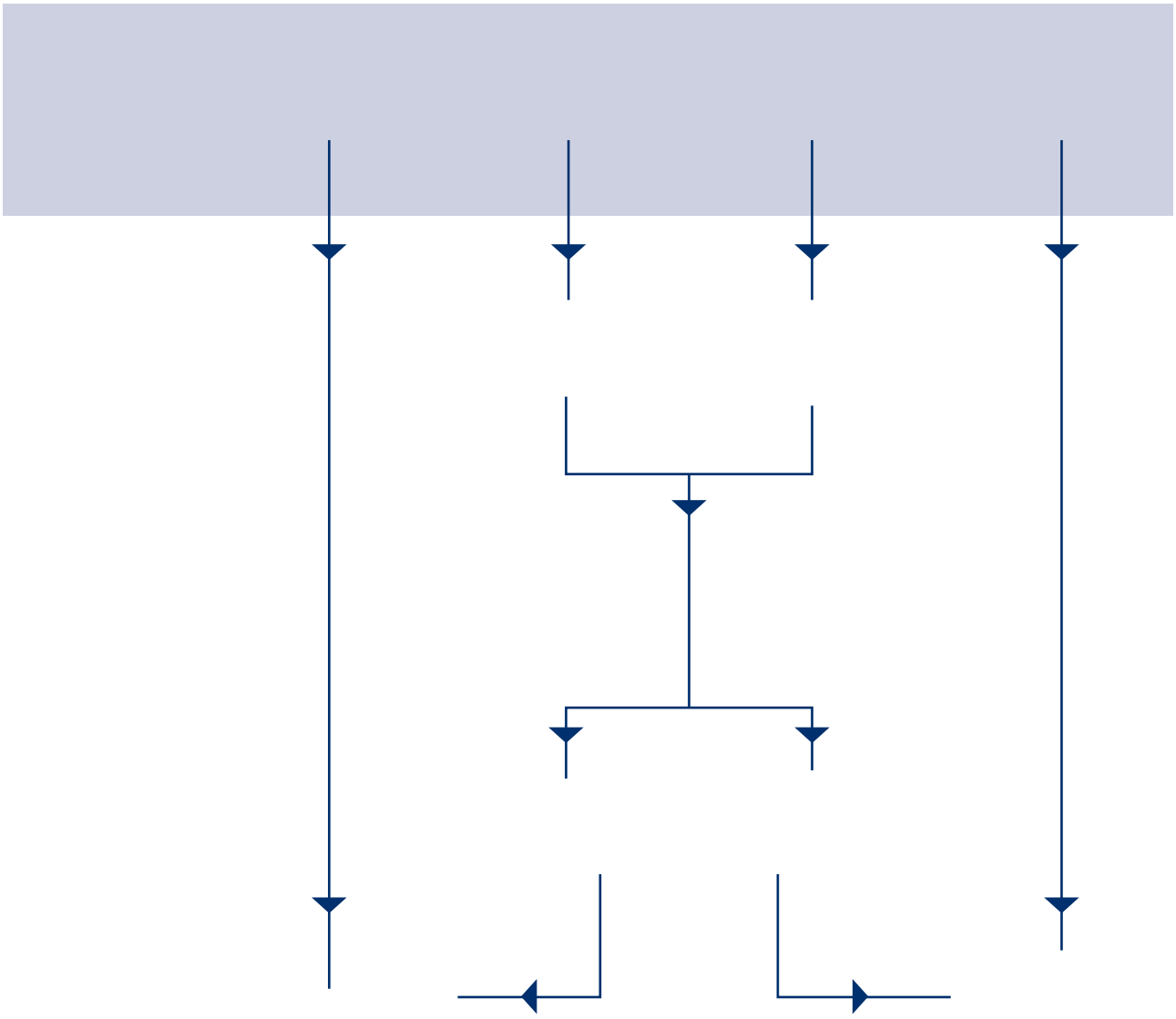


COMMENTS

a. It is not practicable to prevent exposure at ho e
b. Exclusion fro work of pregnant school teachers or child care workers **is no recommended** during parvovirus epide ics, which are often very prolonged (nor is exclusion of infected children)
c. Routine antenatal screening is **no** indicated
d. There is a 50% risk of trans ission fro an infected other to her

PARVOVIRUS – ALGORITHM 2

ANTENATA DIAGN SIS & MANAGEMENT



COMMENTS

- IgM is detectable within 1- weeks of exposure and usually re ains detectable for 2- onths
- o ercial IgM test kits (EIA or IF):
  - sensitivity: 70-80% overall (100% in adults with arthropathy; lower in children)
  - specificity: 92-97% –

