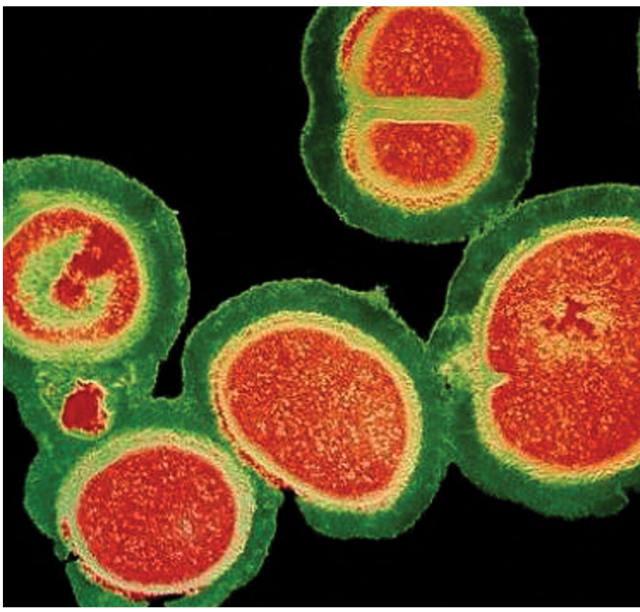
Barnsley Hospital NHS Foundation Trust
The Rotherham NHS Foundation Trust

Antimicrobial Policy for Neonates

age 1 day to 1 month

(Age more than 1 month, see Paediatric Policy)



Do not use antimicrobials unless absolutely essential

2013 15

Your health, your life, your choice, our passion

NHS

Penicillin Allergy | Neonates

Allergy Status

- Always ask for description of the reaction experienced.
- Document in notes and on medicine chart: The Name of medicine and the Reaction.
- Diarrhoea is a result of change in bowel flora and not an allergic reaction

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PENICILLIN ALLERGY

LIFE-THREATENING
IMMEDIATE
eg anaphylaxis
angioedema
urticaria
rash – florid, blotchy

Do not use any Beta-lactams

Penicillins
Amoxicillin
Benzylpenicillin
Co-amoxiclav
Co-fluampicil
Flucloxacillin
Penicillin V
Piperacillin with Tazobactam

Cephalosporins
Cefalexin
Cefotaxime
Ceftazidime
Ceftriaxone
Cefuroxime

Carbapenems
Imipenem
Meropenem

Monobactam
Aztreonam
Microbiologist may advise

PENICILLIN ALLERGY

NOT LIFE-THREATENING
DELAYED
eg simple rash
- non confluent,
- non pruritic
- restricted to small area

Use with caution cephalosporins, carbapenems and monobactams

Cross-reactivity in 10% of patients allergic to penicillin

Cephalosporins
Cefalexin
Cefotaxime
Ceftazidime
Ceftriaxone
Cefuroxime

Carbapenems
Imipenem
Meropenem

Monobactam
Aztreonam

PENICILLIN ALLERGY

ALL TYPES

Safe to use

Amikacin
Azithromycin
Ciprofloxacin
Clarithromycin
Clindamycin
Colomycin
Co-trimoxazole
Erythromycin
Gentamicin
Metronidazole
Nitrofurantoin
Ofloxacin
Rifampicin
Sodium fusidate
Teicoplanin
Tetracycline
Tigecycline
Tobramycin
Trimethoprim
Vancomycin

For antibiotics not listed or for further information, please contact:

	Barnsley	**Rotherham**
Ward paediatric pharmacist	Bleep	8151
Microbiologist	2749, 4986	4742, 7712
Medicines Information	2857	4126

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ABBREVIATIONS

BD	Every 12 hours
FBC	Full blood count
CCDC	Consultant Communicable Diseases Control
CMV	Cytomegalovirus
CRP	C-reactive protein
CSF	Cerebrospinal fluid
CSU	Catheter specimen urine
CXR	Chest X-ray
DMSO	Dimethyl sulphoxide
ELISA	Enzyme linked immunoassay
ESBL	Extended spectrum beta lactamase
ET	Endotracheal
GRE	Glycopeptide Resistant Enterococci
GUM	Genitourinary medicine
HPA	Health Protection Agency
HVS	High vaginal swabs
IF	Immunofluorescence
IgG	Immunoglobulin G
i/v	Intravenous
kg	kilogram
LFT	Liver function tests
LP	Lumbar puncture
MCUG	Micturating cystourethrogram
mg	Milligram
mL	Millilitre
MRSA	Meticillin resistant staphylococcus aureus
NPA	Nasopharyngeal aspirate
OD	Once daily
PICC	Peripherally inserted central catheter
PCR	Polymerase chain reaction
PROM	Premature rupture of membranes
QDS	Every 6 hours
RDS	respiratory distress syndrome
ROM	Rupture of membranes
RSV	Respiratory syncytial virus
SBR	Serum bilirubin
SPA	Suprapubic aspirate
SROM	Spontaneous rupture of membranes
TDS	Every 8 hours
TORCH	Toxoplasma gondii, Rubella, Cytomegalovirus, Herpes simplex
UAC	umbilical artery catheter
UEs	urea and electrolytes
UTI	urinary tract infection
UVC	umbilical venous catheter
VZIg	Varicella zoster Immunoglobulin
VIP	Venous inflammatory phlebitis score
WCC	white cell count

Neonatal Infection

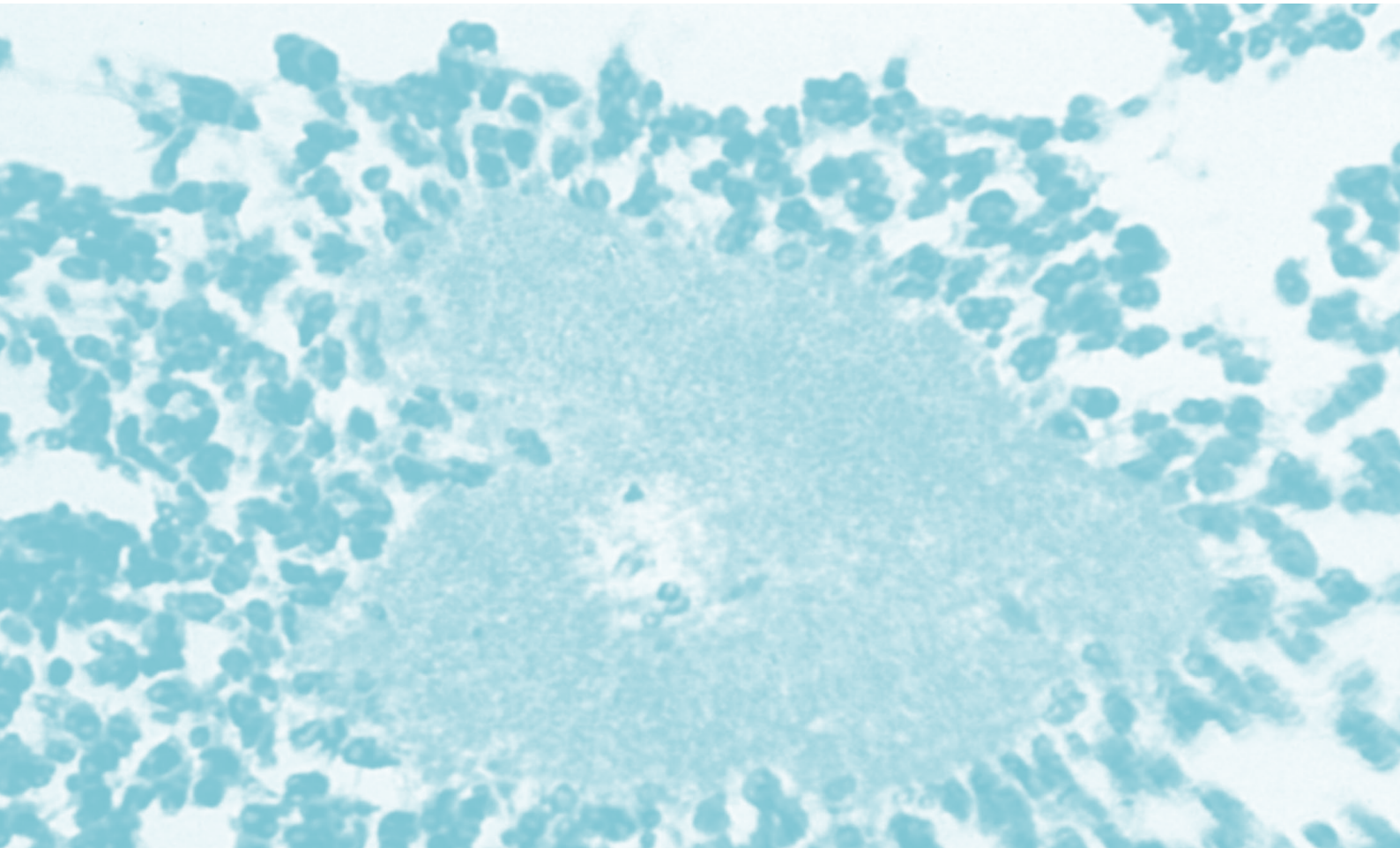
Introduction

The infections remain the most important cause of neonatal morbidity and mortality. Pre-term infants and small for gestational age babies are particularly vulnerable, due to reduced trans-placental acquisition of IgG (which occurs predominantly after 30 weeks gestation), and the need for invasive procedures such as intubation and central arterial and venous catheter placement.

