



ANTIBIOTICS, A PANACEA MISUSED- SURVEY BASED STUDY

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ABSTRACT

The discovery of antimicrobial agents to clinical medicine was one of the greatest break through in the medical triumphs that revolutionized the treatment of bacterial infections. However the gradual development of population of antimicrobial-resistant pathogenic bacteria resulting from use, misuse and abuse of antimicrobials has today become a major concern in global health. Misuse and overuse of these drugs however have contributed to a phenomenon known as antibiotic resistance. Resistance to antibiotics develops when potentially harmful bacteria change in a way that reduces or eliminates the effectiveness of these drugs. Emergency measures need to be taken not only to minimize the use of antimicrobials for prophylactic and therapeutic purposes but also to look for alternative strategies for the control of bacterial infections.

This study was conducted to assess the knowledge, attitude and practices (KAP) related to antibiotic usage and resistance amongst dental Doctors in Government Dental Colleges, Private dental institutes and private practitioners across the country.

Aim: To assess the knowledge, attitude and practices (KAP) related to antibiotic usage and resistance in Government Dental College and Hospital, Mumbai amongst 1000 Dental Doctors working in Government Dental College and Hospitals, Private Dental Institutes, Deemed Universities and Private Practitioners within a period of One month.

Materials and Methods: A cross-sectional questionnaire based online study was undertaken in Government Dental College and Hospital, Mumbai amongst a sample size of 1000 Dental Doctors in Government Dental Colleges, Private Dental Institutes, Deemed university and Private Practitioners across the country within a period of one month. These questions were analyzed using a 5 point Likert scale with responses ranging from strongly disagree to strongly agree. Data obtained was subjected to Chi square test to determine significant difference.

Results: Results obtained from this study were statistically evaluated for the evidence based conclusion. The response rate was 100% among the 1000 doctors who were asked to participate in the survey. 72% strongly agreed that Antibiotic Resistance is an important and serious public health issue facing the World/ country/ hospitals. Only 2.0% strongly disagreed that Antibiotic Resistance is a global problem. 75% of respondents strongly agree that Random prescription of antibiotics can lead to emergence of bacterial resistance.

Conclusion: Antimicrobial Resistance in medicine has become routine issue. Bacteria have evolved multiple mechanisms for the efficient evolution and spread of Antimicrobial Resistance. Our survey revealed that most of the Doctors were aware of the antimicrobial resistance and its consequences. Those who were less aware needs to alter their prescription behavior.

Clinical Significance: The issue of antimicrobial resistance is becoming global and therefore should be tackled with increasing the knowledge amongst the doctors so that the prescription habits can be restricted to the absolute required clinical situations, hence the life saving drugs will not be misused.

KEYWORDS : Antibiotic resistance, antimicrobial agents, antibiotic misuse, bacterial infections.

INTRODUCTION

Antibiotics are the most used drugs in majority of ailments but also equally misused at large.¹ Antibiotic misuse is a major cause of bacterial drug-resistance, although the direct quantitative relationship between the amount of antibiotic used and frequency of resistance is still lacking.² Antimicrobial resistance occurs naturally over time, usually through genetic changes. However, the misuse and overuse of antimicrobials is accelerating this process.³ The indiscriminate and reckless use of antibiotics has led to a fast-approaching crisis.⁴ The indiscriminate use of antibiotics with or without the prescription of clinician and also unreasonable prescription forwards result not only in the emergence of bacterial strains that have become resistant with various adverse reactions but also pose financial burden on local and global health system.⁵

Such absurd use of antibiotics in routine clinical practice

result from lack of concerns relating to long term resistance, rapid relief of present symptoms, rewarding marketing gimmicks of pharmaceutical companies and over the counter sale of antibiotics without prescription.⁶

The threat of antimicrobial resistance is swiftly rising worldwide due to its irresponsible use. Although dental fraternity contributes less to this factor as the intervention techniques itself lead to healing and wellbeing of patients, but inadvertent prescriptions may lead to the development of antibiotic resistance.⁷ The Food and Drug Administration (FDA) has launched several initiatives to address antibiotic resistance. The agency has issued drug labeling regulations, emphasizing the prudent use of antibiotics. The regulations encourage health care professionals to prescribe antibiotics only when clinically necessary and to counsel patients about the proper use of such drugs and importance of taking them as

directed. FDA has also encouraged the development of new drugs, vaccines and improved tests for infectious diseases.⁸ Drug-resistant bacteria kill 25 000 people per year in America and Europe. Perhaps one of the biggest public health threat today is antibiotic resistance.⁹⁻¹⁰

The clinical staff assigned for patient services has a key role to confront the antibiotic resistance problem by rational prescription, promoting patient awareness and safe medication practices concerning antibiotics.¹¹

Importance should be given to adequate training provided under Continuous Dental Education (CDE) program for the undergraduates and clinical staff, especially young doctors to inculcate the rational practice fundamentals in them and keep them motivated to safeguard the health of the population.

