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SURVEY OF ANTIBIOTICS STEWARDSHIP PRACTICES IN THE MANAGEMENT OF DIABETIC FOOT INFECTIONS

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ABSTRACT

Background: Infection is a common epiphenomenon of diabetic foot disease and the most common reason for diabetes-related hospitalizations and lower extremity amputations. Choosing appropriate empirical antibiotics is challenging due to an inadequate microbiological information. Moreover, suboptimal selection of antibiotics will lead to a poor clinical outcome.

Objective: To evaluate empirical antibiotic preferences, regimen changes based on disease severity, common pathogens and antibiotic resistance in diabetic foot ulcer (DFU) management.

Methodology: A descriptive cross-sectional survey was conducted over four months among healthcare professionals in major tertiary care hospitals in Islamabad.

Results: Among 147 participants, 45% preferred Penicillin in minor and 32.7% preferred Oxazolidinones as empirical antibiotic in major diabetic foot wounds. Penicillin (59.9%) was observed to be the most resistant drug in diabetic foot patients. 81% of the healthcare professionals had suggested combination empirical antibiotic therapy. Gram Positive Aerobes (S. Aureus etc.) 46.3% were the most common microbe encountered pathogens.

Conclusions: Based on our study, a stepwise approach is being followed in antibiotic stewardship practice in diabetic foot infections. Initial therapy is usually empirical but may be modified according to the culture and sensitivity results and the patient's clinical response. This study can be used as a framework for local guideline development.

Keywords: Diabetic Foot Infection, Diabetic Foot Ulcer, Empirical antibiotic therapy, Antibiotic resistance

1. INTRODUCTION:

Diabetes mellitus is a metabolic syndrome characterized by chronic hyperglycemia with disturbances in carbohydrates, fat and proteins metabolism due to defects in insulin secretion, action or both. The persistence of hyperglycemia is related to the long-term consequences and failure of organ systems

associated with diabetes [1]. Diabetes mellitus may present with wide variety of symptoms starting from the typical osmotic symptoms such as polyphagia, polyuria and polydipsia to fatigue, blurring of vision and weight loss. In severe forms, it can progress to diabetic ketoacidosis or hyperosmolar hyperglycemic state which can lead to hypotension, stupor, coma and even death with any delay in the treatment [2]. The frequency of people with Diabetes is on a rising trend in each country with 80% of the patients are from low- and middle-income countries [3].

Owing to hyperglycemia related tissue damage, diabetes presents with hazardous complications which can be either microvascular or macro vascular. [4]. Diabetic foot disease is one of the dreadful complication of diabetes. In patients with diabetic foot disease, other complications such as neuropathy, retinopathy, ischemic heart diseases and cerebrovascular diseases are often present [5].

Foot infections are the most common form of diabetic foot disease which vary in severity from mild paronychia to severe infection involving bone. It may present in various forms starting from cellulitis, myositis, abscesses, necrotizing fasciitis, septic arthritis, tendinitis, and eventually to osteomyelitis [6]. Based on clinical signs and symptoms, diabetic foot infections can be classified into 4 grades according to IWGD guidelines: Grade 1 having no signs and symptoms of infection while Grade 2 infection involves skin and subcutaneous tissue along with the presence of 2 of the following signs, local swelling, pain, tenderness, purulent discharge or erythema up to 2 cm around the wound margin. Grade 3 infection penetrates the deeper tissues leading to osteomyelitis or septic arthritis. Signs include erythema greater than 2cm plus one of the above-mentioned signs: swelling, tenderness, warmth or purulent discharge. Any foot infection with the signs of systemic inflammatory response syndrome is classified as grade 4 [7].