PARVOVIRUS – ALGORITHM 3

MANAGEMENT F PR VEN MA

PARV VIRUS
RE ERENCES

1. Attwood LO, Hol es NE, Hui L. Identification and anage ent of congenital parvovirus B19 infection. Prenat Diagn. 2020;40:1722-1731.
2. Bascietto F, Li●erati M, Murgano D, Buca D, Iacovelli A, Flacco M, Manzoli L, Fa iliari A, Sca ●ia G, D'Antonio F. Outco e of fetuses with congenital parvovirus B19 infection: syste atic review and eta-analysis. Ultrasound O●stet Gynecol. 201●;52:569-576.
3. Crane J, Mundle W, Boucoiran I; Maternal Fetal Medicine Co ittee. Parvovirus B19 infection in pregnancy. J O●stet Gynaecol Can. 2014;36:1107-1116.
4. de Jong EP, de Haan TR, Kroes AC, Beers a MF, Oepkes D, Walther FJ. Parvovirus B19 infection in pregnancy. J Clin Virol 2006; 36:1–7.
5. Enders M, Weidner A, Rosenthal T, Baisch C, Hed an L, S derlund-Vener o M, Hed an K. I proved diagnosis of gestational parvovirus B19 infection at the ti e of noni une fetal hydrops. J Infect Dis. 200●;197:5●●-62.
6. HaFger 2H, 3Ad8Er2F 24 -g 2n 3f 9: FD3D29 gD10 g0 6g fc tf 0: 0F,g sc tE P g

Rubella

AUSTRAL

RUBELLA – ALGORITHM 1

DIAGN SIS F SUSPECTED MATERNA RUBE A INFECTI N

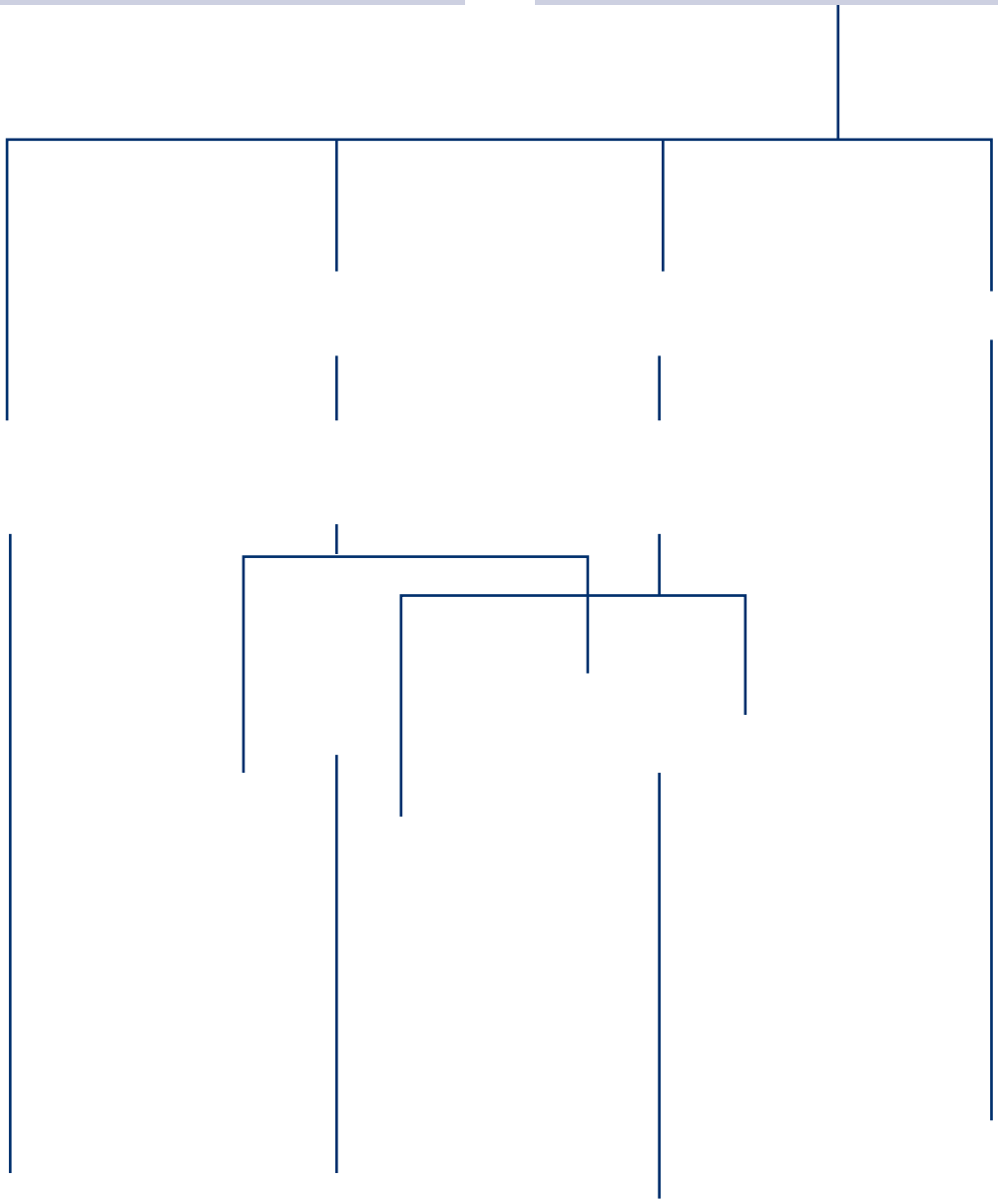
Routine antenatal screening (IgG only)[a] [1,2,3]

