



## Original Research Article

# Emerging Antibiotic Resistance: A Reflection of Actual Practice among Doctors at Tertiary Care Hospitals

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## ABSTRACT

### Keywords

Antibiotic Resistance, Tertiary Care Hospitals

The objective of this study is (1) To identify Medical Doctors' knowledge and attitudes regarding antimicrobial resistance and (2) Current antibiotic prescribing practices at tertiary care hospitals. A cross-sectional survey at the Tertiary Hospitals was conducted at Jawaharlal Nehru Medical College, A.M.U., Aligarh and VIMS, Bellary, Karnataka among the doctors who had at least two years of working experience in clinical departments. A total 140 doctors completed the questionnaire. Factors identified as important in producing resistance included widespread use of antibiotics, inappropriate empiric choices and use of broad-spectrum agents. Hand-washing was not considered to be important in reducing resistance. Useful interventions included access to current information on local resistance patterns, institutional specific antibiotic guidelines and educational programmes. Antibiotic cycling and restriction were regarded as less helpful. Empiric therapy for common infections was appropriate in most cases. Although physicians were aware of the problem of resistance to antibiotics and the contributory factors, their practice did not reflect measures to reduce it. Continuing educational programmes on hospital acquired infections, formulation and adherence to hospital protocols and monitoring of compliance of the same will bring about behavioural change and will result in reduction in Hospital acquired infections.

## Introduction

Antimicrobial resistance is a global concern. The antibiotic resistant organisms develop new resistance mechanisms and spread globally, thus threatening our ability to treat infectious diseases. Antimicrobial resistance is one of the major factors for an increase in mortality, an obstacle to the control of infectious diseases, an increase in the cost of

healthcare, and are a jeopardy to the efficacy of modern medicine. The emergence of antibiotic resistance as a global problem underscores the need for physicians to be aware of its existence and the factors that drive its development. It has been observed that areas within hospitals that have the highest resistance rates also have the highest

rates of antibiotic use (Shlaes *et al.*, 1997). Appropriate antibiotic stewardship including optimal selection, dose and duration of treatment, could prevent or slow the emergence of resistance (McGowan Jr. 1983). The studies conducted previously evaluating physicians have shown both deficient knowledge of the magnitude and causes of resistance, as well as poor correlation between knowledge and practice (Wester *et al.*, 2002; Srinivasan *et al.*, 2004; Paluck *et al.*, 2001; Butler *et al.*, 1998).

Keeping this in view, the present study was undertaken with the following objectives (1) To identify Medical Doctors' knowledge and attitudes regarding antimicrobial resistance and (2) Current antibiotic prescribing practices at tertiary care hospitals.

### **Material and Methods**

A cross-sectional survey at the Tertiary Hospitals was conducted at JNMC, A.M.U., Aligarh and VIMS Bellary, Karnataka. Physicians were identified from departmental rotas and a total of 140 doctors were targeted. Eligible Doctors included doctors who had more than two years of working experience in clinical departments from paediatrics, intensive care, internal medicine, surgery, obstetrics, gynaecology, orthopaedics and anaesthesia. A predesigned and pretested questionnaire was used. Full confidentiality was maintained and approval for the study obtained from Institutional Ethics Committee of the Faculty of Medicine, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh.

Physicians' perceptions on the magnitude of the problem, contributing factors, interventions and complications were assessed. Data collected on prescribing practice included empiric therapy choices,

duration of therapy, factors affecting choices and de-escalation practice. Doctors' were asked using a point Likert-scale graded response option, ranging from slight important to extremely important to describe their opinion on the magnitude of the problem of resistance, minimally to very important for factors contributing to resistance, useful to not useful for interventions to prevent resistance and practice regarding duration of antibiotic therapy.