The importance of the rational use of antibiotics in this age group cannot be over emphasised. The foetus grows in a sterile environment. Following rupture of membranes the baby is exposed initially to maternal organisms from the vagina, rectum and perineum, then those from the environment in which he is nursed. The injudicious use of broad spectrum antimicrobials select for resistant organisms with which the physical environment and staff of the neonatal unit become colonised, posing a severe hazard to infants admitted there. Once resistant organisms have emerged, there is a risk of spread of these organisms particularly if infection control practise is suboptimal.

The manifestations of sepsis in the neonate are often insidious and non-specific. Newborn babies, especially pre-term infants can become ill and deteriorate rapidly. Relatively minor infections may disseminate so septicaemia and meningitis is a constant risk. Treatment has to be on the basis of clinical suspicion, and may be appropriately discontinued after 48 hours if the initial concerns are unsubstantiated

Prevention of cross infection by effective hand washing / decontamination before and after each patient contact is essential. Medical and Nursing staff with intercurrent infections should take advice from Occupational Health and the Infection Control Team as to whether or not they remain on duty or have direct patient contact. Parents, carers and siblings should take similar precautions.



PRINCIPLES OF ANTIMICROBIAL PRESCRIBING

Before prescribing antimicrobials, consider ten fundamental questions:

1. **Is the patient infected with a bacterial agent?**
2. **Are empirical antimicrobials necessary?**
3. **Have you checked antimicrobial allergies and their nature?**
4. **How can we make a microbiological diagnosis? Have the relevant specimens been obtained? (See user guide for more details).**
5. **Have you checked for any previous microbiology results?**
6. **Check for history of MRSA / ESBL / other resistant organisms and Clostridium difficile diarrhoea**
7. **What is the most appropriate antimicrobial therapy and how should it be given?**
8. **How can we monitor therapy?**
9. **What is the duration of antimicrobial therapy?**
10. **Are there any infection control / reporting issues?**

ESSENTIAL FACTS

- Encourage oral antimicrobials whenever possible
- Use IV antimicrobials only in serious infections or when patients are unable to take oral medication.
- After 24-48 hrs of IV therapy review the patient and consider switching to oral medication.
- Generally a total of 5 days of antimicrobials therapy should suffice for uncomplicated infections.
- Review antibiotics and clinical progress in the light of current microbiology results.
- Once the aetiological agent is identified, switch the broad spectrum therapy to a targeted narrow spectrum therapy.

ADVICE

Advice can always be obtained from the Department of Medical Microbiology. There is a 24 hour and 7 day service, both technical and clinical, available for the investigation, treatment, and prevention of infections. Pharmacists may be contacted for dosage, therapeutic drug monitoring and medicines information.

Before contacting for advice:

- Assess the patient
- Know the admitting diagnosis
- Read the most recent progress notes and assessment from the prior shifts
- Have appropriate documents available eg Nursing and Medical Records, PAR (Patient at risk), Charts, Allergies, IV fluids, Resuscitation status

and communicate using the SBAR Reporting Tool.

ADHERENCE TO THE POLICY

This will be achieved by monitoring prescribing on a daily basis and as a rolling programme of audits by the directorates and the microbiology department, as recommended by Saving Lives.[6]

DRUG CHART

- Check for genuine allergy
- Check for MRSA status, ESBL producing and other resistant organisms and history of C.difficile diarrhoea
- Document INDICATION for therapy in the 'Additional instruction' section.
- Clearly document DOSE, ROUTE and DURATION of therapy
- Document Microbiology Code

RESTRICTED ANTIMICROBIAL AGENTS

The following drugs are restricted, unless recommended by the Policy, because of toxicity, excessive cost and/or specific and limited indications for use. However these are available in the pharmacy on a named patient basis after discussion with a Consultant Microbiologist who will also provide a Microbiology Code

Antimicrobials restricted for use unless recommended in the Policy	
Amikacin	**i/v**
Amphotericin	**i/v**
Aztreonam	**i/v**
Caspofungin	**i/v**
Linezolid	**Oral i/v**
Meropenem	**i/v**
Fusidic acid suspension	**Oral**
Valaciclovir	**Oral**

SBAR Reporting Infection

Attention all team members

For good communication about patients between all health professionals, use the SBAR tool before calling:

- **Assess the patient**
- **Know the admitting diagnosis**
- **Read the most recent progress notes and assessment from the prior shifts**
- **Have appropriate documents available eg Nursing and Medical Records, Medicine Charts, Allergies, IV fluids, Resuscitation status**

S ituation

- **State your name and unit/ward**
- **I am calling about patient's name and age**
- **The reason I am calling is...**

B ackground

- **State the admission diagnosis/working diagnosis and date of admission**
- **Relevant medical history including family history; underlying condition/ co morbidities**
- **A brief summary of treatment to date; current antimicrobial therapy and duration; recent antimicrobial use (within the last month if possible)**
- **History of MRSA/ ESBL/ other resistant organisms/ C.difficile diarrhoea**
- **Previous microbiology results**
- **Infective markers**

A ssessment

- **State your assessment of the patient**
  - **Allergies**
  - **Renal function**
  - **Hepatic function**

R ecommendation

- **I would like (state what you would like to see done)**
- **Determine timescale**
- **Is there anything else I should do?**
- **Record name and phone or bleep number of contact**
- **Patient concerns, expectations and wishes**

Don't forget to document the call!

SEPSIS - EARLY ONSET SEPSIS (first 48 hours of life)

RISK FACTORS & SYMPTOMS

MOTHER	BABY
Preterm rupture of membranes / pre-term labour Maternal pyrexia Prolonged rupture of membranes (more than 24 hrs) see Intranet Proforma regarding which babies to treat Offensive liquor Meconium liquor in a pre-term infant Maternal Gp B Streptococcus (see Intranet Proforma)	Preterm Respiratory distress Unstable or low temperature Unstable or deteriorating condition Hypoglycaemia Pallor / mottled skin Lethargy / quietness/ floppiness Jitteriness Irritability Early jaundice Metabolic acidosis Low white cell count Hepato-splenomegaly

IMPORTANT Before prescribing antimicrobials

- Refer to Group B Streptococcus, obstetric SROM (pre-labour ROM) and PROM guidelines as appropriate to see which babies to treat and which to observe (see Appendix)
- Check maternal microbiology results
- Ask obstetricians to get HVS / placental swab
- Treat on suspicion – antibiotics can be stopped if cultures are negative, usually after 48 hrs
- Consider Listeria sp if
  - Maternal flu-like febrile illness pre- labour
  - Meconium staining of liquor in a preterm baby
  - Baby ill with rash (sparse papular eruption)/ hepato-splenomegaly

Take appropriate samples

- Blood cultures
- FBC
- CRP
- CXR
- LP (unless clear focus or baby too unstable. If in doubt take senior advice)
- Skin swabs (ear, umbilicus, axilla, any infected looking area)
- Gastric aspirate (less than 6 hours, not fed)
- ET secretions if ventilated
- Other tests to help in management:
  U+E, bilirubin, glucose, coagulation screen, group and save

SEPSIS - SUSPECTED EARLY ONSET SEPSIS (first 48 hours of life)