- If IgG –ve, prioritise rubella i unisation after delivery
- If IgG +ve at 10 - 15 IU/ L: potential risk of reinfection Consider re-i unisation after delivery
- If > 15 IU/ L: re-i unisation not needed

Rubella testing (IgG/IgM)[b] because of

(i) contact with rubella

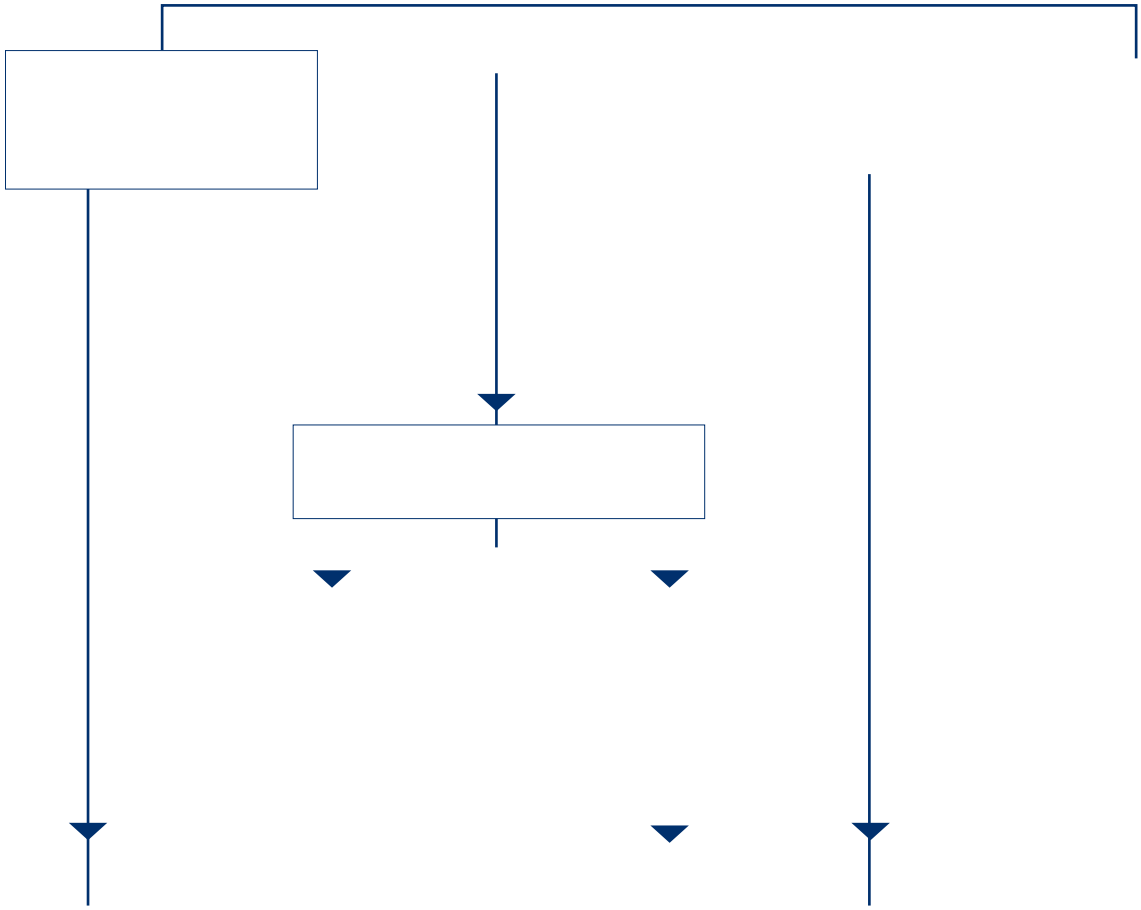
(ii) rubella-like illness (fever, erythe atous rash