Hence for any educational intervention to be successful and sustainable, it should possess the knowledge, attitude and practice of this target group, i.e. young doctors so as to devise a suitable approach and effective results.

It is in this regard this study was undertaken through online medium "Whatsapp" amongst Interns, Clinical Assistants, Post graduate students and Doctors working in the speciality departments of Government Dental College and Hospital, Private Dental Institutes, Deemed Universities and Private practitioners.

AIM:

The aim of the study was to assess the knowledge, attitude and practices (KAP) related to antibiotic usage and resistance in Government Dental College and Hospital, Mumbai amongst 1000 Dental Doctors working in Government Dental College and Hospitals, all over India and Private Dental Institutes, Deemed Universities and Private Practitioners within a period of One month.

OBJECTIVES

- 1) To design the questionnaire to assess knowledge, attitude, practice as per recommendation of FDA with special concern on dental doctors prescribing antibiotics, their usage and resistance.
- 2) To assess the knowledge, attitude and practice of dental doctors on indiscriminate use of antibiotics for various dental problems in routine dental practice.
- 3) To assess the knowledge, attitude and practice of dental doctors for using antibiotics prophylactically.

MATERIAL AND METHODS

This study was a cross-sectional questionnaire based online survey (whatsapp) undertaken in Government Dental College and Hospital, Mumbai amongst 1000 Dental Doctors working in Government Dental College and Hospitals all over India, Private Dental Institutes, Deemed Universities and Private Practitioners within a period of One month.

The questionnaire was taken from the master article¹²⁻¹³ with necessary modifications for dental speciality and was validated by subject experts for its content and relevance. This study was a quantitative cross-sectional, close ended, blind study which was interview based on a structured questionnaire that was sent to Interns, Clinical Assistants, Post Graduate students and Private practitioners across India. They were asked to complete the questionnaire anonymously. The response was recorded by Likert scale that was used to determine their Knowledge, Attitude and Practice (KAP) regarding antibiotic use and resistance. The response of the scale was ranged from strongly disagree to strongly agree. Each answer was coded for the statistic calculation purpose.

Simple descriptive statistics (mean value, median value,

range, and SD) was used to generate frequencies, percentages and proportions. The data was utilized for research purposes.

RESULTS:

The response rate was 100% among the 1000 dental doctors who were asked to participate in the survey.

72% amongst 1000 amounting to 720 strongly agreed that Antibiotic Resistance is an important and serious public health issue facing the World/country/hospitals.

2.0% i.e. 200 participants strongly disagreed that Antibiotic Resistance is a global issue that is significantly less ($p < 0.001$).

62.1% amongst 1000 amounting to 621 participants strongly agree that Random prescription of antibiotics can lead to emergence of bacterial resistance 1.6% amongst 1000 amounting to 160 participants strongly disagree that Random prescription of antibiotics can lead to emergence of bacterial resistance.

54% amongst 1000 amounting to 540 participants felt that the cost was an important factor which deserved consideration before the prescription of an antibiotic [Table 1, Graph 1].

64% respondents amongst 1000 amounting 640 disagreed for prescribing antibiotics in symptomatic periapical pathologies whereas 16% amounting 160 agreed for prescribing antibiotics in Asymptomatic periapical pathologies. 50.8% amounting 508 respondents prescribe antibiotics in Symptomatic periapical pathology with fever, chills and cellulitis and 2.8% amounting 28 did not prescribe any. 66.3% amounting 663 agreed to prescribe medicines in draining sinus/fistula associated with periodontally/endodontically affected tooth [Table 2, Graph 2].

24.0% amounting 240 out of 1000 patients strongly agreed to prescribe antibiotics When patient has pain to prevent getting a more serious illness and 18.5% amounting 185 strongly disagreed. 29.7% amounting 297 strongly disagreed and 28.4% amounting 284 disagreed that Antibiotics are safe drugs, hence they can be commonly prescribed. 72.5% amounting 725 strongly agreed and 3.1% amounting 31 strongly disagreed to counsel the patient about importance of correct dose and duration of taking antibiotics without skipping any dose. A majority of the clinicians in our study were well aware of the global as well as the nationwide problem of antimicrobial resistance [Table 3, Graph 3].