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Early Onset Sepsis	*Gp B Streptococcus,* *E coli* *Coliforms* *Anaerobes* *Other Streptococci* *Haemophilus sp.*	**Benzylpenicillin iv 50mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** (follow meningitis guidelines if LP suggests meningitis) Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C **Add** if liquor smelly / offensive **Metronidazole iv** Loading dose 15 mg/kg followed by 7.5 mg/kg BD starting 12 hours after loading dose	**Review treatment in light of cultures and investigation results:** • Possible infection (no clinical evidence, cultures negative at 48 hrs) – stop at 48 hrs • Probable infection (clinically suspicious, cultures neg) – treat for 5 days • Pneumonia 5-7 days • Positive blood cultures - Treat for 7-14 days depending on organism **If baby remains unwell** • Repeat blood cultures (include line samples) • LP (if not already done) • Seek advice from Consultant Microbiologist regarding antibiotic regime **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
	Listeria monocytogenes	**Amoxicillin iv 100 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Ask obstetricians to culture mother Treat positive blood cultures for 14 days For meningitis: Amoxicllin iv for 21 days plus Gentamicin iv for 14 days Advise parents on avoiding risk in the future **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

SEPSIS - LATE-ONSET (after 48 hours)

RISK FACTORS & SYMPTOMS

MOTHER	BABY
Preterm delivery Maternal pyrexia Prolonged rupture of membranes (more than 24 hrs) see proforma on intranet Offensive liquor Meconium stained liquor in a pre-term infant Maternal Gp B Streptococcus (See Intranet Proforma) Maternal Herpes simplex Maternal Listeria sp. Infection Maternal illness Known colonisation with resistant organisms (MRSA, Other)	Increasing respiratory distress / oxygen requirements Increased apnoeas and bradycardias Unstable or low temperature Unstable or deteriorating condition Poor feeding, vomiting, increased aspirates, abdominal distension Hypoglycaemia Pallor / mottled skin Lethargy / quietness/ floppiness Jitteriness Irritability Jaundice Metabolic acidosis Low WCC/ high WCC/ fall in platelet count Hepato-splenomegaly Local inflammation

IMPORTANT Before prescribing antimicrobials

- Check previous microbiology results
- Treat on suspicion – antibiotics can be stopped after 48hrs if cultures are negative
- Consider *Listeria* if
  - Maternal flu-like febrile illness pre- labour
  - Meconium staining of liquor in a preterm baby
  - Baby ill with rash (sparse papular eruption) / hepato-splenomegaly
- Don't forget *Herpes simplex* or other viral infections

  Add aciclovir if *Herpes simplex* is a possibility

Take appropriate samples

- Blood culture
- FBC
- CRP
- CXR
- Urine (clean catch/ SPA)
- LP (unless clear focus or baby too unstable. If in doubt take senior advice)
- Skin swabs from any infected looking area
- ET secretions if ventilated
- Culture Central lines (PICC, UAC, UVC) and consider removing line
- If viral infection possible, take NPA, throat swab, stools, viral skin swab, blood for viral serology and CSF for microscopy, culture and viral PCR as appropriate.

SEPSIS - SUSPECTED LATE ONSET(after 48 hours of life)

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Bacterial	*Staph. aureus,* *Gp B streptococcus* *Coagulase- negative Staphylococcus* *Coliforms* . *Ps. aeruginosa* *Candida* + other opportunistic pathogens MRSA	1st line **Benzylpenicillin iv 50mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C 2nd line **If long line sepsis suspected** **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Teicoplanin iv** 1st dose 16mg/kg followed 24 hours later by 8 mg/kg once daily	Review treatment in light of cultures and investigation results: • Possible infection (no clinical evidence, cultures negative at 48 hrs) – stop if no clinical concerns • Probable infection (clinically suspicious, cultures negative) – treat for 7 days • Pneumonia 5-7 days • Positive blood cultures- 7-14 days check CSF if not already done **If baby remains unwell** • Repeat blood cultures (include line samples) • LP (if not already done) • Seek advice from Consultant Microbiologist regarding antibiotic regime • Consider fungal infection **Note** If previously treated with the 1st line antimicrobials for 7-10 days, start 2nd line treatment **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

SEPSIS - SUSPECTED LATE ONSET (after 48 hours of life)

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
MRSA Suspected or confirmed Consider if: - mum MRSA positive or - baby has had multiple courses of antimicrobials or - baby transferred from another hospital	Meticillin resistant *Staphylococcus aureus*	**Teicoplanin iv** Loading dose 16 mg/kg Maintenance dose 8 mg/kg starting 24 hours after loading dose plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	• Rigorous Infection Control measures to be taken • Discuss with Infection Control Team and Microbiologist • Counsel parents Duration as advised by paediatrician or microbiologist **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
Listeria	*Listeria sp*	**Amoxicillin iv 100 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	• Follow Infection Control measures • Ask obstetricians to send appropriate samples – stool & high vaginal swab - from mother if febrile or flu-like illness. • Treat positive blood cultures for 14 days. • Treat meningitis for 21 days Gentamicin - consider stopping after one week • Inform CCDC and Infection Control Team • Please advise mother on reducing risks in the future **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

SEPSIS - SUSPECTED LATE ONSET (after 48 hours of life)

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Fungal infection	*Candida albicans (80%)* *Candida sps.*	1st line **Fluconazole iv** Loading dose 12 mg/kg Maintenance dose 6 mg/kg after one dosing interval as below Age under 14 days Every 72 hours 14 - 28 days Every 48 hours over 28 days Every 24 hours 2nd line **Take microbiologist advice before using** **AmBisome® -** **Liposomal amphotericin iv** • Age under 28 days 100 micrograms/kg test dose (max 1mg) as part of 1mg/kg, then 1 mg/kg once daily. Increase if necessary to 3 mg/kg once daily. Maximum 5m/kg once daily • Age over 28 days Initial test dose 100 micrograms/kg (max 1mg) then 3 mg/kg once daily Maximum 5m/kg once daily *Non- albicans Candida sp.* more likely to be resistant to fluconazole	• Discuss treatment with Consultant Microbiologist • Consider fungal infection if poor response to iv antimicrobials / deteriorating clinical condition • Send peripheral and arterial blood cultures • SPA urine for microscopy and fungal culture • ET secretions if ventilated • LP to exclude fungal meningitis • Eye examination for fungal deposits • Ultrasound scan kidneys and heart for fungal deposits **AmBisome** Monitor electrolytes and renal function: FBC, potassium, magnesium and calcium levels

Virus

RSV prophylaxis	Respiratory Syncytial Virus	**Palivizumab im** 15 mg/kg once monthly to at risk infants during RSV season (usually 5 doses October – March)	Give to oxygen dependent babies with: • Chronic lung disease during RSV winter season • Haemodynamically significant left ot right shunt or cyanotic heart disease • Pulmonary hypertension • Combined immunodeficiency

RESPIRATORY TRACT INFECTIONS - PNEUMONIA

IMPORTANT Before prescribing antimicrobials

Treat on suspicion

Check maternal microbiology results

Consider Listeria if

- Maternal flu-like febrile illness pre- labour
- Meconium staining of liquor in a preterm baby
- Baby ill with rash (sparse papular eruption) / hepato-splenomegaly

Don't forget *Herpes simplex*, other viral infections, atypical organisms and MRSA

Take appropriate samples

- Blood culture
- FBC
- CRP
- CXR (may mimic RDS)
- Consider LP unless clear focus or baby too unstable. If in doubt take senior advice
- Gastric aspirate (if newborn less than 6hrs, not fed)
- ET secretions if ventilated
- NPA, throat swab, blood and CSF for viral infections if this is a possibility
- Other tests as indicated to help in management: U+E, bilirubin, glucose, coagulation screen, Group and save

