

GENTAMICIN THERAPY: MEDICAL AUDIT

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ABSTRACT

In order to evaluate the prescription practices on gentamicin, we screened retrospectively the case records of 600 patients admitted to this hospital. Of these, 100 received gentamicin, in combination with other antibiotics, as the initial treatment. Therapy with gentamicin was considered to be indicated in 71 cases; 62% were below 1 year. Patients with neonatal septicemia, meningitis, serious staphylococcal infections and those who were immunocompromised received appropriate treatment with the drug. All the bacteria cultured were sensitive to the antibiotic. Gentamicin was unnecessarily prescribed to 29 cases including bronchial asthma ($n = 7$), bronchiolitis ($n = 6$) and acute gastroenteritis with dehydration ($n = 8$). In most of the latter cases, the use of gentamicin indicated the psychologic dependence, of the physician, on the drug. Nine patients showed gentamicin-related nephrotoxicity. Formulation of standard treatment guidelines and regular medical audits are necessary to improve quality of prescribing and avoid misuse of drugs.

Key words: Medical audit, Gentamicin.

Drugs should be prescribed with utmost discretion and only when indicated. Medical audits have shown that the drugs prescribed are often unnecessary(1-4) or inappropriate(3). Overuse of drugs contributes to the increasing costs of medical services and some drugs may have serious adverse effects. Excessive and inappropriate use of antimicrobials leads to development of multiple drug resistant organisms(5).

Gentamicin is a commonly used antibiotic, effective against most Gram-negative and some Gram-positive bacteria. Administration of this drug should, however, be reserved for serious infections and when less nephrotoxic antibiotics are not likely to be effective. We report the prescription practices on gentamicin in patients admitted to this hospital.

Material and Methods

The case records of patients who received gentamicin as the *initial treatment* on admission to the pediatric wards of the All India Institute of Medical Sciences, between August and November, 1988, were studied retrospectively. The clinical features, diagnosis, results of culture and sensitivity, dose and duration of antibiotics administered were recorded.

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Initial treatment with gentamicin was considered to be *indicated* in patients with (a) septicemia, bronchopneumonia, meningitis or pyelonephritis less than 4 months old; (b) clinically suspected staphylococcal infections including staphylococcal pneumonia, empyema, pyopericardium, osteomyelitis and cavernous sinus thrombosis; (c) immunocompromised patients (leukemia, lymphoma, aplastic anemia) with suspected bacterial infections; (d) Grade III or IV malnutrition with severe chest infection or invasive gastroenteritis and septicemia; and (e) infective endocarditis. In addition, some patients with life threatening infections who had received various antibiotics in other hospitals before being referred here, were also considered eligible for therapy with gentamicin.

Results

Out of 600 cases admitted over a period of 4 months, 100 (17%) received gentami-

cin. Fifty four patients were below 1 year, 16 between 1-3 years, 21 between 4-10 years and 9 more than 10 years. Gentamicin was administered in combination with cephaloridine in 40, ampicillin in 36, crystalline penicillin in 12, crystalline penicillin and cloxacillin in 10 and nalidixic acid in 2 cases; it was never prescribed alone.

Treatment with gentamicin was considered to be indicated in 71 patients; 44 (62%) of these were below 1 year of age (*Table I*). The common conditions where gentamicin was indicated were bronchopneumonia, septicemia, and meningitis during early infancy. It was also prescribed to patients with suspected staphylococcal infections including empyema, cavernous sinus thrombosis and acute endocarditis. Five cases of leukemia with unexplained fever of more than one week duration were treated with a combination of cephaloridine and gentamicin. Therapy with gentamicin was not indicated in 29 cases. The major conditions where the drug was

TABLE I—Indications for Gentamicin Use

Gentamicin indicated (n = 71)		Gentamicin not indicated (n = 29)	
Less than 4 months age		Gastroenteritis	8
Bronchopneumonia	21	Asthma	7
Septicemia	16	Bronchiolitis	6
Pyogenic meningitis	5	Hepatitis	2
Severe malnutrition with		Portal hypertension	2
Gastroenteritis/chest infection	8	Late hemorrhagic disease	2
Empyema	7	Hemophilia	1
Leukemia with fever	5	Snake bite	1
Cavernous sinus thrombosis	3		
Pyopericardium	1		
Infective endocarditis	2		
Peritonitis	2		
Hemolytic uremic syndrome	1		

unnecessarily prescribed included gastroenteritis with moderate/severe dehydration ($n=8$), bronchial asthma ($n=7$), and bronchiolitis ($n=6$).

Blood cultures grew organisms in 10 (out of 20) patients, stool in 7 (of 12), cerebrospinal fluid in 2 (of 14), pleural fluid in 3 (of 7), urine in 1 (of 12) and peritoneal fluid in 1 (of 2) patients. The organisms isolated were *Klebsiella* in 10, *Staphylococcus aureus* in 5, *Escherichia coli* in 6, *Salmonella* in 2 and *Hemophilus influenzae* in 1. All the bacteria cultured were sensitive to gentamicin.

The dosage of gentamicin ranged from 4.5-6 mg/kg/day in 2-3 divided doses parenterally, except in the patient with hemolytic uremic syndrome where the dose was adjusted according to the level of serum creatinine. The duration of therapy in patients where gentamicin was indicated ranged from 5-28 (mean 9.5) days. In 9 cases, treatment with the drug was discontinued or dosage modified because of white cell casts in the urine or rising levels of blood urea and creatinine. Five of these patients were receiving cephaloridine concomitantly.

Discussion

In this study, 29% cases received gentamicin unnecessarily or inappropriately. Most of the case records did not specify the reasons for selecting the drug. Patients with severe bronchiolitis, status asthmaticus or gastroenteritis were often prescribed this drug because the doctor-on-duty felt that the child was "looking-sick". This psychological dependence on antibiotics needs to be replaced by a more rational approach to therapy.

Approximately 10% of patients treated with gentamicin develop urine concentration defects, proteinuria, hyaline and granular casts and decline in glomerular filtration rate(6). A similar incidence was noted among our patients. The toxicity is proportional to the quantity of drug administered and is usually detected following one week of treatment. Concomitant administration of cephaloridine, amphotericin B and furosemide increase the risk of nephrotoxicity. Use of alternative cephalosporins (cefazolin, cefuroxime) and avoiding other nephrotoxic drugs reduce the risk of gentamicin induced renal damage.

Pediatricians in medical colleges should take the lead in initiating a campaign for rational use of drugs(7). Education of the medical profession through formulary manuals, and discussions on specific problems would improve antibiotic prescription practices. Standard treatment guidelines need to be formulated for specific conditions. Frequent audit of prescriptions and peer reviews are necessary to improve the quality of prescribing and reduce misuse of drugs.

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NOTES AND NEWS

NATIONAL CONFERENCE ON INTEGRATED MEDICAL PRACTICE TODAY—IMP 1991 23rd and 24th November, 1991

A National Conference on Integrated Medical Practice Today—IMP, 1991 and Pre-Conference Workshop on "Drugless Therapies in Clinical Practice" are being held at Hotel Chola Sheraton, 10, Cathedral Road, Madras-600 086 on 23rd and 24th November 1991.

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