DISCUSSION

A better understanding of what the dental doctors know and believe about the issues of use of antibiotics and their resistance can assist in planning and devising an effective and tailored educational intervention not only in the debilitating condition of disease but also prophylactically The study was conducted to assess the knowledge, attitude and practices (KAP) of Doctors related to antibiotic usage and resistance with a sample size 1000 that has been conducted across the country among the Doctors working in Dental Institutes and Private Practitioners

The highlight of the study was the vast majority of the dental populace included in the study. Largest sample size up till now so far not reported in the literature (1000 sample size). Also the survey was conducted in all regions across the Country. The participants were included from All Government Dental Colleges and Hospitals, Private Dental institutes, Deemed universities and Private dental Practitioners. The study was conducted to rule out the prescription pattern with respect of age and total years of clinical practice which was less surveyed.

Ivarsson, M. E et al (2015) and Singh, S. B. et al (2006) suggest that Resistance to antibiotics could be due to inactivation by enzymes, reduced uptake of antibiotic, sequestration of antibiotic, target protection and biofilm formation. 14-15 Various studies indicates that microbials are resistant to antibiotics. Although few newer antibiotics are added to the generation still making it a global health issue. 16

Higher mortality rate has been observed due to rise in bacterial resistance all over the world making the process of complete recovery difficult that further burdens healthcare making it more expensive. 17

The changing trend of self medication and its easy availability Over-The-Counter (OTC) without any professional assistance contributes major factor in developing antibiotic resistant pathogens. 18

It has been reported that in a developed countries like United States 23,000 patients die in each year due to drug resistant microbials. As reported by Laxminarayan et al around 58,000 infants died in the year 2013 in India and irrespective of over 40% of antibiotics are manufactured in India. 19 The various studies supports that there is a definite need to upgrade the existing laws in order to make the dispensing of antibiotics more stringent to solve this global issue. 20

Ejim, L. et al. (2011) encountered various solutions to drug resistance, antibiotics in particular like older antibiotics modified into newer classes, providing adjuvants with antibiotics, combining multiple drug regime and vaccines to certain extent. 21-22

It is true that every Health care professional plays an important role while prescribing medicines for any ailment considering the adverse effect of drug resistance, antibiotics in particular. The patients can be educated regarding dosage, harmful effects of self medication and misuse.

There is a definite need to counsel and promote the most desirable attitude of the health professionals in this regard. 23 Dental doctors although prescribe drugs occasionally and in specific conditions for which they are to be trained during their undergraduate training regarding appropriate prescriptions and antibiotic resistance. As per the recommendations of continuing dental education act there is need to upgrade knowledge with respect to inculcate new techniques, technology including drugs, antibiotics in particular. 24

In our study, the response rate was 100% among the 1000 dental doctors who were asked to participate in our survey. 72% strongly agreed that antibiotic resistance is an important and serious public health issue facing the World/ country/ hospitals. This observation was seen amongst the senior faculty with more than 20 years of clinical practice as compared to only 2.0% who strongly disagreed were those who fall into the younger category with less clinical experience. The participants in our study were well aware of the global as well as the nationwide problem of antimicrobial resistance as associated to the past studies. 25

62.1% of respondents strongly agreed whereas only 1.6% strongly disagreed that random prescription of antibiotics can lead to emergence of bacterial resistance. This observation strongly suggest about inappropriate dental doctors practice of random prescriptions due to lack of professional awareness and seriousness about the problem suggestive of need to create awareness in general. As reported in the past by various studies that such result was also concluded in the previous studies that suggest lack of opportunity for patient

follow-up, lack of knowledge regarding optimal therapies and patient demand can also lead to antibiotic resistance. In addition, the rising number of HIV-positive people increases selective pressure for resistant organisms by increasing the need for prophylactic and curative antimicrobial use. 26

54% participants in our study felt that the cost was an important factor that deserved consideration before the prescription of an antibiotic. Cost of the antibiotic was considered to be an important factor in similar study deserving consideration by only 56.7 percent of the participants.

