AMIKACIN PRESCRIBING for ADULT INPATIENTS (≥ 16 YEARS)

Gram-Negative Bacteria

TARGET AUDIENCE	NHS Lanarkshire secondary care
PATIENT GROUP	Adult patients ≥ 16 years Use only on the advice of an Infection Specialist, or when amikacin is susceptible on culture & sensitivity report.

Contents

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For full information on **route and method of administration, contraindications, cautions and adverse effects and drug interactions** please refer to the following approved resources or seek advice from pharmacy:

- British National Formulary (BNF)
- Summary of Product Characteristics (SPC)
- Renal Drug Database (log in required)
- NHS Injectable Medicines Guide (Medusa) or local IV Drug monographs
- Stockley's Drug Interactions

1 INDICATION

Use only on the advice of an Infection Specialist, or when amikacin is susceptible on culture & sensitivity report. Amikacin is an ALERT second link (protected) antimicrobial. Refer to NHSL Alert (protected) antimicrobial authorisation process.

A once-daily regimen is preferred for gram-negative infections. For dosing in non-tuberculosis mycobacterial infections (NTM), seek advice from Infectious Diseases as a different dosing schedule is used.

2 EXCLUSIONS AND CONTRAINDICATIONS (seek pharmacy or specialist team advice)

- Patients <16 years old
- Patients treated in renal units or receiving haemodialysis or haemofiltration
- Pregnancy
- Major burns >20% body surface
- Cystic Fibrosis
- Ascites >20% body weight or decompensated liver disease
- Known allergy to amikacin or any other aminoglycoside
- Known/suspected myasthenia gravis (aminoglycosides may impair neuromuscular transmission)
- Known/family history of mitochondrial DNA mutation m.1555A>G

2.1 Cautions

- Co-administration with neurotoxic or nephrotoxic agents e.g. neuromuscular blockers, nonsteroidal anti-inflammatory drugs, ACE inhibitors, potent diuretics (i.e. IV diuretics, oral furosemide >80mg/daily, oral bumetanide >2mg/day, combination diuretics in refractory oedema e.g. furosemide + metolazone)
- Patients with known muscular weakness
- Chronic Kidney Disease stage 4/5, ≥50% increase in serum creatinine or oliguria for >6 hours in the past 48 hours - if amikacin is clinically indicated, give one dose as per guidance and check with pharmacist or infection specialist before giving second dose
- Patients with hearing loss (avoid if known/suspected mitochondrial DNA mutation)

