# Tobramycin

## General Information

Tobramycin is an aminoglycoside antibiotic with a narrow therapeutic index. Effective use is complex and should be discussed with Microbiology or Infectious Diseases.

**Weight-based dosing** and **therapeutic drug monitoring** (TDM) are essential to ensure therapeutic efficacy and to minimise the risk of adverse effects such as nephrotoxicity, vestibular and ototoxicity. Note: risk is increased in renal impairment, in prolonged therapy, in patients receiving higher doses or for those on concomitant nephrotoxic medications.

Tobramycin is a restricted antimicrobial which should only be prescribed when it is in line with the recommendations of local antimicrobial guidelines or following discussion with Clinical Microbiology/Infectious Diseases.

Once daily dosing of Tobramycin is recommended for most patients. Discuss patients with renal impairment (creatinine clearance <30ml/minute) with Pharmacy/Clinical Microbiology/Infectious Diseases.

Use dose calculations as outlined below however **do not delay 1 st doses** in patients requiring urgent therapy if renal function information is not available. Do NOT hold dose while waiting for level to be reported in a patient <65 years with good renal function (creatinine clearance >80ml/minute) and good urine output, unless specifically advised to do so.

However, in a patient >65 years, or with abnormal renal function (creatinine clearance <80ml/minute), it is preferable to await the result of the first tobramycin level (i.e. before the second dose) before giving the next dose. If the level is <1mg/L and renal function is stable it is not necessary to routinely hold subsequent doses pending levels.

Review need for ongoing treatment with tobramycin on a daily basis - courses should not usually exceed 3 days, except in cystic fibrosis. Please discuss patients on extended treatment courses of tobramycin with Clinical Microbiology/Infectious Diseases.

****** Note: These recommendations do not apply to the use of tobramycin in cystic fibrosis patients - these patients must be discussed with a specialist. ******

## Adverse Effects

**Vestibular and ototoxicity** can occur independently of serum tobramycin levels and duration of treatment, however the risk increases significantly with higher cumulative doses and courses of longer durations.

**Nephrotoxicity** : Consider renal function, volume status, and the use of concomitant nephrotoxic agents such as NSAIDs, ACE inhibitors, and diuretics, when prescribing aminoglycosides.

## Cautions and Contraindications

Caution is advised in patients with auditory and vestibular disorders, and conditions characterised by muscular weakness.

Aminoglycosides (Gentamicin, Amikacin, Tobramycin) are contraindicated in patients with **myasthenia gravis** as they may impair neuromuscular transmission in these patients.

**Dose Calculations**

**Step 1:** Weigh patient **(kg)** to determine **Actual Body Weight.** Record height.

**Step 2:** Calculate the **Body Mass Index** and/or **Ideal Body Weight (IBW)** to determine if the patient is obese. ( Please see formula for weight calculation )

**Step 3** : **Obese Dosing Weight/Adjusted Body Weight** should be used in CrCl and dose calculations if **BMI >30 kg/m$^2$** or Actual Body Weight is 20% more than Ideal Body Weight (IBW). ( Please see formula for weight calculation )

**Step 4:** Calculate **Creatinine clearance** using **Cockcroft-Gault equation** using either **Actual Body Weight or Obese Dosing Weight/Adjusted Body Weight** as indicated above **.** The Cockcroft Gault formula is less reliable in children, acute renal failure, oedematous states, muscle wasting, amputees, and malnourished patients.

( Please see MdCalc Creatinine Clearance Calculator )

**Step 5:** Calculate the **Tobramycin dose to be administered** based on CrCl AND weight (Actual Body Weight or Obese Dosing Weight/Adjusted Body Weight) as per the table below.

| Creatinine Clearance | Dose *(Round to the nearest 40mg)* Max Daily Dose = 480mg |
|---|---|
| >50 mL/min | 5 mg/kg q24h |
| 30-49 mL/min | 4mg/kg q24h |
| 10-29 mL/min | 3 mg/kg q24h |
| <10 mL/min | 1.5 mg/kg stat and re-dose when level <1 mcg/ml. |
| Dialysis | Seek specialist advice |

**Monitoring and Dose Adjustment**

- Order serum trough level to be taken 16-24h post first dose. Monitor renal function.
- Tobramycin trough (pre-dose) level should be ≤**1 mcg/mL.**
- Ensure laboratory request form is labelled with **sample time and date** and tobramycin dose time is recorded accurately.
- Check and interpret trough level result, renal function AND review need for continued treatment prior to prescribing subsequent doses. **NB.** Doses should never be held whilst awaiting trough levels in patients with sepsis or severe infection.

| Trough level | Action |
|---|---|
| < 1mcg/ml | Review need for further dose. Administer same dose again if ongoing aminoglycoside treatment indicated and renal function is stable. |
| ≥1mcg/ml *(high)* | Check the dose and time the sample was taken. Was it taken at the correct time? If the trough level >1micrograms/mL but < 2micrograms/mL and treatment is still indicated, then consider holding the next dose until level <1micrograms/mL and then reduce dose by 1mg/kg. Discuss with pharmacy if required. If the trough is >2micrograms/mL and treatment is still indicated, discuss with pharmacy. |

**References**


1. British National Formulary, ( *accessed online via Medicines Complete May 2024* )
2. Renal Drug Database, ( *accessed online May 2024* )
3. Tobramycin SPC (Pfizer), ( *accessed online at www.hpra.ie May 2024* )
4. Sanford Guide, ( *accessed online May 2024* )
5. Cork University Hospital Antimicrobial Guide, ( *accessed May 2024* )