64% respondents disagreed for prescribing antibiotics in asymptomatic periapical pathologies whereas 16% agreed for the same. 50.8% respondent's prescribed antibiotics in symptomatic periapical pathology with fever, chills and cellulitis and 2.8% did not prescribe any medicines. As per the recommendations of the dental profession, dental doctors prescribe antibiotics in any acute conditions related to teeth and oral tissue because any acute inflammatory condition requires local management to remove the causative factor and prescribe antibiotics for palliative effect. 27 Also as an adjunct to the treatment and to limit and prevent metastasis of the infection to vital organs.

As 66.3% agreed to prescribe antibiotic in draining sinus/fistula associated with periodontally/endodontically affected tooth in contrast with 33.7% participants that is suggestive of creating awareness among everyone under CDE program. Once intervened by the dentist antibiotics are usually not required in particular as the professional intervention eliminates the etiological factor and promotes the healing response taking advantage of oral physiology. As recommended by Lidao Bao et al showed the current situation of prophylactic use of antibiotics in six types of aseptic operative procedures and provides evidence for the development of principles for prophylactic antibiotics in aseptic operative procedures and the standardization of prophylactic antibiotics. 28-29 They concluded that series of measures should be released to manage and reinforce the rational use of antibiotics, establish and perfect the management system of the use of antibiotics.

24.0% strongly agreed to prescribe antibiotics when patient has pain to prevent getting a more serious illness and 18.5% strongly disagreed. Our results in this study where 24% agreed may be for giving relief which is usually the practice and or may be because of patients demand. It is a fact in the field of dentistry that pain requires professional intervention to remove of the etiological factor to give relief.

29.7% strongly agreed and 28.4% disagreed that Antibiotics are safe drugs hence they can be commonly prescribed because if antibiotics are used according to the prescribed regimen they are usually safe with fewer side effects 28% those who disagree felt that each patient should be individually assess to determine the correct antibiotic and dose, especially infants, elderly, pregnant patient and medically compromised patients.

Such group of professional believe that antibiotic is required for the given condition however they are also aware that they are safe when the proper dose and regimen is followed. Those who don't agree they strongly believe that when the antibiotic is not required and professional intervention to remove the cause will definitely stop the disease and hence do not believe.

72.5% strongly agreed and 3.1% strongly disagreed for

counseling the patient about importance of correct dose and duration of taking antibiotics without skipping any dose. As reported by the study done by Elena Bernabé Munoz, professional counseling is must however it is also recommended that the pharmacist should also counsel the patients. It is the cardinal principle in Medicine or for that matter in any health stream that antibiotics or any other drug should be given only when it is required with proper dosage and with all necessary instructions to the patients including counseling preferably for its desirable results and to minimize the confusion in the mind of the patient for any adverse reactions that is expected.³⁰

CONCLUSIONS

- 1) The clinical staff assigned for patient services has a pivotal role to confront the antibiotic resistance problem by rational prescription, promoting patient awareness and safe medication practices concerning antibiotics.
- 2) Importance should be given for continuous training to minimize or overcome the antibiotic misuse under CDE program for the undergraduates, Post Graduate students and clinical staff, especially young doctors to inculcate the rational practice fundamentals in them and keep them motivated to safeguard the health of the population.
- 3) For any educational intervention to be successful and sustainable, it should change the knowledge, attitudes and practice of this target group, i.e. young doctors so as to devise a suitable approach and effective results.
- 4) Strict regulations encourage health care professionals to prescribe antibiotics only when clinically necessary and to counsel patients about the proper use of such drugs and the importance of taking them as directed.
- 5) Need to develop a warning system for the clinical use of antibiotics, a classified management system for antibiotics, a management regulation for the prevention and use of antibiotics during surgical operations, and a management regulation for the prevention and use of antibiotics during aseptic operations.
- 6) A majority of the clinicians in our study were well aware of the global as well as the nationwide problem of antimicrobial resistance. Antimicrobial resistance in medicine has become common. Our survey discovered that most of the young doctors were cognizant of the antimicrobial resistance, its concerns and the prescriber behavior needs to be altered in dental and oral maladies.

Questionnaire

Survey on Antibiotic Usage and Antibiotic resistance.
 We are conducting the survey on the above mentioned title.
 Kindly give your inputs.

