Inhaled Versus Intravenous Tobramycin for Cystic Fibrosis: A Review

Context
Cystic fibrosis (CF) is an inherited genetic disease affecting the glands that produce sweat and mucous. CF leads to an increased production of mucous in many organs in the body — in particular, a buildup of thickened mucous in the lungs leading to chronic, difficult-to-treat pulmonary infections. In 2010, about 3,849 Canadians were reported to have CF and 117 were newly diagnosed in that year.

Technology
Tobramycin is a water-soluble aminoglycoside antibiotic. It has proven to be effective in the management of bacterial pneumonia due to gram-negative bacilli such as Pseudomonas aeruginosa. Tobramycin can be administered intravenously (IV), and is also available in a powder (TOBI PODHALER) or solution (TOBI) for inhalation.

Issue
The management of bacterial pneumonia in patients with CF is challenging due to difficult-to-eradicate gram-negative bacilli like Pseudomonas aeruginosa. Tobramycin given intravenously is widely used for this type of infection but is associated with well-known toxicities — including kidney damage, hearing loss, and harm of the vestibular system (important for balance and spatial orientation). As an alternative to IV tobramycin, inhaled tobramycin was developed to target infected airways efficiently while limiting systemic exposure and toxicity. A review of the comparative clinical and cost-effectiveness of inhaled tobramycin (TOBI and TOBI PODHALER) and IV tobramycin for the treatment of patients with CF will inform health care decisions. Evidence on the compliance rate of patients with CF taking inhaled tobramycin or IV tobramycin, and evidence-based guidelines, will also contribute to the decision-making process.

Methods
A limited literature search of key resources was conducted, and titles and abstracts of the retrieved publications were reviewed. Full-text publications were evaluated for final article selection according to predetermined selection criteria (population, intervention, comparator, outcomes, and study designs).

Key Messages
For the treatment of patients with CF:
- There was no evidence found comparing inhaled and IV tobramycin.
- No decline in kidney function was found with long-term inhaled or IV tobramycin therapy.
- Adherence rates were low with inhaled tobramycin (increasing hospitalization risk).
  - No evidence was identified for adherence with IV tobramycin therapy.

Clinical practice guidelines recommend:
- Treat infants who remain infected with Pseudomonas aeruginosa, after two attempts at eradication, with inhaled tobramycin solution every other month.
- Treat patients six years of age and older with inhaled tobramycin solution if they have lung disease and chronic Pseudomonas aeruginosa infection.

Results
The literature search produced 527 citations, with an additional 3 studies identified from other sources. Of these, 41 were deemed potentially relevant and 5 met the criteria for inclusion in this review — 3 retrospective studies and 2 evidence-based guidelines.

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