RUBE A – A GORITHM 2

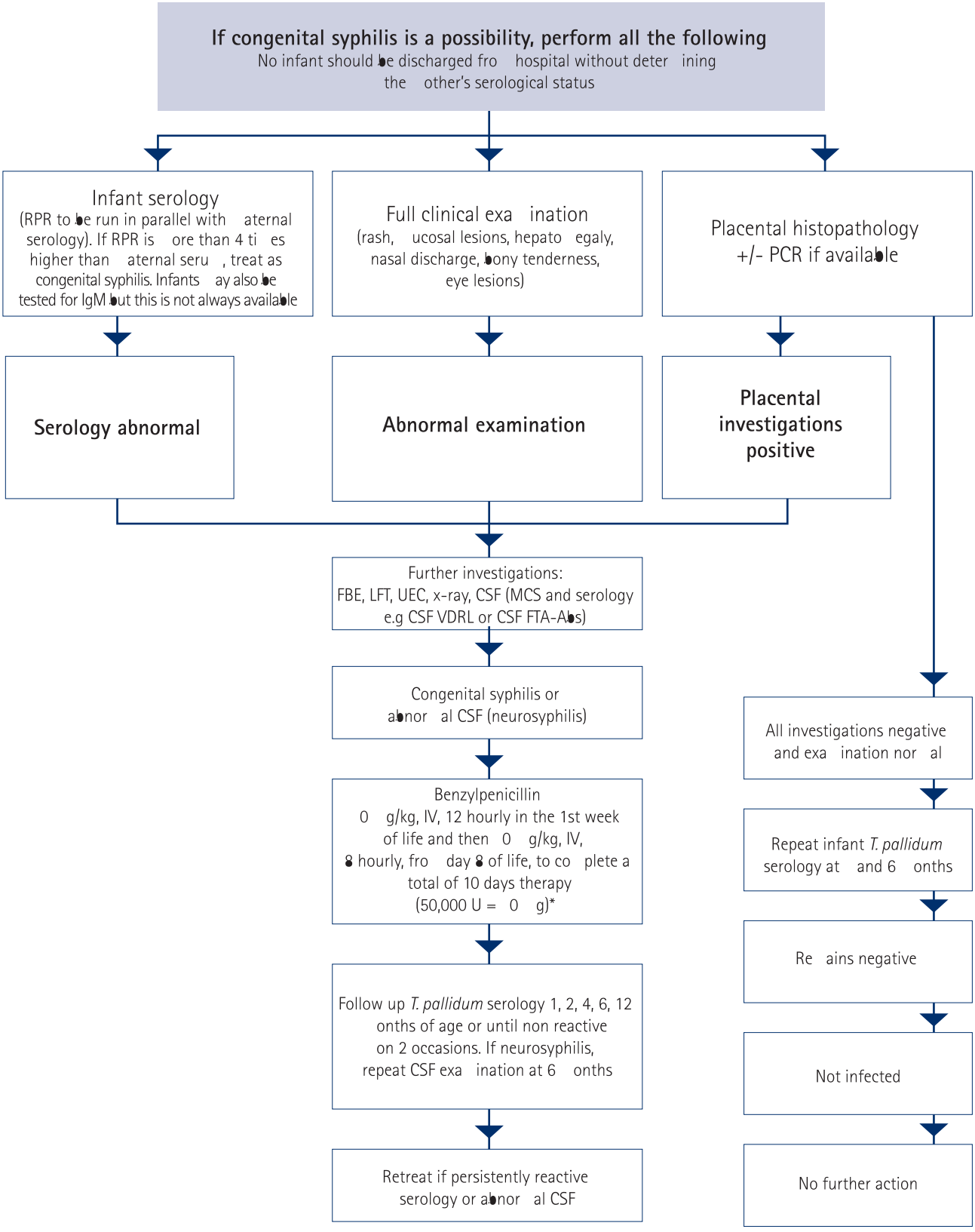
RUBELLA
RE ERENCES

1. Di ech W, Grangeot-Keros L, Vauloup-Fellous C. Standardization of Assays That Detect Anti-Rubella Virus IgG Antibodies. Clinical Microbiology Reviews



SYPHI IS (TREPONEMA PA IDUM) – A GORITHM 3

INVESTIGATI N AND MANAGEMENT F T E NE NATE B RN T A M T ER WIT SYP I IS



* Procaine penicillin (50 g/kg per dose), IM, daily ay be an option if IV access is not feasible.