### **Result and Discussion**

Antimicrobial resistance is one of the biggest challenges for the clinicians and the microbiologists in treatment of infections. With the emergence of multi-drug and pan drug resistant strains in the hospitals, there are very few treatment options left to reduce this menace. Antimicrobial stewardship programme has now become the necessity to reduce the emergence of antimicrobial resistant strains in hospitals. This study was conducted to evaluate the knowledge and practices among the doctors regarding the antimicrobial use and interventions that can reduce the menace of antimicrobial resistance. A total of 153 questionnaires were administered out of which 140 doctors returned completely filled questionnaires. The response rate was 91.5%. When enquired about the factors contributing to antibiotic resistance, 85% considered use of broad spectrum antibiotics as very important factor, 13% thought it to moderately important and only 2% were of the view that it is minimally important. Among the other factors which were considered as very important were extensive use of antibiotics in prescription (82%), unsuitable choice of antibiotic or combination therapy (80%), inappropriate duration of antibiotic treatment (75%), poor availability of local antibiograms (70%), and lack of prescribing guidelines (68%) (Table 1).

A very interesting finding was that hand-washing was considered significant by only 31% doctors of the two institutions. 28% of them had no idea as far as role of inadequate hand washing among the factors contributing to the spread of hospital acquired infections. Although, hand-washing has been shown to be the single most important factor in the prevention of transmission of hospital acquired infection in other studies (Garner, 1996). Numerous evidence in literature reiterates about the spread of resistant organisms all through the hospital has been related to a breakdown in infection control measures, especially hand hygiene (Struelens, 1998; Rao, 1998; Vicca, 1999).

Majority (90%) of the doctors had the opinion that adherence to institutional specific protocols/guidelines of antibiotic prescription was considered the most significant measure to reduce antimicrobial resistance (Table 2). 85% of them believed that use of current antibiograms was helpful. The other measures that are helpful are periodical educational series for recent changes in antibiotic sensitivity spectrum (71%), antibiotic restriction (56%) and regular Microbiological rounds. This is in conformity with findings from other studies which showed that physicians preferred voluntary changes in prescribing practices rather than interventions which imposed limitations (Wester *et al.*, 2002; Murray *et al.*, 1988). There is unavailability for most recent antibiograms for the institution and the institutions need to focus on it and all efforts should be made to make it a part of hospital system.

Patient's demands were also not considered to be noteworthy for antimicrobial resistance by most doctors. In our study, the role of pharmaceutical companies focussing on marketing strategies was not considered

highly significant but Angell M et al (2004) reported that the top ten drug companies in the world spent about one-third of sales for marketing (Angell M 2004). Most of the doctors were not aware of antibiotic cycling.

As per the practice of the doctors regarding duration of antibiotic therapy, 55% were in favour of 14 days course of antibiotics for soft tissue or dermal infections whereas 40% of them prescribed 7–10 days treatment. For urinary tract infection 39% gave the antibiotic for 7–10 days and 36% were in a practice of giving it for 5 days. 60% of the doctors prescribed 14 days regimen for surgical site infections. Around 50% of the doctors practiced giving antibiotics for 7–10 days and 14 days respectively for Blood Stream Infections. 14 days course was the choice in Ventricular Associated Pneumonia by 56% of the doctors. 82% of them practiced 15–21 days treatment in cases of Meningeal Infections (Table 3). There are different school of thoughts on appropriate duration of antibiotics prescription for different infections with a tendency of shorter courses for uncomplicated Infections (Chastre *et al.*, 2003; Tice, 1999; Li *et al.*, 2007). Many Doctors didn't know about resistance inducing antibiotics and drugs like cephalosporins should be avoided for empiric therapy. The findings of the present study are in affirmative by other authors (Patterson, 2001). Although, most doctors were of the opinion that their knowledge was average to good, but they have poor compliance to Hospital acquired infections prevention.

The reasons stated by the authors of similar studies could be high work load, being too busy, inconvenient location of sinks, lack of institutional guidelines, deficiency in knowledge or lack of experience, lack of role models, lack of incentives and rewards (Shimokura *et al.*, 2006; Stutz *et al.*, 2009).