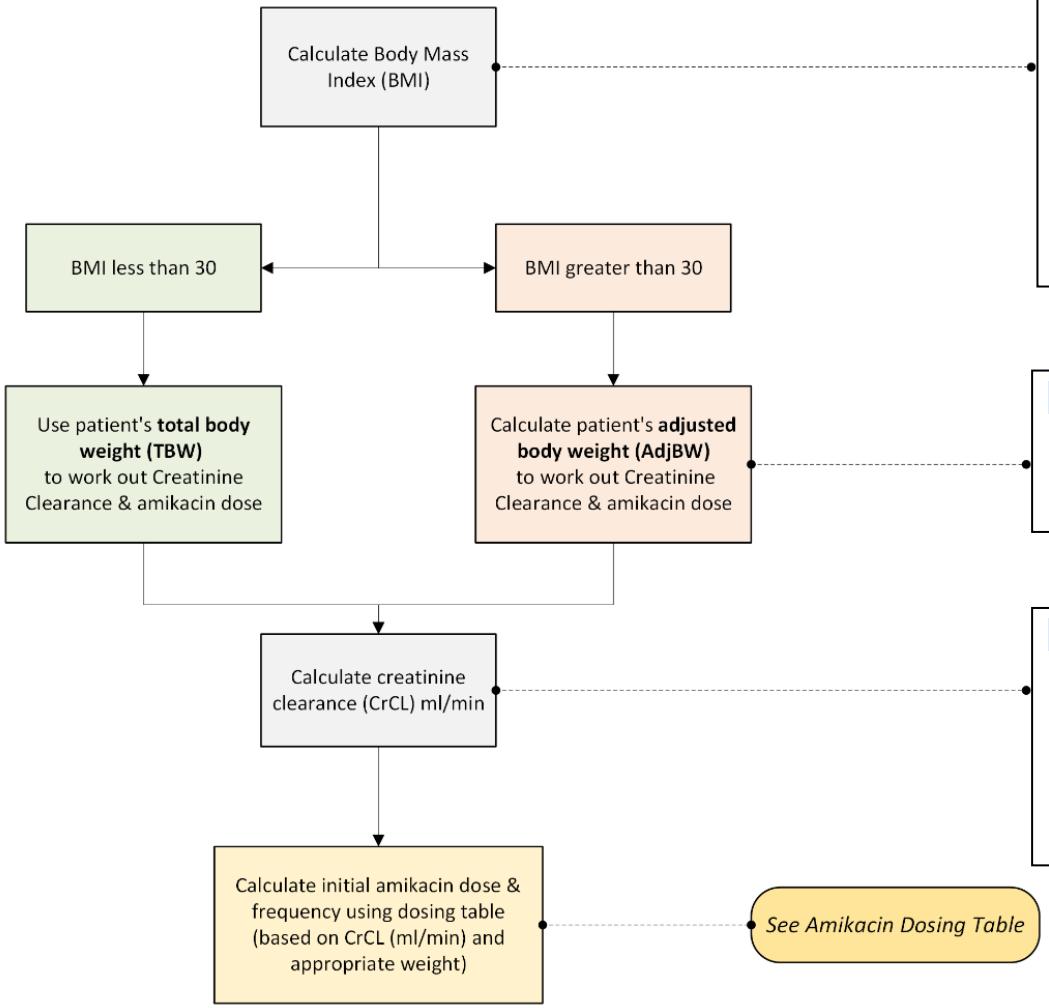
3 PRESCRIBING

Amikacin should be prescribed 'prn as per chart' on HEPMA and also on the paper amikacin prescription, administration and monitoring chart (Appendix A). Choose an administration time that will facilitate peak and trough levels to be monitored. Note that without accurate dosage information, administration times and concentration times, the amikacin concentrations will be unable to be used.
Discuss risks and benefits of therapy with the patient and supply a patient information leaflet 'Amikacin and Your Ears' (Appendix B) at the start of treatment (unless inappropriate).

Lead Author	Antimicrobial Management Team (AMT)	**Date approved**	Approved by Antimicrobial Management Committee (AMC): December 2025 | ADTC: February 2026
Version	2025 V1	**Review Date**	December 2028

4 DOSE CALCULATION AND FREQUENCY OF ADMINISTRATION

Initial amikacin dosing is based on weight and renal function. The **most appropriate weight** must be used to work out both the Creatinine Clearance and the amikacin dose. **DO NOT use eGFR;** calculate creatinine clearance (CrCL) using Cockcroft Gault equation. See the flow chart below. See Appendix C for longhand calculations.



Step 1: Calculate Body Mass Index (BMI) kg/m²

Use MDCalc BMI Calculator

If BMI is > 30:
Use patient's **adjusted body weight (AdjBW**) to calculate CrCL. Proceed to Step 2.

OR

If BMI is < 30:
Use patient's **total body weight (TBW)** to calculate CrCL. Proceed to Step 3.

Step 2: If BMI > 30, calculate adjusted body weight (AdjBW)

MDCalc IBW & AdjBW calculator

Once AdjBW is calculated, proceed to Step 3.

Step 3: Calculate creatinine clearance (CrCL) ml/min

Use the patient's **total body weight (TBW)**, unless BMI > 30 where **adjusted body weight (AdjBW)** is recommended. If serum Cr < 60 micromol/L use **60** in calculation.

Use MDCalc Creatinine Clearance (Cockcroft-Gault Equation)
ensuring the correct CrCL value is selected depending on whether TBW or AdjBW is required (based on BMI result).

AMIKACIN DOSING TABLE

GRAM NEGATIVE BACTERIA INFECTIONS:

Creatinine Clearance (CrCL) ml/min **	**Amikacin dose:** Use total body weight **OR** if BMI > 30 use adjusted body weight. **Round to nearest 50mg**	**Dose frequency**
< 20	2.5 mg/kg (max 200 mg)	Re-dose once trough concentration <5mg/L
20 – 29	5.5 mg/kg (max 550mg)	24 hourly but seek advice before giving next dose
30 – 49	6 mg/kg (max 600mg)	24 hourly
50 – 70	12 mg/kg (max 1200mg)	24 hourly
> 70	15 mg/kg (max 1500mg)	24 hourly

** If creatinine is not known give 7.5 mg/kg amikacin (maximum 600 mg) and seek advice from pharmacy.

5 ADMINISTRATION

Refer to SPC or NHS Injectable Medicines Guide for full information.
Intravenous infusion is the preferred route of administration: dilute the required dose to 100ml with sodium chloride 0.9% or glucose 5% and give over 30 minutes.