* Required

1. Age*

2. Experience of clinical practice (please tick mark the option)

- less than 3 years
- 3-5 years
- 5-10 years
- 10-15 years
- more than 15 years

3. How many prescriptions per day do you dispense.

- 1 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 and more

For all the questions hence forth, mark your response from 1 to 5 where 1 is strongly disagree, 2 is disagree, 3 neutral/neither agree nor disagree, 4 is agree and 5 is strongly agree

4. Indiscriminate use of antibiotics can lead to Ineffective treatment

- 1
- 2
- 3
- 4
- 5

5. Do you agree that Antibiotic Resistance is an important and serious public health issue facing the World/ country/ hospitals

- 1
- 2
- 3
- 4
- 5

6. Random prescription of antibiotics can lead to emergence of bacterial resistance

- 1
- 2
- 3
- 4
- 5

7. Prescribing antibiotics haphazardly by the Doctors can lead to additional burden of medical cost to the patient.

- 1
- 2
- 3
- 4
- 5

8. Would you prescribe Antibiotics routinely for Asymptomatic periapical pathologies?

- 1
- 2
- 3
- 4
- 5

9. Would you prescribe Antibiotics routinely for Symptomatic periapical pathology with fever, chills and cellulitis?

- 1
- 2
- 3
- 4
- 5

10. Would you prescribe Antibiotics routinely for Draining sinus/fistula associated with periodontally/endodontically affected tooth?

- 1
- 2
- 3
- 4
- 5

11. Would you prescribe Antibiotics routinely for Routine Dental extractions/oral prophylaxis/Primary Root canal treatment?

- 1
- 2
- 3
- 4
- 5

12. Would you prescribe antibiotics when patient has pain to prevent getting a more serious illness?

- 1
- 2
- 3
- 4
- 5

13. Do you think Antibiotics are safe drugs, hence they can be commonly prescribed.

- 1
- 2
- 3
- 4
- 5

14. Do you agree that it is important to counsel the patient about correct dose and duration of antibiotics without skipping any dose.

- 1
- 2
- 3
- 4
- 5

15. Do you agree that when patient has discomfort, antibiotics can help to relieve the symptoms.

- 1
- 2
- 3
- 4
- 5

Send me a copy of my responses.

TABLES

Table 1a : Indiscriminate use of antibiotics can lead to Ineffective treatment

	Frequency	Percent		
Valid	1	35	3.5	
	2	41	4.1	
	3	90	9.0	
	4	360	36.0	
	5	474	47.4	
	Total	1000	100.0	

Table 1b :Do you agree that Antibiotic Resistance is an important and serious public health issue facing the World/ country/ hospitals

	Frequency	Percent		
Valid	1	20	2.0	
	2	17	1.7	
	3	28	2.8	
	4	214	21.4	
	5	721	72.1	
	Total	1000	100.0	

Table 1c :Random prescription of antibiotics can lead to emergence of bacterial resistance

	Frequency	Percent		
Valid	1	16	1.6	
	2	19	1.9	
	3	49	4.9	
	4	295	29.5	
	5	621	62.1	
	Total	1000	100.0	

Table 1d :Prescribing antibiotics haphazardly by the Doctors can lead to additional burden of medical cost to the patient.

	Frequency	Percent		
Valid	1	25	2.5	
	2	37	3.7	
	3	86	8.6	
	4	312	31.2	
	5	540	54.0	
	Total	1000	100.0	

Table 2a :Would you prescribe Antibiotics routinely for Asymptomatic periapical pathologies?

	Frequency	Percent		
Valid	1	377	37.7	
	2	263	26.3	
	3	197	19.7	
	4	139	13.9	

		5	24	2.4
	Total	1000	100.0	

Table 2b :Would you prescribe Antibiotics routinely for Symptomatic periapical pathology with fever, chills and cellulitis?

	Frequency	Percent		
Valid	1	28	2.8	
	2	21	2.1	
	3	82	8.2	
	4	361	36.1	
	5	508	50.8	
	Total	1000	100.0	

Table 2c :Would you prescribe Antibiotics routinely for Draining sinus/fistula associated with eriodontally/endodontically affected tooth?

	Frequency	Percent		
Valid	1	95	9.5	
	2	98	9.8	
	3	144	14.4	
	4	383	38.3	
	5	280	28.0	
	Total	1000	100.0	

Table 2d: Would you prescribe Antibiotics routinely for Routine Dental extractions/oral prophylaxis/Primary Root canal treatment?

	Frequency	Percent		
Valid	1	182	18.2	
	2	221	22.1	
	3	211	21.1	
	4	277	27.7	
	5	109	10.9	
	Total	1000	100.0	

Table 3a :Would you prescribe antibiotics when patient has pain to prevent getting a more serious illness?