**Table.1** Physician ratings of the factors contributing to antibiotic resistance

<b>Factors</b>	<b><i>Slightly Important</i></b>	<b><i>Moderately Important</i></b>	<b><i>Very Important</i></b>	<b><i>Don't Know</i></b>
<b>Use of Broad spectrum antibiotics</b>	03 (2)	18 (13)	119 (85)	--
<b>Extensive Use of Antibiotics in Prescriptions</b>	05 (4)	20 (14)	115 (82)	--
<b>Unsuitable choice of antibiotic or combination therapy</b>	04 (3)	24 (17)	112 (80)	--
<b>Inappropriate duration of antibiotic treatment</b>	04 (3)	31 (22)	105 (75)	--
<b>Poor availability of local antibiograms</b>	07 (5)	29 (21)	98 (70)	06 (4)
<b>Lack of Prescribing Guidelines</b>	12 (9)	28 (20)	95 (68)	05 (3)
<b>Frequent Microbial Mutation</b>	14 (10)	56 (40)	63 (45)	07 (5)
<b>Inadequate antibiotic restriction</b>	17 (12)	57 (41)	49 (35)	17 (12)
<b>Intentional Promotion of Pharmaceutical brand</b>	24 (17)	49 (35)	49 (35)	18 (13)
<b>Antibiotic use in veterinary treatment</b>	31 (22)	53 (38)	42 (30)	14 (10)
<b>Patient insisting to use antibiotics for quick cure</b>	35 (25)	52 (37)	45 (32)	08 (6)

**Table.2** Physician rating of interventions which may help to reduce resistance

<b>Factors</b>	<b><i>helpful</i></b>	<b><i>May Be helpful</i></b>	<b><i>Not helpful</i></b>	<b><i>Don't Know</i></b>
<b>Adherence to Institutional Specific protocols /guidelines of antibiotic prescription</b>	126 (90)	14 (10)	---	--
<b>Availability and use of current antibiograms</b>	119 (85)	14 (10)	4 (3)	3 (2)
<b>Periodical Educational series for recent changes in antibiotic sensitivity spectrum</b>	99 (71)	35 (25)	----	6 (4)
<b>Antibiotic Rotation/Cycling</b>	87 (62)	46 (33)	4 (3)	3 (2)
<b>Reducing antibiotic prescription (Antibiotic Restriction)</b>	78 (56)	53 (38)	5 (4)	4 (2)
<b>Regular Microbiology Rounds</b>	77 (55)	57 (41)	4 (3)	2 (1)

**Table.3** Physicians’ practice regarding duration of antibiotic therapy

<b>Factors</b>	<b>&lt;5 Days</b>	<b>5 Days</b>	<b>7-10 days</b>	<b>14 Days</b>	<b>15-21 days</b>
<b>Soft tissue/ Dermal infections</b>	--	--	56(40)	77(55)	7 (5)
<b>Urinary Tract Infection</b>	28(20)	50(36)	55(39)	6(4)	(1)1
<b>Blood Stream Infection</b>	--	(1)1	66(47)	65(46)	8(6)
<b>Surgical Site Infection</b>	--	--	35(25)	84 (60)	21(15)
<b>Community Acquired Pneumonia</b>	(1)1	32(23)	94(67)	10(7)	3(2)
<b>Ventilator Associated Pneumonia</b>	--	--	38(27)	78(56)	24(17)
<b>Meningeal Infection</b>	--	--	3(2)	22(16)	115(82)

The study highlights that the knowledge of the doctors is adequate but there exists a gap in the knowledge and the practice. Thus all measures should be taken to bridge this gap in an endeavour to reduce hospital acquired infections and antibiotic resistance. Continuing educational programmes on hospital acquired infections, formulation and adherence to hospital protocols and monitoring of compliance of the same will bring about behavioural change and will result in reduction in Hospital acquired infections.

**Limitations**

The present study was conducted at two institutions which were chosen by convenience sampling. Thus, in order to generalize the findings of the study requires that research may be conducted taking a sample size encompassing different tertiary institutions of India.

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