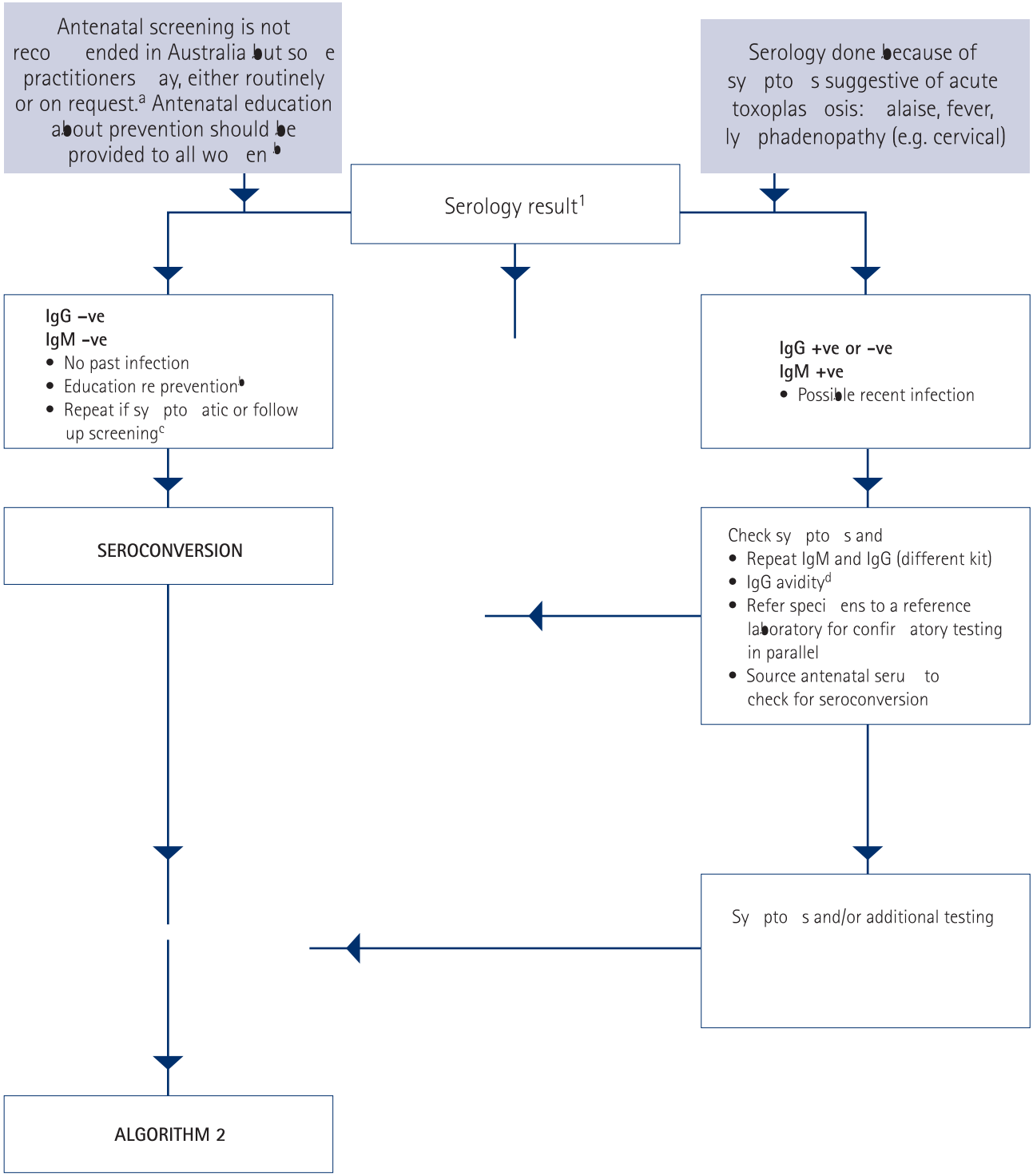
SYPHILIS (TREP NEMA PALLIDUM) RE ERENCES

1. Walker GJA Antibiotics for syphilis diagnosed during pregnancy. Cochrane Database of Syste atic Reviews Issue 3 2009
2. Myles TD et al The Jarisch-Herxhei er reaction and fetal onitoring changes in pregnant wo en treated for syphilis Obstet Gynecol 1999 93(4):631-2
3. Sheffield JS et al. Congenital syphilis after aternal treat ent for syphilis during pregnancy. A J Obstet Gynecol 2002 186(3):569-73
4. Alexander JM et al. Efficacy of treat ent for syphilis in pregnancy Obstet Gynecol 1999 93(1):5-8
5. Guideline: Syhpilis in pregnancy - Queensland Health (first published 2018, a ended 2021) https://www.health.qld.gov.au/__data/assets/pdf_file/0035/736883/g-sip.pdf
6. Workowski KA, Bach ann LH, Chan PA et al. Sexually trans itted infections treat ent guidelines. MMWR Reco Rep s i f l l l g 2 l v s s f w . 2 g C : P (K