PNEUMONIA - EARLY ONSET

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Early onset pneumonia (under 48 hours of age)	*Gp B Streptococcus* *E coli* Coliforms *Anaerobes* *Other Streptococci* *Haemophilus sp.*	**Benzylpenicillin iv 50mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C **Add** If liquor smelly / offensive **Metronidazole iv** Loading dose 15 mg/kg Maintenance dose 7.5 mg/kg BD starting 12 hours after loading dose	**Review treatment in light of cultures and investigation results:** • Probable infection (clinically suspicious, cultures neg) – treat for 5 days • Positive cultures from respiratory secretions - treat for 5-7 days • Positive blood cultures - treat for 7-14 days **If baby remains unwell** • Repeat blood cultures, culture ET and oro-pharyngeal secretions • LP (if not already done) • Seek advice from Consultant Microbiologist regarding antibiotic regime
	Listeria monocytogenes	**Amoxicillin iv 100 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Ask obstetricians to culture mother Treat positive blood cultures for 14 days and CSF for 21 days (see meningitis) **Gentamicin:** review after one week Advise parents on avoiding risk in future **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

PNEUMONIA - LATE ONSET

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Late onset pneumonia (after 48 hours of age)	*Gp B Streptococcus* *Coliforms* *Coagulase -negative Staphylococcus* *Ps. aeruginosa* *Staph. aureus,* *Candida sp* Consider non- bacterial organisms such as *Chlamydia, viruses (Herpes simplex CMV RSV Influenza Adenovirus) and Mycoplasma sp and Ureaplasma sp*	1st line **Benzylpenicillin iv 50mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C 2nd line **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Teicoplanin i/v** Loading dose 16 mg/kg Maintenance dose 8 mg/kg starting 24 hours after loading dose	**Review treatment in light of cultures and investigation results:** • Probable infection (clinically suspicious, cultures neg) – treat for 5 days • Positive cultures of respiratory secretions -treat for 7 days • Positive blood cultures -treat for 7-14 days. **If baby remains unwell** Repeat blood cultures (include line samples) LP (if not already done) Seek advice from Consultant Microbiologist regarding antibiotic regime **Note** If previously treated with the 1st line antimicrobials for 7-10 days, start 2nd line treatment **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

PNEUMONIA - ASPIRATION & ATYPICAL

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Aspiration pneumonia	Wide range of organisms including anaerobes	1st line **Benzylpenicillin iv 50mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C plus **Metronidazole iv** Loading dose 15 mg/kg Maintenance dose 7.5 mg/kg BD starting 12 hours after loading dose 2nd line **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Metronidazole iv** Loading dose 15 mg/kg Maintenance dose 7.5 mg/kg BD starting 12 hours after loading dose	Assess cause of aspiration Review treatment in light of cultures and investigation results Treat for 5-7 days **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
Atypical pneumonia	*Chlamydia trachomatis* *Chlamydia pneumoniae* *Mycoplasma hominis* *Ureaplasma urealyticum.*	**Clarithromycin oral** 7.5 mg/kg BD for 3 weeks **Clarthromycin oral** 7.5 mg/kg BD for 7-10days or **Clarithromycin iv** 7.5 mg/kg BD	**Can occur in the first week of life, but more usual after 3 weeks** • Send ET secretions or nasopharyngeal aspirate for Chlamydial IF and PCR • Send tarsal plate scrape if eye sticky for IF and PCR • If positive, inform parents and refer to GUM for counselling, screening and treatment Change to Clarithromycin oral when appropriate

URINARY TRACT INFECTIONS

IMPORTANT Before prescribing antimicrobials	
• Obtain second urine sample before starting antibiotics if baby's condition allows • If infant is even modestly unwell use broad spectrum iv antibiotics until culture results known	**Take appropriate samples** • Urine for urgent microscopy culture and sensitivities (clean catch, catheter sample of urine, SPA or urine pad if unsuccessful after 30 minutes - state method on request form) • Ward dipstick for leucocytes, nitrite reduction • Blood cultures • FBC • U+E • CRP

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Uncomplicated / typical urinary tract infection in otherwise well baby	*E. coli* Non-E. coli coliforms Coagulase-negative Staphylococcus Pseudomonas aeruginosa	**Co-amoxiclav oral** • Age under 28 days 0.25 mL/kg TDS 125/31 suspension • Age over 28 days 0.25 mL/kg TDS 125/31 suspension Dose doubled in severe infection or **Trimethoprim oral** 3mg/kg stat then 1 - 2 mg/kg BD Treat for 7 days	**Review treatment in light of cultures and investigation results:** • Check for renal tract anomalies, check urinary stream in boys • Check urine after course completed to ensure eradication • Discuss urinary prophylaxis with Senior Paediatrician • Investigate confirmed infection to exclude renal anomaly (Renal Utrasound scan , DMSA, and discuss MCUG with senior)
Atypical urinary tract infection (systemically unwell or non-E.coli infection)		**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS Treat for 7-10 days	

CENTRAL NERVOUS SYSTEM INFECTIONS

IMPORTANT Before prescribing antimicrobials	
Check previous microbiology results History of MRSA contact Microbiologist	**Take appropriate samples** • Blood cultures • LP (microscopy, culture, bacteriology, virology, PCR, glucose and protein) unless baby too unstable or coagulopathy. If in doubt take senior advice. • Skin swabs (ear, umbilicus, axilla, any infected looking area) • Blood EDTA sample for PCR (meningococcal, pneumococcal) • Blood glucose • If viral infection suspected send stool samples, throat swabs and vesicle fluid or swab for PCR

MENINGITIS - SUSPECTED

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Bacterial Meningitis Suspected	*Gr B Streptococcus* *E coli* *Haemophillus influenzae* *Listeria*	**Initial Empirical treatment** **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Amoxicillin iv 100 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS	Review treatment with results of microscopy, culture, sensitivity and PCR If antibiotics started before LP, organism may fail to grow from CSF and treatment should be continued if reasonable clinical suspicion for a minimum of 14 days.

CENTRAL NERVOUS SYSTEM INFECTIONS - MENINGITIS CONFIRMED

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Bacterial Meningitis Confirmed	*Gp B Streptococcus*	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS	Treat for 14 days
	Listeria monocytogenes	**Amoxicillin iv 100 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Follow Infection Control procedures Inform Public Health and Infection Control Team Inform Obstetricians Please advise mother on reducing risks in the future Treat with: Amoxicillin iv for 21 days Gentamicin i/v consider stopping after 7 days **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
	Colforms eg *E. coli Klebsiela*	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Treat for a minimum of three weeks; discuss with Consultant Microbiologist Review antibiotics with sensitivities **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
	Haemophilus influenzae	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS Treat for 14 days	Follow Infection Control procedures Inform HPA and Infection Control Team Inform obstetricians to obtain HVS and throat swabs and to give prophylaxis to mother and other close contacts. Give Rifampicin once daily orally for 4 days at end of course to eliminate carriage. Doses see BNFC
	Neisseria meningitidis	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS Treat for 7 days	Follow Infection Control procedures Notify HPA for contact tracing and prophylaxis Give Rifampicin orally 5 mg/kg BD for 2 days at end of course to treat carriage
	Streptococcus pneumoniae	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS >21 days QDS	Treat for a minimum of 2-3 weeks Check for ear infection

CENTRAL NERVOUS SYSTEM INFECTIONS - VIRAL MENINGITIS & ENCEPHALITIS

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Viral Meningitis	*Enteroviruses* including *ECHO virus* *Par ECHO virus*	Supportive treatment needed	Follow Infection Control procedures Send CSF for microscopy and PCR, throat swabs and stools for virology and PCR Stop antibiotics if viral infection confirmed Notify HPA
Encephalitis	*Herpes simplex* Suspected congenital viral infections see Viral Section	**Aciclovir iv** 20 mg/kg TDS for 21 days i/v infusion over 1 hour	Follow Infection Control procedures Discuss with Consultant Microbiologist Inform Infection Control Team Reduce dose in renal impairment If Herpes simplex confirmed treat with iv aciclovir for 21 days. If vertical transmission suspected, discuss screening mother with obstetricians (consider both genital and oro-labial herpes). Herpes simplex infection may recur after stopping treatment and aciclovir prophylaxis may be required for 6 months. Long courses - monitor for neutropenia

SKIN AND SOFT TISSUE INFECTIONS - BACTERIAL

Superficial infections in an otherwise well baby should always be taken seriously, because of the risk of invasive disease.