6 MONITORING REQUIREMENTS

Amikacin can cause nephrotoxicity and ototoxicity (cochlear and vestibular). The risk of amikacin toxicity increases with increasing duration of therapy and may occur irrespective of amikacin concentration.
Provide patient with 'Amikacin and your Ears' information leaflet (access copies of PIL on FirstPort / Appendix B).

Frequency	**Recommended monitoring**
Baseline	Urea and electrolytes (U&Es), magnesium and calcium, liver function tests (LFTs), C-reactive protein (CRP) and full blood count (FBC). The mitrochondrial DNA mutation m.1555A>G predisposes to severe hearing loss following aminoglycoside exposure. Consider the need for genetic testing, especially in patients requiring recurrent or long-term treatment with aminoglycosides (e.g. complex drug-resistant infections or recurrent neutropenic sepsis) but DO NOT delay urgent treatment in order to test.
Nephrotoxicity	**DAILY U&Es** • Seek advice from pharmacist if renal function is unstable (e.g. change in creatinine of >15-20%) • Signs of amikacin nephrotoxicity include; reduced urine output/ oliguria or increased creatinine • Consider an alternative antimicrobial agent if creatinine is increasing or the patient becomes oliguric • Ensure good hydration
Routine monitoring	DAILY U&Es. TWICE weekly LFTs, CRP, FBC, Mg and Ca (*Note* this may be more frequent if clinically necessary).
Oto/ Vestibular monitoring	Monitor patient regularly for any vestibular or auditory dysfunction e.g. new tinnitus, dizziness, poor balance, hearing loss, oscillating vision, unexplained nausea and/or vomiting. If ototoxicity is suspected, stop amikacin therapy immediately and discuss with an infection specialist. Audiometry required if duration of amikacin is anticipated to continue > 7 days and repeat monthly until end of course and then 2 months after final dose

Therapeutic drug monitoring	**When to take amikacin levels:** • PEAK amikacin concentration 1 hour after the end of the first or second amikacin infusion. Ensure 1 hour has elapsed, from the end of the infusion, as early concentrations will be invalid. • TROUGH amikacin concentration at the end of dosage interval (prior to the next dose). Do not delay giving the second amikacin dose while waiting for the trough concentration to be reported, unless there are concerns over deteriorating renal function or CrCl < 30 ml/min. **How to take amikacin levels:** • Use yellow topped bottle and send PAIRED (trough and peak) samples to Biochemistry. Record exact times of doses and samples on request form and sample times on bottles. Blood samples are sent to Glasgow for processing. • Please send PAIRED samples to Biochemistry before 12 noon where possible. If sent before this time, results will be available that evening. After 12 noon and at weekends, please phone Biochemistry before sending sample – samples may require to be sent to Glasgow by taxi to ensure prompt processing and results. **Reporting of amikacin levels:** • Results only available on NHSGGC Clinical Portal results. Access via NHSL Clinical Portal, then under 'Regional Portals'. For interpretation of results see below. Once satisfactory peak and trough concentrations are achieved and if renal function remains stable, check amikacin trough concentrations twice weekly. Frequency of monitoring can be reduced further depending on course length, discuss with pharmacist.

7 TARGET AMIKACIN PEAK AND TROUGH CONCENTRATIONS

GRAM NEGATIVE BACTERIA INFECTIONS:

Creatinine Clearance (CrCL ml/min)	Target peak concentration (1 hour post end of infusion)	Target trough concentration (end of dosage interval)
≥ 50	> 35 mg/L	< 2.3 mg/L
< 50	15 – 30 mg/L	< 5 mg/L

8 ADJUSTING THE DOSE BASED ON LEVELS

Check the administration and concentration times, ensure peak and trough are taken at the correct times before interpretation. Seek further advice from pharmacy if required.