	Frequency	Percent		
Valid	1	185	18.5	
	2	233	23.3	
	3	230	23.0	
	4	240	24.0	
	5	112	11.2	
	Total	1000	100.0	

Table 3b :Do you think Antibiotics are safe drugs, hence they can be commonly prescribed.

	Frequency	Percent		
Valid	1	297	29.7	
	2	284	28.4	
	3	245	24.5	
	4	114	11.4	
	5	60	6.0	
	Total	1000	100.0	

Table 3c: Do you agree that it is important to counsel the patient about correct dose and duration of antibiotics without skipping any dose.

	Frequency	Percent		
Valid	1	31	3.1	
	2	25	2.5	
	3	30	3.0	
	4	189	18.9	
	5	725	72.5	
	Total	1000	100.0	

Table 3 d: Do you agree that when patient has discomfort, antibiotics can help to relieve the symptoms.

	Frequency	Percent		
Valid	1	131	13.1	
	2	162	16.2	
	3	275	27.5	

	4	337	33.7
	5	95	9.5
	Total	1000	100.0

GRAPHS

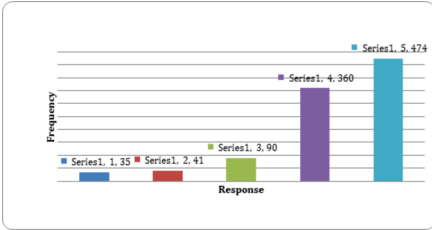
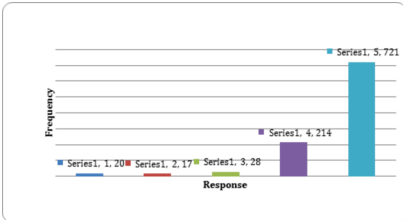
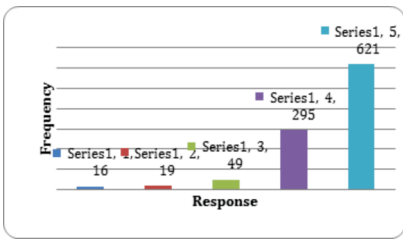


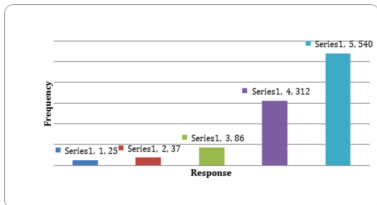
Table 1a : Indiscriminate use of antibiotics can lead to Ineffective treatment



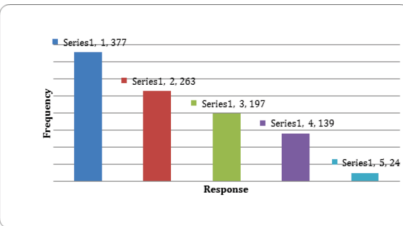
Graph 1b :Do you agree that Antibiotic Resistance is an important and serious public health issue facing the World/ country/ hospitals



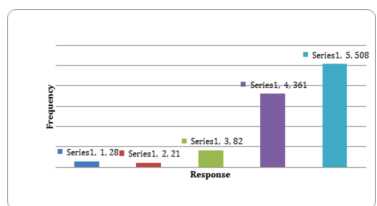
Graph 1c :Random prescription of antibiotics can lead to emergence of bacterial resistance



Graph 1d :Prescribing antibiotics haphazardly by the Doctors can lead to additional burden of medical cost to the patient.

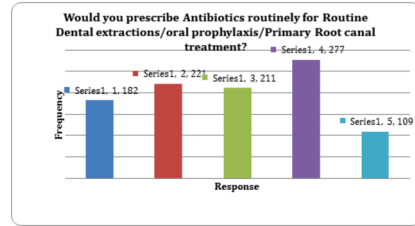


Graph 2a :Would you prescribe Antibiotics routinely for Asymptomatic periapical pathologies?

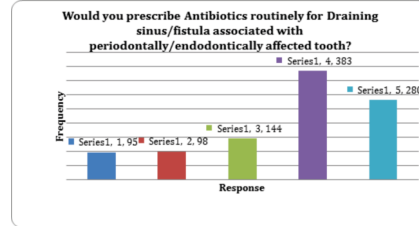


Graph 2b :Would you prescribe Antibiotics routinely for

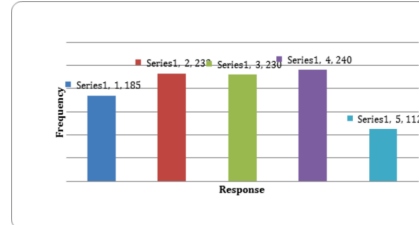
Symptomatic periapical pathology with fever, chills and cellulitis?