Diabetic foot ulcer which carries a lifetime incidence of occurrence between 19-34% according to one study; is foot ulcer in an individual with currently or previously diagnosed diabetes and usually accompanied by neuropathy and or PAD in the lower limbs [8]. Various classification systems (Ade quete, Wegner's, University of Texas, DEPA, PEDIS, SINBAD, SAD classification system) [9] exist, which standardized strategy for the management of diabetic foot ulcers. **Wegner classification system assesses** the depth and presence of osteomyelitis and gangrene. According to this classification the diabetic foot ulcers are classified into five grades. A Localized superficial ulcer which needs only antibiotics and glycemic control is categorized as grade 1. Foot ulcer involving bone ligament or joint with additional need of debridement in management makes up grade 2. Osteomyelitis is classified as grade 3 while gangrene up to forefoot is categorized as grade 4. A gangrene of entire foot is classified as grade 5. Grade 3 -5 makes the patient prone to amputations [10].

Ulcer grading	Description
Grade 0	No ulcer but high-risk foot
Grade 1	Superficial ulcer
Grade 2	Deep ulcer, no bony involvement or abscess
Grade 3	Abscess with bony involvement (as shown by X-ray)
Grade 4	Localized gangrene e.g. toe, heel etc
Grade 5	Extensive gangrene involving the whole foot

Note: Grade 1–3 ulcers are termed *non-gangrenous ulcers* and Grade 4 and 5 ulcers are termed *gangrenous ulcers*

In this study, grade 0, 1 and 2 are graded as minor while grade 3, 4 and 5 are graded as major foot infections [11].

1.1. Microbiology:

Health care professionals should individualize the choice of antibiotic based on microbe, its susceptibilities, culture results and patient's comorbidities in diabetic foot. Bacterial etiology of foot infections depends upon the severity and duration of infection [12]. Empirical antibiotics are commonly initiated in the treatment of acute and severe diabetic foot infection as there is delay in the culture and sensitivity report. The aim is to halt the active infection process but the possibility of

selecting a resistant drug is always present [13]. Penicillin's are the most frequently used antibiotics in DFIs for parenteral and/or empirical therapy [14]. The polymicrobial etiology of DFI, with Gram-positive bacteria as the main protagonists and others including enterococci, anaerobes and *Pseudomonas aeruginosa* can be covered with the use of combination of beta lactams as empirical therapy [15]. Any necrotic gangrenous infection or with foul smell should be treated for an-anaerobic organism managed with clindamycin, metronidazole or carbapanems. Whereas for anti pseudomonal therapy mostly fluoroquinolones are considered [16].

These antibiotics do not cover bacteria stemming from skin commensals in DFI or methicillin-resistant *Staphylococcus aureus* (MRSA). In acute low risk infections, the use of beta lactams, aminoglycosides and carbapenems may cover almost all bacteria. Regarding the chronic, recurrent, severe or less virulent skin commensal gram-positive bacteria in chronic DFI, including for MRSA, clinicians typically refer to glycopeptides/lipopeptides, (e.g., vancomycin, daptomycin) or oxazolidinones for treatment [17]. MRSA has caused hindrance in the empirical use of all the major classes of antibiotics in common use [1] which has been greatly fuelled by exhaustive and at some point, irresponsible use of broad- spectrum antibiotic in addition to patient factors i.e., immunocompromised state and poor infection control [2].

Duration of antibiotic use varies from 1 to 2 weeks in mild infections while 6 weeks or more for severe infections [18].

Antimicrobial stewardship is one of the tools to fight antimicrobial resistance. Establishing the presence of an infection, practice of performing culture test before initiating empirical antibiotics in infections, starting the empirical therapy based on the severity of infection and the knowledge of likely organisms that exist in such wounds are some measures that are proven to be useful in antibiotic stewardship [19].

2. RESULTS:

1.1. General Demographics:

This study, conducted in the major tertiary care hospitals of Islamabad, aimed at exploring the approach of various doctors towards management of diabetic foot infection especially with regards to selection of an empirical antibiotic. A total of 147 individuals completed the questionnaire of which 16 (10.9%) belong to the field of Endocrinology, 63 (42.9%) belonged to General Medicine and 68 (46.3%) to General Surgery. Among them, 68 (46%) were from Pakistan Institute of Medical Sciences (PIMS), 49 (33%) from Federal Government Polyclinic (FGPC) Hospital and 30 (20%) from Capital Hospital.