T

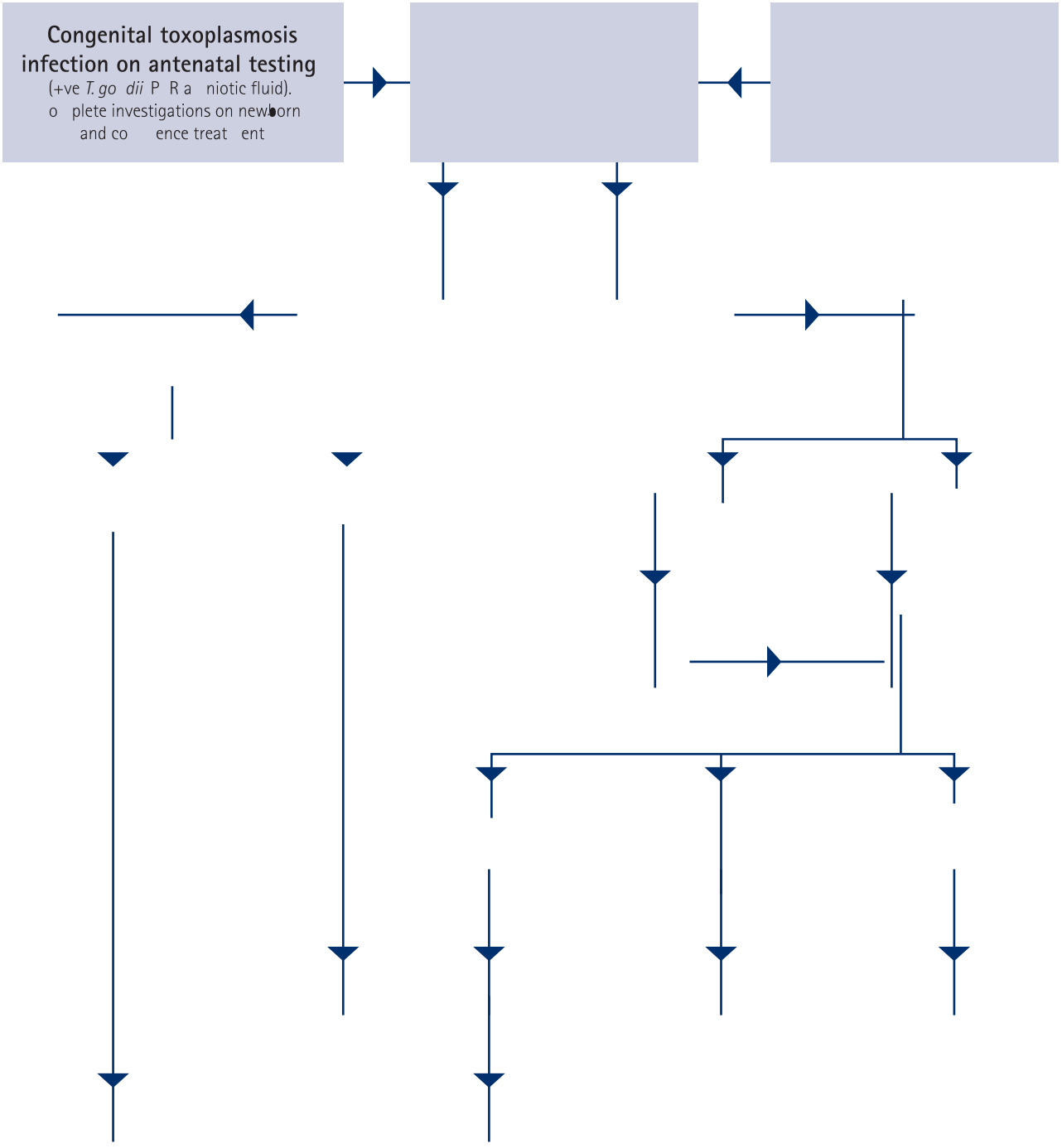
TO OPLASMA GONDII – ALGORITHM 1

ANTENATA EVA UATI N



TO OPLASMA GONDII – ALGORITHM 3

INVESTIGATI N AND MANAGEMENT F INFANT AT RIS F T X P ASM SIS



COMMENTS

a. Neonatal screening not often done, but is an alternative to antenatal screening to detect infected infants for treat ent [7]
b. Proportion of infants infected and severity depends on when aternal infection occurred and if/how treated [9,10]
c. horioretinitis/retinal scarring; intracranial calcification; hydrocephalus; hepatospleno egaly; pneu onia; thro bocytopenia; ly phadenopathy; yocarditis and IgM +ve +/or abnor al placenta +/- SF abnor ality (P R +ve). Toxo SF P R can assist with confir ing diagnosis in sy pto atic infants when IgM negative [1]
d. High incidence of long ter sequelae (e.g. chorioretinitis) in untreated infants even if asy pto atic at birth - can be reduced by treat ent
e. Reco ended duration of treat ent 12 onths. Studies to evaluate shorter durations under evaluation in rando ized controlled trials [1,8]
f. Dose: pyri etha ine: 1 g/kg, every 12 hours for 2 days followed by 1 g/kg daily for 6 onths followed