IMPORTANT Before prescribing antimicrobials

- **History of MRSA – contact Microbiologist**
- Check previous microbiology results
- Don't forget Herpes simplex and Fungal infections

Take appropriate samples before starting treatment

- Skin swabs, pus and aspirate if possible.
- Blood culture, FBC, CRP.
- If Herpes simplex a possibility take viral swabs from skin and oropharynx for PCR, LP for virology and PCR. Discuss with Microbiologist and start treatment with iv aciclovir

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Impetigo			
MILD / MODERATE	*Staph. aureus* *Streptococci*	**Flucloxacillin oral 25 mg/kg** Age under 7 days BD 7 - 21 days TDS over21 days QDS	Treat for 5 - 7 days
SEVERE		**Flucloxacillin iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Gentamicin iv 4 mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Treat for 10 -14 days Review treatment in the light of culture, sensitivities and clinical response **Give Gentamicin until the results of culture and sensitivities available** **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
Paronychia	*Staph. aureus* *Streptococci*	If baby well **Flucloxacillin oral 25 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS If baby unwell **Flucloxacillin iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus if unwell **Gentamicin iv 4 mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Treat for 7 days Treat for 10 – 14 days Review treatment in the light of culture, sensitivities and clinical response Give Gentamicin until results of culture and sensitivities available **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

SKIN AND SOFT TISSUE INFECTIONS - BACTERIAL

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Cellulitis	*Staph. aureus* *Streptococci* *H influenzae*	**Flucloxacillin iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Benzylpenicillin iv 50 mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS or **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS	Review treatment with results of microscopy, culture, sensitivity Mild infections consider changing to oral antibiotics especially in more mature baby once blood culture results are known to be negative Treat for 7 days If severe infection consider substituting benzylpenicillin with cefotaxime
Sticky umbilicus		**Local cleaning (alcohol swab)**	Swab **Start antibiotics as for omphalitis if evidence of-spreading infection (redness of abdominal wall), discharge or unwell baby or if cultures positive**
Omphalitis (umbilical discharge, periumbilical flare)	*Staph. aureus* *Streptococci* *Coliform sps*	**Flucloxacillin iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Gentamicin iv 4 mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C	Swab, blood cultures, FBC, CRP Review treatment with results of microscopy, culture, sensitivity Treat for 7 days **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)

SKIN AND SOFT TISSUE INFECTIONS - CANDIDA SKIN AND MUCOSA

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Oral & Perineal	*Candida albicans* *Candida sps.*	**Nystatin drops oral** 100,000 units /ml 1 mL 4 times a day If nappy area sore, add **Miconazole Cream 2%** Apply twice a day (at nappy change if perineal)	Swab Usually treat for one week or for 48 hours after finishing broad spectrum antimicrobials if given as prophylaxis

SKIN AND SOFT TISSUE INFECTIONS - VIRAL

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Herpes simplex	*Herpes simplex virus*	**Aciclovir iv** 20 mg /kg every 8 hours for 14 days iv Infusion over 60 minutes	Follow isolation procedures Inform Infection Control Team Discuss with Consultant Microbiologist Send CSF, throat swab, stools, vesicle fluid, swab from any suspicious lesions for PCR and viral culture. If Herpes simplex confirmed treat with iv aciclovir for 14 days and 21 days if CNS involvement. If vertical transmission suspected, discuss screening mother with obstetricians (consider both genital and oro-labial herpes). Herpes simplex infection may recur after stopping treatment and aciclovir prophylaxis may be required for 6 months. Adjust dose for renal impairment (Appendix) Long courses - monitor for neutropenia
Chicken pox (See Appendix for management of at risk infant)	*Varicella zoster virus (VZV)*	**Aciclovir iv** 20 mg /kg every 8 hours for 7 days i/v Infusion over 60 minutes	Follow isolation procedures Inform infection Control Team Cohort nurse contacts and give VZIG to non- immune contacts and any pre-term contact under 28 weeks regardless of postnatal age and mothers immune status (see Appendix) Monitor for secondary bacterial infections

CONGENITAL INFECTIONS

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Suspected congenital viral infection (TORCH)	*Toxoplasma gondi* *Rubella* *CMV* *Herpes simplex*	Discuss positive results with Microbiologist and liaise with Consultant Virologist and Paediatric Infectious Disease consultant as appropriate	Send blood for FBC, LFT Send urine for CMV PCR Blood for TORCH serology Review maternal antenatal serology Eye examination Cranial ultrasound Hearing test Isolate if appropriate if urine and blood CMV positive
Suspected congenital syphilis	Syphilis		Blood for FBC Blood for syphilis serology Eye examination hearing test Isolate if appropriate Follow up in history of seroconversion in pregnancy Repeat serology at 3 months and 12 months of age
Maternal Hepatitis B			See Intranet Proforma
Maternal Hepatitis C			See Intranet Proforma
HIV Risk of perinatal transmission		Discuss with local Paediatric consultant and take advice from Infectious Disease Consultant in Sheffield if necessary See local guidelines	See Intranet Proforma
RSV prophylaxis	Respiratory Syncytial Virus	**Palivizumab im** 15 mg/kg once monthly to at risk infants during RSV season (usually 5 doses Oct - Mar)	Give to oxygen dependent babies with: • chronic lung disease during RSV winter season • haemodynamically significant left to right shunt or cyanotic heart disease • pulmonary hypertension • combined immunodeficiency

BONE AND JOINT INFECTIONS

IMPORTANT Before prescribing antimicrobials

- Check previous microbiology results
- May be multifocal
- Bone scan often unhelpful
- Involve orthopaedic surgeon with expertise in this age group
- Consider ultrasound scan
- Exclude line related sepsis and possible portals of entry

Take appropriate samples

- Blood culture
- FBC
- CRP
- Consider if LP indicated
- Skin swabs from any infected looking area
- Culture Central lines (PICC, UAC, UVC) and consider removing line
- Other tests to help in management:
  U+E, SBR, glucose, coagulation screen, group and save

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Osteomyelitis Empirical treatment	*Staphylococcus aureus* *Gp B Streptococcus* *Other Strep. sps* *Gram negative enteric bacilli* *Haemophilus influenzae*	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Flucloxacillin iv 100 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS	Aspiration microscopy and culture essential prior to treatment Review treatment with culture and sensitivity results Treat for at least 6 weeks Monitor response to treatment with serial Xray, CRP, FBC Once organism identified discuss further treatment with microbiologist
Septic Arthritis	*Staphylococcus aureus* *Gp B Streptococcus* *Other Strep. sps* *Gram negative enteric bacilli* *Haemophilus influenzae*	As above	As above

EYE INFECTIONS

IMPORTANT Before prescribing antimicrobials

Sticky eyes are very common and just need cleansing with normal saline

Purulent discharge is always significant

Consider Chlamydia if infection fails to respond to treatment

Take appropriate samples

- If under 48 hrs old swab for standard bacterial culture + gonococcus culture (charcoal and plain dry swabs for gram stain and smear onto microscope slide for gram stain transport medium
- If over 48 hours of age swab for bacterial culture
- Consider tarsal plate scrape smeared onto PTFE coated (blue coating) slide and also Chlamydia swab for PCR

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Conjunctivitis	*Staphylococcus aureus* *Coliforms* *Neisseria gonorrhoea,* *Streptococcus sps* *H. influenzae*	**Chloramphenicol 1% eye ointment** Apply 6 hourly and continue until 48 hours after cleared	Review treatment with culture and sensitivity results If gonococcus or chlamydia confirmed refer parents to GU medicine If Chlamydia monitor for late pneumonia If severe eye infection or signs of systemic illness start iv antibiotics and treat for minimum 5 days
Under 48 hours old	*Gonococcus more likely*	**Chloramphenicol 1% eye ointment** Apply every 6 hours and continue until 48 hours after cleared plus **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS	Consider taking advice from consultant microbiologist and opthalmologist
Day 3-5	*Staphylococcus aureus* *Coliforms* *Streptococcus sps* *H. influenzae*	**Chloramphenicol 1% eye ointment** Apply every 6 hours and continue until 48 hours after cleared	
Chlamydia	*Chlamydia spp*	**Clarithromycin oral** 7.5 mg/kg BD for 14 days	
Gonococcus	*Gonococcus spp*	**Cefotaxime im 100 mg/kg** (max 1g) single dose	Discuss with microbiologist if necessary
Periorbital Cellulitis	*Staphylococcus aureus* *Beta haemolytic strep esp. GpA* *Streptococcus Sp.* *Haemophilus influenzae*	**Flucloxacillin iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS	Take conjunctival swabs, blood cultures, FBC, CRP Review treatment with culture and sensitivity results and discuss with consultant microbiologist and consultant opthalmologist Treat for at least 7 days guided by clinical response and culture results.