2.1. Empirical Antibiotic Regimen:

To identify most commonly prescribed antibiotics in clinical practice, healthcare professionals were questioned regarding their drug preference in a diabetic foot infection in accordance with Wagner's grade of diabetic foot ulcers (termed minor/major w.r.t grade). Furthermore, they were inquired regarding antibiotics against which resistance was commonly seen in clinical practice, as well as, regarding the drug that worked the best, role of multidrug therapy and factors involved in wound healing, and results are as follows.

Preferred class of antibiotic as empirical treatment in minor and major diabetic foot infections:

This study showed 45% healthcare professionals opted for penicillin, 22.4% chose cephalosporin, 15.6% chose oxazolidinones, 8.8% floruoquinolones and 4.1% used carbapanems as the preferred class of antibiotic for minor diabetic foot infections. The choice of antibiotic for major diabetic foot infections varied among healthcare professionals as 32.7% and 23.8% chose oxazolidinones and cephalosporin respectively. While, 14.3% of the respondents opted for penicillin, 17.7% for carbapanems and 6.1% for floruoquinolones. A few of them also chose sulfonamides, macrolides and lincosamides for all both major and minor infections. (Table 1)

Table 1. Class of drugs started empirically in minor and major DFI's

	Class of drugs started empirically in minor DFI's (Wegner's I/II)		Class of drugs started empirically in major DFI's (Wegner's III/IV/V)	
	Frequency	Percent	Frequency	Percent
Penicillin	67	45.5	21	14.3
Cephalosporin	33	22.4	35	23.8
Oxazolidinones	23	15.6	48	32.7
Sulfonamides	1	0.7	6	4.1
Macrolides	1	0.7	1	0.7
Lincosamides	2	1.4	1	0.7
Carbapenems	6	4.1	26	17.7
Fluoroquinolones	13	8.8	9	6.1
Total	146	99.3	147	100
Missing	1	0.7		
Subtotal	147	100	147	100

Need of combination antibiotic therapy and whether grade of infection play a role in change of drug in DFI's:

As evident from Table 88.4% respondents were of the opinion that grade of wound according to the Wegner's classification (minor/major infection) can play a role in change of drug while only 11.6% believed it had no role in considering a change in antibiotic regimen. When the respondents were asked their view regarding the need of combination of antibiotics in empirical therapy 81% responded positively while only 19% negated the fact. (Table 2)

Table 2. Presence of role of grade of wound (Wagner's) in change of drug and combination therapy in dealing with diabetic foot infection

		Combination antibiotic therapy as an empirical treatment in DFI's		Role of grade of wound in change of drug	
		Frequency	Percent	Frequency	Percent
Valid	Yes	130	88.4	119	81.0
	No	17	11.6	28	19.0
	Total	147	100.0	147	100.0

Most common class of antibiotic with regards to Resistance, effect and second preference:

59.9% of the respondents have observed resistance against penicillin when managing DFI's. However resistance against cephalosporin (18.4%), macrolides (7.5%), flouroquinolones (5.4%) and sulfonamides (3.4%) has been observed as well. However only few respondents reported oxazolididiones, carbapanems and lincosamide under this category. Furthermore, DFI's have been observed to respond well to oxazolidinones, cephalosporin and penicillin by many individuals, 25.9%, 24.5% and 21.1% respectively. Few respondents also claimed carbapanems as the drug that works best against such infections. While 6.8% found floruoquinolones effective, only negligible number of doctors chose sulfonamides, macrolides and lincosamides. 38.1% respondents chose oxazalidinones as their second drug of choice in a case of infection that's not responding to the initial treatment without C/S report. However, 21.8% respondents opted for carbapanems, 19% for cephalosporin, 8.8% for macrolides and 6.8% for lincosamides. (Table 3)

Table 3. Antibiotics with best results, against which resistance is commonly observed and second drug of choice as an empirical therapy

	Class of antibiotic against which resistance is commonly observed		Empirical Antibiotic with best observed results in clinical practice		Second drug of choice as empirical therapy	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Penicillin	31	Valid	88	59.9	6	4.1
Cephalosporin	36	24.5	27	18.4	28	19.0
Oxazolidinones	38	25.9	2	1.4	56	38.1