Trough	Peak	Action
Below target	Low	Consider increasing dose (maximum 1500mg/day).
Below target	In range	Continue
Below target	High	Consider reducing dose
High	In range	Withhold and repeat level every 24 hours until below trough target; then consider restarting same dose with extended dosing interval
High	High	Withhold and repeat level every 24 hours until below trough target; then consider reducing dose and in addition consider extending dosing interval. Check trough and peak levels with the next dose

9 REFERENCES

This guidance has been adapted for NHS Lanarkshire from the Association of Scottish Antimicrobial Pharmacists guide which shares practical experience on the use of amikacin from a number of NHS Scotland Health Board documents and SAPG amikacin OPAT good practice prescribing guide.

Siebinga H et al. Population pharmacokinetic evaluation and optimization of amikacin dosage regimens for the management of mycobacterial infections. Journal of Antimicrobial Chemotherapy, 2020:75 (10): 2933-2940

Aminoglycosides: increased risk of deafness in patients with Drug Safety Update volume 14, issue 6: January 2021: 6.

Scottish Antimicrobial Prescribing Group; Adult out patient parenteral antimicrobial therapy (OPAT) good practice prescribing guide: Amikacin – management of Gram-negative infections. May 2024.

CHI no .....
First name ..... DOB ...../...../.....
Last name ..... Sex: ☐ M ☐ F
Address .....
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or attach addressograph label here

Amikacin (Adults)

Prescribing, administration and monitoring chart

Refer to full NHSL Amikacin guideline for information on indications, exclusions/contraindications, cautions, dosing & monitoring

NHS Lanarkshire

Only to be prescribed on the advice of an Infection Specialist
Age ....., Weight .....Kg,
Height .....cm, Creatinine .....
on ...../...../.....
BMI = ...

Initial dosing: .....mg
Predicted frequency: .....hourly.
Dose calculation confirmed by: .....
This is not a prescription and may change. Doses must be prescribed individually below. Do not prescribe doses in advance of the day they are due.

Monitoring:

If Creatinine clearance (CrCL) ≥50ml/minutes:
- Trough (pre-dose): <2.3mg/L
- Peak (1 hour post-end of infusion): >35mg/L

If CrCl <50ml/minutes:
- Trough (pre-dose): <5mg/L
- Peak (1 hour post-end of infusion): 15-30mg/L

Risks of prolonged treatment include nephrotoxicity and ototoxicity. Discuss with patient (unless inappropriate) and supply patient information leaflet 'Amikacin and Your Ears' at the start of treatment ☐

Date: / / Signature.....

Amikacin Prescription Record					Administration Record			Trough levels (pre-dose)			Monitoring Record				
Complete each time a dose is to be given. Prescribe on PRN section of HEPMA 'as per chart' or on paper cardex.					Administer over 30 minutes in 100ml sodium chloride 0.9% or glucose 5%. Complete each record below PLUS chart on HEPMA						Peak levels (1 hour post-end of infusion)				
Date to be given	Creatinine (micromol/L)	Time to be given (24hr clock)	Amikacin dose (mg)	Prescriber's signature PRINTED NAME	Date given	Time started (24hr clock)	Given by	Date of sample	Time of sample (24hr clock)	Trough amikacin level	Date of sample	Time of sample (24hr clock)	Peak Amikacin level	Action required (next dose)	Initials
														Action based on levels: ☐ Continue ☐ Withhold ☐ Change to	
														Action based on levels: ☐ Continue ☐ Withhold ☐ Change to	
														Action based on levels: ☐ Continue ☐ Withhold ☐ Change to	
Risks of prolonged treatment include nephrotoxicity and ototoxicity. Duration of therapy and treatment options should be discussed with an Infection Specialist. Document a rationale for treatment continuing beyond 3-4 days in the case notes.															
														Action based on levels: ☐ Continue ☐ Withhold ☐ Change to	

Upon discontinuation of therapy, ensure the Amikacin prescription is stopped on both HEPMA and the prescribing chart.
Uncontrolled when printed

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Issue No. 06

CHI no .....

First name ..... DOB ...../...../.....

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Address .....

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or attach addressograph label here

Upon discontinuation of therapy, ensure the Amikacin prescription is stopped on both HEPMA and the prescribing chart.