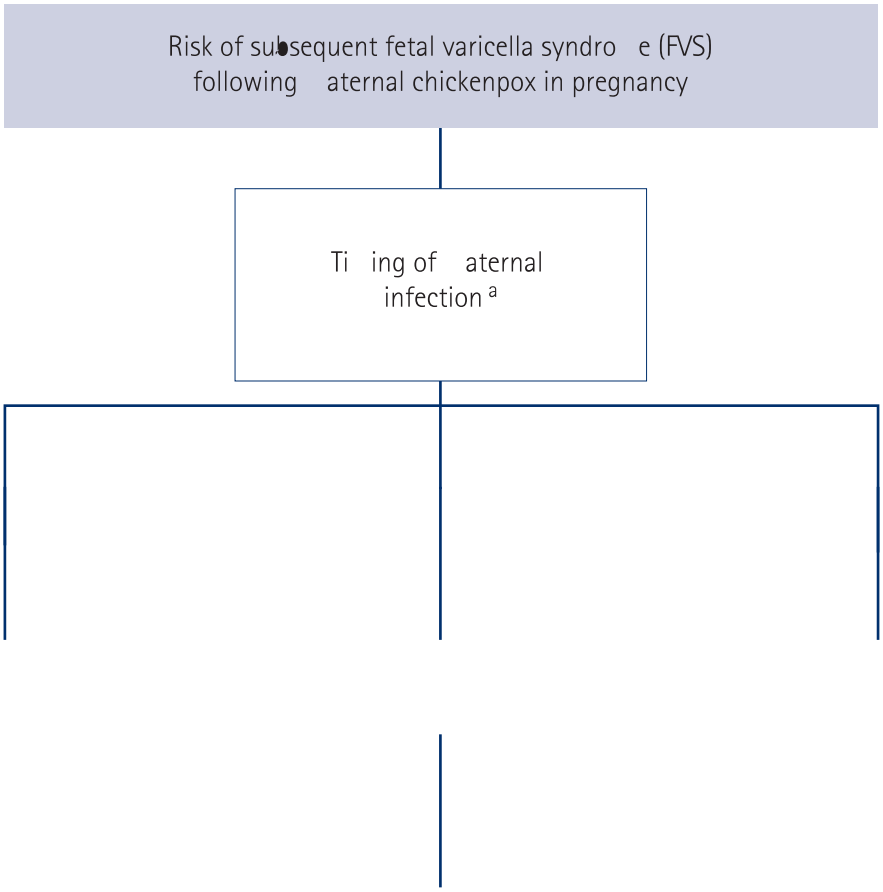
T X PLASMA
RE ERENCES

1. Jose G. Montoya and Jack S. Re ington Manage ent of Toxoplas a gondii Infection during Pregnancy Clinical Infectious Diseases 2008; 47:554–66
2. Dunn D, Wallon M, Peyron F, Petersen E, Peckha C, Gilbert R Mother-to-child trans ission of toxoplas osis: risk esti ates for clinical counselling. Lancet 1999 May 29;353:1829-33
3. Thi baut R, Leproust S, Chêne G, Gilbert R; SYROCOT (Syste atic Review on Congenital Toxoplas osis) study group.Effectiveness of prenatal treat ent for congenital toxoplas osis: a eta-analysisof individual patients' data. Lancet 369(9556), 115–122 (2007).
4. Wallon M,

Var

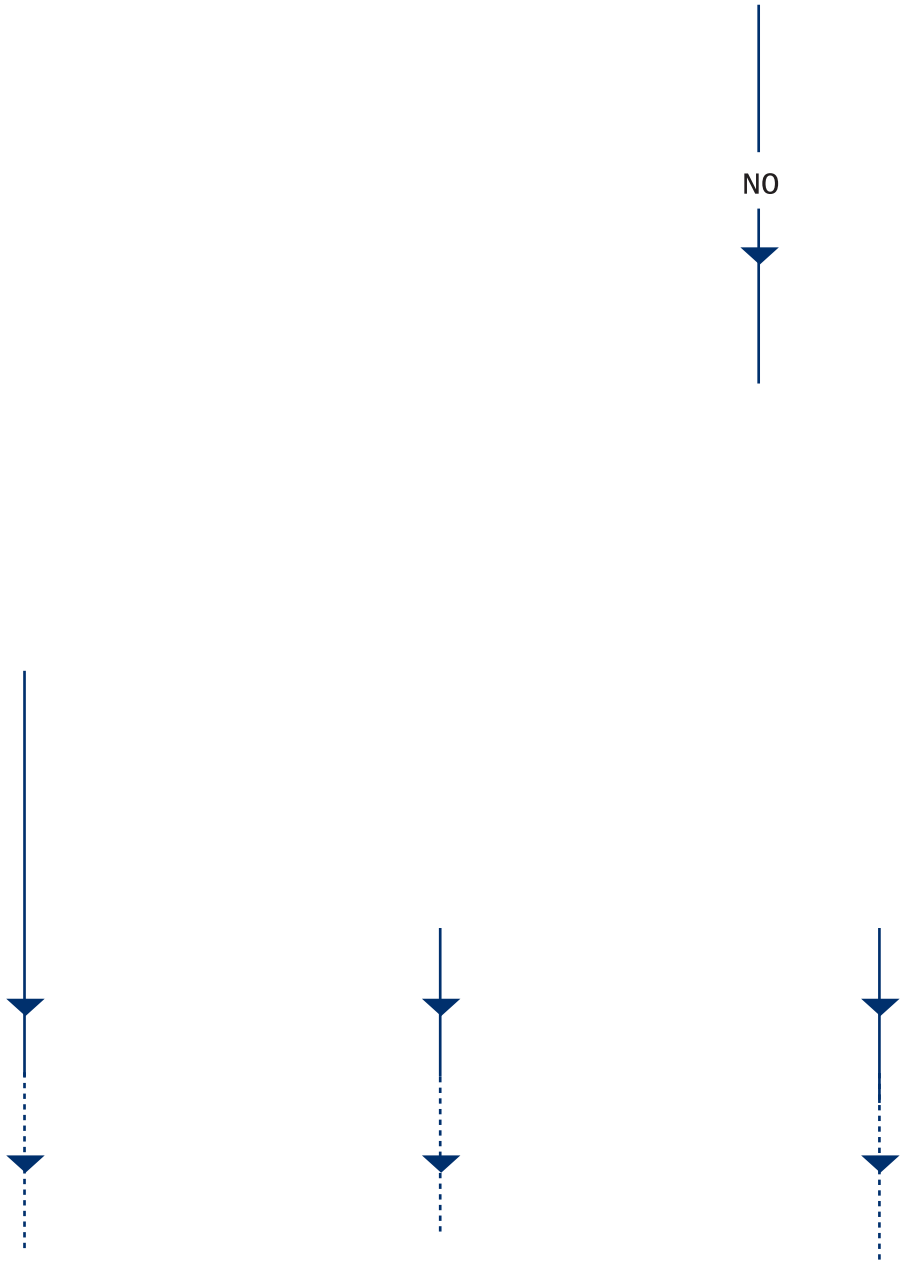
VARICELLA ZOSTER VIRUS – ALGORITHM 3

FETA MEDICINE C UNSE ING F WING C IC ENP X IN PREGNANCY



Varicella Syndrome manifestations

A nor ali ies	Frequency
Skin scars	78%
Eye abnor alities	60%
Li b abnor alities	68%
Pre aturity,	