	Sulfonamides	7	4.8	5	3.4	2	1.4
	Macrolides	3	2.0	11	7.5	13	8.8
	Lincosamides	1	.7	4	2.7	10	6.8
	Carbapenems	21	14.3	2	1.4	32	21.8
	Fluoroquinolones	10	6.8	8	5.4		
	Total	147	100.0	147	100.0	147	100.0

Modification of antibiotic regimen and relevance of C/S results with respect to antibiotic prescription:

To assess the attitude towards need of modification of antibiotic regimen, doctors were asked about replacement of antibiotics according to the culture and sensitivity report and their view regarding the appropriate time to change an antibiotic in case of poor response. The doctor were inquired regarding their practice of suggesting culture and sensitivity report in all patients undergoing treatment of diabetic foot infection as well as their observation regarding the drug most commonly resistant in recurrent and non- recurrent infections.

97.35% respondents mentioned they followed the culture report and suggested a change of antibiotic regimen of patient with DFI accordingly while only 2.7% individuals did not do so. 75.5% of respondents mentioned a change in antibiotic preference as empirical therapy over time while 24.5% claimed no change regarding their primary drug of choice. 93% of the respondents suggested C/S to all patients with DFI while only 6.1% of them did not. (Table 4)

Table 4. Suggestion of C/S, changes followed by C/S report and preference over time

		Do you follow c/s report and suggest changes in antibiotic accordingly		**Has preference for an empirical antibiotic in DFI changed for you?**		**Do you suggest C/S for all patients having DFI**	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
	Yes	143	97.3	111	75.5	138	93.9
	No	4	2.7	36	24.5	9	6.1
	Total	147	100.0	147	100.0	147	100.0

Best time to change empirical therapy in case of poor response of healing

When enquired about their view regarding best time to change an empirical therapy, 41.5% would have opted to wait until the C/S report were back, however, 31.3% were of the view to wait for 7 days or less before changing the drug. While, 21.8% opted to wait for 5 days or less and only 5.4% of them would change a drug after as long as 10 days of initial therapy despite poor response to treatment. (Table 5)

Table 5. Best time to change empirical therapy if it's not working

		Frequency	Percent
	5 Days or Less	32	21.8
	7 days or Less	46	31.3
	10 Days or More	8	5.4
	Wait till CS	61	41.5
	Total	147	100.0

Most commonly encountered microbes in C/S from recurrent and non-recurrent infections in clinical practice

According to 46.3% participants, the most commonly encountered microbes in a culture taken from infected diabetic foot were gram positive, however 42.2% of them, almost similar number of respondents, claimed to have encountered gram negative microbes. However, 11.6% mentioned the presence of anaerobes as well. 47.6% participants claimed to have come across gram negative microbes more often in a recurrent infection of diabetic foot ulcer while (42.2%) stated otherwise i.e. presence of gram positive microbes. 10.2% respondents also mentioned the presence of anaerobes in this case. (Table 6)

Table 6. Most commonly encountered microbes in recurrent and non-recurrent infections

		Non recurrent infections		Recurrent infections	
Microbes encountered		Frequency	Percent	Frequency	Percent
	Gram Positives	68	46.3	62	42.2
	Gram Negatives	62	42.2	70	47.6
	Anaerobes	17	11.6	15	10.2
	Total	147	100.0	147	100.0

Factors other than antibiotic resistance that affect wound healing:

52.4% respondents placed poorly controlled diabetic status on top as a factor which affect wound healing. While 13.6% believed non-compliance to anti-diabetic meds was most common factor leading to non-healing of infections. While smoking, old age, location of ulcer and duration of the disease was mentioned by 6.8%, 5.4%, 5.4% and 4.1% respondents respectively as a factor affecting wound healing. Moreover, 7.5% also attributed factors other than the mentioned, to be involved. (Table 7)

Table 7. Factors other than antibiotic resistance that affects healing in diabetic foot infection