INTRAVASCULAR CATHETER ASSOCIATED INFECTION

IMPORTANT Before prescribing antimicrobials

- History of MRSA - contact Microbiologist
- Check previous microbiology results
- Review VIP score
- Consider central line renewal if signs of local or disseminated infection

Take appropriate samples

- Blood cultures should be obtained from peripheral site and from central line(s)
- FBC
- CRP
- Consider LP if baby significantly unwell
- Skin swabs from line exit site and any infected looking areas.
- Send central line tip for culture and sensitivity

Consider other tests to help in management:
U+E, SBR, glucose, coagulation screen, group and save

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Catheter associated infection	*Coagulase negative Staphylococcus* *Staphylococcus aureus* *Coliforms*	**Cefotaxime iv 50 mg/kg** Age under 7 days BD 7 - 21 days TDS over 21 days QDS plus **Teicoplanin iv** Loading dose 16 mg/kg Maintenance dose 8 mg/kg starting 24 hours after loading dose	Review treatment with culture and sensitivity results

GASTRO-INTESTINAL INFECTIONS

IMPORTANT Before prescribing antimicrobials	
• Check previous microbiology results • Close contact tracing	**Take appropriate samples** • Blood culture • FBC • CRP • U+E, LFT, coagulation screen, group and save • Urine (clean catch/ CSU/SPA) • Consider LP if sick • Stool culture

INFECTION	USUAL ORGANISMS	ANTIMICROBIALS	COMMENTS
Necrotising enterocolitis	*Coliforms* *Anaerobes* *Clostridium sps.* *Enterobacter* *Strep faecalis*	**Benzylpenicillin iv 50mg/kg** Age under 7 days BD 7 - 28 days TDS over 28 days QDS plus **Gentamicin iv 4 mg/kg** Initial dose interval every 24-36 hours depending on gestation and local policy. Dose must be reviewed on the basis of levels. See local policy: Barnsley Hospital Appendix B Rotherham Hospital Appendix C plus **Metronidazole iv** Loading dose 15 mg/kg Maintenance dose 7.5 mg/kg BD starting 12 hours after loading dose	Isolate if possible or barrier nurse Liaise with surgeons Monitor abdominal carefully clinically and with serial Xrays Discuss antimicrobials with consultant microbiologist when results cultures available Treat for minimum of 10 days with high dose iv antibiotics Nil by mouth for 10 days in confirmed infection Organise TPN **Gentamicin levels** Pre dose - less than 1 mg/L Post dose - 5-10 mg/L (one hour)
Gastroenteritis	*Rotavirus* *Norovirus* *Adenovirus* *Salmonella* *Campylobacter* *E. coli*		Follow infection control procedures Inform Infection Control Team Stools for microscopy and virology In sick babies full septic screen and iv antibiotics until culture and sensitivity results available Discuss appropriate iv treatment with consultant microbiologist Supportive treatment

MATERNAL CONDITIONS POTENTIALLY AFFECTING INFANT

Gp B Streptococcus	see hospital guidelines
Hepatitis B	see hospital guidelines
Hepatitis C	see hospital guideline
HIV	see hospital guidelines
Varicella	see hospital guidelines

Genital Herpes simplex

Neonatal infection occurs usually only after primary maternal infection. If mother has overt genital herpes or primary genital herpes, deliver by Caesarian section pre-labour or within 4 hours of onset of labour if SROM. If delivered after this time or through a cervix with overt genital herpes, isolate, culture and treat with iv aciclovir. Suspect at delivery if there has been PROM and suspicious skin or eye lesions, isolate, culture and treat.

If no evidence of active herpes at delivery watch for 48hrs, culture if any concern.

Herpes simplex – oro-labial, cutaneous.

The maternal lesions should be covered, and treated with topical aciclovir. Good maternal handwashing to be encouraged.

Syphilis see hospital guidelines

Toxoplasmosis see hospital guidelines.

IMMUNISATION POLICY

HEPATITIS B

Vaccination of term babies according to the hepatitis B status of the mother

Hepatitis B status of mother	Baby should receive	
	Hepatitis B vaccine	HBIG
Mother is HBsAg positive and HBeAg positive	Yes	Yes
Mother is HBsAg positive, HBeAg negative and anti-HBe negative	Yes	Yes
Mother is HBsAg positive where e-markers have not been determined	Yes	Yes
Mother had acute hepatitis B during pregnancy	Yes	Yes
Mother is HBsAg positive and anti-HBe positive	Yes	No
A woman who is HBsAg seropositive and known to have an HBV DNA level equal or above 1x106IUs/ml in an antenatal sample	Yes	Yes

Baby ≤1500g: Irrespective of Hepatitis status of mother.

Give Hepatitis B Specific Immunoglobulin 200 IU IM (thigh), within 30 min of birth
and
Hepatitis B Vaccine 10 microgram in 0.5 mL IM into opposite thigh - 1st Dose

Baby > 1500g and Mother Hepatitis B surface antigen - positive

Give Hepatitis B Vaccine at birth 10 microgram in 0.5 mL IM in to thigh – 1st Dose

Consider if baby needs screening for Hepatitis C / HIV

1. Sign drug kardex
2. Write date / dose / site / Batch No. in Hospital notes, Red Book
3. Complete Neonatal Hepatitis B Immunisation Information sheet.
   Give one copy to parents and rest to ward clerk
4. Complete Notification of Immunisation slip.
   Give to ward clerk to send to Child Health

Inform parents:

1. Further doses to complete the course will be given by GP Practice Nurse
   2nd Dose at 1 month
   3rd Dose at 2 months
   4th Dose at 12 months
2. Blood test (Hepatitis B surface antigen, and antibody) with the 4th dose to check success of immunisation.
3. Final Hepatitis B dose given with pre-school booster around 4.5 – 5 years of age.

Reference:

1. The Green Book at www.dh.gov.uk Update to Chapter 18
   Full version on intranet

GUIDELINES FOR THE MANAGEMENT OF CHICKEN POX (VARICELLA-ZOSTER) IN THE PERINATAL PERIOD

1. 90-95% of women of childbearing age will already have had chicken pox and therefore have life long immunity.

2. Pregnant mothers who have not had chicken pox may be susceptible to severe disease. Pregnant contacts of chicken pox, without a history of chicken pox in childhood, should be urgently tested for varicella-zoster antibody (send serum for urgent ELISA assay to respective Microbiology Departments; only those without antibody and exposure to varicella within the last 10 days require varicella-zoster immunoglobulin (VZIG, 1 g IM), preferably given within 72 hours of exposure. Supplies of VZIG may be obtained, via Microbiology Bank.

3. Newborn infants whose mothers develop chicken pox in the 7 days before and 7 days after birth may be at risk of developing severe, possible fatal neonatal disseminated varicella infection. This is due to a lack of transfer of protected antibodies from mother to the baby via the placenta.

   Prospective observational studies suggest that giving VZIG to the infants of mothers with chicken pox at around term may attenuate infection. VZIG (250 mg im) should therefore be given at birth to neonates who meet any of the following criteria:
   - their mother's rash develops between 7 days before and 7 days after birth;
   - they were born within the last 7 days, their mother is seronegative and they have had significant non maternal postnatal exposure (eg from a sibling);
   - they have been exposed to chicken pox and are at risk because of potentially inadequate transfer of maternal antibodies. This includes babies born before 28 weeks gestation or weighing less than 1000 g or who have had repeated blood sampling with replacement by packed red cell infusion or those requiring intensive or prolonged special care nursing. VZIG can be issued without antibody testing but, where possible, such infants should be tested. Obstetric medical staff must therefore inform the Neonatal medical staff about cases of maternal varicella. VZIG is obtainable from Microbiology.

Treatment of chicken pox

Severe neonatal infection can occur despite VZIG administration. Therefore intravenous Aciclovir should be given to babies if they develop chicken pox in the first 4 weeks of life and to babies born in the highest risk period for severe disease (ie where the mother develops chicken pox between 4 days before and 2 days after delivery).
All neonates with maternal or other exposure must be followed up for 14-16 days (by the GP, midwife, Health Visitor or in hospital) for early signs of infection.