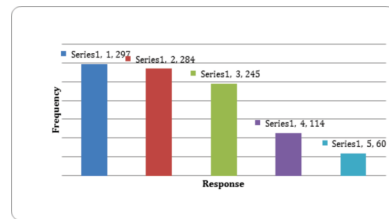
Graph 2c: would you prescribe antibiotics routinely for routine dental extractions?oral prophylaxis/ primary root canal treatment.



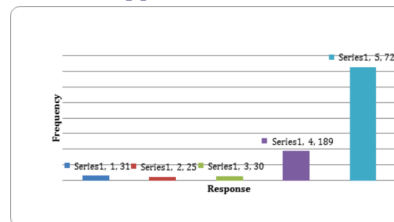
Graph 2d :Would you prescribe Antibiotics routinely for Draining sinus/fistula associated with periodontally/endodontically affected tooth?



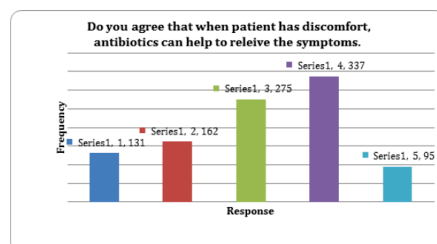
Graph 3a :Would you prescribe antibiotics when patient has pain to prevent getting a more serious illness?



Graph 3b :Do you think Antibiotics are safe drugs, hence they can be commonly prescribed.



Graph 3c: Do you agree that it is important to counsel the patient about correct dose and duration of antibiotics without skipping any dose.



Graph 3d: Do you agree that when patient has discomfort, antibiotics can help to relieve the symptoms.

LEGENDS

Table 1a, Graph 1a: Indiscriminate use of antibiotics can lead to Ineffective treatment

Table 1b, Graph 1b: Do you agree that Antibiotic Resistance is an important and serious public health issue facing the World/country/hospitals

Table 1c, Graph 1c: Random prescription of antibiotics can lead to emergence of bacterial resistance

Table 1d, Graph 1d: Prescribing antibiotics haphazardly by the Doctors can lead to additional burden of medical cost to the patient.

Table 2a, Graph 2a: Would you prescribe Antibiotics routinely for Asymptomatic periapical pathologies?

Table 2b, Graph 2b: Would you prescribe Antibiotics routinely for Symptomatic periapical pathology with fever, chills and cellulitis?

Table 2c, Graph 2c: Would you prescribe Antibiotics routinely for Draining sinus/fistula associated with periodontally/endodontically affected tooth?

Table 2d: Would you prescribe Antibiotics routinely for Routine Dental extractions/oral prophylaxis/Primary Root canal treatment?

Table 3a, Graph 3a: Would you prescribe antibiotics when patient has pain to prevent getting a more serious illness?

Table 3b, Graph 3b: Do you think Antibiotics are safe drugs, hence they can be commonly prescribed.

Table 3c, Graph 3c: Do you agree that it is important to counsel the patient about correct dose and duration of antibiotics without skipping any dose.

Graph 3d: Do you agree that when patient has discomfort, antibiotics can help to relieve the symptoms.