		Frequency	Percent
	Poorly controlled	77	52.4
	High BMI	7	4.8
	Old Age	8	5.4
	Noncompliance	20	13.6
	Location of Ulcer	8	5.4
	Smoking	10	6.8
	Duration of DFU	6	4.1
	Others	11	7.5
	Total	147	100.0

STATISTICAL ANALYSIS:

The results were further analyzed statistically through chi square test, according to a P value which was found to be less than 0.05, an association was found between the most commonly encountered microbes in C/S performed by the doctors with the class of drug that worked best as empirical treatment in practice in their opinion ($p< 0.002$), the most commonly encountered microbes in recurrent infections with class of drug that worked best as empirical treatment to date in physicians practice ($p<0.001$), class of drug commonly started as empirical therapy in minor and major DFI's with the drug against which resistance is most commonly observed ($p<0.002$) and class of drug commonly started as empirical therapy in minor and major DFI's with the class of drug that worked best as empirical treatment to date in physician's practice ($p<0.000$).

However, a chi-square test was computed for the following variables; drug against which resistance is commonly observed with the class of drug that worked best as empirical treatment in physicians practice, most commonly encountered microbes in c/s in case of recurrent infections with the drug against which resistance is most commonly observed. In accordance the association between the aforementioned variables was found to be non-significant indicated by higher value of person (0.242 and 0.10 respectively) as compared to the standard value 0.05 hence no association could be established.

3. DISCUSSION:

To the best of our knowledge, this is the first study conducted in Pakistan that assesses the antimicrobial stewardship in managing diabetic foot infections as recurrent misuse of systemic antibiotics is high in the adult population with DFIs in this region [20]. The main purpose of our study was to evaluate the approach of various doctors towards the management of diabetic foot especially in the selection of empirical antibiotics for different grades of infections. In this regard, data from tertiary care hospitals of Islamabad was collected and doctors of different specialties were included in the survey in attempt to have better understanding of the antibiotics. Our sample size was set at

147 out of which 10 % belonged to the field of Endocrinology, 42.9 % belonged to General Medicine and 46.3% took part from General Surgery.

In our study, for minor DFIs the preferred empirical antibiotics were penicillin (45%) followed by cephalosporin (22.4%). This finding is supported by vast majority of studies conducted all over the world that reported Penicillin and cephalosporin to be the first line empirical antibiotics for milder diabetic foot infections [21]. A study done in Peshawar Pakistan also reported amikacin and cefepime to be the most effective empirical antimicrobial agents against diabetic foot infection [22]. Additionally according to UK based empirical antibiotic guidelines, penicillin is preferred for milder to moderate diabetic foot infection [23]. Thus our study findings reiterates the association of use of penicillin and cephalosporin's as preferred empirical antibiotics in minor diabetic foot infections.

For major DFIs, the most preferred and commonly used antibiotics in our study was oxazolidinones (32.7 %) followed by cephalosporin's (23.8%). This is in contrast to UK based empirical antibiotic guidelines for diabetic foot infection which suggested combination of flucloxacillin, clindamycin and/or gentamycin as preferred choice for severe diabetic foot infection [23]. Another study suggested imipenem or colistin or combination of clindamycin, tobramycin and ampicillin as the preferred choices for severe diabetic foot infections [21]. The reason for this disparity in antibiotic choices in severe diabetic foot infection may lie in the fact that antibiotic susceptibility and resistance pattern depends greatly upon the demographics of the areas that's why doctors from different areas prefer different antibiotics [24, 25]. Moreover cost of the treatment can also be the causative factor for this disparity. Table 8 indicates regional/national pathogens, antimicrobial susceptibility and antibiotic availability. These recommendations are in practical use by UK-based clinicians [25].

Table 8.

	Mild	**Moderate**	**Severe**
Antibiotic naive	Flucloxacillin 1q QDS (oral)	Flucloxacillin 1 g QDS (oral) OR 2g QDS (IV) +/− Metronidazole 400 mg TDS (oral)	Flucloxacillin 2 g QDS (IV) + Clindamycin 600 mg QDS (IV) +/− Gentamicin (IV) (Max 4 days) OR Aztreonam 2 g TDS (IV) +/− Metronidazole 400 mg TDS (oral) or 500 mg TDS (IV)

This is for guidance only and local practice/ guidance may vary. Dosing assumes normal renal and hepatic function. Please refer to BNF for dose adjustments.