Uncontrolled when printed

Monitoring:

If Creatinine clearance (CrCL) ≥50ml/minutes:

- Trough (pre-dose): <2.3mg/L
- Peak (1 hour post-end of infusion): >35mg/L

If CrCl <50ml/minutes:

- Trough (pre-dose): <5mg/L
- Peak (1 hour post-end of infusion): 15-30mg/L

Amikacin Prescription Record					**Administration Record**			**Monitoring Record**							
Complete each time a dose is to be given. Prescribe on PRN section of HEPMA 'as per chart' or on paper cardex.					Administer over 30 minutes in 100ml sodium chloride 0.9% or glucose 5%. Complete each record below PLUS chart on HEPMA			Trough levels (pre-dose)			Peak levels (1 hour post-end of infusion)				
Date to be given	Creatinine (micromol/L)	Time to be given (24hr clock)	Amikacin dose (mg)	Prescriber's signature PRINTED NAME	Date given	Time started (24hr clock)	Given by	Date of sample	Time of sample (24hr clock)	Trough amikacin level	Date of sample	Time of sample (24hr clock)	Peak Amikacin level	Action required (next dose)	Initials
														Action based on levels: ☐ Continue ☐ Withhold ☐ Change to	
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														Action based on levels: ☐ Continue ☐ Withhold ☐ Change to	

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11 APPENDIX B. AMIKACIN & YOUR EARS PATIENT INFORMATION LEAFLET

Antimicrobial Management Committee

Amikacin and Your Ears

Information for patients

What is Amikacin used for?

Amikacin is an antibiotic used to treat serious bacterial infections. Your doctor may decide to give you Amikacin instead of other more commonly used antibiotics because it will be the most effective antibiotic for the type of bacteria causing your infection, or because of any allergies that you may have to other antibiotics.

How is Amikacin given?

Amikacin is given into a vein; it can be given via a drip or as an injection. For this reason Amikacin will usually be given to you by nurses in hospital. The dose of Amikacin given will depend on how serious the infection is, your age, body weight, height and how well your kidneys are working.

How can Amikacin affect my ears?

Like all medicines, Amikacin may occasionally have side effects.
Amikacin can occasionally cause damage to the ears. This may present itself as feeling dizzy or difficulty in keeping your balance, a ringing in your ears ("tinnitus") or hearing loss. In some cases these effects may be irreversible.

It is difficult to estimate the risk of these effects occurring in individual patients as it depends on a number of factors. What is known is that the risk increases if your kidneys do not work very well, if you are over 65 years old or in treatment courses lasting longer than 7 days. These effects however can also occur with shorter courses therefore it is important that care is taken to monitor for these effects in all patients prescribed Amikacin

What can be done to reduce the chance of this happening?

If you are at risk of developing these problems we would ideally try to avoid using Amikacin to treat you, however in some serious infections this may not be possible. In this situation your doctor will discuss the risks and benefits of treatment with you.

The amount of Amikacin in your blood will be measured regularly to check that the correct concentrations have been achieved. In some cases your doctor may also carry out blood tests to check your kidney function before and during treatment with Amikacin.

If you are taking water tablets ("diuretics") such as furosemide, your doctor may ask you to temporarily stop taking them whilst you are being treated with Amikacin. This is because they may increase the risk of Amikacin causing damage to your ears.

Is there anything that I can do?

It is important that you tell your doctor as soon as you notice the symptoms, if you are taking any other medicines, including over the counter medicines (bought from a pharmacy) or herbal remedies, because Amikacin can affect the action of some other medicines and vice-versa.

It is extremely important that you tell your doctor, ward pharmacist or nurse, straight away , if you experience any problems.

Who can I speak to if I have any questions?

This leaflet has been produced specifically to provide information about the side effects that Amikacin may have on your ears. If you would like information about other side effects of Amikacin there is a patient information leaflet produced by the manufacturers which is available in each box of Amikacin. You can ask the nursing staff caring for you to give this leaflet to you. The manufacturer's information leaflet is also available on the following website: **www.emc.medicines.org.uk**

The doctors caring for you will also be happy to answer any questions you may have. You can also ask to speak to one of the pharmacists or nurses caring for you.

How we keep your health information secure

NHS Lanarkshire take care to make sure that only people who are allowed to can access your personal information. Our staff have a legal duty to keep information about your health safe, secure and private.