REFERENCES

1. Buke A.C, Emertcan S, Hosgor-Limoncu M., Ciceklioglu M, Eren, S. Rational antibiotic use and academic staff. *Int. J. Antimicrob. Agents*, 2003; 21: 63–6.
2. Stuart B. Levy: Antibiotic Resistance: Consequences of In action. *Clinical Infectious Diseases* 2001; 33(Suppl 3):S124–9
3. Antimicrobial resistance: WHO September 2016
4. Harrison J, Svec TA: The beginning of the end of the antibiotic era? Part II. Proposed solutions to antibiotic abuse. *Quintessence Int.* 1998 Apr; 29(4):223–9.
5. Gyssens, I.C. Quality measures of antimicrobial drug use. *Int. J. Antimicrob. Agents*, 2001; 17: 9–19.
6. Mc Manus P, Hammon M.L, Whicker S.D, Primrose J.G, Mant A, Fairall S.R. Antibiotic use in the Australian community. *Med. J. Aust.*, 1997; 167: 124–27.
7. Goossens H. Antibiotic consumption and link to resistance. *Clin Microbiol Infect*, 2009; 15: 12–5.
8. FDA – US department of Health and Human Services.
9. Laxminarayan R. Antibiotic effectiveness: balancing conservation against innovation. *Science* 345, 1299–1301 (2014)
10. Evan Martens and Arnold L Demain. The antibiotic resistance crisis, with a focus on the United States. *The Journal of Antibiotics* 70, 520–526; 2017
11. Srinivasan A, Song X, Richards A, Sinkowitz-Cochran R, Cardo D, Rand C. A survey of knowledge, attitudes and beliefs of house staff physicians from various specialties concerning antimicrobial use and resistance. *Arch Intern Med.*, 164: 1451–56, (2004).
12. Afzal Khan AK, Gausia Banu, Reshma KK Antibiotic resistance and usage-a survey on knowledge, attitude, perceptions and practices among the medical students of a southern Indian teaching hospital ; *jcdr* 6290/3230/2013.
13. Dr Siddharth Tevatia, Dr Shubhi Chaidhary, Dr Rishi Rath, Dr Vidhya Dodwad; A Questionnaire based survey on knowledge, attitude and practice of antibiotics among dental and paramedical students: a cross sectional survey; vol, 5 issue 5; 1205–1216, (2016)
14. Ivarsson, M. E, Leroux J. C. & Castagner B. Investigational new treatments for Clostridium difficile infection. *Drug Discov. Today* 20, 602–608 (2015).
15. Singh S. B. & Barrett, J. F. Empirical antibacterial drug discovery – foundation in natural products. *Biochem. Pharmacol.* 71, 1006–1015 (2006).
16. Piddock, L.J. The crisis of no new antibiotics—what is the way forward? *Lancet Infect. Dis.* 12 (3), 249–253, (2012)
17. Murray, B.E. Can antibiotic resistance be controlled? *N. Engl. J. Med.* 330, 1229–1230, (1994)
18. Laxminarayan R, Duse, A, Wattal C, Zaidi, A.K., Wertheim H.F, Sumpradit N. et al. Antibiotic resistance-the need for global solutions. *Lancet Infect. Dis.* 13, 1057–1098, (2013)
19. Barker A, Verhoeven K, Ahsan M, Alam S, Sharma P, Sengupta S, Safdar N. Social determinants of patient antibiotic misuse in Haryana, India. *J. Invest. Med.* 64 (4). 935–935, (2016)
20. Piddock L, Gameau-Tsodikova S, Garner C, 2016. Ask the experts: how to curb antibiotic resistance and plug the antibiotics gap? *Future Med. Chem.* 8, 1027–1032, (2016).
21. The Scientist staff over coming resistance. *Scientist* 28, (2014).
22. Ejim L. et al. Combinations of antibiotics and non-antibiotic drugs enhance antimicrobial efficacy. *Nat. Chem. Biol.* 7, 348–350; (2011).
23. Chen C et al. Behaviour, attitudes and knowledge about antibiotic usage among residents of Changhua, Taiwan. *J Microbiol Immunol Infect.* 38:53–59; (2005).
24. Simpson SA, Wood F, Butler CC. General practitioner's perceptions of antimicrobial resistance: a qualitative study. *Journal of Antimicrobial Chemotherapy.* 2007; 59: 292–96.
25. Thrieme K et al. Antibiotic prescribing in DR Congo: A knowledge, attitude and practice survey among medical doctors and students. 8(2): 55495. doi:10.1371/journal.pone.0055495.
26. The Resistance Phenomenon in Microbes and Infectious Disease Vectors: Implications for Human Health and Strategies for Containment: Workshop Summary. Institute of Medicine (US) Forum on Emerging Infections; Knobler SL, Lemon SM, Najafi M, et al, editors. Washington (DC): National Academies Press (US); 2003.
27. Abbott PV. Selective and intelligent use of antibiotics in endodontics. *Aust Endod J.* 26:30; (2000)
28. Palmer NA, Pealing R, Ireland RS, Martin MV. A study of prophylactic antibiotic prescribing in National Health Service general dental practice in England. *Br Dent J.* 189:43–; (2000).

29. A Multicenter Study on the Prophylactic Application of Antibiotics in Aseptic Operations Lidao Baolan Red Crescent Med J, Jan; 15(1): 68–69; (2013).
30. Elena Bernabé Muñoz A, Macarena Flores Doradob, José Espejo Guerrero, Fernando Martínez Martínez Aten Primaria The effect of an educational intervention to improve patient antibiotic adherence during dispensing in a community pharmacy. 46(7):367–375; (2014).