Thus it is concluded that there are no standard guidelines for severe diabetic foot infection that can be applied all around the world but it varies greatly in different areas across the world.

In our study, the antibiotics against which resistance is commonly observed, were penicillin 59.9% followed by cephalosporin 18.4% while least resistance was observed for oxazolidinones and carbapenems (1.4% each). This finding is partially supported by a study done in Bangladesh, the results of which showed that most cases of diabetic foot infection frequently are resistant to cephalosporin 67% to penicillin and 78% to carbapenems [26]. The different pattern of antibiotic resistance among different studies can be attributed to the fact that antibiotic resistance greatly depends upon the misuse and overuse of antibiotics in an area thus the resistance pattern vary greatly from place to place. Thus these findings emphasizes the importance of antimicrobial susceptibility pattern in area while selecting empirical antibiotics [27].

Most commonly encountered microbes in diabetic foot infection in clinical practice in our study came out to be gram positive (46.3%) followed by gram negative (42.2%) and then anaerobes (11.6%).

This finding is in line with majority of studies that reported gram positive to be the main culprit in diabetic foot infection [28]. This finding is also supported in a study which reported gram positive especially staphylococcus aureus is the main culprit involved in diabetic foot infections [29]. However one such study done in Karachi, Pakistan revealed that diabetic foot infections are frequently polymicrobial with staphylococcus aureus, pseudomonas and E coli the predominant organisms [30]. Similarly pseudomonas was declared as the most commonly involved microbe in diabetic foot infections by Turkish Association of clinical microbiology and infectious diseases [31]. Additionally another study done in North India authored by Zubair M and Malik A reported that gram negative organisms are frequently isolated (63.8%) from the isolates of diabetic foots followed by gram positive (36.1 %). Similarly one such study conducted in China upon microbial and antibiotic susceptibility pattern of diabetic foot infection showed gram negative to be the most prevalent organism [28]. The reason for this fluctuations in the organisms in different studies may lie in the fact that microbes causing infection vary from place to place and strongly depends upon the demographics of the area. Based on these findings it can be concluded that there should be no standard empirical antibiotic regimens for severe diabetic foot infection that can be applied worldwide but the empirical regimens should be selected according to the most commonly encountered microbes as evident from the studies of the local area.

Treatment of an infected diabetic foot should be focused to a narrow spectrum of pathogen cover, ideally directed by culture results [32]. In our study, 93.9 % clinicians suggested culture and sensitivity for all patients of diabetic foot infection before starting empirical antibiotic regimen. This finding is supported by many studies all across the world which emphasized that culture and sensitivity should always be done and is considered as a standard criterion [33, 34].

4. MATERIALS & METHODS:

After institutional review board verification, we performed a descriptive cross sectional study in the form of a questionnaire related to the explained topic. Health care professionals of major government tertiary care hospitals of Islamabad (Pakistan Institute of Medical Sciences (PIMS), Federal Government Polyclinic (PGMI) Hospital, and Capital (CDA) Hospital) were the population for this study. Health care professionals treating diabetic foot infections regardless of their field of expertise (i.e. medicine/surgery/endocrinology) were included in the study. Doctors, non-consenting to take part in the study were excluded. Data was collected between 15th May 2023 to 15th September 2023. Sampling technique used was convenience sampling according to the data analysis.

5. CONCLUSION:

This study provides valuable insight into empirical antibiotic practices for DFIs in Islamabad. The findings highlight a preference for penicillin in minor infections and oxazolidinones in major infections, with significant resistance to penicillin. These results underscore the need for tailored antibiotic stewardship programs and local guidelines to improve DFI management. Further research should address regional differences and evaluate the effectiveness of stewardship interventions.

6. SUPPLEMENTARY MATERIAL:

6.1. Questionnaire:

Specialty Hospital:

Time Frame from which you are treating DFI:

1) Do you ask patients about their current anti-diabetic medications?