Infection Control

Postnatally, the mother and baby should be isolated from other mothers and babies on the ward but not from each other.

Breastfeeding of babies exposed to maternal chicken pox should be encouraged. If the mother has chicken pox lesions close to the nipple, milk should be expressed until the lesions have dried and crusted. If protected from infection by VZIG and/or Aciclovir, the neonate can drink the expressed milk.

Where other members of the family have chicken pox at home and the mother is seronegative, discharge should be delayed until the baby is at least 7 days old, to a place away from exposure.

Mother should be observed for signs and symptoms of chicken pox infection for 14-21 days after Index patient's lesions have dried and crusted.

References:

1. Hospital Occupational Health Policy. Archives of Diseases in Childhood 1993; 68: 1-2
2. Immunisation against Infectious Diseases
3. Chicken pox, pregnancy and the newborn. Drug and Therapeutics Bulletin, September 2005, volume 43, number 9; 69-72.

APPENDICES
APPENDIX A - THERAPEUTIC DRUG MONITORING

Aminoglycosides (Gentamicin, Tobramycin)

Paediatric use of gentamicin is mainly restricted to treatment of endocarditis, cystic fibrosis in the neonatal period, for patients with penicillin allergies for surgical prophylaxis and for the treatment of serious infections. Amikacin and tobramycin are used in cases of resistance to gentamicin.

Aminoglycosides are excreted via the kidneys and therefore accumulation occurs in renal impairment. The side effects associated with toxic levels are hearing and balance disorders and further renal impairment. These drugs should be used with caution particularly in children with renal impairment.

Patients and their carers must be informed of potential side effects.

Dose calculation and monitoring serum concentration
- The dose and dose interval must be based on child's ideal body weight and renal function.
- Serum concentrations must be monitored to avoid both excessive and sub-therapeutic levels.
- The doses must be given at the times prescribed.
- Serum concentrations must be monitored according to the regimens.
- Time of dose and time of blood sample must be documented at all times, otherwise the results cannot be acted upon.
- The treatment with aminoglycosides must be reviewed daily.

Renal function must be monitored regularly throughout the treatment.

Glycopeptides (Vancomycin and Teicoplanin)

Glycopeptides are used for some surgical prophylaxis and for the treatment of infections on the advice of microbiologists.

Intravenous vancomycin dose calculations and monitoring serum concentrations
- Vancomycin dose and dose interval must be based on patient's ideal body weight and renal function when treating infections.
- Serum concentrations must be monitored to avoid both excessive and subtherapeutic levels.
- The doses must be given at the times prescribed.
- Serum concentrations must be monitored according to the regimens.
- Time of dose and time of blood sample must be documented at al times, otherwise the results can not be acted upon.
- The treatment with vancomycin must be reviewed daily.

Renal function must be monitored regularly throughout the treatment.

Teicoplanin serum levels require monitoring in deep seated infections to ensure that adequate levels have been achieved.

APPENDIX B - GENTAMICIN: BARNSLEY GUIDELINES NEONATE GESTATION <28 WEEKS

Barnsley Hospital NHS
NHS Foundation Trust

NEONATAL GENTAMICIN PRESCRIPTION SHEET

Less than 28 (<28) Weeks Gestation

Unit Number Name Date of Birth NHS number **(Patient label)**	**ALERT** (Sign & Date all entries) *(Please specify* **ALLERGIES** *and details of previous reaction if known)* ☐ None Known Date ___/___/___ Sign _____ Current weight _____kg (date) / /

Special Instructions

Refer for more information to a current copy of BNF for Children

Dosage and Administration

Initial Dosage:

< 28 weeks: Dose 4 mg / kg – every 36 hours

Administration:

- Administration as an undiluted slow IV bolus over 3 - 5 minutes
- Do not mix with penicillins, cephalosporins, erythromycin, heparin or sodium bicarbonate.
- Flush : 1ml Normal Saline
- Serum concentration levels to be taken with the **second** (2^{nd}) and **fifth** (5^{th}) dose.
  - **Pre-Dose** (trough) level <1mg/L
  - 1 (one) hour **Post-Dose** (peak) level 5–10mg/L
- If pre dose is high *(1-3mg/L)* but post dose is normal, extend the interval time between doses by 12 hours. If the pre-level was very high *(>3mg/ml*, withhold next dose, discuss with Microbiologist/Senior staff, repeat pre level 12 hours later and review renal function.
- If peak level is high (>10mg/L) with normal pre-dose, decrease dose by at least 10 – 15%.

FIRST DOSE on ……. / ……. /……. at……

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check.							

Serum levels to be taken PRE SECOND DOSE and 1 (ONE) HOUR POST SECOND DOSE

SECOND DOSE on ……. / ……. /……. at……

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

Children's Services, NNU, Dr. E A Gouta, Gentamicin Prescription Sheet <28 weeks, June 2011

<28 WEEKS

Name_____DOB_____Unit Number_____

SERUM LEVEL RESULT

DATE AND TIME PRE-DOSE TAKEN	PRE-DOSE RESULT	ACTION	DATE & SIGN
DATE AND TIME POST DOSE TAKEN	**POST-DOSE RESULT**	**ACTION**	**DATE & SIGN**

THIRD DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

FOURTH DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

Serum levels to be taken PRE FIFTH DOSE and 1 (ONE) HOUR POST FIFTH DOSE

FIFTH DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

SERUM LEVEL RESULTS

DATE AND TIME PRE-DOSE TAKEN	PRE-DOSE RESULT	ACTION	DATE & SIGN
DATE AND TIME POST DOSE TAKEN	**POST-DOSE RESULT**	**ACTION**	**DATE & SIGN**

SIXTH DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

Children's Services, NNU, Dr. E A Gouta, Gentamicin Prescription Sheet <28 weeks, June 2011

APPENDIX B - GENTAMICIN: BARNSLEY GUIDELINES NEONATE GESTATION >28 WEEKS

Barnsley Hospital NHS
NHS Foundation Trust

NEONATAL GENTAMICIN PRESCRIPTION SHEET

More than (>28) Weeks Gestation

Unit Number Name Date of Birth NHS number (Patient label)	**ALERT** (Sign & Date all entries) *(Please specify* **ALLERGIES** *and details of previous reaction if known)* ☐ None Known Date ___ / ___ / ___ Sign: _____
	Current weight _____kg (date) / /

Special Instructions

Refer for more information to a current copy of BNF for Children

Dosage and Administration

Initial Dosage:

> 28 weeks: Dose 4 mg / kg – every 24 hours

Administration:

- Administration as an undiluted slow IV bolus over 3 - 5 minutes
- Do not mix with penicillins, cephalosporins, erythromycin, heparin or sodium bicarbonate.
- Flush : 1ml Normal Saline
- Serum concentration levels to be taken with the **third (3rd)** and **sixth (6th)** dose. If no change in dosage regimen or renal function repeat levels every 3 doses
  - **Pre-Dose** (trough) level <1mg/L
  - 1 (one) hour **Post-Dose** (peak) level 5–10mg/L
- If pre dose is high *(1-3mg/L)* but post dose is normal, extend the interval time between doses by 12 hours. If the pre-level was very high *(>3mg/ml*, withhold next dose, discuss with Microbiologist/senior staff, repeat pre level 12 hours later and review renal function.
- If peak level is high (>10mg/L) with normal pre-dose, decrease dose by at least 10 – 15%.

FIRST DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

SECOND DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

Children's Services, NNU, Dr. E A Gouta, Gentamicin Prescription Sheet >28 weeks, June 2011

>28 WEEKS

Name_____ DOB_____ Unit Number_____

Serum levels to be taken PRE THIRD DOSE and 1 (ONE) HOUR POST THIRD DOSE

THIRD DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

SERUM LEVEL RESULTS

DATE AND TIME PRE- DOSE TAKEN	PRE-DOSE RESULT	ACTION	DATE & SIGN
DATE AND TIME POST DOSE TAKEN	**POST-DOSE RESULT**	**ACTION**	**DATE & SIGN**

FOURTH DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

FIFTH DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

Serum levels to be taken PRE SIXTH DOSE and 1 (ONE) HOUR POST SIXTH DOSE

SIXTH DOSE on ..... / ..... /..... at.....