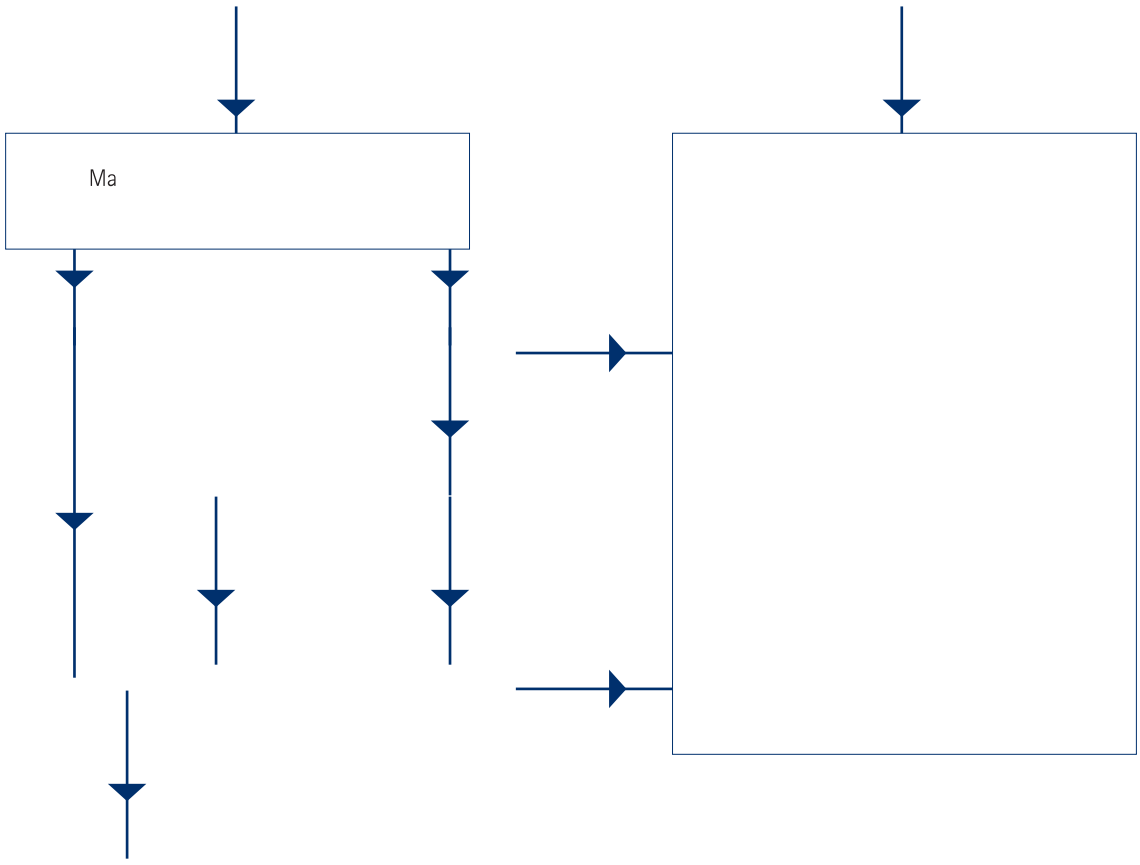

NO

VARICELLA Z STER VIRUS RE ERENCES

1. Australian Technical Advisory Group on I unisation (ATAGI). Australian I unisation Handbook, Australian Govern ent Depart ent of Health, Canberra, Varicella (chickenpox) i unisationhandbook.health.gov.au/vaccine-preventable-diseases/varicella-chickenpox
2. Centers for Disease Control and Prevention. Prevention of varicella: reco endations of the Advisory Co ittee on I unization Practices. MMWR 1996;45:1–25.
3. Enders G Mille E. Varicella and herpes zoster in pregnancy and the newborn, In: Arvin AM,

Zika virus

AUSTRALASIAN


Ma

CZS is a classic pattern of birth defects and disabilities due to intrauterine trans ission of Zika[8]

- Severe icrocephaly
- Decreased brain tissue with subcortical calcifications
- Co on eye abnor alities: acular scarring and retinal focal pig entation
- Hypertonia
- Joint abnor alities: arthrogryposis, talipes
- Other findings include: dysphagia, seizures, other eye findings (icrophthal ia, optic nerve pallor, other brain alfor ations on neuroi aging (ultrasound or MR

ZIKA VIRUS
RE ERENCES

1. Pettersson, J. H., et al. (2018). "Re-visiting the evolution, dispersal and epide iology of Zika virus in Asia." E erg Microbes Infect 7(1): 79.
2.