◯ Yes ◯ No

2) Do you check/advice recent HbA1C or BSR of the patients in your practice?

◯ Yes ◯ No

3) Which class of drugs you commonly start as an empirical treatment in Wagner's type I/II (minor) diabetic foot wounds?

◯ Penicillin (Amoxicillin etc.) ◯ Cephalosporin's (Cefoperazone, Cephalexin etc.) ◯ Oxazolidinones (Linezolid etc.) ◯ Sulfonamides (Co-trimoxazole etc.)
◯ Macrolides (Azithromycin etc.) ◯ Lincosamides (Clindamycin etc.) ◯ Carbapenemes (Meropenem etc.) ◯ Fluroquinolones (Ciprofloxacin etc.)

4) Which class of drugs you commonly start as an empirical treatment in Wagner's type III/IV/V (major) diabetic foot wounds?
◯ Penicillin (Amoxicillin etc.) ◯ Cephalosporin's (Cefoperazone, Cephalexin etc.) ◯ Oxazolidinones (Linezolid etc.) ◯ Sulfonamides (Co-trimoxazole etc.)
◯ Macrolides (Azithromycin etc.) ◯ Lincosamides (Clindamycin etc.) ◯ Carbapenemes (Meropenem etc.) ◯ Fluroquinolones (Ciprofloxacin etc.)

5) Do you suggest C/S for all the patients having DFI in your practice?
◯ Yes ◯ No

6) Most commonly encountered microbes in C/S in your practice?
◯ Gram Positive (Staphylococci, Enterococci etc.) ◯ Gram Negative (Pseudomonas, Acinetobacter etc.) ◯ Anaerobes (Bacteriodes, Clostridium species etc.)

7) Most commonly encountered microbes in recurrent infections in your practice?
◯ Gram Positive (Staphylococci, Enterococci etc.) ◯ Gram Negative (Pseudomonas, Acinetobacter etc.) ◯ Anaerobes (Bacteriodes, Clostridium species etc.)

8) Which class of drug you see resistance against most commonly?
◯ Penicillin (Amoxicillin etc.) ◯ Cephalosporin's (Cefoperazone, Cephalexin etc.) ◯ Oxazolidinones (Linezolid etc.) ◯ Sulfonamides (Co-trimoxazole etc.)
◯ Macrolides (Azithromycin etc.) ◯ Lincosamides (Clindamycin etc.) ◯ Carbapenemes (Meropenem etc.) ◯ Fluroquinolones (Ciprofloxacin etc.)

9) Which class of drug has worked best as an empirical antibiotic over the years?
◯ Penicillin (Amoxicillin etc.) ◯ Cephalosporin's (Cefoperazone, Cephalexin etc.) ◯ Oxazolidinones (Linezolid etc.) ◯ Sulfonamides (Co-trimoxazole etc.)
◯ Macrolides (Azithromycin etc.) ◯ Lincosamides (Clindamycin etc.) ◯ Carbapenemes (Meropenem etc.) ◯ Fluroquinolones (Ciprofloxacin etc.)

10) In your opinion, do grade of the wound (Wagner's classification) has any role in change in the empirical treatment plan?
◯ Yes ◯ No

11) Do you follow C/S reports and suggest changes accordingly in antibiotic?
◯ Yes ◯ No

12) Have your preference for an empirical antibiotic in DFI changed with time?

◯ Yes ◯ No

13) If one drug is not showing any desired effect, your second drug of preference (without C/S report is:

◯ Penicillin (Amoxicillin etc.) ◯ Cephalosporin's (Cefoperazone, Cephalexin etc.) ◯ Oxazolidinones (Linezolid etc.) ◯ Sulfonamides (Co-trimoxazole etc.)

◯ Macrolides (Azithromycin etc.) ◯ Lincosamides (Clindamycin etc.) ◯ Carbapenemes (Meropenem etc.) ◯ Fluroquinolones (Ciprofloxacin etc.)

14) In your observation, do some patients need combination antibiotic therapy as an empirical treatment regimen?

◯ Yes ◯ No

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8. CONFLICTS OF INTEREST: None

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