DATE TO BE GIVEN	TIME TO BE GIVEN	MEDICINE APPROVED NAME	DOSE PRESCRIBED	ROUTE	PRESCRIBER'S SIGNATURE	DATE PRESCRIBED	TIME PRESCRIBED
		GENTAMICIN		IV bolus			
DATE GIVEN		TIME GIVEN	Batch Number		GIVEN BY	CHECKED BY	
Pharmacy Check							

SERUM LEVEL RESULTS

DATE AND TIME PRE- DOSE TAKEN	PRE-DOSE RESULT	ACTION	DATE & SIGN
DATE AND TIME POST DOSE TAKEN	**POST-DOSE RESULT**	**ACTION**	**DATE & SIGN**

APPENDIX C - GENTAMICIN: ROTHERHAM GUIDELINES NEONATE GESTATION <32 WEEKS AND >32 WEEKS

Rotherham Neonatal Unit PIM Aug 2010

print double sided on yellow paper

NEONATAL GENTAMICIN PRESCRIPTION

Name/ID label

Write "Gentamicin" on the "Regular Prescription" part of the ordinary treatment card, add in "see attached gentamicin prescription" and sign the entry.

Staple this sheet to the ordinary treatment card.

starting dose and frequency calculation	baby's weight	starting dose based on **4mg/kg**	Pharmacist's Signature
☐ 36 hourly – post conceptional age less than 32 weeks. ☐ 24 hourly – post conceptional age 32 weeks or greater	…… kg	round DOWN to nearest 0.5mg ……mg	

Standard strength gentamicin preparation is 10mg/ml (20mg in 2ml vial)

Prescription, preparation & administration

please take extra care with dates & times when prescribing & administering 36 hourly doses

administer IV over 3 minutes, close to the cannula site, then flush with 1ml 0.9% NaCl

date	dose (mg)	administer at: (24 hr clock)	take pre and 1hr post dose levels at ✓ (target pre is less than 2 ; post 5-10mg/l)	prescribed by	given by	* checked by	time given	comment/dose change
		hrs				/		
		hrs				/		
		hrs	✓ pre result…… post result……			/		
		hrs				/		
		hrs				/		
		hrs	✓ pre result…… post result……			/		
		hrs				/		

* use with NPSA double checking prompt

P.T.O. for further notes on level monitoring and dose adjustment.

APPENDIX C - GENTAMICIN: ROTHERHAM GUIDELINES NEONATE GESTATION <32 WEEKS AND >32 WEEKS

For routine 'rule out sepsis' use of gentamicin; there is no need for level monitoring in the 1st 48hours of therapy unless renal impairment is suspected or if furosemide is used.
If gentamicin is to be continued, measure levels around the 3rd and 6th doses and twice weekly thereafter.

Principles of Dose Adjustment:

Gentamicin level	Action
pre dose above 2mg/l	extend dose interval (2)
post dose less than 5 mg/l	increase dose (1)
post dose above 10 mg/l	decrease dose (1)
pre dose above 2mg/l post dose less than 5mg/l	extend dose interval(2) and increase dose(1)
pre dose above 2mg/l post dose above 10mg/l	extend dose interval (2) and decrease dose(1)

The following is a guide only, during normal working hours, seek advice from pharmacist.

(1) The excretion of gentamicin is approximately linear. Increase or decrease the dose by calculating for a midrange dose level of 7.5 mg/l
(2) Extend the dose interval by 12 hours.Establish that the next trough level has fallen to below 2mg/l before administering the next dose.

INJECTION COMPATIBILITY

Gentamicin is **compatible,** when administered on a Y connector with the following solutions:

Sodium chloride 0.9%
Dextrose 5% & 10% solutions
Benzylpenicillin
Metronidazole
Morphine
Midazolam

Gentamicin is not compatible with the following, and therefore should be kept separate from these solutions by use of alternative access points if possible, or at least by adequate flushing before and after administration:

Ampicillin
Amphoteracin
Cepahalosporins
Erythromicin
Flucloxacillin
Furosemide (Frusemide)
Heparin
Indometacin

This is not an exhaustive list, Pharmacy should be consulted for details of other compatibilities.

APPENDIX D - LABORATORY RESULTS SUGGESTIVE OF INFECTION

LABORATORY TESTS	RESULTS
FBC	Neutrophilia > 20,000 x10 /L day 1, > 8,000 x 10 /L day 2, Neutropenia esp. < 1.8 x 10 /L Vacuolization / toxic granulation on blood film immature (band, myelo, metamyelocyte): total neutrophil ratio of > 0.16 day 1 > 0.14 day 1 - 2 > 0.13 day 2 - 5 > 0.12 day 5 - 28 Low platelet count / high platelet count
Raised acute phase markers	CRP, fibrinogen - these may not be raised in early sepsis.
CSF	WCC > 20 /mm³ suspicious but up to 30 / mm³ may be normal neonatally.If bloody tap Red cell : WCC ratio should be > 500 : 1 in uninfected CSF Protein 1.5 – 2 g/l term, up to 3.7 g/l pre-term Glucose ≥ 50% of plasma glucose - normal. < 30% of plasma glucose strongly suggests meningitis

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Jessops

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Fleming et al. A Neonatal Vade-Mecum. 2nd Edition
Stephenson et al. Pocket Neonatology.
Family Practice notebook.com. Gonococcal Conjunctivitis

CONTACT NUMBERS

ROTHERHAM NHS FOUNDATION TRUST

Telephone number	01709 820000
On call Consultant Paediatrician or Paediatric Registrar	Via Switch board
Consultant Medical Microbiologist	7712
Associate Specialist	4742
Clinical Scientist	4741
Paediatric Pharmacist	8151
Medicines Information Pharmacist	4126
Pharmacist Antimicrobial Lead	8132

BARNSLEY HOSPITAL NHS FOUNDATION TRUST

Telephone number	01226 730000
On call Consultant Paediatrician or Paediatric Registrar	Via Switch board
Consultant Medical Microbiologist	2749
Consultant Medical Microbiologist	4986
Biomedical Scientist	3044
Paediatric Pharmacist	Bleep 2047
Medicines Information Pharmacist	2857
Pharmacist Antimicrobials Lead	Bleep 688

Out of hours – contact appropriate on-call staff via Switchboard

AUTHORS

Professor Al-Wali	Consultant Microbiologist
Dr Asensio	Associate Specialist Microbiologist
Dr Gupta	Consultant Paediatrician
Dr Harrison	Consultant Paediatrician
Dr Pang	Consultant Microbiologist
Dr Rao	Consultant Microbiologist
S Ahuja	Medicines Evaluation Pharmacist
A-M Bester	Pharmacist Paediatrics
G Lawson	Pharmacist Antimicrobials
D Mowbray	Pharmacist Paediatrics
S Sutcliffe	Pharmacist Paediatrics

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Sheffield Hospitals	Guidelines for cystic fibrosis
Leeds Hospitals	Guidelines for infective endocarditis

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CONTACTING MICROBIOLOGIST

Before contacting for advice:
- Assess the patient
- Know the admitting process
- Read the most recent progress notes and assessment from the prior shifts
- Have appropriate documents available eg Nursing and Medical records, PAR (Patient at Risk), Charts, IV fluids, Resuscitation status

and communicate using the SBA Reporting Tool.

SBAR Reporting Tool

Situation
- State your name and unit/wards
- I am calling about patient's name and age
- The reason I am calling is……..

Background
- Sate the admission/ diagnosis and date of admission
- Relevant medical history including family history, underlying condition/ comorbidities
- A brief summary of treatment to date; current antimicrobial therapy and duration; recent antimicrobial use (within the last month if possible)
- History of MRSA/ ESBL/ other resistant organisms/ C difficile diarrhoea
- Previous microbiology results
- Infective markers

Assessment
- State your assessment of the patient
- Renal function
- Hepatic function

Recommendations
- I would like (state what you would like to see done)
- Determine timescale
- Is there anything else I should do?
- Record name and contact number of contact
- Patient concerns and wishes

Don't forget to document the call!

Pharmacy

Rotherham Hospital
Moorgate Road
Oakwood
Rotherham
S60 2UD

Telephone 01709 820000
www.therotherhamft.nhs.uk

Barnsley Hospital
Gawber Road
Barnsley
S75 2EP

Telephone 01226 730000
www.barnsleyhospital.nhs.uk

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