If you want to learn more about how we do this, you can visit our website at **https://www.nhslanarkshire.scot.nhs.uk/data-protection-notice** You can also ask a member of staff for a copy of our Data Protection Notice.

We may use Copilot to assist in the production of patient leaflets where appropriate.

Care Opinion
What's your story?
www.careopinion.org.uk

NHS Lanarkshire - for local services and the latest health news visit www.nhslanarkshire.scot.nhs.uk
NHS Lanarkshire General Enquiry Line: 0300 30 30 243

NHS inform - The national health information service for Scotland.
www.nhsinform.org
Tel No: 0800 22 44 88

For NHS staff only -

For advice on how to get a leaflet translated for your patients, please contact: **patientinformation@lanarkshire.scot.nhs.uk**

For patient letters, records etc. please email: **translation.services@lanarkshire.scot.nhs.uk**

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Clinical Lead:	
Department:	Antimicrobial Management Committee

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Design - Medical Illustration, NHS Lanarkshire

Based on a Wirral University Teaching Hospital NHS Foundation Trust leaflet and reproduced with their permission.

12 APPENDIX C: Equations for calculating weight and creatinine clearance (CrCL) for Amikacin dosing

How to Calculate Creatinine Clearance for Amikacin Dosing:

DO NOT use eGFR. Calculate creatinine clearance (CrCL) using Cockcroft Gault equation (see below).

Step 1: Calculate Body Mass Index (BMI)

$$BMI\ (kg/m^2) = \frac{Weight\ (kg)}{Height\ (m)^2}$$ **OR** MDCalc BMI Calculator

If BMI is > 30 use patient's **adjusted body weight (AdjBW**) to calculate CrCL. Proceed to Step 2.
OR
If BMI is < 30 use patient's **total body weight (TBW)** to calculate CrCL. Proceed to Step 3.

Step 2: If BMI > 30, calculate adjusted body weight (AdjBW)

$$AdjBW = IBW + (0.4 \times (total\ body\ weight - IBW))$$ **OR** MDCalc IBW & AdjBW calculator

Where IBW is Ideal Body Weight:

$$IBW = \left(\frac{(Height\ (cm) - 152.4\ cm)}{2.54} \times 2.3\ kg\right) + 50\ kg\ (male) \quad \text{OR} \quad + 45\ kg\ (female)$$

Once AdjBW is calculated, proceed to Step 3.

Step 3: Calculate creatinine clearance (CrCL) ml/min

*Use the patient's **total body weight (TBW)** unless BMI > 30 kg/m^2 where **adjusted body weight (AdjBW)** is recommended.
If serum Cr < 60 micromol/L use **60** in calculation.

Either use MDCalc Creatinine Clearance (Cockcroft-Gault Equation), **ensuring the correct CrCL value is selected depending on whether TBW or AdjBW is required (based on BMI result).**

Or alternatively work out using Cockcroft Gault equation:

$$CrCL\ (ml/min) = \frac{[140 - age\ (years)] \times weight\ (kg)^*}{serum\ creatinine\ (micromol/L)} \times 1.23\ (male)\ \text{OR}\ \times 1.04\ (female)$$

13 Governance information

Lead Author(s):	Antimicrobial Management Team (AMT)
Endorsing Body:	Antimicrobial Management Committee (AMC) Area Drug and Therapeutics Committee (ADTC)
Version Number:	2025 version 1
Approval date	AMC December 2025 ADTC February 2026
Review Date:	December 2028
Responsible Person (if different from lead author)	

CONSULTATION AND DISTRIBUTION RECORD	
Contributing Author / Authors	Antimicrobial Management Team (AMT)
Consultation Process / Stakeholders:	Antimicrobial Management Committee (AMC) *This guidance has been adapted for NHS Lanarkshire from the Association of Scottish Antimicrobial Pharmacists guide which shares practical experience on the use of amikacin from a number of NHS Scotland Health Board documents and SAPG amikacin OPAT good practice prescribing guide.*

CHANGE RECORD

Date	Lead Author	Change	Version No.
January 2026	C. MacDonald, Antimicrobial/ Education & Training Pharmacist	Review, revise and update of guidance. Reformatted to new guidelines template.	2025 version 1